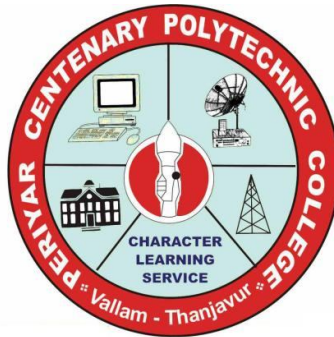


# **PERIYAR CENTENARY POLYTECHNIC COLLEGE**

PERIYAR NAGAR, VALLAM – 613 403 – THANJAVUR

**AUTONOMOUS INSTITUTION**

**NBA Accredited (ECE, EEE, MECH & COMPUTER – up to 2026)**



**DIPLOMA IN CIVIL ENGINEERING**

**SYLLABUS**

**CEE/23/00**

**SEMESTER SYSTEM**

**E - SCHEME**

**PERIYAR CENTENARY POLYTECHNIC COLLEGE**  
**VALLAM – 613 403, THANJAVUR**

**Diploma In Civil Engineering**  
**Programme Advisory Committee (PAC)**

**Syllabus Revision**  
**Chairperson**

Dr.A.Hemalatha  
Principal  
Periyar centenary polytechnic college  
Vallam – 613 403, Thanjavur

**Convener**  
Mr.S.Karthik., HOD/Civil  
Periyar Centenary Polytechnic College,  
Vallam – 613 403,  
Thanjavur .

**Members**

|                                                                                                                                                                     |                                                                                                                                                     |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Er. B.Ramakrishnan</b><br>TCCEA Vice President (2021-2022)<br>Approved Structural Engineer Grade-2<br>Thanjavur Municipality,<br>KRB Construction.<br>Thanjavur. | <b>Dr. J. Santhosh</b><br>Assistant Professor,<br>Periyar Maniammai Institute of Science<br>and Technology, Vallam,<br>Thanjavur.                   |
| <b>Er. R.Sivakumar</b><br>Director,<br>Chithrra civil construction<br>Plot No-7, Jagatheesan Nagar,<br>Vennar Post,<br>Thanjavur-613003                             | <b>Er. Sakthimurugan</b><br>Asst.Professor / Civil Engineering,<br>Anjalai Ammal Mahalingam<br>Engineering College,<br>Kovilveni,<br>Needamangalam. |
| <b>Thiru. S.Karthikeyan</b><br>Home Promoter<br>Annai Savithri Nagar,<br>Madhakottai,<br>Thanjavur.                                                                 | <b>Mr.P.Muthukumarapathy</b><br>Lect/Civil,<br>Periyar Centenary Polytechnic College,<br>Periyar Nagar, Vallam – 613 403,<br>Thanjavur.             |

## CONTENTS

| <b>S. No</b> | <b>Particulars</b>                                                              | <b>Page No</b> |
|--------------|---------------------------------------------------------------------------------|----------------|
| <b>1.</b>    | <b>VISION, MISSION, PROGRAM OUTCOMES (POs)<br/>OUTCOME BASED EDUCATION(OBE)</b> | <b>1 -3</b>    |
| <b>2.</b>    | <b>RULES AND REGULATIONS</b>                                                    | <b>4-26</b>    |
| <b>3.</b>    | <b>CURRICULUM OUTLINE &amp; SCHEME OF<br/>EXAMINATION</b>                       | <b>27-37</b>   |
| <b>4.</b>    | <b>DETAILED SYLLABUS - III SEMESTER</b>                                         | <b>38-98</b>   |
| <b>5.</b>    | <b>DETAILED SYLLABUS - IV SEMESTER</b>                                          | <b>99-159</b>  |
| <b>6.</b>    | <b>DETAILED SYLLABUS - V SEMESTER</b>                                           | <b>160-255</b> |
| <b>7.</b>    | <b>DETAILED SYLLABUS - VI SEMESTER</b>                                          | <b>256-364</b> |

# PERIYAR CENTENARY POLYTECHNIC COLLEGE

Periyar Nagar, Vallam – 613 403, Thanjavur

## AUTONOMOUS INSTITUTION

NBA Accredited (ECE, EEE, MECH & COMPUTER – upto 2026)

### VISION

Periyar Centenary Polytechnic College aspires to be recognized as one of the leaders in imparting quality technical education and strives to prepare rural students with excellent technical and life skills for the benefit of the stakeholders and society at large.

### MISSION

- M1:** To impart quality technical education to the students and equip them with knowledge, skills and attitudes that will lead to successful employment in industry/business, entrepreneurship and higher education.
- M2:** To provide conducive learning environment and adopt well structured teaching – learning practices to make the students technically competent.
- M3:** To strengthen the collaboration with industry and community for career development, placement and extension services.
- M4:** To develop the personality of the students and identify themselves as good individuals, professionals and responsible citizens with ethical values.
- M5:** To inculcate lifelong learning skills to face challenges with innovations.

### PROGRAM OUTCOMES (POs)

- PO1: Basic and Discipline specific knowledge:** Apply knowledge of basic mathematics, science and engineering fundamentals and engineering specialization to solve the engineering problems.
- PO2: Problem analysis:** Identify and analyse well-defined engineering problems using codified standard methods.
- PO3: Design/ development of solutions:** Design solutions for well-defined technical problems and assist with the design of systems components or processes to meet specified needs.
- PO4: Engineering Tools, Experimentation and Testing:** Apply modern engineering tools and appropriate technique to conduct standard tests and measurements.
- PO5: Engineering practices for society, sustainability and environment:** Apply appropriate technology in context of society, sustainability, environment and ethical practices.
- PO6: Project Management:** Use engineering management principles individually, as a team member or a leader to manage projects and effectively communicate about well-defined engineering activities.
- PO7: Life-long learning:** Ability to analyze individual needs and engage in updating in the context of technological changes.

# **DEPARTMENT OF CIVIL ENGINEERING**

## **VISION**

Produce competent and socially aware diploma Civil Engineers, by providing quality education and training to meet the challenges for sustainable environment.

## **MISSION**

**M1:** To provide sound technical knowledge and skills with updated curriculum and infrastructural facilities.

**M2:** To provide an ambience for effective teaching learning practices

**M3:** To provide soft skills especially of rural students through co-curricular and extra-curricular activities.

**M4:** To facilitate the students to play leadership roles for the betterment of the society in a sustainable manner.

## **PROGRAMME EDUCATIONAL OBJECTIVES (PEOs)**

**PEO1:** Our Diploma graduates will have the ability to practice civil engineering in a responsible, professional and ethical manner or take up higher education and pursue productive careers in private and government organization / entrepreneurship.

**PEO2:** Our Diploma graduates will be able to exhibit professionalism, ethical attitude, communication, teamwork, social responsibility and adopt current trends in technology.

**PEO3:** Our Diploma graduates will be able to engage in life long learning and adapt to changing professional and social needs.

## **PROGRAMME SPECIFIC OUTCOMES (PSO)**

**PSO1:** Understand the fundamental, mathematical, scientific and engineering concepts to have a significant and positive long term impact on the field of civil engineering and provide sustainable solutions to the civil engineering problems.

**PSO2:** Apply specific program principles to analysis, design, laboratory investigations and construction aspects of civil engineering infrastructure.

**PSO3:** Ability to analyse and design using codes of practice and software packages.

## OUTCOME BASED EDUCATION (OBE)

Our institution is practicing Outcome Based Education (OBE) which is a student centered instruction model that focuses on measuring student performance throughout comes. Outcomes include knowledge, skills and attitudes.

In the OBE model, the required knowledge and skill sets for a particular diploma programme is predetermined and the students are evaluated for all the required parameters (Outcomes) during the course of the program.

The OBE model measures the progress of the graduate in four parameters, which are

- Program Educational Objectives (PEO)
- Program Specific Outcomes (PSO)
- Program Outcomes (PO)
- Course Outcomes (CO)

**Program Educational Objectives (PEOs)** are broad statements that describe the career and professional accomplishments that the program is preparing the graduates to achieve. PEO's are measured 4-5 years after graduation.

**Program Specific Outcomes (PSOs)** are the statements that describe what the graduates of specific engineering program should be able to do.

**Program Outcomes (POs)** are narrower statements that describe what students are expected to know and be able to do by the time of graduation.

**Course Outcomes (COs)** are the measurable parameters which evaluates each student's performance for each course that the student undertakes in every semester. The teaching learning process and assessment are being carried out in accordance with the revised Bloom's Taxonomy. According to revised Bloom's Taxonomy, the levels are in cognitive domain main areas follows:

| Level | Descriptor    | Level of attainment                                                         |
|-------|---------------|-----------------------------------------------------------------------------|
| 1     | Remembering   | Recalling from memory of previously learned material                        |
| 2     | Understanding | Explaining ideas or concepts                                                |
| 3     | Applying      | Using information in another familiar situation                             |
| 4     | Analyzing     | Breaking information into parts to explore understandings and relationships |
| 5     | Evaluating    | Justifying a decision or course of action                                   |
| 6     | Creating      | Generating new ideas, products or new ways of viewing things.               |

# DIPLOMA PROGRAMME IN ENGINEERING / TECHNOLOGY

(Implemented from 2023 -2024)

## E SCHEME

### RULES AND REGULATIONS

#### **Objective:**

To retain and further strengthen the quality of the human capital produced by our higher technical education at the diploma level as they play a major force behind the state's social, cultural, and economic pre-eminence.

To seed & nurture agents of change & transformation for the digital future with enduring skills and capabilities by cultivating technological capabilities through a skill-centred approach.

#### **Admission:**

Candidates seeking admission to the first semester of the Diploma program:

Should have passed the SSLC Examinations prescribed by the Government of Tamil Nadu or any examination of any other board or authority recognized by the Board of Secondary Education as equivalent thereto with eligibility for Higher Secondary Education in Tamil Nadu.

#### **Lateral entry admission:**

The candidates who possess a pass in the HSC [Academic] or equivalent prescribed in the Higher Secondary Schools in Tamil Nadu affiliated to the Tamil Nadu Higher Secondary Board, with a pass in at least three of the following subjects: Physics / Chemistry / Mathematics / Computer Science / Electronics / Information Technology / Biology / Informatics Practices / Biotechnology / Technical Vocational Subjects / Agriculture / Engineering Graphics / Business Studies / Entrepreneurship are eligible to apply for Lateral entry admission to the third semester of Diploma programs, as per the rules fixed by the Government of Tamil Nadu. (or) The candidates who possess a pass in 2-year ITI with appropriate grade or equivalent examination.

There is no age limit prescribed for admissions to Diploma programs.

**The medium of instruction is English for all courses, examinations, seminar presentations and project work reports, except for the programs offered in Tamil Medium.**

#### **Structure of the Program :**

The Redesigning and revamp of the Diploma program in the State of Tamil Nadu will focus on improving the employability and entrepreneurship outcomes of the campuses through skill-centric and industry allied curriculum and syllabi. The following structure is being proposed for the new curriculum.

## **Pathways for Progressive Learning Experience**

The program offers 4 different pathways for progressive learning. Entrepreneurs, Higher Education, Technocrats and Technologists have different pathways from which the students will pick one of these pathways that they find fascinating and work to ameliorate their knowledge base over the desired pathway.

There are courses offered for the specific pathways in their final semesters that will aid them to choose their career in their specific pathways. Pathway direction for the students can be assisted by faculty mentors from time to time.

- **Entrepreneur:**

Students who aspire to transform opportunity into reality, and create social and economic value for themselves and for others.

- **Higher Education:**

Students with aspirations of pursuing higher education to acquire higher-order skills and competencies in the domain of interest.

- **Technocrats:**

Students who aspire to acquire mastery of technical tools and methods to manage people who manage the processes.

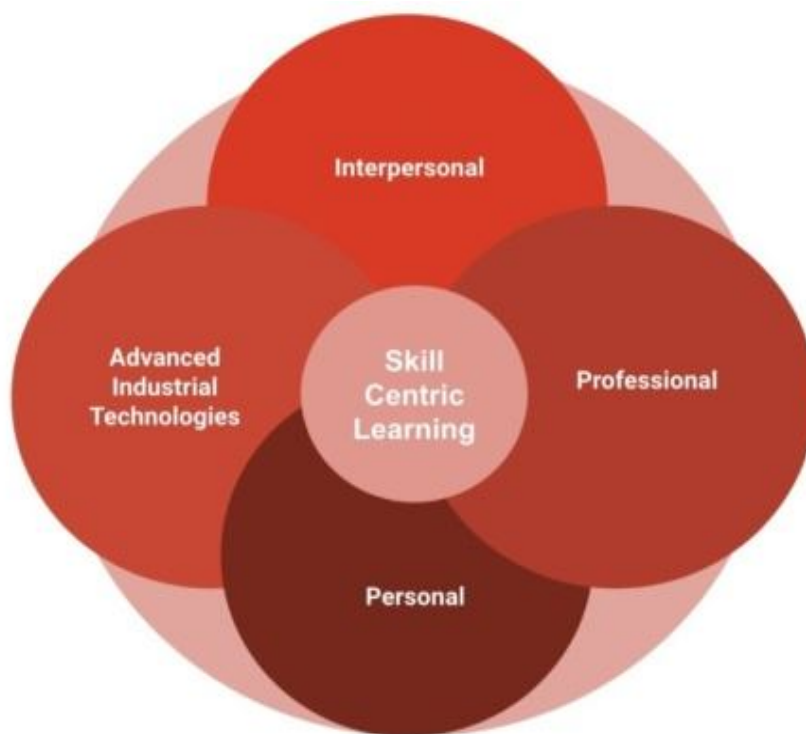
- **Technologists:**

Students who aspire to gain leadership in a particular discipline / technology to evolve into Problem Solvers & Innovators.

## **Various Dimensions for Transformation:**

Today's world is rapidly changing and increasingly interconnected, and the future talent pipeline to be sourced from the campuses needs to adapt to changes that will keep accelerating in the future. The new diploma program focuses on equipping learners with skills that will enable them to cope with the foreseeable social and economic changes and manage often unpredictable realities. The various dimensions of transformation are designed to nurture skills towards holistic human development. Such skills are acquired not only on formal courses but in a variety of contexts throughout the academic curriculum.

Four broad dimensions of skills to ensure holistic human development: (1) Personal, (2) Professional, (3) Interpersonal and (4) Advanced Industrial Technologies skills and competencies.



### **Integrated Curriculum :**

An integrated curriculum is based on learning experiences that lead to the acquisition of disciplinary knowledge and its application in a professional environment interwoven with the teaching of personal, interpersonal, and professional skills, and ways in which the integration of emerging technological skills and multidisciplinary connections are made.

### **Course Levels:**

A course is a component (a paper/subject) of a program. All the courses need not carry the same weightage. The course should have defined Course Objectives and Course Outcomes. A course may be designed to involve lectures/tutorials/laboratory work/project work/Internships/seminars or a combination of these, to effectively meet the teaching and learning needs and the credits may be assigned suitably.

The programs consist of various levels of courses, structured as (F) Foundation, (C) Concentration and the (S) Specialization courses for a greater understanding of the core concepts of the fundamentals in the initial year of learning and thereby moving towards the specialization areas by choice.

- **Foundation (F) | Year I:** Foundation courses build strong fundamental requirements across mathematics, statistics, science, engineering domain, advanced technologies, social sciences and humanities.
- **Concentration (Cn) | Year II:** Concentration courses shall deliver domain-specific knowledge and technological skills. They are offered as core and electives to provide the requisite mandatory working knowledge of the chosen domain.

- **Specialisation (S) | Year III:** Specialization courses are focused on a particular area of study leading to a specific pathway. Some of the courses can also be beyond the program, leading to skills and competencies in emerging technology domains.

#### **Course Types:**

Every diploma program shall have a curriculum with syllabi comprising Theory, Practicum and Practical courses with well-defined Program Outcomes (POs) as per the Outcome Based Education (OBE) model. The content of each course is designed based on the intended Course Outcomes (COs). Every program shall have a distinct curriculum with syllabi consisting of courses broadly categorized under:

- **Core(C)/Elective (E)**–Core / Elective courses are offered to students of a particular program to gain basic and specialized knowledge/skills in a selected field. Core courses are mandatory to complete the program and shall not be exempted or provided with credit equivalence. Elective Courses may be grouped into different domains/streams/specialisations to enable the students to have at least 3 to 5 options. At least 20 students need to express their willingness, for the case of an elective course, to be offered.
- **Practicum (P)**–Integrated course taught in a hands-on learning environment. This may be offered wherever theoretical concepts are to be learned simultaneously with relevant practical sessions. Such courses shall be offered only if sufficient laboratory facilities are available to conduct such courses, and both laboratory and theory components shall be considered for continuous assessment. Final evaluation based on the proportion of the credit awarded for the respective component.
- **Lab (L)** - Practical Courses taught in a designated lab. This may be offered when conceptual learning has to be augmented by practical experiments and also to bring focus on acquiring skills through doing. Such courses shall be offered only if sufficient laboratory facilities are available to conduct such courses.
- **Field Study (FS)**–Offered as a special / curriculum-enriching component to understand certain practical issues/work practices / hands-on training/immersion project/market survey. Field Study, if it forms a part of the course, then credit(s) shall be assigned accordingly, otherwise, such course(s) may be specified in the Grade Sheet without grades.
- **Certification (Cer)**–Industry-driven course shall be offered, jointly with an industry that would result in learning the emerging trends / employment potential topics / solving real-time problems. The contents of the course shall be jointly designed by an industry expert and a suitable faculty member, with relevant assessment and evaluation. Hybrid/Online learning options shall be available. Students are permitted to complete these courses through MOOCs / Professional Certification and credit equivalence (Program Elective or Open Elective), to a maximum of 6 credits.
- **In-House Projects(InP)**–Capstone Project shall be offered once a student completes >95% of the core courses related to the Diploma program. The Capstone Project is expected to involve concepts from fundamentals to recent developments and may be restricted to one

domain or multidomains / multi-disciplines. Capstone Project shall be offered only after completing all the fundamental courses and offered during the final semester. It shall also focus on Environment, Society, Sustainability, Entrepreneurship and Project Management. In the case of a multidisciplinary project, a suitable co-supervisor shall be opted for the students from the relevant Department for successful completion. Capstone Project may be offered in phases, i.e. Phase I and Phase II (single topic or two different topics). Students are encouraged to submit the softcopy of the complete report for evaluation and abstract in the printed form during the final presentation.

- **Fellowship (Fs)**–Up to 6 Months for professional and/or academic development offered by an external organisation identified and nominated by DoTE in India or abroad. Students shall be shortlisted for the same under sponsorship/scholarship by competent authorities and approved by the Head of the Institution.
- **Boot Camp (B)**–2-to-5-day training camps for imparting knowledge and skills in emerging areas. It may be offered jointly by a team of faculty members / external experts with course content that includes interdisciplinary topics from different domains, thereby enhancing the Professional Knowledge & Skills of the students. However, such courses shall not have any significant repetition of other courses offered in that particular diploma program. If a student fails to complete such a course on the first attempt or lacks attendance requirements, they may opt for a different course in the subsequent semester and meet the minimum credit requirements of the program or may redo the same course whenever offered.
- **Hackathon (H)** - 3 to 6 days of problem-solving and building a solution for real-world problems in an intensive/accelerated manner. It may be considered as one of the course types in situations where multiple solutions are expected to a problem or multiple problems are expected to be solved, in a particular industry/research laboratory. Such a course shall be essentially a Practicum and may be offered in a workshop mode. Credit allocation, Assessment and Evaluation shall be based on the respective syllabi designed for the same.
- **Internship (I)**–Internship is offered as a credit course with the Industry/Research Laboratories/ other Universities in India or abroad. Credit allocation, Assessment and Evaluation shall be based on the procedures given. Every student is encouraged to gain Credits through an Internship.
- **Audit Courses**are optionally registered by a student to understand certain basic/advanced concepts in his / her own discipline or other disciplines offered by the college. In this case, if a candidate fails in an Audit Course, it is not mandatory to repeat that course and these courses shall not be considered for eligibility for awarding the Diploma. Grades shall be awarded as “Completed”.

#### **Definition of Credit**

Credit is a kind of weightage given to the contact periods\* to teach the prescribed syllabus, which is in a modular form. The credit distribution for theory, laboratory and project courses are mentioned in the table below.

|                                |                |
|--------------------------------|----------------|
| <b>Theory(L)-15periods</b>     | <b>1credit</b> |
| <b>Tutorial(T)-15periods</b>   | <b>1credit</b> |
| <b>Practical(P)–30periods</b>  | <b>1credit</b> |
| <b>Internship(I)-30periods</b> | <b>1credit</b> |
| <b>Project(J)-30periods</b>    | <b>1credit</b> |

\* 1 period = 50 minutes of class

### Curriculum Structure

Every program shall have a distinct curriculum with syllabi consisting of courses broadly categorized under Basic Sciences, Basic Engineering, Professional Core, Program Electives, Open Electives, and Certification Courses. Credit distribution for various categories of the courses will follow the guidelines given below, subject to minor variations, as may be suggested by the respective Boards of Studies.

| <b>Category</b>                                 | <b>Credit Range</b> |
|-------------------------------------------------|---------------------|
| Humanities and social sciences                  | 11                  |
| Basic Science Courses                           | 17-20               |
| Engineering Sciences                            | 6-13                |
| Program core                                    | 40-51               |
| Program Elective                                | 9-12                |
| Open elective                                   | 10                  |
| Industrial Training / Project work              | 14                  |
| Audit Course                                    | 0                   |
| <b>Integrated Learning Experiences</b>          |                     |
| Induction program                               | Non-Credits Course  |
| I & E / Club Activity / Community Initiatives   | Non-Credits Course  |
| Shop Floor Immersion                            | Non-Credits Course  |
| Health & Wellness                               | Non-Credits Course  |
| Student-Led Initiative                          | Non-Credits Course  |
| Special Interest Groups<br>(Placement Training) | Non-Credits Course  |
| Emerging technology seminars                    | Non-Credits Course  |

Each program will consist of Basic Science (BS), Engineering Sciences (ES), Professional Core (PC), Program Electives (PE), Open Electives (OE), Audit Courses and In-House Project/Internships/Fellowships.

1. **Basic Sciences:** This course is common to all programs to develop fundamental knowledge of science and mathematics; it also enhances the reasoning and analytical skills amongst students.
2. **Engineering Sciences:** Engineering Science shall create awareness of different specializations of engineering studies. The goal of these courses is to create engineers of tomorrow, who possess the knowledge of all disciplines and can apply their

interdisciplinary knowledge in every aspect. It could be any branch of engineering - Civil, Computer Science and Engineering, Electrical, Mechanical, etc.

3. **Program Core:** This includes core courses designed in the program, which are major courses of the discipline, are required to attain desired outcomes and to ignite critical thinking skills amongst students.
4. **Program Elective:** This includes elective courses that can be chosen from a pool of courses which may be very specific or specialized or advanced or supportive to the program of study or nurtures the candidate's proficiency/skill. This is called a program elective course.
5. **Open Electives:** An elective course chosen generally from another discipline/ subject, to seek interdisciplinary exposure is called an open elective. While choosing the electives, students shall ensure that they do not opt for courses with syllabus contents which are similar to that of their departmental core/elective courses.
6. **Audit Courses:** An audit course is one in which the student attends classes, does the necessary assignments and takes exams. The Institute encourages students towards extra learning by auditing for the additional number of courses. The results of audit courses shall not be considered for the prescribed "carry over courses" limit.
7. **Humanities and Social Science:** Basic courses offered across language, communication and social science subjects, including any management skills and shall be categorized as Humanities and Social science.
8. **In-House Project/Internships/Fellowships:** Every student must do one major project in the Final year of their program. Students can do their major project in Industry or R&D Lab or in-house or a combination of any two or a fellowship in a reputed organization.

### **Outcome-Based Education**

Outcome-based education aims to create a clear expectation of results that students must achieve. Here, the outcome includes skills, knowledge and attitude. Outcomes inform both the way students are evaluated on a course and the way a course will be organised. Effective learning outcomes are student-centred, measurable, concise, meaningful, achievable and outcome-based (rather than task-based). To identify achievable learning goals and develop plans to meet them, revised Bloom's Taxonomy framework is introduced to allow educators to assess learning on an ongoing basis, encouraging students to reflect on their progress.

All the programs offered should adopt Outcome Based Education (OBE) in order to enhance the opportunities for the students with respect to their career track (through a student-centric approach). The Program Outcomes (POs) of the respective program of study are achieved through the Course Outcomes (COs). Necessary remedial actions are taken at regular intervals to ensure the proper attainment of outcomes by the students. The evaluation procedures outlined are to be followed by the departments before arriving at the data for the Outcome attainment analysis.

1. OBE is an approach to education in which the decisions about the curriculum instruction and assessment are driven by the learning outcomes that the students should display at the end of a program or course.

2. The vision and mission statements are the guiding forces behind an institute / department. The vision statement provides insight into what the department focuses to achieve or become in the future. The mission statement communicates the process involved in achieving the vision. An effective vision statement should be concise, unambiguous, futuristic, and realistic. aspirational, and inspirational. Furthermore, it shouldn't be generic but rather focus on outcomes specific to the department. A good mission statement should focus on the ways to achieve the vision of the department. It should be brief, clear, informative, simple, and direct.
3. Graduate Attributes (GAs) represent the standard abilities to be looked for in a graduate of any diploma program. They form the Program Outcomes (POs) that reflect the skills, knowledge, and abilities of diploma graduates regardless of the field of study. At the same time, POs are necessarily independent of disciplinary knowledge; rather, these qualities may be developed in various disciplinary contexts. POs are composite statements made-up of multiple aspects relevant to a broader outcome like domain knowledge, design, analysis, etc. They also ensure the holistic development of the students by covering aspects like communication, ethics, project management, etc.,
4. Assessments are designed to measure the POs, and POs give useful guidance at the program level for the curriculum design, delivery, and assessment of student learning. However, they represent fairly high-level generic goals that are not directly measurable. Real observability and measurability of the POs at the course level are very difficult. To connect high-level learning outcomes (POs) with course content, course outcomes and assessments are designed, they are necessary to bring further clarity and specificity to the program outcomes.
5. For each PO, the skills and competencies implied generally require a different assessment methodology. This helps us to create a shared understanding of the competencies that students want to achieve.
6. Course Outcomes (COs) are specific, measurable statements that help the learners to understand the capabilities to be attained by them at the end of the course. COs should highlight what the learner can attain by studying the course and undergoing the evaluation of outcomes prepared for the same. It includes the knowledge to be gained, skills to be acquired and the application of the same towards solving problems specific to the context. The topics for the course should be decided based on the course outcomes in such a way that the specific topics alone do not map to the specific course outcomes.
7. Revised Bloom's Taxonomy for Assessment Design: It attempts to divide learning into three types of domains (cognitive. affective, and behavioural) and then defines the level of performance for each domain. Conscious efforts to map the curriculum and assessment to these levels can help the programs to aim for higher-level abilities which go beyond remembering or understanding, and require application, and analysis, evaluation or creation.

8. CO-PO course articulation matrix should indicate the correlation between the CO and PO based on the extent to which the CO contributes to the PO. This is mapped at three levels 1, 2 or 3 representing low, medium and high respectively. This also ensures that every PO is covered across the courses offered as a part of the program. The matrix will be adopted for all the courses run by the department.
9. The attainment of COs of any course can be assessed from the performance of the students through continuous and final assessments. The goal of continuous assessment is to understand/realise the critical information about student comprehension throughout the learning process and provides an opportunity for the facilitator to improve their pedagogical approach and for students to improve learning outcomes. The goal of the final assessment is to evaluate student learning outcomes at the end of the course instruction. According to the new regulation, 40% weightage is for the continuous assessment, and 60% weightage is for the final assessment.
10. The POs assessment should be carried out by both direct and indirect assessment. The assessment can be estimated by giving 80% weightage to direct assessment and 20% weightage to indirect assessment. Direct assessment is purely based on COs attainment through the course Assessment Method, and indirect assessment is through the feedback taken from the relevant stakeholders of the system. Indirect assessment can be done in the form of a graduate exit survey where the student is required to answer a questionnaire that reflects their satisfaction with respect to the attainment of POs. The questionnaire should be carefully designed so as to not have the POs themselves as direct questions.
11. Each PO attainment corresponding to a specific course can be determined from the attainment values obtained for each course outcome related to that PO and the CO-PO mapping values. The threshold value of 60%, shall be set for the POs and the same can be modified with due approval of the Authorities.
12. The gap identified in the attainment of the COs and POs can be addressed by organising talks from the industry, bridge courses, organising workshops, arranging field visits (industrial visits) with respect to the course, improving the student performance under the innovative teaching-learning process of the institution, etc.,

### **Academic and Curriculum Flexibility**

Academic and curriculum flexibility enhance a student's learning experience by providing various options such as adjusting the timeframe of courses, horizontal mobility, interdisciplinary opportunities, and other benefits through curricular transactions. The types of Academic and curriculum flexibilities are listed below.

1. Break of Study
2. Course Add / Drop
3. Course Withdrawal
4. Credit Equivalence
5. Credit Transfer

6. Examination Withdrawal
7. Fast-Track Option
8. Flexi-Credit System
9. Bridge Course

### **Break of Study**

If a student intends to take a break / temporarily discontinue the program in the middle of a semester/year, during the period of study, for valid reasons (such as Internships, accident or hospitalization due to prolonged ill health) and wishes to re-join the program in the next academic year, student shall intimate stating the reasons.

Break of study is permitted only once during the entire period of the degree program for a maximum period of one year. The student is permitted to rejoin the program after the break and shall be governed by the rules and regulations in force, at the time of rejoining. The break shall be notified in the grade sheet. If a student is detained for want (shortage) of attendance or disciplinary issues, the period spent in that semester shall not be considered a permitted Break of Study.

### **Course Add / Drop**

Subject to resource availability, a student has the option to add additional courses within a week after the regular semester begins. Furthermore, a student can drop registered courses before completing the first Continuous Assessment (CA) test in a semester, limited to a maximum of 6 credits. These dropped courses will not be considered as arrears, but the student will need to retake them when they are offered by the institution. In order to carry out these actions, students must obtain permission from the head of the institution.

### **Credit Equivalence**

It is an option that can be exercised by a student under the following circumstances –

- (i) credits earned through Extra and Co-curricular Activities (only against program elective / open elective – Global)
- (ii) credits earned through online courses (only against Open Electives - Technical and Global and program electives)
- (iii) credits accumulated through Capsule courses, One-Credit courses Such courses and credits earned shall be presented in the Academic Board.

### **Credit Transfer**

Credits earned by a student through Credit Equivalence (as said above) and credits earned by attending and completing the courses successfully, offered by other approved Universities / Institutions / Professional Bodies (only against Technical and Global Open Electives and program electives) shall be considered as “Transferred Credits (specified in the Grade Sheet)” and considered for the calculation of CGPA.

### **Examination Withdrawal**

A student may be permitted to withdraw from appearing for the end semester examination in any course or courses for valid reasons (medically unfit / unexpected family situations / sports approved by the Physical Director / HOD/Principal).

This privilege can be availed ONLY ONCE during the entire program. Valid documents, for medically unfit / unexpected family situations, shall be submitted by the student within seven days before the commencement of the examination in that course or courses and also recommended by the Head of the Department, approved by the Head of the Institution.

Special cases under extraordinary conditions will be considered on the merit of the case if any student applies for withdrawal, notwithstanding the requirement of mandatory seven days' notice.

Those students who withdraw from any course or courses during the program are eligible for the award of first class and first class with distinction as per the requirement in this regard.

Withdrawal is permitted for the end semester examinations in the final semester, only if the period of study, the student concerned, does not exceed 1 semester after the regular period of 3 years so that his eligibility for distinction is considered.

The final approval for withdrawal will depend on the merit of the case and will be decided by the Head of the Institution.

### **Fast-Track**

This option enables a student to complete the minimum credit requirements of a program, to enable

- (i) his / her own entrepreneurial venture (start-up),
- (ii) an internship in industry/research laboratories / fellowship.

This option is currently available for students to complete the two elective papers offered in Semester 6 in advance [Recommended to be completed in Semester 4 or 5] to avail the last semester for internship/fellowship/do his own start-up/enterprise/project outside the campus. However, such an option shall not be exercised to pursue higher education elsewhere. The duration of the study shall remain the same as per the prescribed syllabi for the fast-track option also.

### **Flexi-Credit System**

It offers a student to earn additional credits than that specified (minimum credits) to a program for which student has enrolled. Such additional credits earned shall be mentioned in the Grade Sheet, as 'Additional Credits Earned'. Credits earned through Flexi-Credit System shall not be considered for the calculation of SGPA or CGPA.

### **Bridge Course**

This is specifically designed for Lateral Entry (LE) students who join the Diploma Program in 2nd year (3rd Semester). This course will be a 40 period in which the faculty gives the gist of

important topics that the LE students may have missed in the first year of the program specific to the department concerned.

### **Integrated Learning Experience**

Integrated learning experiences encompass activities that foster the acquisition of disciplinary knowledge, personal and interpersonal skills, and technological proficiency. These experiences promote active engagement in meaningful real-life situations and establish connections between different curricula, cocurricular activities, and extracurricular pursuits across diverse disciplines. Integrated learning experiences are concatenated in the academic curriculum for each semester enabling the students to learn, adapt and transform through experiential learning pedagogy.

This approach enriches the curriculum by incorporating dynamic and up-to-date co-curricular courses and activities that may not be directly aligned with the students' program of study. It prioritizes the holistic development of students, fostering their growth and well-roundedness.

1. Innovation & Entrepreneurship
2. Peer 2 Peer Learning
3. Growth Lab
4. Shop Floor Immersion
5. Health & Wellness
6. Induction Program
7. Special Interest Groups
8. Club Activity
9. Community Initiatives
10. Emerging Tech Seminars
11. Student Led Initiative
12. Industry-Specific Training

### **Innovation Track**

They are offered to the student, to bring awareness on start-up / entrepreneurial ventures through a series of courses/activities. Based on the inputs gained, students can select their electives, specialisation, capstone project and deferred placement option.

### **Peer to Peer Learning**

PTP learning involves interactions between students from senior classes, leading to valuable additions and deepening the understanding of certain concepts. This may happen as a part of a scheduled time-table or after instructional hours in a day, by Peers (from senior classes), leading to value addition, enriching the understanding of certain concepts and implementing practically (developing models, prototypes, proofsof-concept) for learning satisfaction, participating in competitions / competitive examinations. These efforts are expected to improve

teamwork, communication, understanding of societal needs, project management and life-long learning activities.

### **Growth Lab**

Growth labs play an integral role to stimulate and develop a student's personality & skills in various fields of life. It also teaches about a growth mindset to tackle real-world problems and life challenges. It brings self-confidence and empowerment to transform the inter-personality of the student. The process brings the progression to achieve higher goals in life.

### **Shop floor immersion**

This introduces new ideas, inspires participants to further explore them on their own or may illustrate and promote actual process practice through seminars, workshops, Industrial Visits etc that results in learning hands-on skills as it gives the students an opportunity to try out new methods and fall in a safe environment.

### **Health & Wellness**

This aims to teach students about various aspects of health and fitness, including exercise, nutrition, yoga, mental health, and substance awareness.

### **Induction Program**

It shall be organised to all the students, admitted into first year, to offer the course on Universal Human Value, awareness sessions on campus facilities, academic regulation and curriculum, highlight the culture, values and responsibilities of an Engineer in the Society and the Nation as a whole, besides Institutional infrastructure and facilities and student support systems. Awareness of domain-specific requirements to be organised in the second year of induction.

### **Special Interest Groups**

The training is especially based on the placements on campus. Concepts required for aptitude tests, group discussions, resume building, personal interviews, industry-specific orientation and Business Case Competition are taught to the students.

### **Club Activity**

A small community that attracts people who share the same interests such as music, arts, or sports working on a common goal to develop a sense of unity and teamwork, learning how to work with others in reaching the same goals.

### **Community Initiatives**

Community Initiatives involve activities that aim to define values, cultivate empathy, foster social skills, and enhance students' understanding of their community. Through these initiatives, students have the opportunity to build meaningful relationships, gain insights into different

perspectives, and engage with diverse cultures. This engagement enables the development of crucial interpersonal skills.

### **Emerging Tech Seminars**

A technical presentation made by the students & the cross-functional Members of the Faculty to showcase the technology adopted in the industry. This collaborative teaching-learning session between the student & the faculty results in a better understanding of the use of technology in various applications.

### **Student-Led Initiative**

A student-led session will help students to acquire and share knowledge on emerging industrial technologies that will comprehend & introduce the emerging technology to the students. This includes student-led Tech talk series & other initiatives.

### **Industry - Specific Training**

Gaining information about the industry's way of working and understanding the process. This enables one to understand the various non-technical skills & competencies required for the transformation from a student to a professional.

### **Duration of the Program**

- A student is ordinarily expected to complete the Diploma program in 6 semesters (for SSLC students) and four semesters (for Lateral Entry students) but in any case, not more than 12 Semesters for SSLC (or equivalent) students and not more than 10 semesters for Lateral Entry students.
- Each semester shall normally consist of 15 weeks with periods of 50 minutes each. The Head of the Institution shall ensure that every faculty imparts instruction as per the number of periods specified in the syllabus and that the faculty teaches the full content of the specified syllabus for the course being taught.
- The Head of the Institution may conduct additional classes for improvement, special coaching, conduct model tests etc., over and above the specified periods.
- The End Semester Examination will normally follow immediately after the last working day of the semester as per the academic schedule prescribed from time to time.
- The total period for completion of the program from the commencement of the first semester to which the student was admitted shall not exceed the maximum period specified irrespective of the period of break of study in order that student may be eligible for the award of the diploma. The minimum and maximum period of study shall be,

| Diploma Programme         | Min. Period | Max. Period |
|---------------------------|-------------|-------------|
| Full Time                 | 3 Years     | 6 Years     |
| Full Time [Lateral Entry] | 2 Years     | 5 Years     |
| Sandwich                  | 3.5 Years   | 6.5 Years   |
| Part Time                 | 4 Years     | 7 Years     |

### Attendance Requirements

A student who has fulfilled the following conditions shall be deemed to have satisfied the requirements for completion of a semester.

- Ideally every student is expected to attend all classes of all the courses and secure 100% attendance.
- However, in order to make provision for certain unavoidable reasons such as medical / participation in sports, the student is expected to attend at least 75% of the classes.
- Therefore, the student shall secure not less than 75% (after rounding off to the nearest integer) of overall attendance for each semester.
- However, a student who secures overall attendance between 65% and 74% in the current semester due to medical reasons (prolonged hospitalization / accident / specific illness) / participation in sports events may be permitted to appear for the current semester examinations, subject to the condition that the student shall submit the medical certificate / sports participation certificate attested by the Head of the Institution.
- Students who secure less than 65% overall attendance shall not be permitted to write the end semester examination and not permitted to move to the next semester. They are required to repeat the incomplete semester in the next academic year, as per the norms prescribed.
- Candidates who have earned more than 50% attendance but fall short of the basic requirement of 65% attendance (in all subjects of the current semester put together) shall be permitted to proceed to the next semester, only one time during the course of study by considering all the papers in that current semester as absent and to complete the program of study. For such candidates by default, the classification of class shall be Second class on successful passing of course.

### Class Committee

Every class shall have a class committee consisting of faculty of the class concerned, student representatives and a chairperson, who is not teaching the class. It is like the 'Quality Circle' (more commonly used in industries) with the overall goal of improving the teaching learning process. The functions of the class committee include:

- Solving problems experienced by students in the classroom and in the laboratories. Clarifying the regulations of the diploma program and the details of rules therein.
- Informing the student representatives, the academic schedule including the dates of assessments and the syllabus coverage for each assessment.

- Informing the student representatives the details of regulations regarding weightage used for each assessment. In the case of practical courses (laboratory / drawing / project work / seminar etc.) the breakup of marks for each experiment / exercise / module of work, should be clearly discussed in the class committee meeting and informed to the students.
- Analysing the performance of the students of the class after each test and finding the ways and means of solving problems, if any.
- Identifying the slow-learners, if any, and requesting the faculty concerned to provide some additional help or guidance or coaching to such students.
- The class committee for a class under a particular branch is normally constituted by the Head of the Department. However, if the students of different branches are mixed in a class (like the first semester which is generally common to all branches), the class committee is to be constituted by the Head of the Institution.
- The class committee shall be constituted within the first week of each semester. At least 4 student representatives (usually 2 boys and 2 girls) shall be included in the class committee, covering all the elective courses.
- The chairperson of the class committee may invite the class counsellor and the Head of the Department to the class committee meeting.
- The Head of the Institution may participate in any class committee meeting of the institution.
- The chairperson is required to prepare the minutes of every meeting, submit the same to the Head of the Institution within two days of the meeting and arrange to circulate it among the students and faculty concerned. If there are some points in the minutes requiring action by the management, the same shall be brought to the notice of the Head of the Institution.
- The first meeting of the class committee shall be held within one week from the date of commencement of the semester, in order to inform the students about the nature and weightage of assessments within the framework of the regulations.
- Two or three subsequent meetings may be held in a semester at suitable intervals.
- During these meetings the student members representing the entire class, shall meaningfully interact and express the opinions and suggestions of the other students of the class in order to improve the effectiveness of the teaching-learning process.

#### **Course Committee for Common Courses**

Each common theory course offered to more than one discipline or group, shall have a “Course Committee” comprising all the faculty teaching the common course with one of them nominated as the course coordinator. The nomination of the course coordinator shall be made by the Head of the Department / Head of the Institution depending upon whether all the faculty teaching the common course belong to a single department or to several departments. The ‘Course Committee’ shall meet in order to arrive at a common scheme of evaluation for the test and shall ensure a uniform evaluation of the tests. Wherever feasible, the Course Committee may also prepare a common question paper for the internal assessment test(s).

## Assessment and Examination

Performance in each course of study shall be evaluated for a maximum of 100 marks based on one of the following:

### **(i) Continuous Assessment [40%]:**

- Continuous assessment shall be carried out for 100 marks [summation of multiple CAs] for all types of courses and converted to 40 marks.
- Every subject shall have its own framework for continuous assessment designed by the course committee and approved by the academic board as part of the curriculum. The continuous assessment shall be awarded as per the assessment proposed in respective syllabi.
- For One credit courses and Advanced Skill Certification programs, no end semester examination shall be conducted, and final grade will be awarded based on continuous assessment only for 100 marks.

### **(ii) End Semester Examination [60%]:**

- The End Semester Examination will be conducted for 100 marks and shall be converted to 60 marks in the final results.
- The End Semester Examinations (Theory, Practical, Project) of three hours duration will be conducted.
- For Practicum courses, the end semester examination will be conducted as a theory or a practical or a project examination based on the credits for each component, the decision on the mode of exam could be based on the recommendation by the internal committee duly forwarded and approved by Head of the Institute.
- Every practical exercise/experiment shall be evaluated based on conduct of exercise / experiment and records to be maintained, students shall submit a record work duly completed and signed by faculty in charge and the Head of the Department.
- For the project works, the Department will constitute a three member faculty committee to monitor the progress of the project and conduct reviews regularly.
- If the projects are done in-house, the students must obtain the bonafide certificate for project work from the project guide and Head of the Department, at the end of the semester. Students who have not obtained the bonafide certificate are not permitted to appear for the project Viva Voce examination.
- For the projects carried out in Industry, the students must submit a separate certificate from Industry apart from the regular bonafide certificate mentioned above. For Industry related projects there must be one Mentor / Supervisor from Industry (External), this is in addition to the regular faculty supervision.
- The final examination for project work will be evaluated based on the final report submitted by the project group (of not exceeding four students), and the viva voce by an external examiner.
- The split up of marks for Internal and End Semester Viva Voce can follow the below mentioned rubrics,

| Internal Mark Split (40 Marks) |                                   |                                   | End Semester (60)                            |                                              |                                              |
|--------------------------------|-----------------------------------|-----------------------------------|----------------------------------------------|----------------------------------------------|----------------------------------------------|
| Review 1<br>(10 Marks)         | Review 2<br>(15 Marks)            | Review 3<br>(15 marks)            | Record<br>( 20 Marks)                        | Presentation<br>(20 Marks)                   | Viva Voce (20<br>Marks)                      |
| Committee: 5<br>Supervisor: 5  | Committee: 7.5<br>Supervisor: 7.5 | Committee: 7.5<br>Supervisor: 7.5 | External: 10<br>Internal: 5<br>Supervisor: 5 | External: 10<br>Internal: 5<br>Supervisor: 5 | External: 10<br>Internal: 5<br>Supervisor: 5 |

- Students who are unable to complete the project work at the end of the semester can apply for an extension to the Head of the Department, with the recommendation from the project guide for a period of a maximum of two months. For those students who extend the project work for two months, Viva Voce will be carried out and results will be declared separately. If the project report is not submitted even beyond the extended time, then students are not eligible to appear for Project Viva Voce Examination.
- The performance of each student in the project group would be evaluated in a viva voce examination conducted by a committee consisting of an external examiner and the Department project coordinator as an internal examiner.
- If a student indulges in malpractice in any of the End Semester Examination / Internal Examinations, student will be liable for punitive action as prescribed by the college from time to time.

#### Passing Requirement for Award of Diploma

A student who secures not less than 40% of total marks prescribed for the course [Internal Assessment + End semester Examinations] with a minimum of 35% of the marks prescribed for the end semester examination, shall be declared to have passed the course and acquired the relevant number of credits. This is applicable for both theory and laboratory courses (including project work).

- (i) No Minimum marks for continuous assessment (Internal). (ii) Minimum Marks to be secured in end semester exam is 35 out of 100, (iii) Those who secure minimum mark (35) in end semester examination need to secure minimum of 19 out of 40 in continuous assessment to achieve overall pass percentage of 40% in that particular subject.

If a student fails to secure a pass in a theory course / laboratory course / elective course (same elective course), the student shall register and appear only for the end semester examination in the subsequent semester. In such cases, the internal assessment marks obtained by the student in the first appearance shall be retained and considered valid for all subsequent attempts till the student secures a pass. However, from the third attempt onwards if a student fails to obtain pass marks (Internal Assessment + End Semester Examination), then the student shall be declared to have passed the examination if the student secures a minimum of 35% marks prescribed for the end semester examinations alone.

If any other Elective course is opted by the student, the previous registration is cancelled and henceforth it is to be considered as a new Elective course. The student has to register and

attend the classes, earn the continuous assessment marks, fulfil the attendance requirements and appear for the end semester examination.

If a student is absent during the viva - voce examination, it would be considered a failure. If a student fails to secure a pass in Project Work, the student shall register for the course again in the subsequent semester and can do Project Work.

The passing requirement for the courses which are assessed only through purely internal assessments, the passing requirement is 50% of the internal assessment (continuous assessment) marks only.

A student can apply for revaluation of the student's semester examination answer paper in a theory course, as per the prescribed fee along with prescribed application to the COE (Controller of Examination) through the Head of the Institution.

The COE will arrange for the revaluation and the results will be intimated to the student. Revaluation is not permitted for laboratory courses and projects.

### **Award of Grades**

The award of letter grades will be decided using relative grading principle. The performance of a student will be reported using letter grades, each carrying certain points as detailed below:

| <b>Letter Grade</b>         | <b>Grade Points</b> | <b>Marks</b> |
|-----------------------------|---------------------|--------------|
| O (Outstanding)             | 10                  | 91-100       |
| A+ (Excellent)              | 9                   | 81-90        |
| A (Very Good)               | 8                   | 71-80        |
| B+(Good)                    | 7                   | 61-70        |
| B (Average)                 | 6                   | 51-60        |
| C (Satisfactory)            | 5                   | 40-50        |
| RA (Re-Appearence)          | 0                   | <40          |
| SA (Shortage of Attendance) | 0                   | 0            |
| W (Withdrawal)              | 0                   | 0            |

A student is deemed to have passed and acquired the corresponding credits in a particular course if the student obtains any one of the following grades: "O", "A+", "A", "B+", "B", "C".

'SA' denotes shortage of attendance and hence prevents students from writing the end semester examinations. 'SA' will appear only in the result sheet.

"RA" denotes that the student has failed to pass in that course. "W" denotes withdrawal from the exam for the particular course. The grades RA and W will figure both in the Grade Sheet as well as in the Result Sheet. In both cases, the student has to appear for the end semester examinations as per the regulations.

If the grade RA is given to Theory Courses/ Laboratory Courses it is not required to satisfy the attendance requirements, but has to appear for the end semester examination and fulfill the norms to earn a pass in the respective courses.

If the grade RA is given to courses which are evaluated only through internal assessment, the student shall register for the course again in the subsequent semester, fulfilling the norms as to earn a pass in the course. However, attendance requirements need not be satisfied.

For the Audit Course and Integrated Learning Experience, on its successful completion a 'completed' certificate will be issued by the head of the institute. Every student needs a minimum of 75% attendance in the Audit / integrated Learning experience compulsorily. However, for valid reasons, the Head of the Institution may permit a student to exempt/complete this requirement in the subsequent years. Successful completion of these courses is compulsory for the award of Diploma. These courses will be monitored by the central committee constituted by Autonomous. The grades O, A+, A, B+, B, C obtained for the one/two credit course (not the part of curriculum) shall figure in the Grade Sheet under the title 'Value Added Courses/Internship/Industrial training'.

The courses for which the grades obtained are SA will not figure in the Grade Sheet.

### Grade Sheet

After results are declared, Grade Sheets will be issued to each student which will contain the following details: The college in which the student has studied, the list of courses registered during the semester and the grade scored. The Grade Point Average (GPA) for the semester and the Cumulative Grade Point Average (CGPA) of all courses enrolled from the first semester onwards. GPA for a semester is the ratio of the sum of the products of the number of credits acquired for courses and the corresponding points to the sum of the number of credits acquired for the courses in the semester. CGPA will be calculated in a similar manner, considering all the courses registered from the first semester. RA grades will be excluded for calculating GPA and CGPA.

$$CGPA = \frac{\sum_{i=1}^n C_i GP_i}{\sum_{i=1}^n C_i}$$

where  $C_i$  is the number of Credits assigned to the course

$GP_i$  is the point corresponding to the grade obtained for each course

$n$  is number of all courses successfully cleared during the particular semester in the case of GPA and during all the semesters in the case of CGPA.

### Award of Diploma

A student shall be declared to be eligible for the award of the Diploma provided the student has,

- Successfully gained the required number of total credits as specified in the curriculum corresponding to the student's program within the stipulated time.
- Successfully completed the course requirements, appeared for the end semester examinations and passed all the subjects within the period as prescribed.
- Successfully passed any additional courses prescribed whenever the student is readmitted under E - Scheme from the earlier regulations.

- Successfully completed the Integrated Learning Experience requirements.
- No disciplinary action pending against the student.
- The award of Diploma must have been approved by the Board of Examinations.

### **Classification of Diploma Awarded**

#### **FIRST CLASS WITH DISTINCTION**

A student who satisfies the following conditions shall be declared to have passed the examination in First class with Distinction:

- Should have passed the examination in all the courses of all the six semesters (4 semesters in the case of Lateral Entry) in the student's First Appearance. The duration of the program shall be extended up to one additional semester in case of any withdrawals from end semester examination. Withdrawal from examination will not be considered as an appearance.
- Should have secured a CGPA of not less than 8.50.
- One-year authorized break of study (if availed of) shall be permitted within the four years period (three years in the case of lateral entry) for award of First class with Distinction.
- The candidates should NOT have been prevented from writing the end semester examination due to lack of attendance in any semester.

#### **FIRST CLASS**

A student who satisfies the following conditions shall be declared to have passed the examination in First class:

- Should have passed the examination in all the courses in all six semesters (4 semesters in the case of Lateral Entry). The duration of the program shall be extended up to one additional semester in case of any withdrawals from end semester examination. Withdrawal from examination will not be considered as an appearance.
- One-year authorized break of study (if availed of) or prevention from writing the end semester examination due to lack of attendance (if applicable) shall be provided with the duration of four years (three years in the case of lateral entry) for award of First class.
- Should have secured a CGPA of not less than 6.50.

#### **SECOND CLASS**

All other students who qualify for the award of the Diploma shall be declared to have passed the examination in Second Class.

## **Discipline**

Every student is expected to maintain disciplined and respectable behaviour both within and outside the college premises, refraining from engaging in any activities that may tarnish the reputation of the college.

The Head of the Institution shall constitute a disciplinary committee consisting of the Head of the Institution, Two Heads of Department of which one should be from the faculty of the student, to enquire into acts of indiscipline and notify the authorities about the disciplinary action recommended for approval.

In case of any serious disciplinary action which leads to suspension or dismissal, then a committee shall be constituted.

If a student indulges in malpractice in any of the end semester examinations, student shall be liable for punitive action as prescribed by the Autonomous Examination from time to time. For any malpractices in any continuous assessment, the same shall be reported to the Head of the Institution for disciplinary actions.

### Credit Distribution

| Semester     | No of Courses | Periods | Credits    |
|--------------|---------------|---------|------------|
| Semester I   | 8             | 640     | 20         |
| Semester II  | 8             | 640     | 20         |
| Semester III | 8             | 640     | 21         |
| Semester IV  | 7             | 640     | 20         |
| Semester V   | 8             | 635     | 21         |
| Semester VI  | 3             | 660     | 18         |
| <b>Total</b> |               |         | <b>120</b> |

\*Industrial Training during summer vacation for two weeks has to be completed to earn the required two credits.

**ANNEXURE - I**  
**E – SCHEME**  
**(Implemented from the Academic Year 2023 – 2024 onwards)**  
**CURRICULUM OUTLINE**  
**CIVIL ENGINEERING (FULL TIME)**

**THIRD SEMESTER**

| S. No        | Course Category             | Course Type                    | Code    | Course Title                              | L-T-P | Period (Hrs.) | Credit    | End Exam  |
|--------------|-----------------------------|--------------------------------|---------|-------------------------------------------|-------|---------------|-----------|-----------|
| 1            | Program Core                | Theory                         | CEE3110 | Mechanics of Materials                    | 3-0-0 | 45            | 3         | Theory    |
| 2            | Program Core                | Theory                         | CEE3210 | Construction Materials                    | 3-0-0 | 45            | 3         | Theory    |
| 3            | Program Core                | Practicum                      | CEE3340 | Surveying Practice                        | 1-0-4 | 75            | 3         | Practical |
| 4            | Program Core                | Practicum                      | CEE3440 | Building Planning and Drawing             | 1-0-4 | 75            | 3         | Practical |
| 5            | Program Core                | Practicum                      | CEE3540 | Hydraulics                                | 1-0-4 | 75            | 3         | Practical |
| 6            | Program Core                | Practicum                      | CEE3640 | Material Testing Lab                      | 1-0-4 | 75            | 3         | Practical |
| 7            | Open Elective               | Advanced Skill Certification   | CEE3760 | Advanced Skills Certification - 3         | 2-0-2 | 60            | 2         | NA        |
| 8            | Humanities & Social Science | Integrated Learning Experience | GLE3880 | Growth Lab                                | -     | 30            | 0         | NA        |
| 9            | Audit Course                | Integrated Learning Experience | ACE3881 | Induction Program – II                    | -     | 16            | 0         | -         |
| 10           | Audit Course                | Integrated Learning Experience | ACE3882 | I&E/ Club Activity/ Community Initiatives | -     | 16            | 0         | -         |
| 11           | Audit Course                | Integrated Learning Experience | ACE3883 | Shop floor Immersion                      | -     | 6             | 0         | -         |
| 12           | Audit Course                | Integrated Learning Experience | ACE3884 | Student-Led Initiative                    | -     | 24            | 0         | -         |
| 13           | Audit Course                | Integrated Learning Experience | ACE3885 | Emerging Technology Seminars              | -     | 8             | 0         | -         |
| 14           | Audit Course                | Integrated Learning Experience | ACE3886 | Health & Wellness                         | 0-0-2 | 30            | 1         | -         |
| <b>TOTAL</b> |                             |                                |         |                                           |       | <b>580</b>    | <b>21</b> |           |

**Note:** Test & Revisions - 45 Periods | Library Hours - 15 Periods

#### FOURTH SEMESTER

| S. No        | Course Category | Course Type                    | Code    | Course Title                                 | L-T-P | Period (Hrs.) | Credit    | End Exam  |
|--------------|-----------------|--------------------------------|---------|----------------------------------------------|-------|---------------|-----------|-----------|
| 1            | Program Core    | Theory                         | CEE4110 | Mechanics of Structures                      | 3-0-0 | 45            | 3         | Theory    |
| 2            | Program Core    | Theory                         | CEE4210 | Transportation Engineering                   | 3-0-0 | 45            | 3         | Theory    |
| 3            | Program Core    | Practicum                      | CEE4330 | Soil Mechanics and Foundation Engineering    | 2-0-2 | 60            | 3         | Theory    |
| 4            | Program Core    | Practicum                      | CEE4440 | Concrete Technology                          | 1-0-4 | 75            | 3         | Practical |
| 5            | Engineering     | Practicum                      | CEE4540 | Construction Practices                       | 1-0-4 | 75            | 3         | Practical |
| 6            | Program Core    | Practicum                      | CEE4640 | Estimation and Costing                       | 1-0-4 | 75            | 3         | Practical |
| 7            | Open Elective   | Advanced Skill Certification   | CEE4760 | Advanced Skill Certification - 4             | 2-0-2 | 60            | 2         | NA        |
| 8            | Audit Course    | Integrated Learning Experience | ACE4882 | I&E /Club Activity/Community Initiatives     | -     | 40            | 0         | -         |
| 9            | Audit Course    | Integrated Learning Experience | ACE4883 | Shop Floor Immersion                         | -     | 8             | 0         |           |
| 10           | Audit Course    | Integrated Learning Experience | ACE4884 | Student Led Initiative                       | -     | 25            | 0         | -         |
| 11           | Audit Course    | Integrated Learning Experience | ACE4885 | Emerging technology seminars                 | -     | 12            | 0         | -         |
| 12           | Audit Course    | Integrated Learning Experience | ACE4886 | Health & Wellness                            | -     | 30            | 0         | -         |
| 13           | Audit Course    | Integrated Learning Experience | ACE4887 | Special Interest groups (Placement training) | -     | 30            | 0         | -         |
| <b>TOTAL</b> |                 |                                |         |                                              |       | <b>580</b>    | <b>20</b> |           |

**Note:** Test & Revisions - 45 Periods | Library Hours - 15 Periods

## FIFTH SEMESTER

| S. No.       | Course Category    | Course Type                    | Code    | Course Title                                         | L-T-P | Period (Hrs.) | Credit    | End Exam  |
|--------------|--------------------|--------------------------------|---------|------------------------------------------------------|-------|---------------|-----------|-----------|
| 1            | Program Core       | Theory                         | CEE5110 | Design of RCC Structures (Limit State Method)        | 4-0-0 | 60            | 4         | Theory    |
| 2            | Program Elective   | Theory                         |         | Elective-1                                           | 3-0-0 | 45            | 3         | Theory    |
| 3            | Program Core       | Lab                            | CEE5320 | Computer Applications in Civil Engineering.          | 0-0-4 | 60            | 2         | Practical |
| 4            | Program Core       | Practicum                      | CEE5440 | Construction Management and Safety Practice          | 1-0-4 | 75            | 3         | Practical |
| 5            | Program Core       | Practicum                      | CEE5540 | Environmental Engineering                            | 1-0-4 | 75            | 3         | Practical |
| 6            | Program Core       | Practicum                      | CEE5654 | Innovation and Startup                               | 1-0-2 | 45            | 2         | Project   |
| 7            | Project/Internship | Internship                     | CEE5773 | Industrial Training*<br>[Summer Vacation - 90 Hours] | -     | -             | 2         | Project   |
| 8            | Open Elective      | Advanced Skill Certification   | CEE5860 | Advanced Skills Certification - 5                    | 2-0-2 | 60            | 2         | NA        |
| 9            | Audit Course       | Integrated Learning Experience | ACE5981 | Induction program III                                | -     | 40            | 0         | -         |
| 10           | Audit Course       | Integrated Learning Experience | ACE5984 | Student-Led Initiative                               | -     | 45            | 0         | -         |
| 11           | Audit Course       | Integrated Learning Experience | ACE5986 | Health & Wellness                                    | -     | 30            | 0         | -         |
| 12           | Audit Course       | Integrated Learning Experience | ACE5987 | Special Interest Groups (Placement Training)         | -     | 40            | 0         | -         |
| <b>TOTAL</b> |                    |                                |         |                                                      |       | <b>575</b>    | <b>21</b> |           |

**Note:** Test & Revisions - 45 Periods | Library Hours - 15 Periods

\* Internship shall be offered in the summer break between 4th and 5th semester followed by a review and award of credits in the 5th semester

### ELECTIVE 1

| S. No                                                                                                                                          | Course Category  | Course Type | Code    | Course Title                                  |
|------------------------------------------------------------------------------------------------------------------------------------------------|------------------|-------------|---------|-----------------------------------------------|
| 1                                                                                                                                              | Program Elective | Theory      | CEE5211 | Mechanical, Electrical, and Plumbing Services |
| 2                                                                                                                                              | Program Elective | Theory      | CEE5212 | Irrigation and water resources Engineering    |
| 3                                                                                                                                              | Program Elective | Theory      | CEE5213 | Defects in Building and Remedies              |
| 4                                                                                                                                              | Program Elective | Theory      | CEE5214 | Urban Planning and Development                |
| 5                                                                                                                                              | Program Elective | Theory      | CEE5215 | Building Bye Laws and Statutory drawing.      |
| #Courses from other programmers with the same credit can be considered after proper approval from the Chairperson, Autonomous of Examinations. |                  |             |         |                                               |

**SIXTH SEMESTER**

| S. No | Course Category    | Course Type        | Code | Course Title                              | L-T-P | Period (Hrs.) | Credit | End Exam  |
|-------|--------------------|--------------------|------|-------------------------------------------|-------|---------------|--------|-----------|
| 1     | Open Elective      | Theory             |      | Electives-2 (Pathway)                     | 3-0-0 | 45            | 3      | Theory    |
| 2     | Open Elective      | Practicum          |      | Elective-3 (Specialisation)               | 1-0-4 | 75            | 3      | Practical |
| 3     | Project/Internship | Project/Internship |      | In-house<br>Project/Internship/Fellowship | -     | 540           | 12     | Project   |
| TOTAL |                    |                    |      |                                           |       | 660           | 18     |           |

\*\*Every student should select any one from the In-house Project or Internship or Fellowship. The guidelines given have to be followed.

**Elective 2 (Pathway)**

| S. No. | Course Category             | Course Type | Code    | Course Title                        |
|--------|-----------------------------|-------------|---------|-------------------------------------|
| 1      | Elective   Higher Education | Theory      | CEE6111 | Advanced Engineering Mathematics    |
| 2      | Elective   Entrepreneurship | Theory      | CEE6112 | Entrepreneurship                    |
| 3      | Elective   Technocrats      | Theory      | CEE6113 | Project Management                  |
| 4      | Elective   Technocrats      | Theory      | CEE6114 | Finance Fundamentals                |
| 5      | Elective   Technologists    | Theory      | CEE6115 | Advanced Environmental Engineering  |
| 6      | Elective   Technologists    | Theory      | CEE6116 | Advanced Concrete Technology        |
| 7      | Elective   Technologists    | Theory      | CEE6117 | Advanced Transportation Engineering |
| 8      | Elective   Technologists    | Theory      | CEE6118 | Advanced Surveying                  |

\*\*Every student should select any one from the In-house Project or Internship or Fellowship. The guidelines given have to be followed.

**Elective 3 (Specialisation)**

| S. No. | Course Category | Course Type | Code     | Course Title                                                            |
|--------|-----------------|-------------|----------|-------------------------------------------------------------------------|
| 1      | Elective        | Practicum   | CEE 6241 | Artificial Intelligence and Machine Language in Construction Management |
| 2      | Elective        | Practicum   | CEE 6242 | Structural Detailing for RCC elements                                   |
| 3      | Elective        | Practicum   | CEE 6243 | Design and Drawing of Steel Elements                                    |

**Project/Internship**

| S. No. | Course Category    | Course Type        | Code    | Course Title     |
|--------|--------------------|--------------------|---------|------------------|
| 1      | Project/Internship | Project/Internship | CEE6351 | Internship       |
| 2      | Project/Internship | Project/Internship | CEE6353 | Fellowship       |
| 3      | Project/Internship | Project/Internship | CEE6374 | In-house Project |

**ANNEXURE – II**

**SCHEME OF EXAMINATIONS**

**(CIVIL ENGINEERING (FULL TIME))**

**THIRD SEMESTER**

| S. No | Course Category                           | Course type | Examination Marks         |                       | Total Marks | Min. For Pass | Duration of Exam Hours | End Exam  |
|-------|-------------------------------------------|-------------|---------------------------|-----------------------|-------------|---------------|------------------------|-----------|
|       |                                           |             | Internal Assessment Marks | Autonomous Exam Marks |             |               |                        |           |
| 1     | Mechanics of Materials                    | Theory      | 40                        | 60                    | 100         | 40            | 3                      | Theory    |
| 2     | Construction Materials                    | Theory      | 40                        | 60                    | 100         | 40            | 3                      | Theory    |
| 3     | Surveying Practice                        | Practicum   | 40                        | 60                    | 100         | 40            | 3                      | Practical |
| 4     | Building Planning and Drawing             | Practicum   | 40                        | 60                    | 100         | 40            | 3                      | Practical |
| 5     | Hydraulics                                | Practicum   | 40                        | 60                    | 100         | 40            | 3                      | Practical |
| 6     | Material Testing Lab                      | Practicum   | 40                        | 60                    | 100         | 40            | 3                      | Practical |
| 7     | Advanced Skills Certification - 3         |             |                           |                       |             |               |                        | NA        |
| 8     | Growth Lab                                |             |                           |                       |             |               |                        | NA        |
| 9     | Induction Program – II                    |             |                           |                       |             |               |                        | **        |
| 10    | I&E/ Club Activity/ Community Initiatives |             |                           |                       |             |               |                        | **        |
| 11    | Shop floor Immersion                      |             |                           |                       |             |               |                        | **        |
| 12    | Student-Led Initiative                    |             |                           |                       |             |               |                        | **        |
| 13    | Emerging Technology Seminars              |             |                           |                       |             |               |                        | **        |
| 14    | Health & Wellness                         |             |                           |                       |             |               |                        | **        |
|       | <b>TOTAL</b>                              |             | <b>240</b>                | <b>360</b>            | <b>600</b>  | <b>-</b>      | <b>-</b>               | <b>-</b>  |

# Autonomous Examinations will be conducted for 100 marks and will be converted to 60 marks.

## ANNEXURE – II

### SCHEME OF EXAMINATIONS

#### (CIVIL ENGINEERING (FULL TIME))

#### FOURTH SEMESTER

| S. No | Course Code  | Course                                       | Examination Marks         |                       | Total Marks | Min. For Pass | Duration of Exam Hours | End Exam  |
|-------|--------------|----------------------------------------------|---------------------------|-----------------------|-------------|---------------|------------------------|-----------|
|       |              |                                              | Internal Assessment Marks | Autonomous Exam Marks |             |               |                        |           |
| 1     | CEE4110      | Mechanics of Structures                      | 40                        | 60                    | 100         | 40            | 3                      | Theory    |
| 2     | CEE4210      | Transportation Engineering                   | 40                        | 60                    | 100         | 40            | 3                      | Theory    |
| 3     | CEE4330      | Soil Mechanics and Foundation Engineering    | 40                        | 60                    | 100         | 40            | 3                      | Theory    |
| 4     | CEE 4440     | Concrete Technology                          | 40                        | 60                    | 100         | 40            | 3                      | Practical |
| 5     | CEE4540      | Construction Practices                       | 40                        | 60                    | 100         | 40            | 3                      | Practical |
| 6     | CEE4640      | Estimation and Costing                       | 40                        | 60                    | 100         | 40            | 3                      | Practical |
| 7     | CEE 4760     | Advanced Skill Certification - 4             |                           |                       |             |               |                        | NA        |
| 8     | CEE 4882     | I&E /Club Activity/Community Initiatives     |                           |                       |             |               |                        | NA        |
| 9     | CEE 4883     | Shop Floor Immersion                         |                           |                       |             |               |                        | **        |
| 10    | CEE4884      | Student Led Initiative                       |                           |                       |             |               |                        | **        |
| 11    | CEE4885      | Emerging technology seminars                 |                           |                       |             |               |                        | **        |
| 12    | CEE4886      | Health & Wellness                            |                           |                       |             |               |                        | **        |
| 13    | CEE4887      | Special Interest groups (Placement training) |                           |                       |             |               |                        | **        |
|       | <b>TOTAL</b> |                                              | <b>240</b>                | <b>360</b>            | <b>600</b>  | <b>-</b>      | <b>-</b>               | <b>-</b>  |

# Autonomous Examinations will be conducted for 100 marks and will be converted to 60 marks.

## ANNEXURE – II

### SCHEME OF EXAMINATIONS

#### (CIVIL ENGINEERING (FULL TIME))

#### FIFTH SEMESTER

| S. No | Course Code       | Course                                            | Examination Marks         |                       | Total Marks | Min. For Pass | Duration of Exam Hours | End Exam  |
|-------|-------------------|---------------------------------------------------|---------------------------|-----------------------|-------------|---------------|------------------------|-----------|
|       |                   |                                                   | Internal Assessment Marks | Autonomous Exam Marks |             |               |                        |           |
| 1     | CEE5110           | Design of RCC Structures (Limit State Method)     | 40                        | 60                    | 100         | 40            | 3                      | Theory    |
| 2     | <b>Elective-1</b> |                                                   | 40                        | 60                    | 100         | 40            | 3                      | Theory    |
|       | CEE5211           | Mechanical, Electrical, and Plumbing Services     |                           |                       |             |               |                        |           |
|       | CEE5212           | Irrigation and water resource engineering         |                           |                       |             |               |                        |           |
|       | CEE5213           | Defects in Building and Remedies                  |                           |                       |             |               |                        |           |
|       | CEE5214           | Urban Planning and Development                    |                           |                       |             |               |                        |           |
|       | CEE5215           | Building Bye Laws and Statutory drawing           |                           |                       |             |               |                        |           |
| 3     | CEE5320           | Computer Applications in Civil Engineering.       | 40                        | 60                    | 100         | 40            | 3                      | Practical |
| 4     | CEE5440           | Construction Management and Safety Practice       | 40                        | 60                    | 100         | 40            | 3                      | Practical |
| 5     | CEE5540           | Environmental Engineering                         | 40                        | 60                    | 100         | 40            | 3                      | Practical |
| 6     | CEE5654           | Innovation and Startup                            |                           |                       |             |               |                        | Project   |
| 7     | CEE5773           | Industrial Training* [Summer Vacation - 90 Hours] |                           |                       |             |               |                        | Project   |
| 8     | CEE5860           | Advanced Skills Certification - 5                 |                           |                       |             |               |                        | NA        |
| 9     | CEE5981           | Induction program III                             |                           |                       |             |               |                        | **        |
| 10    | CEE5984           | Student-Led Initiative                            |                           |                       |             |               |                        | **        |
| 11    | CEE5986           | Health & Wellness                                 |                           |                       |             |               |                        | **        |
| 12    | CEE5987           | Special Interest Groups (Placement Training)      |                           |                       |             |               |                        | **        |
|       | <b>TOTAL</b>      |                                                   | <b>200</b>                | <b>300</b>            | <b>500</b>  |               |                        |           |

# Autonomous Examinations will be conducted for 100 marks and will be converted to 60 marks.

## ANNEXURE – II

### SCHEME OF EXAMINATIONS

#### (CIVIL ENGINEERING (FULL TIME))

#### SIX SEMESTER

| S. No | Course Code                 | Course                                                                  | Examination Marks         |                       | Total Marks | Min. For Pass | Duration of Exam Hours | End Exam  |
|-------|-----------------------------|-------------------------------------------------------------------------|---------------------------|-----------------------|-------------|---------------|------------------------|-----------|
|       |                             |                                                                         | Internal Assessment Marks | Autonomous Exam Marks |             |               |                        |           |
| 1     | Elective 2 (Pathway)        |                                                                         | 40                        | 60                    | 100         | 40            | 3                      | Theory    |
|       | CEE6111                     | Advanced Engineering Mathematics                                        |                           |                       |             |               |                        |           |
|       | CEE36112                    | Entrepreneurship                                                        |                           |                       |             |               |                        |           |
|       | CEE6113                     | Project Management                                                      |                           |                       |             |               |                        |           |
|       | CEE6114                     | Finance Fundamentals                                                    |                           |                       |             |               |                        |           |
|       | CEE6115                     | Advanced Environmental Engineering                                      |                           |                       |             |               |                        |           |
|       | CEE6116                     | Advanced Concrete Technology                                            |                           |                       |             |               |                        |           |
|       | CEE6117                     | Advanced Transportation Engineering                                     |                           |                       |             |               |                        |           |
|       | CEE6118                     | Advanced Surveying                                                      |                           |                       |             |               |                        |           |
| 2     | Elective 3 (Specialisation) |                                                                         | 40                        | 60                    | 100         | 40            | 3                      | Practical |
|       | CEE6241                     | Artificial Intelligence and Machine Language in Construction Management |                           |                       |             |               |                        |           |
|       | CEE6242                     | Structural Detailing for RCC elements                                   |                           |                       |             |               |                        |           |
|       | CEE6243                     | Design and Drawing of Steel Elements                                    |                           |                       |             |               |                        |           |
| 3     |                             | In-house Project/Internship/Fellowship                                  | 40                        | 60                    | 100         | 40            | 3                      | Project   |
|       |                             | TOTAL                                                                   | 120                       | 180                   | 300         |               |                        |           |

#Autonomous Examinations will be conducted for 100 marks and will be converted to 60 marks.

### CEE3110-MECHANICS OF MATERIALS

Programme Name : CIVIL ENGINEERING  
 Course Code : CEE3110  
 Semester : III SEMESTER  
 Course Title : MECHANICS OF MATERIALS  
 Course Type : THEORY

| L | T | P | C |
|---|---|---|---|
| 3 | 0 | 0 | 3 |

#### TEACHING AND SCHEME OF EXAMINATION

No. of weeks per semester: 15 weeks

| Course                 | Instructions |                  | Examination         |                        |       |          |
|------------------------|--------------|------------------|---------------------|------------------------|-------|----------|
|                        | Hours / Week | Hours / Semester | Marks               |                        |       | Duration |
|                        |              |                  | Internal Assessment | Autonomous Examination | Total |          |
| Mechanics of Materials | 3            | 45               | 40                  | 100*                   | 100   | 3 Hrs    |

\*Examinations will be conducted for 100 marks and will be converted to 60 marks

#### TOPICS AND ALLOCATION OF HOURS

| Unit         | Topics                                  | Time (Hrs) |
|--------------|-----------------------------------------|------------|
| I            | Simple stresses and strains             | 9          |
| II           | Shear force and bending moment in beams | 9          |
| III          | Geometrical properties of sections      | 9          |
| IV           | Stresses in beams                       | 9          |
| V            | Pin jointed frames                      | 9          |
| <b>Total</b> |                                         | <b>45</b>  |

#### COURSE DESCRIPTION

This is a fundamental course which covers broad elements of engineering mechanics and strength of materials. Strength of materials, also known as mechanics of materials, is a branch of engineering that deals with the behavior of solid objects when acted upon by objects. Because it deals with how objects deform under loading, strength of materials is an essential topic for civil engineers. Study of this course enables the student to distinguish between different types of stress and strain in a material, under the action of external forces. The student will learn to analyze simple structural elements for their design which he usually needs in the professional life.

Teachers while imparting instruction should stress on concepts and principles and provide considerable practice in problem solving.

### COURSE OBJECTIVE

The objective of this course is to enable the student to

- To understand the Stress, strain and elastic constants.
- To understand the nature of stresses induced in material under different loads.
- To plot the variation of shear force and bending moments over the beams under different types of loads.
- To study about geometrical properties of section and able to locate centroid and find out moment of Inertia.
- To understand the stresses in beams.
- To Analyze Pin jointed frames.
- Solving problems in the course of study.

### COURSE OUTCOMES

| After successful completion of this course, the students should be able to |                                                                    |
|----------------------------------------------------------------------------|--------------------------------------------------------------------|
| <b>E3110.1</b>                                                             | Know stresses and strain and its application in Engineering field. |
| <b>E3110.2</b>                                                             | Analyze the determinate beams and draw the SFD and BMD.            |
| <b>E3110.3</b>                                                             | Understand about geometrical properties of sections.               |
| <b>E3110.4</b>                                                             | Understand the stresses in beams.                                  |
| <b>E3110.5</b>                                                             | Analyze pin jointed frames.                                        |

### Pre-requisites

Nil

### CO-POs & PSOs mapping matrix

| CO                       | PO1       | PO2       | PO3       | PO4      | PO5       | PO6      | PO7       | PSO1      | PSO2      | PSO3      |
|--------------------------|-----------|-----------|-----------|----------|-----------|----------|-----------|-----------|-----------|-----------|
| <b>E3110.1</b>           | 3         | 3         | 2         | -        | 2         | -        | 3         | 3         | 3         | 2         |
| <b>E3110.2</b>           | 3         | 3         | 2         | -        | 2         | -        | 3         | 3         | 3         | 2         |
| <b>E3110.3</b>           | 3         | 3         | 2         | -        | 2         | -        | 3         | 3         | 3         | 2         |
| <b>E3110.4</b>           | 3         | 3         | 2         | -        | 2         | -        | 3         | 3         | 3         | 2         |
| <b>E3110.5</b>           | 3         | 3         | 2         | -        | 2         | -        | 3         | 3         | 3         | 2         |
| <b>Total</b>             | <b>15</b> | <b>15</b> | <b>10</b> | <b>-</b> | <b>10</b> | <b>-</b> | <b>15</b> | <b>15</b> | <b>15</b> | <b>10</b> |
| <b>Correlation Level</b> | <b>3</b>  | <b>3</b>  | <b>2</b>  | <b>-</b> | <b>2</b>  | <b>-</b> | <b>3</b>  | <b>3</b>  | <b>3</b>  | <b>2</b>  |

Correlation level 1 – Slight (low)

Correlation level 2 – Moderate (Medium)

Correlation level 3 – Substantial (high)

### Instructional Strategy

This course is introduced so that diploma holder in Civil Engineering may appreciate the concepts and principles of mechanics of materials of various elements of building and are able to apply the knowledge gained through the course for the design of simple and small components. Teacher should give simple exercises involving the applications of various concepts and principles being taught in the course. Efforts should be made to prepare tutorial sheets on various topics and students should be encouraged /guided to solve the tutorial problems independently. Teacher may conduct weekly small quiz sessions to know the students level of understanding and if need be, teacher may reinforce the concepts and principles related to mechanics of materials of elements/members of building components.

### Assessment Methodology

|                           | Continuous Assessment (40marks) |                           |                                         |                       | End Semester Examination (60 marks) |
|---------------------------|---------------------------------|---------------------------|-----------------------------------------|-----------------------|-------------------------------------|
|                           | CA1                             | CA2                       | CA3                                     | CA4                   |                                     |
| <b>Mode</b>               | Written test (Unit 1 & 2)       | Written test (Unit 3 & 4) | Quiz MCQ (Online/ Offline)              | Model Examination     | Written Examination                 |
| <b>Duration</b>           | 2 Periods                       | 2 Periods                 | 1Hour                                   | 3Hours                | 3Hours                              |
| <b>Exam Marks</b>         | 50                              | 50                        | 60                                      | 100                   | 100                                 |
| <b>Converted to</b>       | 10                              | 10                        | 10                                      | 10                    | 60                                  |
| <b>Marks</b>              | 40                              |                           |                                         |                       | 60                                  |
| <b>Tentative Schedule</b> | 6 <sup>th</sup> Week            | 12 <sup>th</sup> Week     | 13 <sup>th</sup> -14 <sup>th</sup> Week | 16 <sup>th</sup> Week |                                     |

## **CONTINUOUS ASSESSMENT**

**CA1and CA2:** Assessment written test should be conducted for 50Marks for two units. The marks scored will be converted to 10 Marks for the internal assessment.

**CA1and CA2, Assessment test should be conducted for two units as below**

- PARTA: (5X 10Marks=50Marks).
- Eight questions will be asked, students should write five questions. Four questions can be asked from each unit.

**CA3:** 60 MCQ can be asked by covering the entire portion. It may be conducted by Online / Offline. The marks scored should be converted to 10 marks for the internal assessment.

**CA4:** Model examination should be conducted as per the end semester question pattern. The marks should be converted to 10marks for the internal assessment.

### **Question Pattern:**

- Answer Ten questions by selecting two questions from each unit. Each question carries 10 marks.
- Four questions will be asked from every unit Students should write any two questions.

### **Question Pattern –Model Examination and End Semester Examination Theory Exam**

PART-A

(5x2x10Marks=100Marks)

Note: Answer Ten questions by selecting two questions from each unit. Each question carries 10 marks.

### **Sample:**

|      |    |
|------|----|
| I.   | 1  |
|      | 2  |
|      | 3  |
|      | 4  |
| II.  | 5  |
|      | 6  |
|      | 7  |
|      | 8  |
| III. | 9  |
|      | 10 |
|      | 11 |
|      | 12 |
| IV.  | 13 |
|      | 14 |
|      | 15 |
|      | 16 |
| V.   | 17 |
|      | 18 |
|      | 19 |
|      | 20 |

### QUESTION PAPER SETTING

The teaching learning process and assessment are being carried out in accordance with the revised Blooms Taxonomy. The question paper should consist of 90% questions based on Lower Order Thinking (LOTs) and the remaining 10% based on Higher Order Thinking (HOTs) as detailed below.

| Revised Bloom's<br>Taxonomy<br>Level | Lower order thinking skills<br>(LOTs) | Higher Order Thinking<br>Skills (HOTs) |
|--------------------------------------|---------------------------------------|----------------------------------------|
|                                      | R-Remember, U-Understand,<br>AP-Apply | An- Analyse, E-Evaluate,<br>C-Create   |
| % to be included                     | 10 %                                  | 90 %                                   |

### CEE3110–MECHANICS OF MATERIALS

| CEE3110                                                                                                                                                                                                                                               | MECHANICS OF MATERIALS                         | L           | T | P | C     |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------|-------------|---|---|-------|
| THEORY                                                                                                                                                                                                                                                |                                                | 3           | 0 | 0 | 3     |
| <b>Unit-I</b>                                                                                                                                                                                                                                         | <b>SIMPLE STRESSES AND STRAINS</b>             | <b>9Hrs</b> |   |   |       |
| <b>1. INTRODUCTION TO STRESSES AND STRAINS</b>                                                                                                                                                                                                        |                                                |             |   |   | [1Hr] |
| Definitions of Force, Moment of force, Types of forces on structural members                                                                                                                                                                          |                                                |             |   |   |       |
| Mechanical properties of materials Rigidity, Elasticity, Plasticity, Compressibility, Hardness, Toughness, Stiffness, Brittleness, Ductility, Malleability, Creep, Fatigue, Tenacity, Durability.                                                     |                                                |             |   |   | [1Hr] |
| Definitions of stress and strain-Types of stresses, Tensile, Compressive and Shear stresses- Types of strains-Tensile, Compressive and Shear Strains, Elongation and Contraction-Longitudinal and Lateral strains, Poisson's Ratio, Volumetric Strain |                                                |             |   |   | [1Hr] |
| Simple problems in computation of stress, strain, Poisson's ratio.                                                                                                                                                                                    |                                                |             |   |   | [1Hr] |
| Hooke's law-Elastic Constants Definitions of: Young's Modulus of Elasticity                                                                                                                                                                           |                                                |             |   |   | [1Hr] |
| Shear modulus (or) Modulus of Rigidity-Bulk Modulus Relationship between elastic constants (Derivations not necessary)                                                                                                                                |                                                |             |   |   | [1Hr] |
| Simple problems                                                                                                                                                                                                                                       |                                                |             |   |   |       |
| Limit of proportionality, Elastic limit, Yield stress, Ultimate stress, Breaking stress, Actual, Nominal stresses, Working stress, Factor of safety                                                                                                   |                                                |             |   |   | [1Hr] |
| <b>Unit-II</b>                                                                                                                                                                                                                                        | <b>SHEAR FORCE AND BENDING MOMENT IN BEAMS</b> | <b>9Hrs</b> |   |   |       |
| <b>2.1 TYPES OF BEAMS AND LOADS</b>                                                                                                                                                                                                                   |                                                |             |   |   | [1Hr] |
| Definition of a beam–Support conditions and diagrammatic representation                                                                                                                                                                               |                                                |             |   |   |       |
| Types of supports-Types of beams based on support conditions, Diagrammatic representation of beams–Static equilibrium equations.                                                                                                                      |                                                |             |   |   | [1Hr] |
| Determinate and indeterminate beams- Load-Axial Loads-Transverse Loads                                                                                                                                                                                |                                                |             |   |   |       |
| Types of loads(Concentrated, uniformly distributed and varying loads)                                                                                                                                                                                 |                                                |             |   |   | [1Hr] |
| Diagrammatic representation of beams with different loads.                                                                                                                                                                                            |                                                |             |   |   |       |
| <b>2.2 SHEAR FORCE AND BENDING MOMENT</b>                                                                                                                                                                                                             |                                                |             |   |   | [1Hr] |
| Definition of Shear force and Bending Moment                                                                                                                                                                                                          |                                                |             |   |   |       |
| Conventional signs used for S.F. and B.M - SFD & BMD                                                                                                                                                                                                  |                                                |             |   |   | [1Hr] |
| S.F and B.M of Cantilever beam with endpoint load/UDL for entire span                                                                                                                                                                                 |                                                |             |   |   |       |
| Simply supported beams with central point load/ UDL for entire span and draw SFD&BMD.                                                                                                                                                                 |                                                |             |   |   | [1Hr] |
| Numerical problems on SF& BM for cantilever beams (Maximum Three concentrated loads/UDL for entire span Combination of Maximum Three-point loads with UDL for entire span /UDL for the half-length from fixed end only/. For simply supported beams   |                                                |             |   |   | [1Hr] |
| (Central point load/Single eccentric point load                                                                                                                                                                                                       |                                                |             |   |   | [1Hr] |

|                                                                                                                                                                                                                                                                                           |                                           |                 |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------|-----------------|
| Two equal point loads at one-third points /UDL for entire span/Combination of central point load and UDL throughout the beam only).                                                                                                                                                       |                                           | [1Hr]           |
| <b>Unit-III</b>                                                                                                                                                                                                                                                                           | <b>GEOMETRICAL PROPERTIES OF SECTIONS</b> | <b>9 Hrs</b>    |
| <b>3.1 CENTROID</b>                                                                                                                                                                                                                                                                       |                                           |                 |
| Geometrical properties–Definitions and examples of Symmetrical, Anti Symmetrical, Asymmetrical shapes - Definitions of center of gravity and centroid                                                                                                                                     |                                           | [1Hr]<br>[1Hr]  |
| Centroid of Symmetrical shapes (square, rectangular, circular,) Numerical problems                                                                                                                                                                                                        |                                           | [2Hrs]          |
| Determination of centroids of T Section and I Sections only.                                                                                                                                                                                                                              |                                           |                 |
| <b>3.2 MOMENT OF INERTIA</b>                                                                                                                                                                                                                                                              |                                           |                 |
| Definitions of Inertia, Moment of Inertia, Polar moment of inertia, Radius of gyration, Section Modulus, Polar Modulus-Parallel and perpendicular axes theorems (statement only)                                                                                                          |                                           | [1Hr]<br>[2Hrs] |
| Numerical problems on M.I about centroidal axis, Section modulus, Radius of gyration of (solid/hollow) square, (solid/hollow) rectangular and(solid/hollow) circular sections (Derivation not required)–Numerical problems on M.I about centroidal axis of T Section and I Sections only. |                                           | [2Hrs]          |
| <b>Unit-IV</b>                                                                                                                                                                                                                                                                            | <b>STRESSES IN BEAMS</b>                  | <b>9 Hrs</b>    |
| <b>STRESSES IN BEAMS DUE TO BENDING</b>                                                                                                                                                                                                                                                   |                                           |                 |
| Types of Bending stresses                                                                                                                                                                                                                                                                 |                                           | [2Hrs]          |
| Neutral axis–Theory of simple bending–Assumptions–Moment of resistance                                                                                                                                                                                                                    |                                           | [2Hrs]          |
| Flexure/bending equation $M / I = E / R = \sigma / y$ (Derivation not required) Bending stress distribution                                                                                                                                                                               |                                           |                 |
| Curvature of beam–Position of N.A and centroidal axis Stiffness equation                                                                                                                                                                                                                  |                                           | [1Hr]           |
| Flexural rigidity–Strength equation–Significance of Section modulus                                                                                                                                                                                                                       |                                           | [2Hrs]          |
| Numerical Problem on simply supported beam with symmetrical loads only                                                                                                                                                                                                                    |                                           | [2Hrs]          |

| Unit-V                                                                                                                                       | PIN JOINTED FRAMES | 9 Hrs     |
|----------------------------------------------------------------------------------------------------------------------------------------------|--------------------|-----------|
| <b>ANALYSIS BY ANALYTICAL METHOD(METHOD OF JOINTS)</b>                                                                                       |                    |           |
| Definitions of Frame / Truss, Pin Joint, Nodes, Rafters, Ties, Struts, Slings                                                                |                    | [2Hrs]    |
| Determinate and indeterminate frames                                                                                                         |                    | [1Hr]     |
| Classification of frames-Perfect and Imperfect frames–Deficient/Instable and redundant frames-Resolutions of force-Designation of forces     |                    | [1Hr]     |
| Nature of force in the frame-Identification of Member with zero force in a determinate truss- Methods of analysis-Analytical methods         |                    | [1Hr]     |
| Method of Joints and Method of Sections (Description only)                                                                                   |                    | [1Hr]     |
| Problems on Analysis of cantilever (with not more than eight members) with vertical nodal loads by method of joints only                     |                    | [1Hr]     |
| simply supported perfect frames(with not more than ten members) with vertical nodal loads (Symmetrical frame only) by method of joints only. |                    | [1Hr]     |
| <b>ANALYSIS BY GRAPHICAL METHOD</b>                                                                                                          |                    | [1Hr]     |
| Magnitude and nature of forces in the members of a cantilever / simply supported                                                             |                    | [1Hr]     |
| <b>TOTAL</b>                                                                                                                                 |                    | <b>45</b> |

#### Text Books

| S.NO | TITLE                 | AUTHOR                   | PUBLISHER WITH EDITION                                 |
|------|-----------------------|--------------------------|--------------------------------------------------------|
| 1.   | Strength of materials | Dr .B.C.Punmia           | 9 <sup>th</sup> edition, Lakshmi publications, 2018.   |
| 2.   | Strength of materials | Er.R.K.Rajput            | 6 <sup>th</sup> edition, S. Chand publications,        |
| 3.   | Strength of materials | Dr R.S.Khurmi & N.Khurmi | 26 <sup>th</sup> edition, S. Chand publications, 2018. |

#### Web-based/Online Resources

| S.No | Website/Links                                                                                                                                                                                                      |
|------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1    | <a href="https://nptel.ac.in/">https://nptel.ac.in/</a>                                                                                                                                                            |
| 2    | <a href="https://ndl.iitkgp.ac.in">https://ndl.iitkgp.ac.in</a>                                                                                                                                                    |
| 3    | Stress and strain<br><a href="https://www.youtube.com/watch?v=KGCyT2oVa_A&amp;list=PLd4YqEvwJs8YZ79RCYe3Cg6bljJv-nGB-">https://www.youtube.com/watch?v=KGCyT2oVa_A&amp;list=PLd4YqEvwJs8YZ79RCYe3Cg6bljJv-nGB-</a> |
| 4    | An introduction to stress and strain<br><a href="https://www.youtube.com/watch?v=aQf6Q8t1FQE">https://www.youtube.com/watch?v=aQf6Q8t1FQE</a>                                                                      |
| 5    | Stress strain curve<br><a href="https://www.youtube.com/watch?v=7OXQNv73qr4">https://www.youtube.com/watch?v=7OXQNv73qr4</a>                                                                                       |
| 6    | SFD and BMD<br><a href="https://www.youtube.com/watch?v=UahfUvcS24o&amp;list=PL4K9r9dYCOopLQIqfKO5haEkR1FKKVJdU">https://www.youtube.com/watch?v=UahfUvcS24o&amp;list=PL4K9r9dYCOopLQIqfKO5haEkR1FKKVJdU</a>       |
| 7    | Understanding Shear Force and Bending Moment Diagrams<br><a href="https://www.youtube.com/watch?v=C-FEVzI8oe8">https://www.youtube.com/watch?v=C-FEVzI8oe8</a>                                                     |

|    |                                                                                                                                                |
|----|------------------------------------------------------------------------------------------------------------------------------------------------|
| 8  | SFD and BMD of simply supported beam<br><a href="https://www.youtube.com/watch?v=J7nyhgiJFmQ">https://www.youtube.com/watch?v=J7nyhgiJFmQ</a>  |
| 9  | SFD and BMD of cantilever beam<br><a href="https://www.youtube.com/watch?v=zYJuYQwIcJs">https://www.youtube.com/watch?v=zYJuYQwIcJs</a>        |
| 10 | How to find Centroid of an I- Section<br><a href="https://www.youtube.com/watch?v=v6VTMwxx4oA">https://www.youtube.com/watch?v=v6VTMwxx4oA</a> |
| 11 | M.I of T section<br><a href="https://www.youtube.com/watch?v=dbiPJ5qJ_EI">https://www.youtube.com/watch?v=dbiPJ5qJ_EI</a>                      |
| 12 | Understanding stresses in beams<br><a href="https://www.youtube.com/watch?v=f08Y39UiC-o">https://www.youtube.com/watch?v=f08Y39UiC-o</a>       |
| 13 | Understanding stresses in shaft<br><a href="https://www.youtube.com/watch?v=1YTKedLQOa0">https://www.youtube.com/watch?v=1YTKedLQOa0</a>       |
| 14 | Understanding and Analyzing Trusses<br><a href="https://www.youtube.com/watch?v=Hn_iozUo9m4">https://www.youtube.com/watch?v=Hn_iozUo9m4</a>   |
| 15 | Method of joints<br><a href="https://www.youtube.com/watch?v=_rK02neOF18">https://www.youtube.com/watch?v=_rK02neOF18</a>                      |

# MODEL QUESTION PAPER

## CEE3110–MECHANICS OF MATERIALS

Time :3 Hrs

Max.Marks:100

PART-A

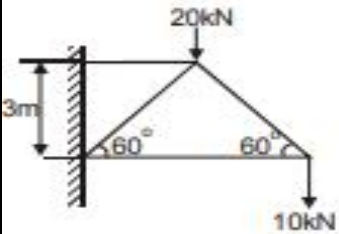
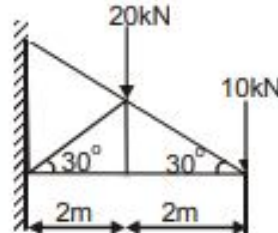
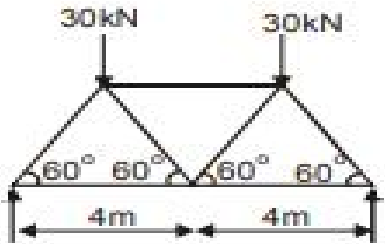
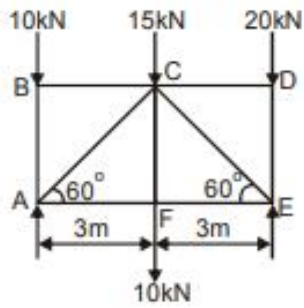
(5x2x10Marks=100Marks)

Note: Answer Ten questions by selecting two questions from each unit.

Each question carries 10 marks

| S. no | Questions                                                                                                                                                                                                                                             | Unit | Blooms Level | Course Outcome | Program Outcomes        |
|-------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|--------------|----------------|-------------------------|
| I     | 1) A rod 1m long and 20mm x 20mm in cross section is subjected to a pull of 98kN. If the modulus of elasticity of the material is $0.2 \times 10^6$ N/mm <sup>2</sup> . Determine the elongation of the bar.                                          | I    | AN           | E3110.1        | PO1, PO2, PO3, PO6, PO7 |
|       | 2) A bar of 300mm long, 50mm wide and 30mm thick is subjected to an axial compression of 90 KN in the length direction. Calculate the final dimensions and change in volume of the bar. Take $E = 0.6 \times 10^5$ N/mm <sup>2</sup> and $\nu = 0.25$ | I    | AN           | E3110.1        | PO1, PO2, PO3, PO6, PO7 |
|       | 3) A steel rod 25 mm diameter and 2m long is subjected to an axial pull of 50 KN find,<br>The intensity of stress<br>Strain<br>Elongation<br>Take $E = 200$ GN/m <sup>2</sup>                                                                         | I    | AN           | E3110.1        | PO1, PO2, PO3, PO6, PO7 |
|       | 4) A steel wire of 1 m long and 3 mm diameter elongated by 0.08 mm in length and contracted by $3 \times 10^{-5}$ mm in diameter under a tensile load of 200N. Calculate stress, linear strain, lateral strain and Poisson's, and Young's modulus.    | I    | AN           | E3110.1        | PO1, PO2, PO3, PO6, PO7 |
| II    | 5) Sketch the SFD and BMD of cantilever beam subjected to uniformly distributed load of W KN/m over a half of span from the fixed end.                                                                                                                | II   | AN           | E3110.2        | PO1, PO2, PO3, PO6, PO7 |
|       | 6) A cantilever beam of 6m span is loaded with point loads of 5KN, 8KN and 10KN at a distance of 2m, 4m and 6m from fixed end.                                                                                                                        | II   | AN           | E3110.2        | PO1, PO2, PO3, PO6, PO7 |
|       | 7) Briefly explain the different types of supports provided for the beams.                                                                                                                                                                            | II   | R,U          | E3110.2        | PO1, PO2, PO3, PO6, PO7 |
|       | 8) A simply supported beam of span 4m long carries a point load of 2KN at 2m from right support and an additional udl of 1KN/m for a length of 1m from the left support. Draw the                                                                     | II   | AN           | E3110.2        | PO1, PO2, PO3, PO6, PO7 |

|     |                                                                                                                                                                                                                                                                                                                                                             |     |    |         |                         |
|-----|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|----|---------|-------------------------|
|     | SFD & BMD                                                                                                                                                                                                                                                                                                                                                   |     |    |         |                         |
| III | 9) Locate the centroid of the angle section 100mm x 100mm x 10mm for its base and left edge.                                                                                                                                                                                                                                                                | III | AN | E3110.3 | PO1, PO2, PO3, PO6, PO7 |
|     | 10) Find the centre of gravity of the T section of size 120mmx130mmx30mm overall.                                                                                                                                                                                                                                                                           | III | AN | E3110.3 | PO1, PO2, PO3, PO6, PO7 |
|     | 11) Find the moment of inertia of hollow circular section having outer diameter as 300mm and inner diameter as 200 mm. Also find the section modulus and radius of gyration                                                                                                                                                                                 | III | AN | E3110.3 | PO1, PO2, PO3, PO6, PO7 |
|     | 12) A steel beam of an I-section has the following details,<br>Top flange = 120mm x 20mm<br>Bottom flange = 200mm x 40mm<br>Web = 180mm x 20mm<br>Determine moment of inertia about XX and YY axis.                                                                                                                                                         | III | AN | E3110.3 | PO1, PO2, PO3, PO6, PO7 |
| IV  | 13) A rectangular beam of size 60x100 mm is subjected to a central point load of 10kN on a simply supported beam of span 5m. Find the maximum bending stress.                                                                                                                                                                                               | IV  | AN | E3110.4 | PO1, PO2, PO3, PO6, PO7 |
|     | 14) A simply supported beam of 6m span carries a point load of 40kN at its centre. Its cross section is a rectangle of section 300mmx400mm. Determine (i) Maximum bending stress, (ii) bending stress at 40mm above the N.A                                                                                                                                 | IV  | AN | E3110.4 | PO1, PO2, PO3, PO6, PO7 |
|     | 15) A simply supported beam of 6m span carries a point load of 40kN at its center, its cross section is a rectangular of breadth 300mm and depth 400mm. Determine the following (i) Maximum moment of resistance, (ii) Draw the bending stress diagram and (iii) Bending stress at 50mm above N.A. if the maximum bending moment stress is $5\text{N/mm}^2$ | IV  | AN | E3110.4 | PO1, PO2, PO3, PO6, PO7 |
|     | 16) A Simply supported timber beam is 6m long. It carries an UDL of 15 KN/m over the entire span and a point load of 10kN at mid span. The stress in beam is not to exceed $8\text{N/mm}^2$ . Design a suitable section by assuming depth as twice the width.                                                                                               | IV  | AN | E3110.4 | PO1, PO2, PO3, PO6, PO7 |

|   |                                                                                                                                                                                                          |   |    |         |                         |
|---|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|----|---------|-------------------------|
| V | <p>17) Determine the magnitude and nature of forces in the members of truss shown in figure by method of joints.</p>    | V | AN | E3110.5 | PO1, PO2, PO3, PO6, PO7 |
|   | <p>18) Determine the magnitude and nature of forces in the members of truss shown in figure by method of joints.</p>    | V | AN | E3110.5 | PO1, PO2, PO3, PO6, PO7 |
|   | <p>19) Determine the magnitude and nature of forces in the members of truss shown in figure by method of joints.</p>  | V | AN | E3110.5 | PO1, PO2, PO3, PO6, PO7 |
|   | <p>20) Determine the magnitude and nature of forces in the members of truss shown in figure by method of joints.</p>  | V | AN | E3110.5 | PO1, PO2, PO3, PO6, PO7 |

## QUESTION PAPER SETTING

The teaching learning process and assessment are being carried out in accordance with the revised Blooms Taxonomy. The question paper should consist of 90% questions based on Lower Order Thinking (LOTs) and the remaining 10% based on Higher Order Thinking (HOTs) as detailed below.

| <b>Revised Bloom's<br/>Taxonomy<br/>Level</b> | <b>Lower order thinking skills<br/>(LOTs)</b> | <b>Higher Order Thinking<br/>Skills (HOTs)</b> |
|-----------------------------------------------|-----------------------------------------------|------------------------------------------------|
|                                               | <b>R-Remember, U-Understand,<br/>Ap-Apply</b> | <b>An- Analyse, E-Evaluate,<br/>C-Create</b>   |
| % to be included                              | 10 %                                          | 90 %                                           |

## CEE3210– CONSTRUCTION MATERIALS

Programme Name : CIVIL ENGINEERING  
 Course Code : CEE3210  
 Semester : III SEMESTER  
 Course Title : CONSTRUCTION MATERIALS  
 Course Type : THEORY

| L | T | P | C |
|---|---|---|---|
| 3 | 0 | 0 | 3 |

### TEACHING AND SCHEME OF EXAMINATION

No. of weeks per semester: 15 weeks

| Course                 | Instructions |                  | Examination         |                        |       |          |
|------------------------|--------------|------------------|---------------------|------------------------|-------|----------|
|                        | Hours / Week | Hours / Semester | Marks               |                        |       | Duration |
|                        |              |                  | Internal Assessment | Autonomous Examination | Total |          |
| Construction Materials | 3            | 45               | 40                  | 100*                   | 100   | 3 Hrs    |

\*Examinations will be conducted for 100 marks and will be converted to 60 marks

### TOPICS AND ALLOCATION OF HOURS

| Unit         | Topics                                                      | Time (Hrs.) |
|--------------|-------------------------------------------------------------|-------------|
| I            | Construction materials and properties                       | 9           |
| II           | Bricks, masonry blocks, ceramic products, and glass         | 9           |
| III          | Cementitious materials                                      | 9           |
| IV           | Timber, mortar, concrete, protective materials and coatings | 9           |
| V            | Metallic, plastic and composite materials                   | 9           |
| <b>Total</b> |                                                             | <b>45</b>   |

### COURSE DESCRIPTION

In Civil Engineering construction field, building materials can generally be divided into two categories viz., natural and man-made construction materials. This Course is designed to understand various properties, Manufacturing process, characteristics and material suitability for different construction activities. Civil Engineers must know the quality, material standards and properties of materials used in any construction. Hence this course is designed as to provide in depth conceptual understanding about the various construction materials.

## COURSE OBJECTIVE

The objective of this course is to enable the student to

- Understand about Physical, Mechanical, Chemical and Thermal properties of construction materials.
- Understand about new and advanced construction materials available around the globe.
- Compare the suitability of materials for different construction purpose.
- Understand the importance of durability any construction materials.
- Understand about the raw materials and manufacturing process of various construction materials

## COURSE OUTCOMES

| After successful completion of this course, the students should be able to |                                                                                                                                 |
|----------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------|
| <b>E3210.1</b>                                                             | Select suitable materials for construction activities and can have required technical knowledge on the same.                    |
| <b>E3210.2</b>                                                             | Analyse the quality concern in the field of civil Engineering construction by adopting suitable standards on materials.         |
| <b>E3210.3</b>                                                             | Handle the construction project as supervisor/site Engineer/project engineer by having overall technical knowledge on materials |
| <b>E3210.4</b>                                                             | Prepare detailed specifications about materials used in construction activities.                                                |
| <b>E3210.5</b>                                                             | Do research and able to develop new, sustainable/improved material for the future construction industry.                        |

## Pre-requisites

Knowledge of basic Science and basic knowledge on materials.

## CO-POs & PSOs mapping matrix

| CO                       | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PSO1 | PSO2 | PSO3 |
|--------------------------|-----|-----|-----|-----|-----|-----|-----|------|------|------|
| <b>E3210.1</b>           | 3   | 1   | 1   | 1   | 1   | 1   | 2   | 3    | 3    | 2    |
| <b>E3210.2</b>           | 3   | 1   | 1   | 1   | 1   | 1   | 2   | 3    | 3    | 2    |
| <b>E3210.3</b>           | 3   | 2   | 2   | 2   | 2   | 2   | 2   | 3    | 3    | 2    |
| <b>E3210.4</b>           | 3   | 1   | 1   | 1   | 1   | 1   | 1   | 3    | 3    | 2    |
| <b>E3210.5</b>           | 2   | 2   | 2   | 2   | 2   | 2   | 2   | 3    | 3    | 2    |
| <b>Total</b>             | 14  | 7   | 7   | 7   | 7   | 7   | 9   | 15   | 15   | 10   |
| <b>Correlation Level</b> | 3   | 1   | 1   | 1   | 1   | 1   | 1   | 3    | 3    | 2    |

Correlation level 1 – Slight (low)

Correlation level 2 – Moderate (Medium)

Correlation level 3 – Substantial (high)

### Instructional Strategy

- Since this course covers vast area, Teachers are expected to impart technical knowledge to the students about construction materials by screening the pictures /videos of various materials used in construction.
- Students shall be asked to visit various stores/dealers selling standard construction materials. (For better understanding about available market forms and cost of materials).
- Emphasis shall be given to understand durability and sustainability of materials used in construction
- Apart from syllabus content, Students shall be encouraged to learn about modern construction materials through online sources.

### Assessment Methodology

|                    | Continuous Assessment(40marks) |                              |                                         |                       | End Semester Examination<br>(60 marks) |
|--------------------|--------------------------------|------------------------------|-----------------------------------------|-----------------------|----------------------------------------|
|                    | CA1                            | CA2                          | CA3                                     | CA4                   |                                        |
| Mode               | Written test<br>(Unit 1 & 2)   | Written test<br>(Unit 3 & 4) | Quiz<br>MCQ<br>(Online/<br>Offline)     | Model<br>Examination  | Written<br>Examination                 |
| Duration           | 2 Periods                      | 2 Periods                    | 1Hour                                   | 3Hours                | 3Hours                                 |
| Exam Marks         | 50                             | 50                           | 60                                      | 100                   | 100                                    |
| Converted to       | 10                             | 10                           | 10                                      | 10                    | 60                                     |
| Marks              | 40                             |                              |                                         |                       | 60                                     |
| Tentative Schedule | 6 <sup>th</sup> Week           | 12 <sup>th</sup> Week        | 13 <sup>th</sup> -14 <sup>th</sup> Week | 16 <sup>th</sup> Week |                                        |

### CONTINUOUS ASSESSMENT

**CA1and CA2:** Assessment written test should be conducted for 50Marks for two units. The marks scored will be converted to 10 Marks for the internal assessment.

**CA1and CA2, Assessment test should be conducted for two units as below**

- PARTA: (5X 10Marks=50Marks).
- Eight questions will be asked, students should write five questions. Four questions can be asked from each unit.

**CA3:** 60 MCQ can be asked by covering the entire portion. It may be conducted by Online / Offline. The marks scored should be converted to 10 marks for the internal assessment.

**CA4:** Model examination should be conducted as per the end semester question pattern. The marks should be converted to 10marks for the internal assessment.

**Question Pattern:**

- Answer Ten questions by selecting two questions from each unit. Each question carries 10 marks.
- Four questions will be asked from every unit. Students should write any two questions.

**Question Pattern –Model Examination and End Semester Examination Theory Exam**

PART-A

(5x2x10Marks=100Marks)

Note: Answer Ten questions by selecting two questions from each unit. Each question carries 10 marks

**Sample**

- |      |    |
|------|----|
| I.   | 1  |
|      | 2  |
|      | 3  |
|      | 4  |
| II.  | 5  |
|      | 6  |
|      | 7  |
|      | 8  |
| III. | 9  |
|      | 10 |
|      | 11 |
|      | 12 |
| IV.  | 13 |
|      | 14 |
|      | 15 |
|      | 16 |
| V.   | 17 |
|      | 18 |
|      | 19 |
|      | 20 |

### QUESTION PAPER SETTING

The teaching learning process and assessment are being carried out in accordance with the revised Blooms Taxonomy. The question paper should consist of 90% questions based on Lower Order Thinking (LOTs) and the remaining 10% based on Higher Order Thinking (HOTs) as detailed below.

| <b>Revised Bloom's<br/>Taxonomy<br/>Level</b> | <b>Lower order thinking skills<br/>(LOTs)</b> | <b>Higher Order Thinking<br/>Skills (HOTs)</b> |
|-----------------------------------------------|-----------------------------------------------|------------------------------------------------|
|                                               | <b>R-Remember, U-Understand,<br/>AP-Apply</b> | <b>An- Analyse, E-Evaluate,<br/>C-Create</b>   |
| % to be included                              | 90 %                                          | 10 %                                           |

**CEE3210–CONSTRUCTION MATERIALS**

| CEE3210                                                                                                                                                                                                                                                                                         | CONSTRUCTION MATERIALS                                     | L           | T | P | C                       |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------|-------------|---|---|-------------------------|
| THEORY                                                                                                                                                                                                                                                                                          |                                                            | 3           | 0 | 0 | 3                       |
| <b>Unit-I</b>                                                                                                                                                                                                                                                                                   | <b>CONSTRUCTION MATERIALS AND PROPERTIES</b>               | <b>9Hrs</b> |   |   |                         |
| <b>Introduction:</b><br>History of building materials-Conventional building materials-New and advanced materials<br>Eco friendly and green construction materials (Definition and any five materials)<br>Energy efficient and sustainable building materials(Definition and any five materials) |                                                            |             |   |   | [1Hr]<br>[1Hr]<br>[1Hr] |
| <b>1.2 Properties of construction Materials</b>                                                                                                                                                                                                                                                 |                                                            |             |   |   | [1Hr]                   |
| Density-Specific gravity                                                                                                                                                                                                                                                                        |                                                            |             |   |   |                         |
| Porosity-Water absorption – Permeability - Chemical resistance-weathering resistance                                                                                                                                                                                                            |                                                            |             |   |   | [1Hr]                   |
| Fire resistance-Thermal conductivity                                                                                                                                                                                                                                                            |                                                            |             |   |   |                         |
| Thermal expansion-sustainability to freezing and thawing                                                                                                                                                                                                                                        |                                                            |             |   |   | [1Hr]                   |
| Durability-Factors affecting durability of building materials.                                                                                                                                                                                                                                  |                                                            |             |   |   |                         |
| <b>1.3.Aggregates</b>                                                                                                                                                                                                                                                                           |                                                            |             |   |   | [1Hr]                   |
| Classification of aggregates                                                                                                                                                                                                                                                                    |                                                            |             |   |   |                         |
| Natural aggregates Artificial aggregates -Lightweight aggregates                                                                                                                                                                                                                                |                                                            |             |   |   | [1Hr]                   |
| Heavy weight aggregates-Recycling of aggregates.                                                                                                                                                                                                                                                |                                                            |             |   |   |                         |
| <b>1.4. Water</b>                                                                                                                                                                                                                                                                               |                                                            |             |   |   | [1Hr]                   |
| Requirements of water used in construction works-Effects of presence, Sulphates and chlorides in water-Permissible limits of deleterious materials as per Indian standard, IS456:2000.                                                                                                          |                                                            |             |   |   | [1Hr]                   |
| <b>Unit-II</b>                                                                                                                                                                                                                                                                                  | <b>BRICKS, MASONRY BLOCKS, CERAMIC PRODUCTS, AND GLASS</b> | <b>9Hrs</b> |   |   |                         |
| <b>2.1 Clay bricks</b>                                                                                                                                                                                                                                                                          |                                                            |             |   |   | [1Hr]                   |
| Brick-Brick Earth-Composition of good brick earth                                                                                                                                                                                                                                               |                                                            |             |   |   | [1Hr]                   |
| Classification and grades of bricks as per BIS Compressive strength                                                                                                                                                                                                                             |                                                            |             |   |   |                         |
| Characteristics of good brick                                                                                                                                                                                                                                                                   |                                                            |             |   |   | [1Hr]                   |
| Special types of brick and uses.                                                                                                                                                                                                                                                                |                                                            |             |   |   | [1Hr]                   |
| <b>2.2. Masonry blocks</b>                                                                                                                                                                                                                                                                      |                                                            |             |   |   |                         |
| Masonry blocks-Constituents, Properties, Characteristics and uses of- Fly ash bricks                                                                                                                                                                                                            |                                                            |             |   |   | [1Hr]                   |
| Solid blocks- Hollow blocks, AAC blocks.                                                                                                                                                                                                                                                        |                                                            |             |   |   |                         |
| <b>2.3 Ceramic Products</b>                                                                                                                                                                                                                                                                     |                                                            |             |   |   | [1Hr]                   |
| Ceramic products- Properties                                                                                                                                                                                                                                                                    |                                                            |             |   |   |                         |
| Characteristics and uses of Earthenware-Stoneware-Porcelain-Terracotta-Ceramic Tiles                                                                                                                                                                                                            |                                                            |             |   |   | [1Hr]                   |
| Glazed Tiles-Thermal care tiles-Roof tiles.                                                                                                                                                                                                                                                     |                                                            |             |   |   |                         |
| <b>2.4 Glass</b>                                                                                                                                                                                                                                                                                |                                                            |             |   |   | [1Hr]                   |

|                                                                                                                                                                                                                  |                                                                    |                         |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------|-------------------------|
| Definition-Constituents of glass<br>Classification of glass, Size and thickness.                                                                                                                                 |                                                                    | [1Hr]                   |
| <b>Unit-III</b>                                                                                                                                                                                                  | <b>CEMENTITIOUS MATERIALS</b>                                      | <b>9Hrs</b>             |
| <b>3.1 Cement</b><br>Cement - composition of ordinary Portland Cement, Portland pozzolanic cement<br>Grades of cement-water cement ratio-hydration of cement<br>Setting of cement- formation of bogus compounds. |                                                                    | [1Hr]<br><br>[1Hr]      |
| <b>3.2 Supplementary cementitious materials</b><br>Pozzolanic materials, Fly ash-types-ground granulated blast furnace slag<br>Silica fume- natural pozzolans.                                                   |                                                                    | [1Hr]<br>[1Hr]          |
| <b>3.3 Lime</b><br>Sources of lime<br>Classification of lime-uses of lime-slaking of lime-lime Mortar -lime putty-uses.                                                                                          |                                                                    | [1Hr]<br>[1Hr]<br>[1Hr] |
| <b>3.4 Bituminous materials</b><br>Introduction, Bitumen-tar-asphalt-applications.                                                                                                                               |                                                                    | [1Hr]                   |
| <b>Unit-IV</b>                                                                                                                                                                                                   | <b>TIMBER, MORTAR, CONCRETE, PROTECTIVE MATERIALS AND COATINGS</b> | <b>9Hrs</b>             |
| <b>4.1. Timber and wooden products</b><br>Classification of Timber-Seasoning of Timber-Methods of seasoning<br>Defects in Timber, Preservation of Timber, Wood Products.                                         |                                                                    | [2Hrs]                  |
| <b>4.2 Mortar</b><br>Introduction-Classification<br>Characteristics of good mortar- mix ratios for different works<br>Grouting-Guniting.                                                                         |                                                                    | [2Hrs]                  |
| <b>4.3 Concrete</b><br>Concrete-Production- Mix Ratios-Mixing-Workability-Ready mix concrete<br>Strength of concrete-non-destructive test on Concrete<br>Durability-factors affecting durability of concrete.    |                                                                    | [2Hrs]<br>[1Hr]         |
| <b>4.4 Protective &amp; Insulating materials</b><br>Damp proof-Water Proof-Termite proof -Pest control in buildings-Heat insulating materials-Sound insulating materials.                                        |                                                                    | [1Hr]                   |
| <b>4.5. Paints and Varnishes</b><br>Introduction-Characteristics of ideal paint-Types of paints-Distemper- Varnishes.                                                                                            |                                                                    | [1Hr]                   |
| <b>4.6.Anti-Termite Treatment Material</b><br>Objectives, Methods of termite treatment.                                                                                                                          |                                                                    |                         |

| UNIT-V                                                                                                                                          | METALLIC, PLASTIC AND COMPOSITE MATERIALS | 9Hrs      |
|-------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------|-----------|
| <b>5.1. Metals and composites</b>                                                                                                               |                                           |           |
| Metals used in construction                                                                                                                     |                                           | [1Hr]     |
| Steel-Galvanised Iron-Stainless steel -Pipes-Structural steel                                                                                   |                                           |           |
| Market forms of steel sections-cold formed Light gauge sections                                                                                 |                                           | [1Hr]     |
| Aluminium and Composites.                                                                                                                       |                                           |           |
| <b>5.2 Plastics in construction</b>                                                                                                             |                                           |           |
| Plastics –Characteristics – plastic products                                                                                                    |                                           | [1Hr]     |
| PVC pipes-UPVC Pipes, Doors and windows,                                                                                                        |                                           |           |
| Water tanks-CPVC-PVC materials used in water supply, Sanitary and electricity plumbing                                                          |                                           | [2Hrs]    |
| Standards as per BIS.                                                                                                                           |                                           |           |
| <b>5.3. Roofing materials</b>                                                                                                                   |                                           |           |
| Types of roofing materials, RCC-AC Sheets-G.I Sheets-Galvalume Sheets-Insulated roofing sheets, False Ceiling-Materials used for false ceiling. |                                           | [2Hrs]    |
| <b>5.4. Elevation and façade materials</b>                                                                                                      |                                           |           |
| Importance of facade design in architecture                                                                                                     |                                           |           |
| Types of materials used, Insulated glass,                                                                                                       |                                           | [2Hrs]    |
| Aluminium composite panels,                                                                                                                     |                                           |           |
| Fibre cement, Wood Plastic composites, cladding- types                                                                                          |                                           |           |
| <b>TOTAL</b>                                                                                                                                    |                                           | <b>45</b> |

#### Suggested List of Students Activity

- For better understanding about various construction materials, Student shall actively visit Standard stores, and different ongoing construction sites.
- Web based learning is encouraged.

#### Text Books

| S.NO | TITLE                 | AUTHOR       | PUBLISHERWITHEDITION                                               |
|------|-----------------------|--------------|--------------------------------------------------------------------|
| 1.   | Engineering Materials | S.C.Rangwala | 43 <sup>rd</sup> Edition, Charotar Publishing House Pvt.Ltd, 2019. |
| 2.   | Building Materials    | P.C.Varghese | 2nd Edition, Prentice Hall of India Pvt Ltd, 2015.                 |
| 3.   | Building Materials    | S.K.Duggal   | 3rd Edition, New Age International (P) Ltd, 2012                   |

#### Web-based/Online Resources

| S.No | Website/Links                                                                                                                                                                       |
|------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1    | <a href="https://www.buildersmart.in/blogs/evolution-of-construction-and-building-materials">https://www.buildersmart.in/blogs/evolution-of-construction-and-building-materials</a> |
| 2    | <a href="https://www.coa.gov.in/show_img.php?fid=137">Green building materials: https://www.coa.gov.in/show_img.php?fid=137</a>                                                     |
| 3    | <a href="https://archiroots.com/10-best-energy-efficient-building-materials/">https://archiroots.com/10-best-energy-efficient-building-materials/</a>                               |
| 4    | <a href="https://www.bis.gov.in/standards/technical-department/national-building-code/">https://www.bis.gov.in/standards/technical-department/national-building-code/</a>           |

**MODEL QUESTION PAPER****CEE3210–CONSTRUCTION MATERIALS****Time :3 Hrs****Max.Marks:100****PART-A****(5x2x10Marks=100Marks)**

Note: Answer Ten questions by selecting two questions from each unit. Each question carries 10 marks

| S.no | Questions                                                                                             | Unit | Bloom's Level | Course Outcome | Program Outcomes |
|------|-------------------------------------------------------------------------------------------------------|------|---------------|----------------|------------------|
| I    | 1) Write short notes on any three eco-friendly and green construction materials                       | I    | R             | E3210.1        | PO1,PO5, PO7     |
|      | 2) Write about the effects of presence of Sulphates and Chlorides in water.                           | I    | R             | E3210.1        | PO1,PO5, PO7     |
|      | 3) Explain the factors affecting durability of concrete                                               | I    | U             | E3210.1        | PO1,PO5, PO7     |
|      | 4) Explain the classification of aggregates                                                           | I    | U             | E3210.1        | PO1,PO5, PO7     |
| II   | 5) Write down the Constituents, Properties, Characteristics and uses of- Fly ash brick and AAC blocks | II   | R             | E3210.2        | PO1,PO5, PO7     |
|      | 6) i. What are the characteristics of good bricks<br>ii. Write about special bricks                   | II   | R             | E3210.2        | PO1,PO5, PO7     |
|      | 7) Write the properties, Characteristic and uses of Earthenware and Porcelain                         | II   | R             | E3210.2        | PO1,PO5, PO7     |
|      | 8) Define glass. Explain its constituents                                                             | II   | R             | E3210.2        | PO1,PO5, PO7     |
| III  | 9) Explain in detail about the process of hydration of cement and setting of cement                   | III  | U             | E3210.3        | PO1,PO5, PO7     |
|      | 10) Write notes on bituminous material                                                                | III  | R             | E3210.3        | PO1,PO5, PO7     |
|      | 11) Write short notes on source and uses of Lime                                                      | III  | R             | E3210.3        | PO1,PO5, PO7     |
|      | 12) What are bogus compounds? Explain.                                                                | III  | R             | E3210.3        | PO1,PO5, PO7     |
| IV   | 13) Explain the defects in timber                                                                     | IV   | U             | E3210.4        | PO1,PO5, PO7     |
|      | 14) Explain GPR test of non-destructive test on concrete                                              | IV   | U             | E3210.4        | PO1,PO5, PO7     |
|      | 15) Explain the methods of seasoning                                                                  | IV   | U             | E3210.4        | PO1,PO5, PO7     |
|      | 16) Briefly explain properties of damp proofing material                                              | IV   | U             | E3210.4        | PO1,PO5, PO7     |

|   |                                                                         |   |    |         |              |
|---|-------------------------------------------------------------------------|---|----|---------|--------------|
| V | 17) What are the metals used in construction? Explain                   | V | AN | E3210.5 | PO1,PO5, PO7 |
|   | 18) Write the Importance of facade design in architecture?              | V | R  | E3210.5 | PO1,PO5, PO7 |
|   | 19) Define Cladding? Explain its types                                  | V | R  | E3210.5 | PO1,PO5, PO7 |
|   | 20) Write the characteristics of plastic products used in construction? | V | R  | E3210.5 | PO1,PO5, PO7 |

### QUESTION PAPER SETTING

The teaching learning process and assessment are being carried out in accordance revised Blooms Taxonomy. The question paper should consist of 90% questions based on Lower Order Thinking (LOTs) and the remaining 10% based on Higher Order Thinking(HOTs) as detailed below.

| Revised Bloom's Taxonomy Level | Lower order thinking skills (LOTs) | Higher Order Thinking Skills (HOTs) |
|--------------------------------|------------------------------------|-------------------------------------|
|                                | R-Remember, U-Understand, AP-Apply | An- Analyse, E-Evaluate, C-Create   |
| % to be included               | 90 %                               | 10 %                                |

## CEE3340– SURVEYING PRACTICE

Programme Name : CIVIL ENGINEERING  
 Course Code : CEE3340  
 Semester : III SEMESTER  
 Course Title : SURVEYING PRACTICE  
 Course Type : PRACTICUM

| L | T | P | C |
|---|---|---|---|
| 1 | 0 | 4 | 3 |

### TEACHING AND SCHEME OF EXAMINATION

No. of weeks per semester: 15 weeks

| Course             | Instructions  |                     | Examination            |                           |       |          |
|--------------------|---------------|---------------------|------------------------|---------------------------|-------|----------|
|                    | Hour/<br>Week | Hours /<br>Semester | Marks                  |                           |       | Duration |
|                    |               |                     | Internal<br>Assessment | Autonomous<br>Examination | Total |          |
| Surveying practice | 5             | 75                  | 40                     | 100*                      | 100   | 3Hrs.    |

\*Examinations will be conducted for 100 marks and will be converted to 60 marks

### TOPICS AND ALLOCATION OF HOURS

| Unit         | Topics                                           | Time<br>(Hrs.) |
|--------------|--------------------------------------------------|----------------|
| I            | Chain & compass surveying                        | 15             |
| II           | Levelling & contouring                           | 15             |
| III          | Theodolite surveying & trigonometrical levelling | 15             |
| IV           | Tacheometric surveying & areas and volumes       | 15             |
| V            | Modern surveying                                 | 15             |
| <b>Total</b> |                                                  | <b>75</b>      |

### COURSE DESCRIPTION

At the diploma level of Civil Engineering studies, students are expected to develop skills in managing sites, taking measurements, surveying and inspection. One of the main focuses of survey work is the development of townships, residential colonies, public buildings, and other structures. Hence, it is necessary to have a thorough knowledge of surveying principles and techniques such as chain surveying, compass surveying, levelling, Theodolite surveying, Tachometric surveying, and modern surveying. Teachers are expected to explain various concepts and principles by demonstrating the use of different equipment and conducting practical exercises in all types of surveying to benefit the students

**COURSE OBJECTIVE:**

The objective of this course is to enable the student

- Gain a foundational understanding of surveying by familiarizing with key concepts and surveying instruments.
- Explore the principles of chain, compass, levelling, and contour surveying, and learn about the various types of levels and levelling methods.
- Expand knowledge to include Theodolite, Tachometry surveying, Trigonometrical levelling and GPS.
- Finally, discover the principles and applications of Total Station in civil engineering.

**COURSE OUTCOMES:**

| After successful completion of this course, the students should be able to |                                                                                                                                                                                                                            |
|----------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>E3340.1</b>                                                             | Explain the principle of chain surveying and perform the operations involved in chaining and describe the operations involved in compass surveying like taking bearings and calculation of included angles and traversing. |
| <b>E3340.2</b>                                                             | Explain the fundamental principles of levelling, tabulate the leveling field data, explain the computation of reduced levels, different types of levelling, and contour surveying.                                         |
| <b>E3340.3</b>                                                             | Apply the knowledge of principles and purpose of theodolite surveying and Trigonometrical levelling.                                                                                                                       |
| <b>E3340.4</b>                                                             | Apply the knowledge of principles and purpose of tacheometric surveying and areas and volumes.                                                                                                                             |
| <b>E3340.5</b>                                                             | Know the principles and purpose of Total Station and GPS.                                                                                                                                                                  |

**Pre-requisites**

Nil

**CO-POs & PSOs mapping matrix**

| CO/PO                    | PO1       | PO2      | PO3       | PO4       | PO5       | PO6      | PO7       | PSO1      | PSO2      | PSO3      |
|--------------------------|-----------|----------|-----------|-----------|-----------|----------|-----------|-----------|-----------|-----------|
| <b>E3340.1</b>           | 3         | -        | 2         | 2         | 2         | -        | 3         | 3         | 3         | 3         |
| <b>E3340.2</b>           | 3         | -        | 2         | 2         | 2         | -        | 3         | 3         | 3         | 3         |
| <b>E3340.3</b>           | 3         | -        | 2         | 2         | 2         | -        | 3         | 3         | 3         | 3         |
| <b>E3340.4</b>           | 3         | -        | 2         | 2         | 2         | -        | 3         | 3         | 3         | 3         |
| <b>E3340.5</b>           | 3         | -        | 2         | 2         | 2         | -        | 3         | 3         | 3         | 3         |
| <b>Total</b>             | <b>15</b> | <b>-</b> | <b>10</b> | <b>10</b> | <b>10</b> | <b>-</b> | <b>15</b> | <b>15</b> | <b>15</b> | <b>15</b> |
| <b>Correlation Level</b> | <b>3</b>  | <b>-</b> | <b>2</b>  | <b>2</b>  | <b>2</b>  | <b>-</b> | <b>3</b>  | <b>3</b>  | <b>3</b>  | <b>3</b>  |

Correlation level 1 – Slight (low)

Correlation level 2 – Moderate (Medium)

Correlation level 3 – Substantial (high)

### Instructional Strategy

- Teachers have the responsibility to provide theoretical knowledge on surveying equipment and its standard procedures. This will help students to understand the importance of each surveying equipment. Additionally, teachers should encourage students to practice using all surveying equipment.
- To ensure that learning is outcome and employability-based, a theory-demonstrate-practice-activity strategy can be implemented throughout the course. This approach will help students to better assimilate the knowledge they have acquired.
- Furthermore, teachers should encourage active participation from students in both theoretical and practical classes. This will help to increase their confidence in their learning abilities.

### Assessment Methodology

|                           | Continuous Assessment (40 marks)   |                                             |                       |                       | End Semester Examination (60 marks) |
|---------------------------|------------------------------------|---------------------------------------------|-----------------------|-----------------------|-------------------------------------|
|                           | CA1                                | CA2                                         | CA3                   | CA4                   |                                     |
| <b>Mode</b>               | Practical Test                     | Practical Test                              | Written Test Theory   | Practical Test        | Practical Examination               |
| <b>Portion</b>            | Cycle I Exercises<br>50% Exercises | Cycle II Exercises<br>Another 50% Exercises | All Units             | All Exercises         | All Exercises                       |
| <b>Duration</b>           | 2 Periods                          | 2 Periods                                   | 3 hours               | 3 hours               | 3 hours                             |
| <b>Exam Marks</b>         | 60                                 | 60                                          | 100                   | 100                   | 100                                 |
| <b>Converted to</b>       | 10                                 | 10                                          | 10                    | 10                    | 60                                  |
| <b>Marks</b>              | 40                                 |                                             |                       |                       | 60                                  |
| <b>Tentative Schedule</b> | 7 <sup>th</sup> Week               | 14 <sup>th</sup> Week                       | 15 <sup>th</sup> Week | 16 <sup>th</sup> Week |                                     |

#### Note:

- **CA1 and CA2:** All the exercises/experiments should be completed as per the portions above and kept for the practical test. The students shall be permitted to select any one by lot for the test. The practical test should be conducted as per the scheme of evaluation as below. The marks awarded shall be converted to 10 Marks for each assessment test.

Practical documents should be maintained for every exercise / experiment immediately after completion of the practice. The practical document should be submitted for the practical test. The same should be evaluated for 10 Marks for each exercise/experiment. The total marks awarded should be converted to 10 Marks for the practical test as per the scheme of evaluation as below.

**The details of the documents to be prepared as per the instruction below.**

Each exercise should be completed on the day of practice. The same shall be evaluated for 10 marks on the day or next day of practice before commencement of the next exercise.

This documentation can be carried out in a separate notebook or printed manual or a file with documents. Students should write the procedure and draw the sketch manually.

The detailed date of the practices and its evaluations should be maintained in the course logbook. The log book and the practical documents should be submitted for the verification by the Flying Squad.

#### **SCHEME OF EVALUATION**

| <b>PART</b> | <b>DESCRIPTION</b>                        | <b>MARKS</b> |
|-------------|-------------------------------------------|--------------|
| A           | Aim and Apparatus Required                | 5            |
| B           | Tabulation/Observation                    | 20           |
| C           | Graph/Sketch/Calculation                  | 20           |
| D           | Result                                    | 5            |
| TOTAL       |                                           | 50           |
| E           | Practical Documents (As per the portions) | 10           |
| TOTAL       |                                           | 60           |

- **CA 3:** Written Test for complete theory portions should be conducted for 100 Marks as per the question pattern below. The marks scored will be converted to 10 Marks for internal assessment.

#### **Question pattern – Written Test Theory**

| <b>Description</b> |                                                 | <b>Marks</b> |           |
|--------------------|-------------------------------------------------|--------------|-----------|
| Part – A           | 30 MCQ from the complete theory portions.       | 30X1Mark     | 30Marks   |
| Part – B           | 7 Questions to be answered out of 10 Questions. | 7X10Marks    | 70Marks   |
| TOTAL              |                                                 |              | 100 Marks |

- **CA 4:** All the exercises/experiments should be completed and kept for the practical test. The students shall be permitted to select any one by lot for the test. The practical test should be conducted as per the scheme of evaluation below. After completion of all the exercises the practical test should be conducted as per End Semester Examination

question pattern scheme of evaluation. The marks awarded should be converted to 10 Marks for the internal assessment.

#### **SCHEME OF EVALUATION**

##### **Model Practical Examination and End Semester Examination - Practical Exam**

| <b>PART</b> | <b>DESCRIPTION</b>         | <b>MARKS</b> |
|-------------|----------------------------|--------------|
| A           | Aim and Apparatus Required | 10           |
| B           | Tabulation/Observation     | 20           |
| C           | Graph/Sketch /Calculation  | 20           |
| D           | Result                     | 10           |
| E           | Written Test               | 30           |
| F           | Viva Voce                  | 10           |
| TOTAL       |                            | 100          |

Note: For the written test 30 MCQ shall be asked from the theory portions.

**CEE3340-SURVEYING PRACTICE**

| CEE3340                                                                                                                                                                                    |                           | SURVEYING PRACTICE | L | T | P | C      |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------|--------------------|---|---|---|--------|
| PRACTICUM                                                                                                                                                                                  |                           |                    | 1 | 0 | 4 | 3      |
| Unit I                                                                                                                                                                                     | CHAIN & COMPASS SURVEYING |                    |   |   |   | 15Hrs  |
| 1.1 Introduction                                                                                                                                                                           |                           |                    |   |   |   | [1Hr]  |
| Definition of surveying - object of surveying - Division of surveying - Surveying Units and its conversion.                                                                                |                           |                    |   |   |   |        |
| 1.2 Chain surveying:                                                                                                                                                                       |                           |                    |   |   |   |        |
| Ranging – Types - Direct and Indirect ranging - Survey stations- types - Baseline - Check line - Tie line - Chain triangulation - Offsets - Types.                                         |                           |                    |   |   |   | [1Hr]  |
| 1.3 Compass Surveying                                                                                                                                                                      |                           |                    |   |   |   |        |
| Compass- Types – Purpose – Whole Circle Bearing and Reduced Bearing- Fore and Back bearing - Magnetic dip and Declination – Meridian - Types - Bearing – Types - Open and closed traverse. |                           |                    |   |   |   | [1Hr]  |
| Exercises:                                                                                                                                                                                 |                           |                    |   |   |   |        |
| 1) Study of FMB sketch/Land documents and instruments used for chain surveying. (Not for examination)                                                                                      |                           |                    |   |   |   | [3Hrs] |
| 2) Determine the distance between two ground stations with the help of a chain. (Direct ranging)                                                                                           |                           |                    |   |   |   | [3Hrs] |
| 3) Calculate the area bounded by the given points by chain triangulation.                                                                                                                  |                           |                    |   |   |   | [3Hrs] |
| 4) Find the included angle of the given closed traverse by using a compass (Minimum 5 stations).                                                                                           |                           |                    |   |   |   | [3Hrs] |
| Unit II                                                                                                                                                                                    | LEVELLING & CONTOURING    |                    |   |   |   | 15Hrs  |
| 2.1 Levelling                                                                                                                                                                              |                           |                    |   |   |   |        |
| Levelling - Temporary adjustment – Terms used in Levelling - Back Sight - Fore sight - Intermediate sight                                                                                  |                           |                    |   |   |   | [1Hr]  |
| Change point -Benchmark – Types - field book                                                                                                                                               |                           |                    |   |   |   |        |
| Methods of Reduction of levels - Height of collimation - Rise and Fall method.                                                                                                             |                           |                    |   |   |   | [1Hr]  |
| 2.2 Contour Surveying:                                                                                                                                                                     |                           |                    |   |   |   |        |
| Definition - Contour - Contouring - Contour interval                                                                                                                                       |                           |                    |   |   |   |        |
| horizontal equivalent-Characteristics of Contours–Contour Gradient interpolation of contours uses of Contour plan and Map                                                                  |                           |                    |   |   |   | [1Hr]  |

|                                                                                                                                                                                                                                                                                                                     |                                                           |              |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------|--------------|
| <b>Exercises:</b>                                                                                                                                                                                                                                                                                                   |                                                           |              |
| 5) Determine the elevations of given points (Minimum 6 points) by conducting fly levelling with Height of collimation method.                                                                                                                                                                                       |                                                           | [3Hrs]       |
| 6) Determine the elevations of given points (Minimum 6 points) by conducting fly levelling with Rise and fall method.                                                                                                                                                                                               |                                                           | [3Hrs]       |
| 7) Conduct a block contouring survey in the given irregular field and plot the contour lines. (Not for examination)                                                                                                                                                                                                 |                                                           | [6Hrs]       |
| <b>Unit III</b>                                                                                                                                                                                                                                                                                                     | <b>THEODOLITE SURVEYING&amp;TRIGONOMETRICAL LEVELLING</b> | <b>15Hrs</b> |
| <b>3.1 Theodolite surveying</b>                                                                                                                                                                                                                                                                                     |                                                           |              |
| Theodolite – Types - Transit and non-Transit - Vernier and Micro meter technical terms used - Temporary adjustments - Fundamental lines Inter relationships –Horizontal angle determination by repetition method and reiteration method - Latitude and Departure - Consecutive coordinates independent coordinates. |                                                           | [1Hr]        |
| <b>3.2 Trigonometrical Levelling</b>                                                                                                                                                                                                                                                                                |                                                           | [1Hr]        |
| Definition - Uses - Finding elevation of objects - Base accessible - Base inaccessible - Single plane method (No derivation) - Double plane method. (No derivation)                                                                                                                                                 |                                                           | [1Hr]        |
| <b>Exercises:</b>                                                                                                                                                                                                                                                                                                   |                                                           |              |
| 8)Determination of distance between two points when their bases are accessible, using Theodolite – Measuring Horizontal angles by repetition method and distances from a Theodolite station.                                                                                                                        |                                                           | [3Hrs]       |
| 9)Determination of distance between two points when their bases are inaccessible, using Theodolite – Measuring Horizontal angles by reiteration method from a baseline.                                                                                                                                             |                                                           | [3Hrs]       |
| 10)Determine the elevation of an object when the base is accessible by trigonometrical levelling.                                                                                                                                                                                                                   |                                                           | [3Hrs]       |
| 11)Determine the elevation of an object when the base is inaccessible by single plane method.                                                                                                                                                                                                                       |                                                           | [3Hrs]       |
| <b>Unit-IV</b>                                                                                                                                                                                                                                                                                                      | <b>TACHEOMETRIC SURVEYING &amp; AREAS AND VOLUMES</b>     | <b>15Hrs</b> |
| <b>4.1 Tacheometry</b>                                                                                                                                                                                                                                                                                              |                                                           |              |
| Instrument used – System of Tacheometry - stadia and tangential - Fixed hair method and movable hair method - Tacheometric Constants - Analectic lens (No Proof)                                                                                                                                                    |                                                           | [1Hr]        |
| Uses Distance and elevation formulae for horizontal and inclined line of sight (No derivation) - Uses of tacheometry.                                                                                                                                                                                               |                                                           | [1Hr]        |
| <b>4.2 Areas and volumes</b>                                                                                                                                                                                                                                                                                        |                                                           |              |
| Methods of determining areas and volumes - Mid ordinate rule - Average ordinate rule Trapezoidal rule - Simpson's rule - One-level section and two-level section.                                                                                                                                                   |                                                           | [1Hr]        |
| <b>Exercises:</b>                                                                                                                                                                                                                                                                                                   |                                                           |              |
| 12) Determine the constants of the given tacheometer.                                                                                                                                                                                                                                                               |                                                           | [3Hrs]       |
| 13) Determine the gradient between two points by stadia tacheometry.                                                                                                                                                                                                                                                |                                                           | [3Hrs]       |
| 14) Calculate the area of the given irregular field by using the Trapezoidal rule                                                                                                                                                                                                                                   |                                                           | [3Hrs]       |

|                                                                                                                                                                                                                        |                         |              |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------|--------------|
| 15) Calculate the area of a given irregular field by using Simpson's rule.                                                                                                                                             |                         | [3Hrs]       |
| <b>Unit-V</b>                                                                                                                                                                                                          | <b>MODERN SURVEYING</b> | <b>15Hrs</b> |
| <b>5.1 Total station</b><br>Introduction – components parts – accessories used –Summary of total station characteristics –Features of total station- applications of total station Instrument preparation and setting. |                         | [1Hr]        |
| <b>5.2 Global Positioning System</b><br>Introduction - Maps - Types of maps - Various satellites used in GPS Fundamentals of GPS - Handheld GPS - Differential GPS - Applications of GPS in Civil Engineering field.   |                         | [1Hr]        |
| <b>Exercises:</b><br>16) Determine the Horizontal distance, slope distance, height, and horizontal and vertical angle of given points using Total Station. (Minimum 5 points)                                          |                         | [3Hrs]       |
| 17) Find the coordinates of closed traverse stations using the Total Station and determine the area of the traverse.                                                                                                   |                         | [3Hrs]       |
| 18) Determine the area of a field/ Land/College campus etc. using Total Station.                                                                                                                                       |                         | [3Hrs]       |
| <b>(Not for examination)</b><br>19)Determine the Latitude, Longitude and Altitude using hand held GPS                                                                                                                  |                         | [3Hrs]       |
| <b>TOTAL</b>                                                                                                                                                                                                           |                         | <b>75</b>    |

#### LIST OF SUGGESTED STUDENT ACTIVITIES

- Collect the information on survey instruments available in the market with specifications.
- Watch educational videos on various surveying methods to understand the concepts.
- Visit any construction site and make a report on different types of conventional and modern surveying equipment used.
- Perform reconnaissance survey for alignment of road.
- Additional surveying practices can be undertaken on the campus itself.

#### EQUIPMENTS REQUIRED (Batch strength: 30 students)

| S.No | LIST OF EQUIPMENTS                 | QUANTITY REQUIRED |
|------|------------------------------------|-------------------|
| 1.   | Chain with arrows                  | 6 Nos.            |
| 2.   | Ranging Rod                        | 30 Nos.           |
| 3.   | Cross Staff                        | 6 Nos.            |
| 4.   | Tape                               | 6 Nos.            |
| 5.   | Prismatic Compass with Stand       | 6 Nos.            |
| 6.   | Dumpy Level with tripod            | 6 Nos.            |
| 7.   | Levelling staff                    | 10 Nos.           |
| 8.   | Theodolite with tripod             | 6 Nos.            |
| 9.   | Total Station with all accessories | 3 Nos.            |

**Text Books**

| S.NO | TITLE                             | AUTHOR                                              | PUBLISHERWITHEDITION                                             |
|------|-----------------------------------|-----------------------------------------------------|------------------------------------------------------------------|
| 1.   | Surveying Vol I& II               | S. K. Duggal                                        | 5th edition& 4 <sup>th</sup> edition, McGraw-Hill, 2019 & 2017.  |
| 2.   | Surveying and Levelling Vol I& II | S.S. Bhavikatti                                     | 1st2nd edition, I K International Publishing House Pvt.Ltd, 2019 |
| 3.   | Surveying Volume I & II           | B.C. Punmia<br>Ashok Kumar Jain,<br>Arun Kumar Jain | 17th edition, Laxmi Publications, 2016 & 2023                    |

**Web-based/Online Resources**

| S.No | Website/Links                                                           |
|------|-------------------------------------------------------------------------|
| 1    | <a href="https://ndl.iitkgp.ac.in/">https://ndl.iitkgp.ac.in/</a>       |
| 2    | <a href="https://nptel.ac.in/">https://nptel.ac.in/</a>                 |
| 3    | <a href="https://www.youtube.com/@iit">https://www.youtube.com/@iit</a> |
| 4    | <a href="https://www.nptelvideos.com/">https://www.nptelvideos.com/</a> |

**CEE3340-SURVEYING PRACTICE****MODEL QUESTION PAPER****Time: 3 hrs.****Max. Marks: 100****Answer one question (By lot)**

| <b>S.No</b> | <b>Name of the Experiments</b>                                                                                                                                                             | <b>CO</b> | <b>PO</b>                         |
|-------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|-----------------------------------|
| 1           | Determine the distance between two ground stations with the help of a chain. (Direct ranging)                                                                                              | E3340.1   | PO1, PO2, PO3, PO4, PO5, PO6, PO7 |
| 2           | Calculate the area bounded by the given points by chain triangulation.                                                                                                                     | E3340.1   | PO1, PO2, PO3, PO4, PO5, PO6, PO7 |
| 3           | Find the included angle of the given closed traverse by using a compass (Minimum 5 stations).                                                                                              | E3340.1   | PO1, PO2, PO3, PO4, PO5, PO6, PO7 |
| 4           | Determine the elevations of given points (Minimum 6 points) by conducting fly levelling with Height of collimation method.                                                                 | E3340.2   | PO1, PO2, PO3, PO4, PO5, PO6, PO7 |
| 5           | Determine the elevations of given points (Minimum 6 points) by conducting fly levelling with Rise and fall method.                                                                         | E3340.2   | PO1, PO2, PO3, PO4, PO5, PO6, PO7 |
| 6           | Determination of distance between two points when their bases are accessible, using Theodolite – Measuring Horizontal angles by repetition method and distances from a Theodolite station. | E3340.3   | PO1, PO2, PO3, PO4, PO5, PO6, PO7 |
| 7           | Determination of distance between two points when their bases are inaccessible, using Theodolite – Measuring Horizontal angles by reiteration method from a baseline.                      | E3340.3   | PO1, PO2, PO3, PO4, PO5, PO6, PO7 |
| 8           | Determine the elevation of an object when the base is accessible by trigonometrical levelling.                                                                                             | E3340.3   | PO1, PO2, PO3, PO4, PO5, PO6, PO7 |
| 9           | Determine the elevation of an object when the base is inaccessible by single plane method.                                                                                                 | E3340.3   | PO1, PO2, PO3, PO4, PO5, PO6, PO7 |
| 10          | Determine the constants of the given tacheometer.                                                                                                                                          | E3340.4   | PO1, PO2, PO3, PO4, PO5, PO6, PO7 |
| 11          | Determine the gradient between two points by stadia tacheometry.                                                                                                                           | E3340.4   | PO1, PO2, PO3, PO4, PO5, PO6, PO7 |
| 12          | Calculate the area of the given irregular field by using the Trapezoidal rule                                                                                                              | E3340.4   | PO1, PO2, PO3, PO4, PO5, PO6, PO7 |
| 13          | Calculate the area of a given irregular field by using Simpson's rule.                                                                                                                     | E3340.4   | PO1, PO2, PO3, PO4, PO5, PO6, PO7 |
| 14          | Determine the Horizontal distance, slope distance, height, and horizontal and vertical angle of given points using Total Station. (Minimum 5 points)                                       | E3340.5   | PO1, PO2, PO3, PO4, PO5, PO6, PO7 |
| 15          | Find the coordinates of closed traverse stations using the Total Station and determine the area of the traverse.                                                                           | E3340.5   | PO1, PO2, PO3, PO4, PO5, PO6, PO7 |
| 16          | Determine the Latitude, Longitude and Altitude using hand held GPS                                                                                                                         | E3340.5   | PO1, PO2, PO3, PO4, PO5, PO6, PO7 |

## CEE3440– BUILDING PLANNING AND DRAWING

Programme Name : CIVIL ENGINEERING  
 Course Code : CEE3440  
 Semester : III SEMESTER  
 Course Title : BUILDING PLANNING AND DRAWING  
 Course Type : PRACTICUM

| L | T | P | C |
|---|---|---|---|
| 1 | 0 | 4 | 3 |

### TEACHING AND SCHEME OF EXAMINATION

No. of weeks per semester: 15 weeks

| Course                              | Instructions  |                     | Examination            |                           |       |          |
|-------------------------------------|---------------|---------------------|------------------------|---------------------------|-------|----------|
|                                     | Hour/<br>Week | Hours /<br>Semester | Marks                  |                           |       | Duration |
|                                     |               |                     | Internal<br>Assessment | Autonomous<br>Examination | Total |          |
| Building<br>Planning and<br>Drawing | 5             | 75                  | 40                     | 100*                      | 100   | 3Hrs.    |

\*Examinations will be conducted for 100 marks and will be converted to 60 marks

### TOPICS AND ALLOCATION OF HOURS

| Unit         | Topics                           | Time<br>(Hrs.) |
|--------------|----------------------------------|----------------|
| I            | Introduction to Building Drawing | 12             |
| II           | Planning of Residential Building | 22             |
| III          | Planning of Public Building      | 22             |
| IV           | Planning of Industrial Building  | 19             |
| <b>Total</b> |                                  | <b>75</b>      |

### COURSE DESCRIPTION

Drawing is the language of engineers. Engineering is incomplete without a thorough knowledge of drawing. A Civil Engineering diploma holder must be capable of sketching detailed constructional drawing of various components of building for the purpose of communication with the craftsman. Planning of small buildings, developing a line plan, dimensioning, key plan, drainage plan should be a part of curriculum. The diploma engineer must be conversant with reading and interpretation of drawings for execution of work.

**COURSE OBJECTIVE:**

The objective of this course is to enable the student

- Impart basic knowledge of the principles of building planning and drawing
- Impart the knowledge of 2D building drawings required for various civil engineering applications.
- Enable the students to prepare submission drawings and service plans.

**COURSE OUTCOMES**

| After successful completion of this course, the students should be able to |                                                                                  |
|----------------------------------------------------------------------------|----------------------------------------------------------------------------------|
| <b>E3440.1</b>                                                             | Understand the basic principles and terminology of building drawing and planning |
| <b>E3440.2</b>                                                             | Prepare a detail Computer Aided Drawing for residential buildings                |
| <b>E3440.3</b>                                                             | Prepare a detail Computer Aided Drawing for public buildings.                    |
| <b>E3440.4</b>                                                             | Prepare a detail Computer Aided Drawing for Industrial buildings.                |

**Pre-requisites**

- Basic Drawing Skills
- Understanding of Geometry
- Spatial Visualization Ability
- Computer Literacy
- Enough knowledge in Drafting Practice course which is available in II Semester

**CO-POs & PSOs Mapping matrix**

| CO/PO                    | PO1      | PO2      | PO3      | PO4       | PO5      | PO6      | PO7      | PSO1      | PSO2     | PSO3      |
|--------------------------|----------|----------|----------|-----------|----------|----------|----------|-----------|----------|-----------|
| <b>E3440.1</b>           | 2        | -        | -        | 3         | -        | -        | -        | 3         | 2        | 3         |
| <b>E3440.2</b>           | 2        | -        | -        | 3         | -        | -        | -        | 3         | 2        | 3         |
| <b>E3440.3</b>           | 2        | -        | -        | 3         | -        | -        | -        | 3         | 2        | 3         |
| <b>E3440.4</b>           | 2        | -        | -        | 3         | -        | -        | -        | 3         | 2        | 3         |
| <b>Total</b>             | <b>8</b> | <b>-</b> | <b>-</b> | <b>12</b> | <b>-</b> | <b>-</b> | <b>-</b> | <b>12</b> | <b>8</b> | <b>12</b> |
| <b>Correlation Level</b> | <b>2</b> | <b>-</b> | <b>-</b> | <b>3</b>  | <b>-</b> | <b>-</b> | <b>-</b> | <b>3</b>  | <b>2</b> | <b>3</b>  |

Correlation level 1 – Slight (low)

Correlation level 2 – Moderate (Medium)

Correlation level 3 – Substantial (high)

### Instructional Strategy

1. Start by introducing the importance of building drawing in architecture, engineering, and design.
2. Explain basic terminology such as elevation, plan, section, perspective, etc.
3. Provide examples of famous architectural drawings and discuss their significance.
4. Encourage students to continue practicing and refining their drawing skills even after the course ends.
5. Provide resources for further self-study and exploration in building drawing and related fields.

### Assessment Methodology

|                           | Continuous Assessment (40 marks)   |                                             |                       |                       | End Semester Examination (60 marks) |
|---------------------------|------------------------------------|---------------------------------------------|-----------------------|-----------------------|-------------------------------------|
|                           | CA1                                | CA2                                         | CA3                   | CA4                   |                                     |
| <b>Mode</b>               | Practical Test                     | Practical Test                              | Written Test Theory   | Practical Test        | Practical Examination               |
| <b>Portion</b>            | Cycle I Exercises<br>50% Exercises | Cycle II Exercises<br>Another 50% Exercises | All Units             | All Exercises         | All Exercises                       |
| <b>Duration</b>           | 2 Periods                          | 2 Periods                                   | 3 hours               | 3 hours               | 3 hours                             |
| <b>Exam Marks</b>         | 60                                 | 60                                          | 100                   | 100                   | 100                                 |
| <b>Converted to</b>       | 10                                 | 10                                          | 10                    | 10                    | 60                                  |
| <b>Marks</b>              | 40                                 |                                             |                       |                       | 60                                  |
| <b>Tentative Schedule</b> | 7 <sup>th</sup> Week               | 14 <sup>th</sup> Week                       | 15 <sup>th</sup> Week | 16 <sup>th</sup> Week |                                     |

### Note:

- **CA1 and CA2:** All the exercises/experiments should be completed as per the portions above and kept for the practical test. The students shall be permitted to select any one by lot for the test. The practical test should be conducted as per the scheme of evaluation as below. The marks awarded shall be converted to 10 Marks for each assessment test. Practical documents should be maintained for every exercise / experiment immediately after completion of the practice. The practical document should be submitted for the practical test. The same should be evaluated for 10 Marks for each exercise/experiment. The total marks awarded should be converted to 10 Marks for the practical test as per the scheme of evaluation as below.

**The details of the documents to be prepared as per the instruction below.**

Each exercise should be completed on the day of practice. The same shall be evaluated for 10 marks on the day or next day of practice before commencement of the next exercise.

This documentation can be carried out in a separate notebook or printed manual or a file with documents. Students should write the procedure and draw the sketch manually.

The detailed date of the practices and its evaluations should be maintained in the course logbook. The log book and the practical documents should be submitted for the verification by the Flying Squad.

#### **SCHEME OF EVALUATION**

| <b>PART</b> | <b>DESCRIPTION</b>                        | <b>MARKS</b> |
|-------------|-------------------------------------------|--------------|
| A           | Aim and Apparatus Required                | 5            |
| B           | Free Hand Sketch                          | 20           |
| C           | Execution/Printout                        | 20           |
| D           | Result                                    | 5            |
| Total       |                                           | 50           |
| E           | Practical Documents (As per the portions) | 10           |
| Total       |                                           | 60           |

- **CA 3:** Written Test for complete theory portions should be conducted for 100 Marks as per the question pattern below. The marks scored will be converted to 10 Marks internal assessment.

#### **Question pattern – Written Test Theory**

| <b>Description</b> |                                                 | <b>Marks</b> |           |
|--------------------|-------------------------------------------------|--------------|-----------|
| Part – A           | 30 MCQ from the complete theory portions.       | 30X1Mark     | 30Marks   |
| Part – B           | 7 Questions to be answered out of 10 Questions. | 7X10Marks    | 70Marks   |
| TOTAL              |                                                 |              | 100 Marks |

- **CA 4:** All the exercises/experiments should be completed and kept for the practical test. The students shall be permitted to select any one by lot for the test. The practical test should be conducted as per the scheme of evaluation below. After completion of all the exercises the practical test should be conducted as per End Semester Examination

question pattern scheme of evaluation. The marks awarded should be converted to 10 Marks for the internal assessment.

#### **SCHEME OF EVALUATION**

##### **Model Practical Examination and End Semester Examination - Practical Exam**

| <b>PART</b> | <b>DESCRIPTION</b>         | <b>MARKS</b> |
|-------------|----------------------------|--------------|
| A           | Aim and Apparatus Required | 10           |
| B           | Free Hand Sketch           | 20           |
| C           | Execution/Printout         | 20           |
| D           | Result                     | 10           |
| E           | Written Test               | 30           |
| F           | Viva Voce                  | 10           |
| TOTAL       |                            | 100          |

Note: For the written test 30 MCQ shall be asked from the theory portions.

**CEE3440 – BUILDING PLANNING AND DRAWING**

| CEE3440                                                                                                                                                                                                            | BUILDING PLANNING AND DRAWING    | L | T | P | C      |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------|---|---|---|--------|
| PRACTICUM                                                                                                                                                                                                          |                                  | 1 | 0 | 4 | 3      |
| Note: All the drawings should be created using CAD Software and the printout should be submitted for evaluation                                                                                                    |                                  |   |   |   |        |
| Unit-I                                                                                                                                                                                                             | INTRODUCTION TO BUILDING DRAWING |   |   |   | 12hrs  |
| Theory                                                                                                                                                                                                             |                                  |   |   |   |        |
| Basic principle of building drawing-General – Conventions- Title block- Scales- Line work- Lettering -Symbols – Abbreviations                                                                                      |                                  |   |   |   | [1Hr]  |
| Conventional signs for materials like bricks, stone, concrete, wood, glass, earth, steel water supply and sanitary fixtures like tap, wash basin, sink, W.C pan (Indian and European type), shower, flush tank.    |                                  |   |   |   | [1Hr]  |
| Electrical installations like one way switch, Two-way switch, Distribution Board, Socket, Ceiling fan, LCD bulb, Fluorescent Lamp, Bell-Doors-Windows, Furniture’s, Structural Elements like steel bars, stirrups. |                                  |   |   |   | [1Hr]  |
| Practical                                                                                                                                                                                                          |                                  |   |   |   |        |
| 1. Sketch the Conventional signs for different construction materials                                                                                                                                              |                                  |   |   |   | [3Hrs] |
| 2. Sketch the Conventional signs for different water supply and sanitary fixtures                                                                                                                                  |                                  |   |   |   | [3Hrs] |
| 3. Draw the Conventional signs for Door, window and furniture items                                                                                                                                                |                                  |   |   |   | [3Hrs] |
| Unit-II                                                                                                                                                                                                            | PLANNING OF RESIDENTIAL BUILDING |   |   |   | 22hrs  |
| Theory                                                                                                                                                                                                             |                                  |   |   |   |        |
| Types of residential buildings- Usual Requirements                                                                                                                                                                 |                                  |   |   |   | [1Hr]  |
| Types of Rooms – Minimum Size requirement for each type of rooms                                                                                                                                                   |                                  |   |   |   | [1Hr]  |
| Furniture arrangement in each room- Position of stairs / lifts                                                                                                                                                     |                                  |   |   |   | [1Hr]  |
| Position of Doors/Windows House drainage and Sanitary fittings                                                                                                                                                     |                                  |   |   |   | [1Hr]  |
| Sump/Water tanks -Plumbing Pipes                                                                                                                                                                                   |                                  |   |   |   |        |
| Practical                                                                                                                                                                                                          |                                  |   |   |   |        |
| 4. Preparation of plan, section and elevation of a single storey House with single bed room and attached bathroom with R.C.C. flat roof (load bearing structure)                                                   |                                  |   |   |   | [6hrs] |
| 5. Preparation of plan, section and elevation of a single storey Two BHK house with RCC flat roof (Framed structure)                                                                                               |                                  |   |   |   | [6hrs] |
| 6. Preparation of approval drawing for Two BHK Residential building with RCC flat roof. (Not for Examination)                                                                                                      |                                  |   |   |   | [6hrs] |
| Unit -III                                                                                                                                                                                                          | PLANNING OF PUBLIC BUILDING      |   |   |   | 22hrs  |
| Theory                                                                                                                                                                                                             |                                  |   |   |   |        |
| Types of public buildings                                                                                                                                                                                          |                                  |   |   |   | [1Hr]  |
| Miscellaneous public buildings                                                                                                                                                                                     |                                  |   |   |   | [1Hr]  |

|                                                                                                                                                |                                        |               |
|------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------|---------------|
| Usual requirements- General requirements of Public Buildings                                                                                   |                                        | [1Hr]         |
| Landscape architecture                                                                                                                         |                                        | [1Hr]         |
| <b>Practical</b>                                                                                                                               |                                        |               |
| 7. Preparation of plan, section and elevation of a single storey Primary health centre for rural area with R.C.C flat roof. (Framed structure) |                                        | [6Hrs]        |
| 8. Preparation of plan, section and elevation of a Single storied Primary School building with R.C.C flat roof (Framed structure)              |                                        | [6Hrs]        |
| 9.Preparation of plan, section and elevation of a Single storied Library building with R.C.C flat roof (Framed structure)                      |                                        | [6Hrs]        |
| <b>Unit IV</b>                                                                                                                                 | <b>PLANNING OF INDUSTRIAL BUILDING</b> | <b>19hrs.</b> |
| <b>Theory</b>                                                                                                                                  |                                        |               |
| Planning aspects                                                                                                                               |                                        | [1Hr]         |
| Requirements of industrial units                                                                                                               |                                        | [1Hr]         |
| Sheets for pitched roof coverings – Rolling Shutters                                                                                           |                                        | [1Hr]         |
| Ramps- Stores- Public Toilets/ Bath rooms- Dining / Resting halls- Ventilation and Lighting                                                    |                                        | [1Hr]         |
| <b>Practical</b>                                                                                                                               |                                        |               |
| 10. Draw the elevation of a King post roof truss                                                                                               |                                        | [4Hrs]        |
| 11. Preparation of plan, section and elevation of a Small workshop with north light steel roof truss (6 to 10m Span) over R.C.C. Columns.      |                                        | [4Hrs]        |
| 12. Preparation of plan, section and elevation of a Small Pre-Engineered building.                                                             |                                        | [4Hrs]        |
| 13. Plan, section and elevation of a Bank building with R.C.C flat roof.                                                                       |                                        | [3Hrs]        |

### Suggested List of Students Activity

1. Visit architectural sites or use reference images to sketch building facades, architectural details, and urban landscapes, focusing on observation and capturing proportions and details.
2. Present drawings to the class and participate in critique sessions, providing feedback on peers' work and receiving constructive criticism on their own drawings.
3. Analyze and critique architectural drawings from historical and contemporary architects, discussing design principles, drawing techniques, and communication strategies.
4. Assign design projects where students create building drawings for specific scenarios or client requirements, incorporating elements such as site analysis, program development, and conceptual design sketches.
5. Organize group projects where students collaborate to create complex building drawings, simulating real-world teamwork and coordination in architectural practice.

**EQUIPMENTS REQUIRED (Batch strength: 30 students)**

| S. No | LIST OF EQUIPMENTS | QUANTITY REQUIRED |
|-------|--------------------|-------------------|
| 1.    | Computers          | 30 Nos.           |
| 2.    | Laser printer      | 2 Nos.            |
| 3.    | CAD software       | 30 Users          |

**Text Books**

| S.NO | TITLE                                        | AUTHOR       | PUBLISHERWITHEDITION                    |
|------|----------------------------------------------|--------------|-----------------------------------------|
| 1.   | National Building code of India 2023         |              |                                         |
| 2.   | Civil Engineering Drawing and house planning | B.P.Verma    | 13th edition, Khanna Publishers, 2023.  |
| 3.   | Civil Engineering Drawing,                   | S.C.Rangwala | 3rd Edition, Charotar Publication, 2017 |

**Web-based/Online Resources**

| S.No | Website/Links                                                                                                                                                                                                                                                                       |
|------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1    | <a href="http://ndl.iitkgp.ac.in/he_document/bharat_skills/bharat_skills/01_0853?e=2 building%20planning%20and%20drawing">http://ndl.iitkgp.ac.in/he_document/bharat_skills/bharat_skills/01_0853?e=2 building%20planning%20and%20drawing</a>                                       |
| 2    | <a href="http://ndl.iitkgp.ac.in/he_document/bharat_skills/bharat_skills/01_0910?e=18 bond%20building%20drawing%20polytechnic%20engineering">http://ndl.iitkgp.ac.in/he_document/bharat_skills/bharat_skills/01_0910?e=18 bond%20building%20drawing%20polytechnic%20engineering</a> |
| 3    | <a href="http://ndl.iitkgp.ac.in/he_document/bharat_skills/bharat_skills/01_0844?e=6 bond%20building%20drawing%20polytechnic%20engineering">http://ndl.iitkgp.ac.in/he_document/bharat_skills/bharat_skills/01_0844?e=6 bond%20building%20drawing%20polytechnic%20engineering</a>   |

## MODEL QUESTION PAPER

### CEE3440–BUILDING PLANNING AND DRAWING

Time: 3 hrs.

Max. Marks: 100

Answer one question (By lot)

| S.No | Name of the Experiments                                                                                                                                       | CO      | PO                      |
|------|---------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|-------------------------|
| 1    | Sketch the Conventional signs for different construction materials                                                                                            | E3440.1 | PO1, PO2, PO3, PO5, PO7 |
| 2    | Sketch the Conventional signs for different water supply and sanitary fixtures                                                                                | E3440.1 | PO1, PO2, PO3, PO5, PO7 |
| 3    | Draw the Conventional signs for Door, window and furniture items                                                                                              | E3440.1 | PO1, PO2, PO3, PO5, PO7 |
| 4    | Preparation of plan, section and elevation of a single storey House with single bed room and attached bathroom with R.C.C. flat roof (load bearing structure) | E3440.2 | PO1, PO2, PO3, PO5, PO7 |
| 5    | Preparation of plan, section and elevation of a single storey Two BHK house with RCC flat roof (Framed structure)                                             | E3440.2 | PO1, PO2, PO3, PO5, PO7 |
| 6    | Preparation of plan, section and elevation of a single storey Primary health centre for rural area with R.C.C flat roof. (Framed structure)                   | E3440.3 | PO1, PO2, PO3, PO5, PO7 |
| 7    | Preparation of plan, section and elevation of a Single storied Primary School building with R.C.C flat roof (Framed structure)                                | E3440.3 | PO1, PO2, PO3, PO5, PO7 |
| 8    | Preparation of plan, section and elevation of a Single storied Library building with R.C.C flat roof (Framed structure)                                       | E3440.3 | PO1, PO2, PO3, PO5, PO7 |
| 9    | Draw the elevation of a King post roof truss                                                                                                                  | E3440.4 | PO1, PO2, PO3, PO5, PO7 |
| 10   | Preparation of plan, section and elevation of a Small workshop with north light steel roof truss (6 to 10m Span) over R.C.C. Columns.                         | E3440.4 | PO1, PO2, PO3, PO5, PO7 |
| 11   | Preparation of plan, section and elevation of a Small Pre-Engineered building.                                                                                | E3440.4 | PO1, PO2, PO3, PO5, PO7 |
| 12   | Plan section and elevation of a Bank building with R.C.C flat roof.                                                                                           | E3440.4 | PO1, PO2, PO3, PO5, PO7 |

## CEE3540–HYDRAULICS

Programme Name : CIVIL ENGINEERING

Course Code : CEE3540

Semester : III SEMESTER

Course Title : HYDRAULICS

Course Type : PRACTICUM

| L | T | P | C |
|---|---|---|---|
| 1 | 0 | 4 | 3 |

### TEACHING AND SCHEME OF EXAMINATION

No. of weeks per semester: 15 weeks

| Course     | Instructions  |                     | Examination            |                           |       |          |
|------------|---------------|---------------------|------------------------|---------------------------|-------|----------|
|            | Hour/<br>Week | Hours /<br>Semester | Marks                  |                           |       | Duration |
|            |               |                     | Internal<br>Assessment | Autonomous<br>Examination | Total |          |
| Hydraulics | 5             | 75                  | 40                     | 100*                      | 100   | 3 Hrs    |

\*Examinations will be conducted for 100 marks and will be converted to 60 marks

### TOPICS AND ALLOCATION OF HOURS

| Unit         | Topics                                 | Time<br>(Hrs.) |
|--------------|----------------------------------------|----------------|
| I            | Introduction                           | 19             |
| II           | Flow through orifices and Mouth pieces | 19             |
| III          | Flow through pipes                     | 07             |
| IV           | Flow through Notches and Weirs         | 15             |
| V            | Pumps                                  | 15             |
| <b>Total</b> |                                        | <b>75</b>      |

### COURSE DESCRIPTION

Hydraulics which is also meant by Mechanics of Fluids helps in solving problems in the field of Civil, Environmental, Transportation, Mechanical, and Metallurgical Engineering. The course deals with basic concepts and principles in hydro-statics, hydro - kinematics and hydro-dynamics and their application in solving fluid flow problems. The course is also designed to study the practical applications of fluid flow problems.

### COURSE OBJECTIVE

The objectives of the course is to enable the students to

- Understand parameters associated with fluid flow and hydrostatic pressure.
- Understand types of forces, energy and application of Bernoulli's theorem.
- Know the different types of Orifices and Mouth pieces and to derive discharge formulae and their practical applications.
- Know the different types of pipes in parallel flow / series flow connected to the

reservoirs.

- State the different losses of head of flowing liquids in pipes and their equations.
- Know the different types of Notches, and deriving the discharge formulas and their Practical applications.
- Learn the construction details, specifications and efficiencies of Reciprocating Pumps and Centrifugal Pumps.

## COURSE OUTCOMES

| After successful completion of this course, the students should be able to |                                                                                                                                                                                                                                                              |
|----------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>E3540.1</b>                                                             | Define Parameters associated with fluid flow and hydrostatic pressure, types of flow, total energy and total head, Bernoulli's theorem. Determine the co-efficient of discharges of orifice meter, venturi meter.                                            |
| <b>E3540.2</b>                                                             | Describe about the different types of Orifices and Mouthpieces and to derive discharge formulae and their practical applications and determine the co-efficient of discharges of Orifice, mouthpiece                                                         |
| <b>E3540.3</b>                                                             | Describe the losses of heads in pipes, major losses, minor losses, pipes in parallel flow series flow connected to the reservoirs, determine the friction factor of the pipe.                                                                                |
| <b>E3540.4</b>                                                             | Describe the different types of Notches, and Derive the discharge formulas and their Practical applications and coefficient of discharges for different notches.                                                                                             |
| <b>E3540.5</b>                                                             | Classify various types of pumps, Describe the advantages, working principles, construction details, specifications and efficiencies of Reciprocating Pumps and Centrifugal Pumps and Draw the characteristic curves for centrifugal and Reciprocating pumps. |

## Pre-requisites

Knowledge of fluids

## CO-POs & PSOs mapping matrix

| CO/PO                    | PO1       | PO2       | PO3      | PO4       | PO5      | PO6       | PO7       | PSO1      | PSO2      | PSO3      |
|--------------------------|-----------|-----------|----------|-----------|----------|-----------|-----------|-----------|-----------|-----------|
| <b>E3540.1</b>           | 3         | 2         | 1        | 3         | 1        | 2         | 2         | 3         | 2         | 3         |
| <b>E3540.2</b>           | 3         | 2         | 1        | 3         | 1        | 2         | 2         | 3         | 2         | 3         |
| <b>E3540.3</b>           | 3         | 2         | 1        | 3         | 1        | 2         | 2         | 3         | 2         | 3         |
| <b>E3540.4</b>           | 3         | 2         | 1        | 3         | 1        | 2         | 2         | 3         | 2         | 3         |
| <b>E3540.5</b>           | 3         | 2         | 1        | 3         | 1        | 2         | 2         | 3         | 2         | 3         |
| <b>Total</b>             | <b>15</b> | <b>10</b> | <b>5</b> | <b>15</b> | <b>5</b> | <b>10</b> | <b>10</b> | <b>15</b> | <b>10</b> | <b>15</b> |
| <b>Correlation Level</b> | <b>3</b>  | <b>2</b>  | <b>1</b> | <b>3</b>  | <b>1</b> | <b>2</b>  | <b>2</b>  | <b>3</b>  | <b>2</b>  | <b>3</b>  |

Correlation level 1 – Slight (low)

Correlation level 2 – Moderate (Medium)

Correlation level 3 – Substantial (high)

### Instructional Strategy

- It is advised that teachers take steps to pique pupils' attention and boost their learning confidence.
- To help students learn and appreciate numerous concepts and principles in each area, teachers should provide examples from daily life, realistic situations, and real-world engineering and technological applications.
- The demonstration can make the subject exciting and foster in the students a scientific mindset. Student activities should be planned on all the topics.
- Throughout the course, a theory-demonstrate-practice-activity strategy may be used to ensure that learning is outcome - and employability-based.
- Do not let students work on an activity or an experiment with the expected outcome, rather allow students to be honest about whatever the results of the experiment are. If the results are different from the expectations, students should do an analysis where they could be the source of error, if any.

### Assessment Methodology

|                           | Continuous Assessment (40 marks)   |                                             |                       |                       | End Semester Examination (60 marks) |
|---------------------------|------------------------------------|---------------------------------------------|-----------------------|-----------------------|-------------------------------------|
|                           | CA1                                | CA2                                         | CA3                   | CA4                   |                                     |
| <b>Mode</b>               | Practical Test                     | Practical Test                              | Written Test Theory   | Practical Test        | Practical Examination               |
| <b>Portion</b>            | Cycle I Exercises<br>50% Exercises | Cycle II Exercises<br>Another 50% Exercises | All Units             | All Exercises         | All Exercises                       |
| <b>Duration</b>           | 2 Periods                          | 2 Periods                                   | 3 hours               | 3 hours               | 3 hours                             |
| <b>Exam Marks</b>         | 60                                 | 60                                          | 100                   | 100                   | 100                                 |
| <b>Converted to</b>       | 10                                 | 10                                          | 10                    | 10                    | 60                                  |
| <b>Marks</b>              | 40                                 |                                             |                       |                       | 60                                  |
| <b>Tentative Schedule</b> | 7 <sup>th</sup> Week               | 14 <sup>th</sup> Week                       | 15 <sup>th</sup> Week | 16 <sup>th</sup> Week |                                     |

#### Note:

**CA1 and CA2:** All the exercises/experiments should be completed as per the portions above and kept for the practical test. The students shall be permitted to select any one by lot for the test. The practical test should be conducted as per the scheme of evaluation as below. The marks awarded shall be converted to 10 Marks for each assessment test. Practical documents should be maintained for every exercise / experiment immediately after completion of the practice. The practical document should be submitted for the practical test. The same should be evaluated for

10 Marks for each exercise/experiment. The total marks awarded should be converted to 10 Marks for the practical test as per the scheme of evaluation as below.

**The details of the documents to be prepared as per the instruction below.**

Each exercise should be completed on the day of practice. The same shall be evaluated for 10 marks on the day or next day of practice before commencement of the next exercise.

This documentation can be carried out in a separate notebook or printed manual or a file with documents. Students should write the procedure and draw the sketch manually.

The detailed date of the practices and its evaluations should be maintained in the course logbook. The log book and the practical documents should be submitted for the verification by the Flying Squad.

**SCHEME OF EVALUATION**

| PART  | DESCRIPTION                               | MARKS |
|-------|-------------------------------------------|-------|
| A     | Aim and Apparatus Required                | 5     |
| B     | Tabulation/Observation                    | 20    |
| C     | Graph/Sketch/Calculation                  | 20    |
| D     | Result                                    | 5     |
| TOTAL |                                           | 50    |
| E     | Practical Documents (As per the portions) | 10    |
|       |                                           | 60    |

- **CA 3:** Written Test for complete theory portions should be conducted for 100 Marks as per the question pattern below. The marks scored will be converted to 10 Marks for internal assessment.

**Question pattern – Written Test Theory**

| Description |                                                     | Marks     |           |
|-------------|-----------------------------------------------------|-----------|-----------|
| Part – A    | 30 MCQ from the complete theory portions.           | 30X1Mark  | 30Marks   |
| Part – B    | Seven Questions to be answered out of 10 Questions. | 7X10Marks | 70Marks   |
| TOTAL       |                                                     |           | 100 Marks |

- **CA 4:** All the exercises/experiments should be completed and kept for the practical test. The students shall be permitted to select any one by lot for the test. The practical test should be conducted as per the scheme of evaluation below. After completion of all the

exercises the practical test should be conducted as per End Semester Examination question pattern scheme of evaluation. The marks awarded should be converted to 10 Marks for the internal assessment.

**SCHEME OF EVALUATION**

**Model Practical Examination and End Semester Examination - Practical Exam**

| <b>PART</b> | <b>DESCRIPTION</b>         | <b>MARKS</b> |
|-------------|----------------------------|--------------|
| A           | Aim and Apparatus Required | 10           |
| B           | Tabulation/Observation     | 20           |
| C           | Graph/Sketch /Calculation  | 20           |
| D           | Result                     | 10           |
| E           | Written Test               | 30           |
| F           | Viva Voce                  | 10           |
| TOTAL       |                            | 100          |

Note: For the written test 30 MCQ shall be asked from the theory portions.

**CEE3540-HYDRAULICS**

| CEE3540                                                                                                                                                                                                                                                                                        |                                        | HYDRAULICS |  | L | T | P | C       |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------|------------|--|---|---|---|---------|
| PRACTICUM                                                                                                                                                                                                                                                                                      |                                        |            |  | 1 | 0 | 4 | 3       |
| Unit- I                                                                                                                                                                                                                                                                                        | INTRODUCTION                           |            |  |   |   |   | [19Hrs] |
| 1.1 FLUID PROPERTIES & MEASUREMENT OF PRESSURE                                                                                                                                                                                                                                                 |                                        |            |  |   |   |   | [2Hrs]  |
| Hydraulics - Definition - Fluids - Properties of fluids - Types of pressures - Static pressure, Atmospheric pressure, Gauge pressure, Vacuum pressure and Absolute Pressure-Measurement of Pressure-Simple Mercury Barometer - Piezometer Tube-Simple U-Tube Manometer-Differential Manometer. |                                        |            |  |   |   |   |         |
| 1.2 FLOW OF FLUIDS                                                                                                                                                                                                                                                                             |                                        |            |  |   |   |   | [1Hr]   |
| Types of Flow - Energy possessed by a Fluid Body - Potential Energy and Potential Head - Pressure Energy and Pressure Head - Kinetic Energy and Kinetic Head - Total Energy and Total Head - Bernoulli’s Theorem (No proof) - Venturimeter - Orifice meter                                     |                                        |            |  |   |   |   |         |
| Practical exercises:                                                                                                                                                                                                                                                                           |                                        |            |  |   |   |   |         |
| 1) Study of Manometers and Pressure Gauges. (Not for Exam)                                                                                                                                                                                                                                     |                                        |            |  |   |   |   | [4Hrs]  |
| 2) Verification of Bernoulli’s Theorem.                                                                                                                                                                                                                                                        |                                        |            |  |   |   |   | [4Hrs]  |
| 3) Flow through Venturi meter - Determination of Co-efficient of Discharge.                                                                                                                                                                                                                    |                                        |            |  |   |   |   | [4Hrs]  |
| 4) Flow through Orifice meter – Determination of Co-efficient of Discharge.                                                                                                                                                                                                                    |                                        |            |  |   |   |   | [4Hrs]  |
| Unit -II                                                                                                                                                                                                                                                                                       | FLOW THROUGH ORIFICES AND MOUTH PIECES |            |  |   |   |   | [19Hrs] |
| Definitions - Types of orifices - Vena contract - Hydraulic coefficients Cd, Cv and Cc                                                                                                                                                                                                         |                                        |            |  |   |   |   | [2Hrs]  |
| Formula - Large orifice - Definition - Discharge formula                                                                                                                                                                                                                                       |                                        |            |  |   |   |   | [1Hr]   |
| Practical applications of orifices - Types of mouth pieces-External and internal mouth pieces-Discharge formula.                                                                                                                                                                               |                                        |            |  |   |   |   |         |
| Practical exercises:                                                                                                                                                                                                                                                                           |                                        |            |  |   |   |   |         |
| 5) Flow through orifice - Determination of Co-efficient of Discharge by Time Fall-Head method.                                                                                                                                                                                                 |                                        |            |  |   |   |   | [4Hrs]  |
| 6) Flow through orifice - Determination of Co-efficient of Discharge by Constant head method.                                                                                                                                                                                                  |                                        |            |  |   |   |   | [4Hrs]  |
| 7) Flow through external cylindrical mouth piece - Determination of Co-efficient of Discharge by Timing fall in head method.                                                                                                                                                                   |                                        |            |  |   |   |   | [4Hrs]  |
| 8) Flow through external cylindrical mouth piece - Determination of Co-efficient of Discharge by Constant head method.                                                                                                                                                                         |                                        |            |  |   |   |   | [4Hrs]  |

|                                                                                                                                                                                                                                                                          |                                       |                |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------|----------------|
| <b>Unit- III</b>                                                                                                                                                                                                                                                         | <b>FLOW THROUGH PIPES</b>             | <b>[7Hrs]</b>  |
| Definition of pipe-Losses of head in pipes - Major losses - Minor losses - Sudden enlargement, sudden contraction, obstruction in pipes (No proof) - Energy/Head losses off flowing fluid due to friction                                                                |                                       | [2Hrs]         |
| Darcy's equation – Chezy's equation (No derivation) - pipes in parallel flow / series flow connected to a reservoir.                                                                                                                                                     |                                       | [1Hr]          |
| <b>Practical exercises:</b>                                                                                                                                                                                                                                              |                                       |                |
| 9) Determination of friction factor for the given GI pipe.                                                                                                                                                                                                               |                                       | [4Hrs]         |
| <b>Unit -IV</b>                                                                                                                                                                                                                                                          | <b>FLOW THROUGH NOTCHES AND WEIRS</b> | <b>[15Hrs]</b> |
| Definitions-Types of notches - Rectangular, Triangular and Trapezoidal Notches- Formula (No derivation)                                                                                                                                                                  |                                       | [2Hrs]         |
| Comparison of V-Notch and Rectangular Notch-Weir - definition - classifications of weirs-comparison of Weirs and Notches.                                                                                                                                                |                                       | [1Hr]          |
| <b>Practical exercises:</b>                                                                                                                                                                                                                                              |                                       |                |
| 10) Determination of Co-efficient of Discharge for Rectangular Notch.                                                                                                                                                                                                    |                                       | [4Hrs]         |
| 11) Determination of Co-efficient of Discharge for Triangular Notch.                                                                                                                                                                                                     |                                       | [4Hrs]         |
| 12) Determination of Co-efficient of Discharge for Trapezoidal notch.                                                                                                                                                                                                    |                                       | [4Hrs]         |
| <b>Unit- V</b>                                                                                                                                                                                                                                                           | <b>PUMPS</b>                          | <b>[15Hrs]</b> |
| Pumps - Definition - Classification of pumps - Reciprocating pump - Construction Detail and Working Principle                                                                                                                                                            |                                       | [1Hr]          |
| Types - Single Acting and Double Acting - Slip - Air Vessels - Discharge and Efficiency - Centrifugal pump - Advantages and Disadvantages over a Reciprocating pump - Layout - Construction Details                                                                      |                                       | [1Hr]          |
| Priming of Centrifugal Pump - Construction and Working of the Pump - Classification Functions of Foot Valve, Delivery Valve and Non - Return Valve - Fundamental Equation of Centrifugal Pump - Characteristics of a Centrifugal Pump - Discharge, Power and Efficiency. |                                       | [1Hr]          |
| <b>Practical exercises:</b>                                                                                                                                                                                                                                              |                                       | [4Hrs]         |
| 13) Prepare a Layout and indicate the construction parts of a Reciprocating pump / Centrifugal pump. (Not for Exam)                                                                                                                                                      |                                       | [4Hrs]         |
| 14) Reciprocating pump - To draw characteristic curves and determine the efficiency.                                                                                                                                                                                     |                                       | [4Hrs]         |
| 15) Centrifugal Pump - To draw characteristic curves and determine the efficiency.                                                                                                                                                                                       |                                       | [4Hrs]         |
| <b>TOTAL</b>                                                                                                                                                                                                                                                             |                                       | <b>75</b>      |

**Suggested list of student activity**

- Explore and investigate the different types of fluids and provide real-time examples of each.
- Presentation by students on major and minor losses of flow through pipes.
- Seminar on the classification of pumps based on their working principle, design, and applications
- Periodic class quizzes conducted on a weekly/fortnightly based on the course
- Micro project that shall be an extension of any practical lab exercise to real-world application

**EQUIPMENTS REQUIRED (Batch strength: 30 students)**

| S. No | LIST OF EQUIPMENTS                                                                                     | QUANTITY REQUIRED |
|-------|--------------------------------------------------------------------------------------------------------|-------------------|
| 1.    | Bernoulli's theorem apparatus (closed circuit)                                                         | 1No.              |
| 2.    | Venturimeter and Orifice meter apparatus (closed circuit)With all accessories (Combined or Individual) | 1No.              |
| 3.    | Pipe Friction apparatus (closed circuit) with all accessories                                          | 1No.              |
| 4.    | Orifice and Mouth piece apparatus (closed circuit)with all Accessories (Combined or Individual)        | 1No.              |
| 5.    | Notch apparatus (closed circuit) with all accessories                                                  | 1No.              |
| 6.    | Reciprocating Pump Testing Rig with all accessories                                                    | 1No.              |
| 7.    | Centrifugal Pump Testing Rig with all accessories                                                      | 1No.              |

**Text Books**

| S.NO | TITLE                                          | AUTHOR                              | PUBLISHERWITHEDITION                          |
|------|------------------------------------------------|-------------------------------------|-----------------------------------------------|
| 1.   | Fluid Mechanics                                | R.K. Bansal                         | 2nd Edition, Laxmi Publications,2020          |
| 2.   | Fluid Mechanics: Fundamentals and Applications | John. M. Cimbala<br>Yunus A. Cengel | 4th Edition, McGraw-Hill,2019                 |
| 3.   | Hydraulic Fluid Mechanics and Fluid Machines   | S.Ramamrtham                        | 9 <sup>th</sup> Edition,DhanpatRai& Sons,2014 |

**Web-based/Online Resources**

| S. No | Website/Links                                                                                                     |
|-------|-------------------------------------------------------------------------------------------------------------------|
| 1     | <a href="https://youtu.be/OfViSGNSf4o?si=921H2Aqvt8xhiVZV">https://youtu.be/OfViSGNSf4o?si=921H2Aqvt8xhiVZV</a>   |
| 2     | <a href="https://youtu.be/ikt-MxC3_1o?si=kitMRCScKWAQ4n2-">https://youtu.be/ikt-MxC3_1o?si=kitMRCScKWAQ4n2-</a>   |
| 3     | <a href="https://youtu.be/95vwYGJ3E48?si=LLB51FVO8VFfa16MG">https://youtu.be/95vwYGJ3E48?si=LLB51FVO8VFfa16MG</a> |
| 4     | <a href="https://youtu.be/kcPawgvFehI?si=XsUjJ3wZ9YLKWyej">https://youtu.be/kcPawgvFehI?si=XsUjJ3wZ9YLKWyej</a>   |
| 5     | <a href="https://youtu.be/wdjmQ3JoP34?si=AKglGUnVZ6jHD3zC">https://youtu.be/wdjmQ3JoP34?si=AKglGUnVZ6jHD3zC</a>   |
| 6     | <a href="https://youtu.be/dHSb0Z80O4I?si=GVA5lsmS_jwRH20x">https://youtu.be/dHSb0Z80O4I?si=GVA5lsmS_jwRH20x</a>   |
| 7     | <a href="https://youtu.be/mqaUXV0kAGs?si=ohIydr-jjRgsm2sO">https://youtu.be/mqaUXV0kAGs?si=ohIydr-jjRgsm2sO</a>   |
| 8     | <a href="https://youtu.be/nLtnJ6DCpok?si=1JJ6_pYyeAa-FPci">https://youtu.be/nLtnJ6DCpok?si=1JJ6_pYyeAa-FPci</a>   |
| 9     | <a href="https://youtu.be/TgD3nEO1iCA?si=xUdoTsbCepyY_tBd">https://youtu.be/TgD3nEO1iCA?si=xUdoTsbCepyY_tBd</a>   |
| 10    | <a href="https://youtu.be/zwSWHrVBQls?si=KP5KyL-jljDWEUeD">https://youtu.be/zwSWHrVBQls?si=KP5KyL-jljDWEUeD</a>   |

**MODEL QUESTION PAPER****CEE3540–HYDRAULICS****Time: 3 hrs.****Max. Marks: 100**

| <b>S.No</b> | <b>Name of the Experiments</b>                                                                                      | <b>CO</b> | <b>PO</b>                         |
|-------------|---------------------------------------------------------------------------------------------------------------------|-----------|-----------------------------------|
| 1           | Verification of Bernoulli's Theorem.                                                                                | E3540.1   | PO1, PO2, PO3, PO4, PO5, PO6, PO7 |
| 2           | Flow through Venturimeter - Determination of Co-efficient of Discharge.                                             | E3540.2   | PO1, PO2, PO3, PO4, PO5, PO6, PO7 |
| 3           | Flow through Orifice meter – Determination of Co-efficient of Discharge                                             | E3540.3   | PO1, PO2, PO3, PO4, PO5, PO6, PO7 |
| 4           | Flow through orifice - Determination of Co-efficient of Discharge by Time fall-Head method.                         | E3540.3   | PO1, PO2, PO3, PO4, PO5, PO6, PO7 |
| 5           | Flow through orifice - Determination of Co-efficient of Discharge by Constant head method.                          | E3540.3   | PO1, PO2, PO3, PO4, PO5, PO6, PO7 |
| 6           | Flow through external cylindrical mouth piece - Determination of Co-efficient of Discharge by Timing fall method.   | E3540.2   | PO1, PO2, PO3, PO4, PO5, PO6, PO7 |
| 7           | Flow through external cylindrical mouth piece - Determination of Co-efficient of Discharge by Constant head method. | E3540.3   | PO1, PO2, PO3, PO4, PO5, PO6, PO7 |
| 8           | Determination of friction factor for the given GI pipe.                                                             | E3540.4   | PO1, PO2, PO3, PO4, PO5, PO6, PO7 |
| 9           | Determination of Co-efficient of Discharge for Rectangular Notch.                                                   | E3540.3   | PO1, PO2, PO3, PO4, PO5, PO6, PO7 |
| 10          | Determination of Co-efficient of Discharge for Triangular Notch.                                                    | E3540.4   | PO1, PO2, PO3, PO4, PO5, PO6, PO7 |
| 11          | Determination of Co-efficient of Discharge for Trapezoidal notch                                                    | E3540.5   | PO1, PO2, PO3, PO4, PO5, PO6, PO7 |
| 12          | Reciprocating pump - To draw characteristic curves and determine the efficiency.                                    | E3540.5   | PO1, PO2, PO3, PO4, PO5, PO6, PO7 |
| 13          | Centrifugal Pump - To draw characteristic curves and determine the efficiency.                                      | E3540.5   | PO1, PO2, PO3, PO4, PO5, PO6, PO7 |

### CEE3640 -MATERIAL TESTING LAB

Programme Name : CIVIL ENGINEERING  
 Course Code : CEE3640  
 Semester : III SEMESTER  
 Course Title : MATERIAL TESTING LAB  
 Course Type : PRACTICUM

| L | T | P | C |
|---|---|---|---|
| 1 | 0 | 4 | 3 |

#### TEACHING AND SCHEME OF EXAMINATION

No. of weeks per semester: 15 weeks

| Course               | Instructions |                  | Examination         |                        |       |          |
|----------------------|--------------|------------------|---------------------|------------------------|-------|----------|
|                      | Hours / Week | Hours / Semester | Marks               |                        |       | Duration |
|                      |              |                  | Internal Assessment | Autonomous Examination | Total |          |
| Material Testing Lab | 5            | 75               | 40                  | 100*                   | 100   | 3 Hrs.   |

\*Examinations will be conducted for 100 marks and will be converted to 60 marks

#### TOPICS AND ALLOCATION OF HOURS

| Unit         | Topics                              | Time (Hrs) |
|--------------|-------------------------------------|------------|
| I            | Construction Materials introduction | 7          |
| II           | Construction Materials properties   | 8          |
|              | Practical Exercises                 | 60         |
| <b>Total</b> |                                     | <b>75</b>  |

#### COURSE DESCRIPTION

- Civil Engineering diploma holders have to supervise construction of various types of civil works involving, the use of various materials like stones, bricks and tiles, cement and cement-based products, lime, timber and wood-based products, paints and varnishes, metals and other miscellaneous materials.
- The students shall acquire knowledge regarding the characteristics, uses and availability of various building materials and skills in conducting tests as per BIS as well as international standards to determine the suitability of materials for various construction purposes.
- Strength and durability are the main parameter for any construction material.
- This Laboratory experiments provide a hands-on experience with the testing of civil Engineering materials such as cement, steel, Timber, non-ferrous materials, ceramic materials, fine and coarse aggregates used in construction activities. Tensile, Compressive, shear and flexural strength are main strength parameter for any construction

material. Water absorption characteristic of materials also an important parameter in strength and durability point of view.

### COURSE OBJECTIVE

- This course is designed to conduct standard tests on various construction materials and specimens as per the Indian standard (IS code) and ASTM standards.
- Since the materials used in construction shall withstand all loads acting on it throughout the life of the structure and durable.
- Hence the students are expected to learn and have to perform Hands on training through laboratory practice.

### COURSE OUTCOMES

| After successful completion of this course, the students should be able to |                                                                                                                                                                |
|----------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>E3640.1</b>                                                             | Conduct appropriate test on materials such as Tension, Compression, Torsion, Flexure and Shear strength                                                        |
| <b>E3640.2</b>                                                             | Act as a quality controlling engineer in civil Engineering construction field.                                                                                 |
| <b>E3640.3</b>                                                             | Conduct various tests on cement (binding material) and aggregates (Fine and Coarse Aggregates)                                                                 |
| <b>E3640.4</b>                                                             | Prepare various specimen for Conducting quality control tests.                                                                                                 |
| <b>E3640.5</b>                                                             | Follow the procedure and Standards laid down by Indian standards and ASTM standard testing procedure of civil Engineering materials and acceptable parameters. |

### Pre-requisites

Basic knowledge on Civil Engineering Construction Materials

### CO-POs & PSOs mapping matrix

| CO/PO                    | PO1       | PO2       | PO3      | PO4       | PO5      | PO6      | PO7      | PSO1      | PSO2      | PSO3      |
|--------------------------|-----------|-----------|----------|-----------|----------|----------|----------|-----------|-----------|-----------|
| <b>E3640.1</b>           | 3         | 1         | 1        | 2         | 1        | 1        | 1        | 2         | 3         | 3         |
| <b>E3640.2</b>           | 3         | 3         | 1        | 2         | 1        | 1        | 1        | 2         | 3         | 3         |
| <b>E3640.3</b>           | 3         | 2         | 2        | 2         | 2        | 2        | 2        | 2         | 3         | 3         |
| <b>E3640.4</b>           | 3         | 1         | 1        | 2         | 1        | 1        | 1        | 2         | 3         | 3         |
| <b>E3640.5</b>           | 3         | 3         | 3        | 2         | 3        | 3        | 3        | 2         | 3         | 3         |
| <b>Total</b>             | <b>15</b> | <b>10</b> | <b>8</b> | <b>10</b> | <b>8</b> | <b>8</b> | <b>8</b> | <b>10</b> | <b>15</b> | <b>15</b> |
| <b>Correlation Level</b> | <b>3</b>  | <b>2</b>  | <b>1</b> | <b>2</b>  | <b>1</b> | <b>1</b> | <b>1</b> | <b>2</b>  | <b>3</b>  | <b>3</b>  |

Correlation level 1 – Slight (low)

Correlation level 2 – Moderate (Medium)

Correlation level 3 – Substantial (high)

### Instructional Strategy

- Teachers shall deliver theoretical knowledge on each test and standard procedures to perform the test for better understanding and importance of the particular Test on materials.
- Teachers shall inculcate students on preparing specimen / samples as per the standard procedure and the same shall be demonstrated.

### Assessment Methodology

|                           | Continuous Assessment (40 marks)   |                                             |                       |                       | End Semester Examination (60 marks) |
|---------------------------|------------------------------------|---------------------------------------------|-----------------------|-----------------------|-------------------------------------|
|                           | CA1                                | CA2                                         | CA3                   | CA4                   |                                     |
| <b>Mode</b>               | Practical Test                     | Practical Test                              | Written Test Theory   | Practical Test        | Practical Examination               |
| <b>Portion</b>            | Cycle I Exercises<br>50% Exercises | Cycle II Exercises<br>Another 50% Exercises | All Units             | All Exercises         | All Exercises                       |
| <b>Duration</b>           | 2 Periods                          | 2 Periods                                   | 3 hours               | 3 hours               | 3 hours                             |
| <b>Exam Marks</b>         | 60                                 | 60                                          | 100                   | 100                   | 100                                 |
| <b>Converted to</b>       | 10                                 | 10                                          | 10                    | 10                    | 60                                  |
| <b>Marks</b>              | 40                                 |                                             |                       |                       | 60                                  |
| <b>Tentative Schedule</b> | 7 <sup>th</sup> Week               | 14 <sup>th</sup> Week                       | 15 <sup>th</sup> Week | 16 <sup>th</sup> Week |                                     |

### Note

**CA1 and CA2:** All the exercises/experiments should be completed as per the portions above and kept for the practical test. The students shall be permitted to select any one by lot for the test. The practical test should be conducted as per the scheme of evaluation as below. The marks awarded shall be converted to 10 Marks for each assessment test. Practical documents should be maintained for every exercise / experiment immediately after completion of the practice. The practical document should be submitted for the practical test. The same should be evaluated for 10 Marks for each exercise/experiment. The total marks awarded should be converted to 10 Marks for the practical test as per the scheme of evaluation as below.

**The details of the documents to be prepared as per the instruction below.**

Each exercise should be completed on the day of practice. The same shall be evaluated for 10 marks on the day or next day of practice before commencement of the next exercise. This documentation can be carried out in a separate notebook or printed manual or a file with documents. Students should write the procedure and draw the sketch manually. The detailed date of the practices and its evaluations should be maintained in the course logbook. The log book and the practical documents should be submitted for the verification by the Flying Squad.

#### SCHEME OF EVALUATION

| PART  | DESCRIPTION                               | MARKS |
|-------|-------------------------------------------|-------|
| A     | Aim and Apparatus Required                | 5     |
| B     | Tabulation/Observation                    | 20    |
| C     | Graph/Sketch/Calculation                  | 20    |
| D     | Result                                    | 5     |
| TOTAL |                                           | 50    |
| E     | Practical Documents (As per the portions) | 10    |
| TOTAL |                                           | 60    |

- **CA 3:** Written Test for complete theory portions should be conducted for 100 Marks as per the question pattern below. The marks scored will be converted to 10 Marks for internal assessment.

#### Question pattern – Written Test Theory

| Description |                                                     | Marks     |           |
|-------------|-----------------------------------------------------|-----------|-----------|
| Part – A    | 30 MCQ from the complete theory portions.           | 30X1Mark  | 30Marks   |
| Part – B    | Seven Questions to be answered out of 10 Questions. | 7X10Marks | 70Marks   |
| TOTAL       |                                                     |           | 100 Marks |

**CA 4:** All the exercises/experiments should be completed and kept for the practical test. The students shall be permitted to select any one by lot for the test. The practical test should be

conducted as per the scheme of evaluation below. After completion of all the exercises the practical test should be conducted as per End Semester Examination question pattern scheme of evaluation. The marks awarded should be converted to 10 Marks for the internal assessment.

#### **SCHEME OF EVALUATION**

##### **Model Practical Examination and End Semester Examination - Practical Exam**

| <b>PART</b> | <b>DESCRIPTION</b>         | <b>MARKS</b> |
|-------------|----------------------------|--------------|
| A           | Aim and Apparatus Required | 10           |
| B           | Tabulation/Observation     | 20           |
| C           | Graph/Sketch /Calculation  | 20           |
| D           | Result                     | 10           |
| E           | Written Test               | 30           |
| F           | Viva Voce                  | 10           |
| TOTAL       |                            | 100          |

Note: For the written test 30 MCQ shall be asked from the theory portions.

**CEE3640- MATERIAL TESTING LAB**

| CEE3640                                                                                                                                                                                                | MATERIAL TESTING LAB                 | L | T | P | C      |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|---|---|---|--------|
| PRACTICUM                                                                                                                                                                                              |                                      | 1 | - | 4 | 3      |
| THEORY                                                                                                                                                                                                 |                                      |   |   |   |        |
| Unit -I                                                                                                                                                                                                | CONSTRUNCTION MATERIALS-INTRODUCTION |   |   |   | 7Hrs   |
| Introduction to Strength and durability of materials                                                                                                                                                   |                                      |   |   |   | [1Hr]  |
| Direct Tensile strength                                                                                                                                                                                |                                      |   |   |   | [1Hr]  |
| stress strain relation for ductile materials                                                                                                                                                           |                                      |   |   |   | [2Hrs] |
| Direct compressive strength-Flexural Strength-Deflection of beams-Bending                                                                                                                              |                                      |   |   |   | [1Hr]  |
| Compression-Bending tension-split tensile strength                                                                                                                                                     |                                      |   |   |   | [1Hr]  |
| Torsional strength- shear strength-impact strength, Hardness of materials.                                                                                                                             |                                      |   |   |   | [1Hr]  |
| Unit- II                                                                                                                                                                                               | CONSTRUCTION MATERIALS –PROPERTIES   |   |   |   | 8hrs   |
| Cement -types of cement- water cement ratio-consistency-Fineness of cement                                                                                                                             |                                      |   |   |   | [2Hrs] |
| Initial setting time and final setting time-Bulk density-Specific gravity                                                                                                                              |                                      |   |   |   | [2Hrs] |
| Importance of Crushing value of aggregates-Impact value                                                                                                                                                |                                      |   |   |   | [1Hr]  |
| Attrition and abrasive value of aggregates-Water absorption of construction materials                                                                                                                  |                                      |   |   |   | [1Hr]  |
| Effect / Impact of water absorption-Elongation index-flakiness                                                                                                                                         |                                      |   |   |   | [1Hr]  |
| Index and angularity index of aggregates.                                                                                                                                                              |                                      |   |   |   | [1Hr]  |
| PRACTICAL EXERCISES                                                                                                                                                                                    |                                      |   |   |   |        |
| Practical Exercises.                                                                                                                                                                                   |                                      |   |   |   |        |
| 1. Conducting tensile test on mild steel /deformed bars and determining yield strength and finding important parameters.                                                                               |                                      |   |   |   | [4Hrs] |
| 2. Conducting compression test and determining direct compressive strength on (i)wooden cube (ii)Brick/ Fly ash brick (iii) Masonry block (iv)Paver blocks<br>(Any two shall be given in Examination). |                                      |   |   |   | [4Hrs] |
| 3. Conducting double shear test on Mild steel bar and finding the shear value.                                                                                                                         |                                      |   |   |   | [4Hrs] |
| 4. Conducting Torsion test on Steel bar and finding its Modulus of rigidity.                                                                                                                           |                                      |   |   |   | [4Hrs] |
| 5. Conducting an Impact test on brittle and ductile material by performing Izod/Charpy tests.                                                                                                          |                                      |   |   |   | [4Hrs] |
| 6. Conducting Hardness test and finding Brinell’s / Rockwell’s hardness number on (i)Mild steel (ii)Brass (iii)Aluminium                                                                               |                                      |   |   |   | [4Hrs] |
| 7. Conducting deflection test on simply supported beams and finding its young’s modulus value on (i)Wooden and (ii)Steel                                                                               |                                      |   |   |   | [4Hrs] |

|                                                                                                        |           |
|--------------------------------------------------------------------------------------------------------|-----------|
| 8. Conducting fineness test on cement by Sieve analysis (OR) Blain's Airpermeability apparatus.        | [4Hrs]    |
| 9. Conduct Water absorption test on (i)Brick/Fly ash brick (ii) Coarse aggregates.                     | [4Hrs]    |
| 10. Determination of bulk density and Specific gravity of (i)Fine aggregate and (ii) Coarse aggregate. | [4Hrs]    |
| 11. Conducting attrition test on coarse aggregate by Deval's (OR) Losangels method.                    | [4Hrs]    |
| 12. Conducting abrasion test on aggregate by Dorry's method.                                           | [4Hrs]    |
| 13. Conducting Crushing test on coarse aggregate and finding the crushing value of aggregate.          | [4Hrs]    |
| 14. Conducting Impact test on coarse aggregate and finding the impact value of the aggregates.         | [4Hrs]    |
| 15. Determination of Elongation Index, Flakiness index and angularity index of aggregates.             | [4Hrs]    |
| <b>TOTAL</b>                                                                                           | <b>75</b> |

### Suggested List of Students Activity

Student shall prepare specimen / sample of the construction material as per the testing standards and procedure.

### EQUIPMENTS REQUIRED (Batch strength: 30 students)

| S. No | LIST OF EQUIPMENTS                                                                                                          | QUANTITY REQUIRED |
|-------|-----------------------------------------------------------------------------------------------------------------------------|-------------------|
| 1     | Universal testing machine (UTM)-Capacity 400 KN and above capacity with accessories with double shear arrangement.          | 1 No              |
| 2     | Compression Testing Machine (CTM)1000 KN and above capacity                                                                 | 1 No              |
| 3     | Torsion testing Machine                                                                                                     | 1 No              |
| 4     | Impact Testing machine for Izod /Charpy test                                                                                | 1 No              |
| 5     | Rockwell cum Brinell harness testing machine                                                                                | 1 No              |
| 6     | Floor type deflection test arrangements magnetic stand, deflection gauge, weights and Beams made up of different materials. | 1 No              |
| 7     | Weighing balances with required capacity and accuracy                                                                       | 1 No              |
| 8     | Sieve sets for Cement IS sieve No.9 (90 Micron) made up of brass with 20cm dia.                                             | 1 No              |
| 9     | Blains Air permeability apparatus                                                                                           | 1 No              |
| 10    | Deval's attrition testing Machine /Los Angeles abrasion testing machine                                                     | 1 No              |
| 11    | Dorry's abrasion testing machine--1No.                                                                                      | 1 No              |
| 12    | Metal Containers of 1lit,3 lit,5 lit,10 lit and 20 lit Capacity                                                             | 1 No              |
| 13    | Aggregate impact testing machine                                                                                            | 1 No              |
| 14    | Aggregate crushing value apparatus                                                                                          | 1 No              |

**Text Books**

| S.NO | TITLE                                                 | AUTHOR     | PUBLISHERWITHEDITION                            |
|------|-------------------------------------------------------|------------|-------------------------------------------------|
| 1.   | Concrete technology, Theory and Practice              | M.S.Shetty | 7th Editions, S.Chand & Company Pvt. Ltd, 2013. |
| 2.   | Coarse and Fine aggregates for concrete-specification | --         | Indian Standard, IS 383:2016                    |
| 3.   | Plain and Reinforced cement concrete                  | --         | Indian Standard, IS 456:2000                    |
| 4.   | Methods of test for aggregates for concrete           | --         | Indian Standard, IS 2386(part-1) :1963          |
| 5.   | Methods of test for aggregates for concrete           | --         | Indian Standard, IS 2386(part-3) :1963          |

**Web-based/Online Resources**

| S.No | Website/Links                                                                                                                                                                                                                                   |
|------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1    | American Society for testing and Materials(ASTM) standards<br><a href="https://www3.epa.gov/hudson/pdf/sedc_2004-2005_append.pdf">https://www3.epa.gov/hudson/pdf/sedc_2004-2005_append.pdf</a>                                                 |
| 2    | Bureau of Indian standards<br><a href="https://www.services.bis.gov.in/php/BIS_2.0/dgdashboard/Published_Standards_new/revised_standards">https://www.services.bis.gov.in/php/BIS_2.0/dgdashboard/Published_Standards_new/revised_standards</a> |

**MODEL QUESTION PAPER****CEE3640-MATERIAL TESTING LAB****Time: 3 hrs.****Max. Marks: 100**

| <b>S.No</b> | <b>Name of the Experiments</b>                                                                                                                                                                  | <b>CO</b> | <b>PO</b>                      |
|-------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|--------------------------------|
| 1           | Conducting Tensile test on mild steel /Deformed bars and determining yield strength and finding important parameters.                                                                           | E3640.1   | PO1, PO2, PO3, PO4,PO5,PO6,PO7 |
| 2           | Conducting compression test and determining direct compressive strength on(i)wooden cube (ii)Brick/ Fly ash brick (iii) Masonry block (iv)Paver blocks (Any two shall be given in Examination). | E3640.2   | PO1, PO2, PO3, PO4,PO5,PO6,PO7 |
| 3           | Conducting double shear test on Mild steel bar and finding the shear value                                                                                                                      | E3640.3   | PO1, PO2, PO3, PO4,PO5,PO6,PO7 |
| 4           | Conducting Torsion test on Steel bar and finding its Modulus of rigidity                                                                                                                        | E3640.4   | PO1, PO2, PO3, PO4,PO5,PO6,PO7 |
| 5           | Conducting an Impact test on brittle and ductile material by performing Izod/Charpy tests.                                                                                                      | E3640.5   | PO1, PO2, PO3, PO4,PO5,PO6,PO7 |
| 6           | Conducting Hardness test and finding Brinnel's and Rockwell's hardness number on (i)Mild steel (ii)Brass (iii)Aluminium                                                                         | E3640.6   | PO1, PO2, PO3, PO4,PO5,PO6,PO7 |
| 7           | Conducting deflection test on simply supported beams and finding its young's modulus value on (i)Wooden and (ii)Steel                                                                           | E3640.7   | PO1, PO2, PO3, PO4,PO5,PO6,PO7 |
| 8           | Conducting fineness test on cement by Sieve analysis (OR) Blain's Air permeability apparatus.                                                                                                   | E3640.8   | PO1, PO2, PO3, PO4,PO5,PO6,PO7 |
| 9           | Conduct Water absorption test on (i)Brick/Fly ash brick (ii) Coarse aggregates.                                                                                                                 | E3640.9   | PO1, PO2, PO3, PO4,PO5,PO6,PO7 |
| 10          | Determination of bulk density and Specific gravity of (i)Fine aggregate and (ii)Coarse aggregate.                                                                                               | E3640.10  | PO1, PO2, PO3, PO4,PO5,PO6,PO7 |
| 11          | Conducting attrition test on coarse aggregate by Deval's (OR) Lo's angel method.                                                                                                                | E3640.11  | PO1, PO2, PO3, PO4,PO5,PO6,PO7 |
| 12          | Conducting abrasion test on aggregate by Dorry's method.                                                                                                                                        | E3640.12  | PO1, PO2, PO3, PO4,PO5,PO6,PO7 |
| 13          | Conducting Crushing test on coarse aggregate and finding the crushing value of aggregate.                                                                                                       | E3640.13  | PO1, PO2, PO3, PO4,PO5,PO6,PO7 |
| 14          | Conducting Impact test on coarse aggregate and finding the impact value of the aggregates.                                                                                                      | E3640.14  | PO1, PO2, PO3, PO4,PO5,PO6,PO7 |
| 15          | Determination of Elongation Index, Flakiness index and angularity index of aggregates.                                                                                                          | E3640.15  | PO1, PO2, PO3, PO4,PO5,PO6,PO7 |

## CEE4110–MECHANICS OF STRUCTURES

Programme Name : CIVIL ENGINEERING  
 Course Code : CEE4110  
 Semester : IV SEMESTER  
 Course Title : MECHANICS OF STRUCTURES  
 Course Type : THEORY

| L | T | P | C |
|---|---|---|---|
| 3 | 0 | 0 | 3 |

### TEACHING AND SCHEME OF EXAMINATION

No. of weeks per semester: 15 weeks

| Course                  | Instructions |                  | Examination         |                        |       |          |
|-------------------------|--------------|------------------|---------------------|------------------------|-------|----------|
|                         | Hours / Week | Hours / Semester | Marks               |                        |       | Duration |
|                         |              |                  | Internal Assessment | Autonomous Examination | Total |          |
| Mechanics of Structures | 3            | 45               | 40                  | 100*                   | 100   | 3 Hrs    |

\*Examinations will be conducted for 100 marks and will be converted to 60 marks

### TOPICS AND ALLOCATION OF HOURS

| Unit         | Topics                                           | Time (Hrs) |
|--------------|--------------------------------------------------|------------|
| I            | Slope and deflection of beams                    | 9          |
| II           | Fixed beams–area moment method                   | 9          |
| III          | Continuous beams–theorem of three moments method | 9          |
| IV           | Portal frames – moment distribution method       | 9          |
| V            | Columns and struts                               | 9          |
| <b>TOTAL</b> |                                                  | <b>45</b>  |

### COURSE DESCRIPTION

Mechanics of structures is a fundamental subject in Civil engineering that deals with understanding the behaviour of structures under various loads. It forms the backbone of designing safe and efficient structures. Study of structural behaviour, analysis and design is a principal part of civil engineering courses and is essential for professional accreditation. This course enhances the structural analytical ability of the students. This course is conceptual applications of principles of mechanics of rigid and deformable bodies in Engineering, helps in determining statics response of statically determinate and indeterminate structures. This course has been designed for Diploma civil engineering students or those interested in developing a deeper understanding of introductory structural analysis concepts and methods. The lectures cover the essential concepts and methods of structural analysis and provide examples demonstrating their applications.

## COURSE OBJECTIVE

On completion of the course, the students will be able to:

- Define and describe the basic concept and principle of structure Analysis.
- Analyze determinate and indeterminate structures using various methods.
- Gain a solid understanding of how structures behave Under various loads.
- To understand the different techniques for analysis of structures.
- Identify different types of structural elements and their behaviour.
- Ability to distinguish between determinate and indeterminate structures.
- Ability to compute and draw normal, shear and bending moment diagrams for beams and frames.
- Apply knowledge of mathematics and Engineering in calculating slope and Deflections.
- The column subjected to axial loads, buckling behavior will also help the students in developing the basic concepts of structural analysis.

## COURSE OUTCOMES

| On successful completion of this course, the student will be able to |                                                                                  |
|----------------------------------------------------------------------|----------------------------------------------------------------------------------|
| <b>E4110.1</b>                                                       | Determine the of Slope and Deflection of Determinate beams by area moment method |
| <b>E4110.2</b>                                                       | Analyze of Fixed beams by Area-Moment method and draw SFD, BMD.                  |
| <b>E4110.3</b>                                                       | Analyze of Continuous beams by Theorem of Three moments and draw SFD, BMD        |
| <b>E4110.4</b>                                                       | Analyze of Portal frames by Moment Distribution Method and Draw SFD, BMD.        |
| <b>E4110.5</b>                                                       | Define the different types of Columns and finding critical loads of Columns.     |

### Pre-requisites

Mechanics of Materials and Engineering Mechanics

### CO-POs & PSOs mapping matrix

| CO                       | PO1       | PO2       | PO3       | PO4      | PO5       | PO6       | PO7       | PSO1      | PSO2      | PSO3      |
|--------------------------|-----------|-----------|-----------|----------|-----------|-----------|-----------|-----------|-----------|-----------|
| <b>E4110.1</b>           | 3         | 3         | 2         | 1        | 2         | 3         | 2         | 3         | 2         | 3         |
| <b>E4110.2</b>           | 3         | 3         | 2         | 1        | 2         | 3         | 2         | 3         | 2         | 3         |
| <b>E4110.3</b>           | 3         | 3         | 2         | 1        | 2         | 3         | 2         | 3         | 2         | 3         |
| <b>E4110.4</b>           | 3         | 3         | 2         | 1        | 2         | 3         | 2         | 3         | 2         | 3         |
| <b>E4110.5</b>           | 3         | 3         | 2         | 1        | 2         | 3         | 2         | 3         | 2         | 3         |
| <b>Total</b>             | <b>15</b> | <b>15</b> | <b>10</b> | <b>5</b> | <b>10</b> | <b>15</b> | <b>10</b> | <b>15</b> | <b>10</b> | <b>15</b> |
| <b>Correlation Level</b> | <b>3</b>  | <b>3</b>  | <b>2</b>  | <b>1</b> | <b>2</b>  | <b>3</b>  | <b>2</b>  | <b>3</b>  | <b>2</b>  | <b>3</b>  |

Correlation level 1 – Slight (low)

Correlation level 2 – Moderate (Medium)

Correlation level 3 – Substantial (high)

### Instructional Strategy

This course is introduced so that diploma holder in Civil Engineering may appreciate the concepts and principles of mechanics understanding the behaviour of structures under various loads and are able to apply the knowledge gained through the course for the design of simple and small components. Teacher should give simple exercises involving the applications of various concepts and principles being taught in the course. Efforts should be made to prepare tutorial sheets on various topics and students should be encouraged/ guided to solve the tutorial problems independently. Teacher may conduct weekly small quiz sessions to know the students' level of understanding and if need be, teacher may reinforce the concepts and principles related to mechanics of structures elements/members of building components.

### Assessment Methodology

|                           | Continuous Assessment(40marks) |                              |                                         |                       | End Semester Examination<br>(60 marks) |
|---------------------------|--------------------------------|------------------------------|-----------------------------------------|-----------------------|----------------------------------------|
|                           | CA1                            | CA2                          | CA3                                     | CA4                   |                                        |
| <b>Mode</b>               | Written test<br>(Unit 1 & 2)   | Written test<br>(Unit 3 & 4) | Quiz<br>MCQ<br>(Online/<br>Offline)     | Model<br>Examination  | Written<br>Examination                 |
| <b>Duration</b>           | 2 Periods                      | 2 Periods                    | 1Hour                                   | 3Hours                | 3Hours                                 |
| <b>Exam Marks</b>         | 50                             | 50                           | 60                                      | 100                   | 100                                    |
| <b>Converted to</b>       | 10                             | 10                           | 10                                      | 10                    | 60                                     |
| <b>Marks</b>              | 40                             |                              |                                         |                       | 60                                     |
| <b>Tentative Schedule</b> | 6 <sup>th</sup> Week           | 12 <sup>th</sup> Week        | 13 <sup>th</sup> -14 <sup>th</sup> Week | 16 <sup>th</sup> Week |                                        |

### CONTINUOUS ASSESSMENT

**CA1and CA2:** Assessment written test should be conducted for 50Marks for two units. The marks scored will be converted to 10 Marks for the internal assessment.

**CA1and CA2, Assessment test should be conducted for two units as below**

- PART-A: (5X 10Marks=50Marks).
- Eight questions will be asked, students should write five questions. Four questions can be asked from each unit.

**CA3:** 60 MCQ can be asked by covering the entire portion. It may be conducted by Online / Offline. The marks scored should be converted to 10 marks for the internal assessment.

**CA4:** Model examination should be conducted as per the end semester question pattern. The marks should be converted to 10marks for the internal assessment.

**Question Pattern**

- Answer Ten questions by selecting two questions from each unit. Each question carries 10 marks.
- Four questions will be asked from every unit. Students should write any two questions.

**Question Pattern –Model Examination and End Semester Examination Theory Exam**

PART-A

(5x2x10Marks=100Marks)

Note: Answer Ten questions by selecting two questions from each unit. Each question carries 10 marks.

**Sample**

- |      |    |
|------|----|
| I.   | 1  |
|      | 2  |
|      | 3  |
|      | 4  |
| II.  | 5  |
|      | 6  |
|      | 7  |
|      | 8  |
| III. | 9  |
|      | 10 |
|      | 11 |
|      | 12 |
| IV.  | 13 |
|      | 14 |
|      | 15 |
|      | 16 |
| V.   | 17 |
|      | 18 |
|      | 19 |
|      | 20 |

### QUESTION PAPER SETTING

The teaching learning process and assessment are being carried out in accordance with the revised Blooms Taxonomy. The question paper should consist of 90% questions based on Lower Order Thinking (LOTs) and the remaining 10% based on Higher Order Thinking (HOTs) as detailed below.

| <b>Revised Bloom's<br/>Taxonomy<br/>Level</b> | <b>Lower order thinking skills<br/>(LOTs)</b> | <b>Higher Order Thinking<br/>Skills (HOTs)</b> |
|-----------------------------------------------|-----------------------------------------------|------------------------------------------------|
|                                               | <b>R-Remember, U-Understand,<br/>AP-Apply</b> | <b>An- Analyze, E-Evaluate,<br/>C-Create</b>   |
| % to be included                              | 10 %                                          | 90 %                                           |

**CEE4110– MECHANICS OF STRUCTURES**

| CEE4110                                                                                                                                                                                                                                                                                                                                                                                                                             |                                | MECHANICS OF STRUCTURES | L | T | P | C      |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------|-------------------------|---|---|---|--------|
| THEORY                                                                                                                                                                                                                                                                                                                                                                                                                              |                                |                         | 3 | 0 | 0 | 3      |
| Unit-I                                                                                                                                                                                                                                                                                                                                                                                                                              | SLOPE AND DEFLECTION OF BEAMS  |                         |   |   |   | 9Hrs   |
| Deflected shapes / Elastic curves of beams with different support conditions –Definition of Slope and Deflection- Flexural rigidity and Stiffness of beams- Mohr’s Theorems – Area Moment method for slope and deflection of beams –Derivation of expressions for maximum slope and maximum deflection of standard cases by area moment method for cantilever and simply supported beams subjected to symmetrical UDL& point loads. |                                |                         |   |   |   | [2Hrs] |
| Numerical problems on determination of slopes and deflections at salient points of Cantilever Beam with maximum two-point loads,                                                                                                                                                                                                                                                                                                    |                                |                         |   |   |   | [2Hrs] |
| Udl throughout the beam, udl for the half length from fixed end and Combination of single point load and udl throughout the beam only                                                                                                                                                                                                                                                                                               |                                |                         |   |   |   | [1Hr]  |
| Determination of slopes and deflections at salient points of Simply supported beams with central point load.                                                                                                                                                                                                                                                                                                                        |                                |                         |   |   |   | [1Hr]  |
| Two equal point loads at one third points, udl throughout the beam and Combination of central point load and udl throughout the beam only from first principles and by using formulae.                                                                                                                                                                                                                                              |                                |                         |   |   |   | [2Hrs] |
| Unit-II                                                                                                                                                                                                                                                                                                                                                                                                                             | FIXED BEAMS-AREA MOMENT METHOD |                         |   |   |   | 9Hrs   |
| Introduction to fixed beam - Advantages –Degree of indeterminacy of fixed beam-Sagging and Hogging bending moments- Points of Contra flexure                                                                                                                                                                                                                                                                                        |                                |                         |   |   |   | [2Hrs] |
| Determination of fixing end (support) moments (FEM) by Area Moment method Bending moment diagram (BMD)-Free BMD –Fixed BMD- Derivation of Expression for subjected to concentrated load at mid span, Single eccentric point load, udl throughout the beams.                                                                                                                                                                         |                                |                         |   |   |   | [2Hrs] |
| Numerical Problems for Fixed beams subjected to concentrated load at mid span, Single eccentric point load.                                                                                                                                                                                                                                                                                                                         |                                |                         |   |   |   | [2Hrs] |
| Two equal point loads at one third points, udl throughout the beams, Combination of central point load and udl throughout the beam only.                                                                                                                                                                                                                                                                                            |                                |                         |   |   |   | [1Hr]  |
| Drawing SF and BM diagrams for Fixed beams with supports at the same level (sinking of supports or supports at different levels are not included).                                                                                                                                                                                                                                                                                  |                                |                         |   |   |   | [2Hrs] |

|                                                                                                                                                                 |                                                         |                 |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------|-----------------|
| <b>Unit-III</b>                                                                                                                                                 | <b>CONTINUOUS BEAMS–THEOREM OF THREE MOMENTS METHOD</b> | <b>9Hrs</b>     |
| Introduction to continuous beams-Advantages–Deflected shapes of continuous beam                                                                                 |                                                         | [2Hrs]          |
| Degree of indeterminacy of continuous beams with respect to number of spans                                                                                     |                                                         |                 |
| Types of supports Simple/ Fixed supports of beams                                                                                                               |                                                         | [2Hrs]          |
| General methods of analysis of Indeterminate structures                                                                                                         |                                                         |                 |
| Clapeyron’s theorem of three moments–Application of Clapeyron’s theorem of three moments for the following cases–Two span beams with both ends simply supported |                                                         | [2Hrs]          |
| Two span beams with one end fixed and the other end simply supported.                                                                                           |                                                         | [1Hr]           |
| Numerical Problems on Two span beams with both ends simply supported                                                                                            |                                                         |                 |
| Two span beams with one end fixed and the other end simply supported, Sketching of SFD and BMD for all the above cases.                                         |                                                         | [2Hrs]          |
| <b>Unit-IV</b>                                                                                                                                                  | <b>PORTAL FRAMES – MOMENT DISTRIBUTION METHOD</b>       | <b>9Hrs</b>     |
| Introduction to moment distribution method- Carry over moment-Carryover factor and Stiffness factor (Derivation not required)                                   |                                                         | [2Hrs]          |
| Distribution moment- Distribution factor-Stiffness Ratio or Relative Stiffness, Concept of distribution of un balanced moments at joints - Sign conventions,    |                                                         | [2Hrs]          |
| Definition of Frames– Types–Bays and Story - Sketches of Single/Multi Story Frames, Single/Multi Bay Frames- Portal Frame– Sway and Non- sway Frames            |                                                         | [2Hrs]          |
| Deflected shapes of Portal frames under different loading / support conditions                                                                                  |                                                         |                 |
| Numerical problems of Non sway (Symmetrical) Portal Frames for Joint moments by Moment Distribution Method and drawing BMD only.                                |                                                         | [2Hrs]<br>[1Hr] |
| <b>Unit-V</b>                                                                                                                                                   | <b>COLUMNS AND STRUTS</b>                               | <b>9Hrs</b>     |
| Columns and Struts–Definition–Short and Long columns–End conditions                                                                                             |                                                         | [2Hrs]          |
| Equivalent length / Effective length– Slenderness ratio – Axially loaded short column                                                                           |                                                         | [2Hrs]          |
| Axially loaded long column – Euler’s theory of long columns-Assumptions                                                                                         |                                                         |                 |
| Expression for Critical load of Columns standard cases of end conditions                                                                                        |                                                         |                 |
| Limitations of Euler’s formula – Modes of failure of column-Buckling of column-                                                                                 |                                                         | [2Hrs]          |
| Buckling load-crushing load-safe load- Factor of Safety                                                                                                         |                                                         |                 |
| Expression of Rankine’s formula for Crippling load of Columns                                                                                                   |                                                         | [1Hr]           |
| Simple problems for circular column, Hollow circular column, rectangular column, Single -I section without cover plate only.                                    |                                                         | [2Hrs]          |
| <b>TOTAL</b>                                                                                                                                                    |                                                         | <b>45</b>       |

**Suggested student activities**

1. Quiz.
2. Group discussion.
3. Seminar.
4. Surprise tests.
5. Class assignments.

**Text Books**

| S.NO | TITLE                     | AUTHOR         | PUBLISHERWITHEDITION                                                        |
|------|---------------------------|----------------|-----------------------------------------------------------------------------|
| 1.   | Theory of structures      | S.Ramamrutham  | 9 <sup>th</sup> Edition, Dhanpat Rai Publications, 2014.                    |
| 2.   | Structural Analysis-Vol 1 | Bhavikatti S.S | 4 <sup>th</sup> Edition, Vikas Publishing House Pvt.Ltd., NewDelhi-4, 2011. |
| 3.   | Structural Analysis-Vol.2 | Bhavikatti S.S | 4 <sup>th</sup> Edition, Vikas Publishing House Pvt.Ltd., NewDelhi-4, 2011. |

**Web-based/Online Resources**

| S.No | Website/Links                                                                                                                                                        |
|------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1    | SLOPE AND DEFLECTION OF BEAMS:<br><a href="https://youtu.be/U0uj67OwF4U?si=pxxtxfYoxP4Of3xc">https://youtu.be/U0uj67OwF4U?si=pxxtxfYoxP4Of3xc</a>                    |
| 2    | FIXED BEAMS–AREA MOMENT METHOD:<br><a href="https://youtu.be/0iIvT8x01wI?si=57CGtfvWi5LO2CZk">https://youtu.be/0iIvT8x01wI?si=57CGtfvWi5LO2CZk</a>                   |
| 3    | CONTINUOUS BEAMS–THEOREM OF THREE MOMENTS METHOD:<br><a href="https://youtu.be/pk6z6STv_uw?si=TnKEFKJDaNoFv5hT">https://youtu.be/pk6z6STv_uw?si=TnKEFKJDaNoFv5hT</a> |
| 4    | MOMENT DISTRIBUTION METHOD:<br><a href="https://youtu.be/xSDpRiTaoLg?si=ySvDfTcGq0GXQL0h">https://youtu.be/xSDpRiTaoLg?si=ySvDfTcGq0GXQL0h</a>                       |
| 5    | COLUMNS AND STRUTS:<br><a href="https://youtu.be/hwpGAxa8UoI?si=vMGt1P20H_hTL4DO">https://youtu.be/hwpGAxa8UoI?si=vMGt1P20H_hTL4DO</a>                               |

## MODEL QUESTION PAPER

### CEE4110–MECHANICS OF STRUCTURES

**Time : 3 Hrs**

**Max.Marks:100**

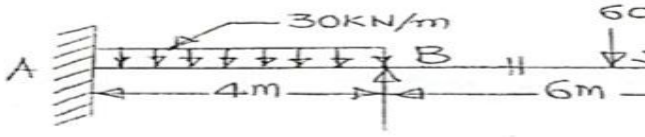
PART-A

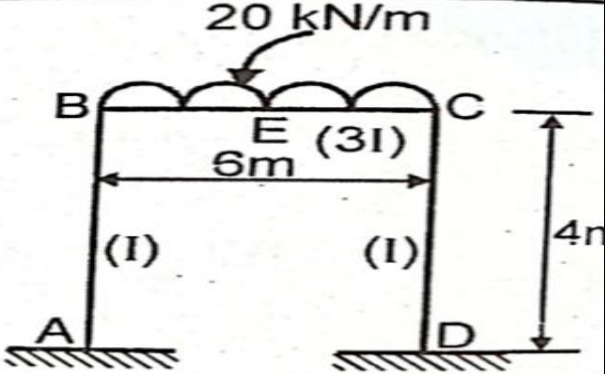
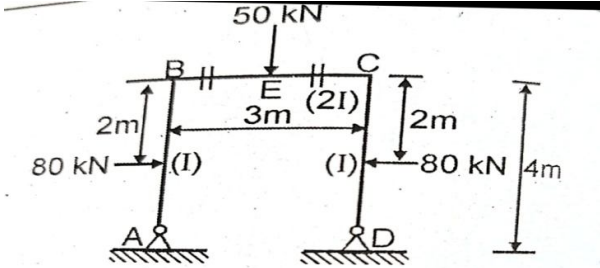
(5x2x10Marks=100Marks)

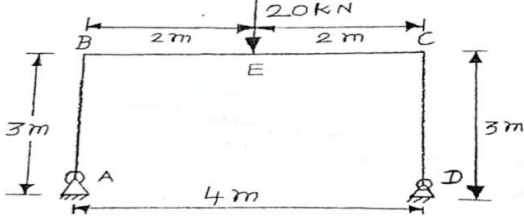
Note: Answer Ten questions by selecting two questions from each unit.

Each question carries 10 marks

| S.No | Questions                                                                                                                                                                                                                                                                                                                     | Unit | Bloom's Level | Course Outcome | Program Outcomes        |
|------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|---------------|----------------|-------------------------|
| I    | 1. A Cantilever beam of 1m long is of rectangular section of width 40 mm and depth 60mm. Calculate the maximum udl that can be allowed over the entire length of the beam without exceeding a deflection of 3.5 mm at the free end. Also calculate the maximum slope at the free end. Take $E=7 \times 10^4 \text{ N/mm}^2$ . | I    | AP, AN        | E4110.1        | PO1, PO2, PO3, PO6, PO7 |
|      | 2. A simply supported beam of 6m span is subjected to two-point loads of 30kN each at one third points. Calculate the maximum slope and deflection at the centre of beam. Take $EI = 4 \times 10^3 \text{ Nm}^2$                                                                                                              | I    | AP, AN        | E4110.1        | PO1, PO2, PO3, PO6, PO7 |
|      | 3. A rectangular beam of size 300X400 mm and 6m span. is simply supported at its ends. It carries a central point load of 20kN. Calculate the maximum slope and deflection, If $E = 1.5 \times 10^5 \text{ N/mm}^2$ .                                                                                                         | I    | AP, AN        | E4110.1        | PO1, PO2, PO3, PO6, PO7 |
|      | 4. A Cantilever beam of span 5m is carrying point loads of 25kN and 15kN at 3m and 4m from the fixed end. Calculate the slope and deflection at the free end, $EI = 6.75 \times 10^4 \text{ kNm}^2$ .                                                                                                                         | I    | AP, AN        | E4110.1        | PO1, PO2, PO3, PO6, PO7 |
| II   | 5. A fixed beam of span 6m is subjected to a point load of 50kN at 2m from left support.                                                                                                                                                                                                                                      | II   | AP, AN        | E4110.2        | PO1, PO2, PO3, PO6, PO7 |
|      | 6. A fixed beam of 8m span carries a central concentrated point load of 50 kN. Find the fixed end moments, Maximum positive moments, point of contra flexure and Draw the SFD and BMD                                                                                                                                         | II   | AP, AN        | E4110.2        | PO1, PO2, PO3, PO6, PO7 |

|     |                                                                                                                                                                                                                                                                                    |     |       |         |                     |
|-----|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|-------|---------|---------------------|
|     | 7. A fixed beam of 6m span carries a central point load of 20kN in addition to uniformly distributed load of 10 kN/m over the entire beam. Find the fixed end moments, Maximum positive moments , point of contra flexure and Draw the SFD and BMD                                 | II  | AP,AN | E4110.2 | PO1,PO2,PO3,PO6,PO7 |
|     | 8. A fixed beam of span 8m carries an udl of 15kN/m over the entire span. Calculate the fixed end moments. Draw SFD and BMD. Also mark the point of contra flexure. Use moment area method                                                                                         | II  | AP,AN | E4110.2 | PO1,PO2,PO3,PO6,PO7 |
| III | 9. A continuous beam ABC is simply at A and C such that B=6m and BC=5m. The span AB carries an UDL of 20kN/m and the span BC carries a point load of 50kN at its mid span. Find the support moments by theorem of three moments .Draw the BMD.                                     | III | AP,AN | E4110.3 | PO1,PO2,PO3,PO6,PO7 |
|     | 10. A continuous beam ABC 10m long rests on three simple supports A, B and C at the same level. Point loads 30kN is placed at the mid span of AB and BC. The spans AB and BC are equal. Determine the support moments and draw the BMD by using theorem of three moments.          | III | AP,AN | E4110.3 | PO1,PO2,PO3,PO6,PO7 |
|     | 11. A two span beam ABC of length 9m is fixed at A and simply supported at C. The span AB is 6m long carries a point load 40kN at 2m from A. The span BC is 3m long carries an udl of 20kN/m. Find the support moments using theorem of three moments method and Draw SFD and BMD. | III | AP,AN | E4110.3 | PO1,PO2,PO3,PO6,PO7 |
|     | 12. Analyze the continuous beam shown in figure by use of Clapeyron's theorem of three moments. Draw the BMD.<br>                                                                               | III | AP,AN | E4110.3 | PO1,PO2,PO3,PO6,PO7 |

|    |                                                                                                                                                                                                                                                                                                                                                                          |    |       |         |                     |
|----|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|-------|---------|---------------------|
| IV | 13. Analyse the portal frame in figure by moment distribution method. Draw the BMD.                                                                                                                                                                                                                                                                                      |    |       |         |                     |
|    |                                                                                                                                                                                                                                                                                         | IV | AP,AN | E4110.4 | PO1,PO2,PO3,PO6,PO7 |
|    | 14. Symmetrical portal frame of 4 meter span and 5 meter height carries a vertical udl of 20kN/m on the beam portion and two inward horizontal point loads of 30kN each acting one on each column at their middle height. The column and beam are uniform size. The bottom ends of columns are fixed. Draw the BM diagram for the frame using moment distribution method | IV | AP,AN | E4110.4 | PO1,PO2,PO3,PO6,PO7 |
|    | 15. Analyse the portal frame in figure by moment distribution method. Draw the BMD                                                                                                                                                                                                                                                                                       |    |       |         |                     |
|    |                                                                                                                                                                                                                                                                                       | IV | AP,AN | E4110.4 | PO1,PO2,PO3,PO6,PO7 |
|    | 16. A portal frame ABCD shown in figure is loaded with central point load of 20kn at E on the horizontal member BC. If EI is constant throughout the frame, calculate the bending moments in the frame by moment distribution method and plot the BMD                                                                                                                    | IV | AP,AN | E4110.4 | PO1,PO2,PO3,PO6,PO7 |

|   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |   |        |         |                      |
|---|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|--------|---------|----------------------|
|   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |   |        |         |                      |
| V | <p>17. A steel bar of rectangular cross-section 30mmx60mm is to be used as a column with pinned ends. What is the shortest length for which Euler's equation can be applied. Assume <math>E = 2.0 \times 10^5 \text{ N/mm}^2</math>, and stress at proportional limit <math>= 210 \text{ N/mm}^2</math>. Also Calculate the buckling load and compressive stress if the length is 1.5m.</p>                                                                                                                                                                                                                                                                                                            | V | AP,AN  | E4110.5 | PO1,PO2,PO3,PO6,PO7  |
| V | <p>18. A circular column 200mm diameter hinged at both ends is 4 m long.</p> <p>i) Find the Euler's safe load on the column with a factor of safety of 3.</p> <p>ii) Calculate the limiting slenderness ratio and shortest length of column for which Euler's formula can be used. Take <math>E = 15 \text{ KN/mm}^2</math>, <math>\sigma_y = 50 \text{ N/mm}^2</math></p>                                                                                                                                                                                                                                                                                                                             | V | AP,AN  | E4110.5 | PO1,PO2,PO3,PO6,PO7  |
|   | <p>19. A steel column consists of 2 channels ISMC 300 placed back-to-back with clear distance of 120mm between their backs. Each channel has the following geometrical properties:</p> <p>Area <math>= 4564 \text{ mm}^2</math></p> <p>Depth <math>= 300 \text{ mm}</math></p> <p>Width <math>= 90 \text{ mm}</math></p> <p>Centre of gravity <math>C_{yy} = 23.6 \text{ mm}</math></p> <p><math>I_{xx} = 63.626 \times 10^6 \text{ mm}^4</math></p> <p><math>I_{yy} = 3.108 \times 10^6 \text{ mm}^4</math></p> <p>The length of the column is 5m. It is fixed at bottom and hinged at top. <math>E = 210 \times 10^3 \text{ N/mm}^2</math>. Calculate the Euler's Crippling load for the column.</p> | V | AP, AN | E4110.5 | PO1,PO2,PO3,PO6, PO7 |

|                                                                                                                                                                                                                                                                                                                                                                                              |   |       |         |                       |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|-------|---------|-----------------------|
| 20. A hollow C.I. column whose inside diameter is 160 mm has a wall thickness of 20mm. It is 4.5m long and fixed at both ends. Calculate the (i) Slenderness ratio (ii) safe load by Rankine's formula using a factor of safety of 4 and (iii) Ratio of Euler's and Rankine's critical loads. Take $E = 2.1 \times 10^5 \text{ N/mm}^2$ , $\sigma_c = 550 \text{ N/mm}^2$ and $a = 1/1600$ . | V | AP,AN | E4110.5 | PO1,PO2,PO3, PO6, PO7 |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|-------|---------|-----------------------|

### QUESTION PAPER SETTING

The teaching learning process and assessment are being carried out in accordance with the revised Blooms Taxonomy. The question paper should consist of 90% questions based on Lower Order Thinking (LOTs) and the remaining 10% based on Higher Order Thinking (HOTs) as detailed below.

| Revised Bloom's Taxonomy Level | Lower order thinking skills (LOTs) | Higher Order Thinking Skills (HOTs) |
|--------------------------------|------------------------------------|-------------------------------------|
|                                | R-Remember, U-Understand, AP-Apply | An- Analyse, E-Evaluate, C-Create   |
| % to be included               | 10 %                               | 90 %                                |

## CEE4210– TRANSPORTATION ENGINEERING

Programme Name : CIVIL ENGINEERING

Course Code : CEE4210

Semester : IV SEMESTER

Course Title : TRANSPORTATION ENGINEERING

Course Type : THEORY

| L | T | P | C |
|---|---|---|---|
| 3 | 0 | 0 | 3 |

### TEACHING AND SCHEME OF EXAMINATION

No. of weeks per semester: 15 weeks

| Course                     | Instructions |                  | Examination         |                        |       |          |
|----------------------------|--------------|------------------|---------------------|------------------------|-------|----------|
|                            | Hours / Week | Hours / Semester | Marks               |                        |       | Duration |
|                            |              |                  | Internal Assessment | Autonomous Examination | Total |          |
| Transportation Engineering | 3            | 45               | 40                  | 100*                   | 100   | 3 Hrs    |

\*Examinations will be conducted for 100 marks and will be converted to 60 marks

### TOPICS AND ALLOCATION OF HOURS

| Unit         | Topics                            | Time (Hrs) |
|--------------|-----------------------------------|------------|
| I            | Highway Engineering               | 10         |
| II           | Road alignment and Classification | 9          |
| III          | Railway Engineering               | 10         |
| IV           | Railway Engineering(contd.)       | 8          |
| V            | Airport and Harbour Engineering   | 8          |
| <b>Total</b> |                                   | <b>45</b>  |

### COURSE DESCRIPTION

Construction of roads is one of the areas in which diploma holders in Civil Engineering get employment. These diploma holders are responsible for construction and maintenance of highways. Basic concepts of road geo-metrics, surveys and plans, road materials, construction of rigid and flexible pavements find place in this course. In addition, this course will cater the needs of those technicians who would like to find employment in the construction of railway tracks, airport and harbor. The course aims at providing broad based knowledge regarding various components and construction of railway track, airport and harbor components.

## COURSE OBJECTIVE

The objective of this course is to

- Make the students learn the basics of transportation engineering.
- Get knowledge about the various types of roadways and its geometric design.
- Acquire knowledge about railways, rail components and its uses.
- Know the various types of stations, signaling and interlocking in railways.
- Study the general aspect of airport and harbour planning and design aspects.

## COURSE OUTCOMES

| After successful completion of this course, the students should be able to |                                                                                                                                  |
|----------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------|
| <b>E4210.1</b>                                                             | Understand the importance of the roads, development of roads and classification of roads, highway pavements, Geometrical design. |
| <b>E4210.2</b>                                                             | Study the highway alignment, road machineries and construction of different types of Roads.                                      |
| <b>E4210.3</b>                                                             | Understand the components of railway and methods of laying the rails.                                                            |
| <b>E4210.4</b>                                                             | Learn the Railway fixtures, Types of stations, Signaling and Control of movement of trains.                                      |
| <b>E4210.5</b>                                                             | Study the general aspects of airport and harbor engineering.                                                                     |

### Pre-requisites

Knowledge of basic highway, railway, airport and harbor components.

### CO-POs & PSOs mapping matrix

| CO                       | PO1       | PO2      | PO3       | PO4       | PO5       | PO6       | PO7       | PSO1      | PSO2      | PSO3      |
|--------------------------|-----------|----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| <b>E4210.1</b>           | 3         | 1        | 3         | 3         | 1         | 3         | 2         | 3         | 3         | 3         |
| <b>E4210.2</b>           | 3         | 2        | 2         | 3         | 3         | 3         | 3         | 3         | 3         | 3         |
| <b>E4210.3</b>           | 3         | 1        | 2         | 1         | 3         | 1         | 1         | 3         | 3         | 3         |
| <b>E4210.4</b>           | 3         | 2        | 3         | 3         | 2         | 1         | 2         | 3         | 3         | 3         |
| <b>E4210.5</b>           | 3         | 1        | 1         | 1         | 1         | 3         | 3         | 3         | 3         | 3         |
| <b>Total</b>             | <b>15</b> | <b>7</b> | <b>10</b> | <b>11</b> | <b>10</b> | <b>11</b> | <b>15</b> | <b>15</b> | <b>15</b> | <b>15</b> |
| <b>Correlation Level</b> | <b>3</b>  | <b>1</b> | <b>2</b>  | <b>2</b>  | <b>2</b>  | <b>2</b>  | <b>3</b>  | <b>3</b>  | <b>3</b>  | <b>3</b>  |

Correlation level 1 – Slight (low)

Correlation level 2 – Moderate (Medium)

Correlation level 3 – Substantial (high)

### Instructional Strategy

- It is advised that teachers take steps to pique pupils' attention and boost their learning confidence.
- To help students learn and appreciate numerous concepts and principles in each area, teachers should provide examples from daily life, realistic situations, and real-world engineering and technological applications.
- The demonstration can make the subject exciting and foster in the students a scientific mindset. Student activities should be planned on all the topics.
- Throughout the course, a theory-demonstrate-practice-activity strategy may be used to ensure that learning is outcome and employability-based.
- Do not let students work on an activity or an experiment with the expected outcome, rather allow students to be honest about whatever the results of the experiment are. If the results are different from the expectations, students should do an analysis where they could be the source of error, if any.

### Assessment Methodology

|                    | Continuous Assessment(40marks) |                           |                                         |                       | End Semester Examination (60 marks) |
|--------------------|--------------------------------|---------------------------|-----------------------------------------|-----------------------|-------------------------------------|
|                    | CA1                            | CA2                       | CA3                                     | CA4                   |                                     |
| Mode               | Written test (Unit 1 & 2)      | Written test (Unit 3 & 4) | Quiz<br>MCQ<br>(Online/<br>Offline)     | Model Examination     | Written Examination                 |
| Duration           | 2 Periods                      | 2 Periods                 | 1Hour                                   | 3Hours                | 3Hours                              |
| Exam Marks         | 50                             | 50                        | 60                                      | 100                   | 100                                 |
| Converted to       | 10                             | 10                        | 10                                      | 10                    | 60                                  |
| Marks              | 40                             |                           |                                         |                       | 60                                  |
| Tentative Schedule | 6 <sup>th</sup> Week           | 12 <sup>th</sup> Week     | 13 <sup>th</sup> -14 <sup>th</sup> Week | 16 <sup>th</sup> Week |                                     |

#### CONTINUOUS ASSESSMENT

**CA1and CA2:** Assessment written test should be conducted for 50Marks for two units. The marks scored will be converted to 10 Marks for the internal assessment.

**CA1and CA2, Assessment test should be conducted for two units as below**

- PART A: (5X 10Marks=50Marks).
- Eight questions will be asked, students should write five questions. Four questions can be asked from each unit.

**CA3:** 60 MCQ can be asked by covering the entire portion. It may be conducted by Online / Offline. The marks scored should be converted to 10 marks for the internal assessment.

**CA4:** Model examination should be conducted as per the end semester question pattern. The marks should be converted to 10marks for the internal assessment.

**Question Pattern:**

- Answer Ten questions by selecting two questions from each unit. Each question carries 10 marks.
- Four questions will be asked from every unit. Students should write any two questions.

**Question Pattern – Model Examination and End Semester Examination Theory Exam**

PART-A

(5x2x10Marks=100Marks)

Note: Answer Ten questions by selecting two questions from each unit. Each question carries 10 marks

**Sample**

|      |    |
|------|----|
| I.   | 1  |
|      | 2  |
|      | 3  |
|      | 4  |
| II.  | 5  |
|      | 6  |
|      | 7  |
|      | 8  |
| III. | 9  |
|      | 10 |
|      | 11 |
|      | 12 |
| IV.  | 13 |
|      | 14 |
|      | 15 |
|      | 16 |
| V.   | 17 |
|      | 18 |
|      | 19 |
|      | 20 |

### QUESTION PAPER SETTING

The teaching learning process and assessment are being carried out in accordance with the revised Blooms Taxonomy. The question paper should consist of 90% questions based on Lower Order Thinking (LOTs) and the remaining 10% based on Higher Order Thinking (HOTs) as detailed below.

| <b>Revised Bloom's<br/>Taxonomy<br/>Level</b> | <b>Lower order thinking skills<br/>(LOTs)</b> | <b>Higher Order Thinking<br/>Skills (HOTs)</b> |
|-----------------------------------------------|-----------------------------------------------|------------------------------------------------|
|                                               | <b>R-Remember, U-Understand,<br/>AP-Apply</b> | <b>An- Analyse, E-Evaluate,<br/>C-Create</b>   |
| % to be included                              | 90 %                                          | 10 %                                           |

**CEE4210- TRANSPORTATION ENGINEERING**

| CEE4210                                                                                                                                              |                                   | TRANSPORTATION ENGINEERING | L | T | P | C      |
|------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------|----------------------------|---|---|---|--------|
| THEORY                                                                                                                                               |                                   |                            | 3 | 0 | 0 | 3      |
| Unit -I                                                                                                                                              | HIGHWAY ENGINEERING               |                            |   |   |   | 10Hrs  |
| General-Development of Roads in India-Modes of transportation                                                                                        |                                   |                            |   |   |   | [1Hr]  |
| Advantages of Roads Requirements of an ideal road–Indian Road                                                                                        |                                   |                            |   |   |   | [1Hr]  |
| Congress Classifications of Highways - Highway Pavements-Objectives                                                                                  |                                   |                            |   |   |   | [1Hr]  |
| Types of Pavements–Flexible and Rigid Pavements                                                                                                      |                                   |                            |   |   |   | [1Hr]  |
| Comparative study of Flexible and Rigid pavements.                                                                                                   |                                   |                            |   |   |   | [1Hr]  |
| Road structure- Right of way– Width of formation-Road Camber                                                                                         |                                   |                            |   |   |   | [1Hr]  |
| Super Elevation-Sight distances–Road gradient-Road                                                                                                   |                                   |                            |   |   |   | [1Hr]  |
| Curves-Horizontal Curves-Vertical Curve                                                                                                              |                                   |                            |   |   |   | [1Hr]  |
| Types- Widening of pavement on horizontal curves.                                                                                                    |                                   |                            |   |   |   | [1Hr]  |
| Unit- II                                                                                                                                             | ROAD ALIGNMENT AND CLASSIFICATION |                            |   |   |   | 9Hrs   |
| Principles for ideal highway alignment-Factors affecting highway alignment                                                                           |                                   |                            |   |   |   | [1Hr]  |
| Excavating Equipment’s-Tractor, Bulldozer, Grader, Scraper, Asphalt Recycling Equipment, Motor graders                                               |                                   |                            |   |   |   | [1Hr]  |
| Compaction Equipment’s                                                                                                                               |                                   |                            |   |   |   | [1Hr]  |
| Water Bound Macadam roads,                                                                                                                           |                                   |                            |   |   |   | [1Hr]  |
| Bituminous Roads, cement concrete roads                                                                                                              |                                   |                            |   |   |   | [1Hr]  |
| (Construction with sketches, Advantages and Disadvantages for these roads)                                                                           |                                   |                            |   |   |   | [1Hr]  |
| Surface dressing of Bituminous Roads-Types.                                                                                                          |                                   |                            |   |   |   | [2Hrs] |
| Unit -III                                                                                                                                            | RAILWAY ENGINEERING               |                            |   |   |   | 10Hrs  |
| Introduction to Railways -Classifications of Indian Railways –Rail Gauges                                                                            |                                   |                            |   |   |   | [2Hrs] |
| Requirements of an ideal rail-Types of rail sections - Coning of wheels- Creep of rails Causes and prevention of creep- Ballast-Functions of Ballast |                                   |                            |   |   |   | [2Hrs] |
| Requirements of ballast Materials used as ballast.                                                                                                   |                                   |                            |   |   |   | [1Hr]  |
| Functions of Sleepers-Types of sleepers – Requirements of sleepers                                                                                   |                                   |                            |   |   |   | [1Hr]  |
| Sleeper density-Rail Joints-Types-Rail Fastenings-Fish plates - Fish Bolts-Spikes                                                                    |                                   |                            |   |   |   | [1Hr]  |
| Chairs and Keys-Bearing Plates-Blocks-Elastic Fastenings-Anchors and anti-creepers.                                                                  |                                   |                            |   |   |   | [1Hr]  |

|                                                                                                                                                                                                        |                                        |                  |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------|------------------|
| <b>Unit- IV</b>                                                                                                                                                                                        | <b>RAILWAY ENGINEERING (Contd.)</b>    | <b>8Hrs</b>      |
| Definition of station -Types of stations -Platforms–Passenger and Goods platforms                                                                                                                      |                                        | [1Hr]            |
| Definition of Yard–Types of yard-Level Crossings-Engine Shed-Triangles                                                                                                                                 |                                        | [2Hrs]           |
| Turntable Traverses-Scotch Block-Buffer stops- Fouling marks.                                                                                                                                          |                                        | [2Hrs]           |
| Points and crossings-Turnouts-Right hand and left-hand turn outs-Crossings-                                                                                                                            |                                        | [1Hr]            |
| Types of Crossings - Objects of signalling –Types of signalling based on functions and location- Principles of interlocking.                                                                           |                                        | [2Hrs]           |
| <b>Unit -V</b>                                                                                                                                                                                         | <b>AIRPORT AND HARBOUR ENGINEERING</b> | <b>8Hrs</b>      |
| Airport classification airport planning: objectives, components, layout Characteristics, Orientation of Runways and correction factors for runway as per ICAO stipulations, Parking wind rose diagram. |                                        | [1Hr]<br>[1Hr]   |
| Harbour, port, satellite port, docks, waves and tides-planning of harbours: requirements                                                                                                               |                                        | [1Hr]            |
| Classification, location-harbour layout and terminal facilities-coastal structures: piers                                                                                                              |                                        | [1Hr]            |
| break waters, wharves, jetties, quays, spring fenders, dolphins and floating landing stage.                                                                                                            |                                        | [2Hrs]<br>[2Hrs] |
| <b>TOTAL</b>                                                                                                                                                                                           |                                        | <b>45</b>        |

#### **Suggested List of Students Activities:**

- Presentation/Seminars by students on any recent technological developments in Highway Engineering.
- Periodic class quizzes conducted on a weekly/fortnightly based on the course.
- Prepare Models of road geometric structures, points and crossing in railways etc.
- Visit near by road construction activities, Railway stations, Airports and Harbours.

#### **Text Books**

| S.NO | TITLE               | AUTHOR                     | PUBLISHERWITHEDITION                                               |
|------|---------------------|----------------------------|--------------------------------------------------------------------|
| 1.   | Highway Engineering | S.K.Khanna and C.E.G Justo | 10 <sup>th</sup> edition, Nem Chand& Bros Publisher, Roorkee,2017. |
| 2.   | Highway Engineering | Rangwala,                  | 11 <sup>th</sup> Edition, Charotar Publishing House Pvt. Ltd,2017. |
| 3.   | Railway Engineering | Rangwala,                  | 27 <sup>th</sup> edition,Charotar Publishing House Pvt. Ltd.,2017. |

#### **Web-based/Online Resources**

| S.no | Website/Links                                                                                                                                     |
|------|---------------------------------------------------------------------------------------------------------------------------------------------------|
| 1    | Highway engineering : <a href="https://youtu.be/3oNa9Z94Hiw?si=KaE7Cu7w6SvwVdek">https://youtu.be/3oNa9Z94Hiw?si=KaE7Cu7w6SvwVdek</a>             |
| 2    | <a href="https://www.digimat.in/nptel/courses/video/105107220/L04.html">https://www.digimat.in/nptel/courses/video/105107220/L04.html</a>         |
| 3    | Railway Engineering : <a href="https://youtu.be/37WMS483T7Y?si=0qkDRyZj6WeaTCcE">https://youtu.be/37WMS483T7Y?si=0qkDRyZj6WeaTCcE</a>             |
| 4    | <a href="https://youtu.be/SC5GIAHuCQY?si=HhOK_zuWdM-SV_el">https://youtu.be/SC5GIAHuCQY?si=HhOK_zuWdM-SV_el</a>                                   |
| 5    | <a href="https://youtu.be/NznOF2ukTy4?si=URsRhChYEfpBCCn5">https://youtu.be/NznOF2ukTy4?si=URsRhChYEfpBCCn5</a>                                   |
| 6    | Airport and harbour engineering : <a href="https://youtu.be/3YY9FUVtG-4?si=QjwhILSWM-APJl7V">https://youtu.be/3YY9FUVtG-4?si=QjwhILSWM-APJl7V</a> |

## MODEL QUESTION PAPER

### CEE4210– TRANSPORTATION ENGINEERING

**Time : 3 Hrs**

**Max.Marks:100**

**PART-A**

(5x2x10Marks=100Marks)

Note: Answer Ten questions by selecting two questions from each unit.

Each question carries 10 marks

| S.no | Questions                                                                                                                                                 | Unit | Bloom's Level | Course Outcome | Program Outcomes        |
|------|-----------------------------------------------------------------------------------------------------------------------------------------------------------|------|---------------|----------------|-------------------------|
| I    | 1. a. Explain the requirements of ideal roads.<br>b. Write about the classifications of highways?                                                         | I    | U,R           | E4210.1        | PO1, PO2, PO3, PO6, PO7 |
|      | 2. Explain about the sight distances.                                                                                                                     | I    | U             | E4210.1        | PO1, PO2, PO3,          |
|      | 3. a. Explain briefly about IRC.<br>b. Differentiate between flexible and Rigid pavements.                                                                | I    | U, R          | E4210.1        | PO1, PO2, PO3, PO6, PO7 |
|      | 4. Explain various types of vertical curves.                                                                                                              | I    | U             | E4210.1        | PO1, PO2, PO3, PO6, PO7 |
| II   | 5. a. Explain the construction of Bituminous roads with neat sketch.<br>b. What are the advantages and disadvantages of Bituminous roads?                 | II   | U,R           | E4210.2        | PO1, PO2, PO3           |
|      | 6. Explain about the principles for ideal highway alignment.                                                                                              | II   | U             | E4210.2        | PO1, PO2, PO3, PO6, PO7 |
|      | 7. a. What are the various types of excavating equipment's and explain any two?<br>b. What are the advantages and disadvantages of cement concrete roads? | II   | R             | E4210.2        | PO1, PO2, PO3, PO6, PO7 |
|      | 8. Explain the construction of Water Bound Macadam roads with neat sketch.                                                                                | II   | U             | E4210.2        | PO1, PO2, PO3, PO6, PO7 |

|     |                                                                                                                                      |     |     |         |                         |
|-----|--------------------------------------------------------------------------------------------------------------------------------------|-----|-----|---------|-------------------------|
| III | 9. a. Explain about the types of rail sections.<br>b. What are the functions and requirements of good ballast ?                      | III | U,R | E4210.3 | PO1, PO2, PO3, PO6, PO7 |
|     | 10. Explain about the types of sleepers.                                                                                             | III | U   | E4210.3 | PO1, PO2, PO3, PO6, PO7 |
|     | 11. a. What are causes and prevention of creep of rails?<br>b. What are the functions and requirements of good ballast ?             | III | R   | E4210.3 | PO1, PO2, PO3, PO6, PO7 |
|     | 12. Explain about different types of rail joints .                                                                                   | III | U   | E4210.3 | PO1, PO2, PO3, PO6, PO7 |
| IV  | 13.a. Explain about the various types of stations .<br>b. Explain about right hand turnouts with neat sketch.                        | IV  | U   | E4210.4 | PO1, PO2, PO3, PO6, PO7 |
|     | 14. Explain the types of signaling.                                                                                                  | IV  | U   | E4210.4 | PO1, PO2, PO3, PO6, PO7 |
|     | 15. a. Explain about passenger and goods platforms<br>b. Explain about left hand turnouts with neat sketch                           | IV  | U   | E4210.4 | PO1, PO2, PO3, PO6, PO7 |
|     | 16 .Explain the types of yards.                                                                                                      | IV  | U   | E4210.4 | PO1, PO2, PO3, PO6, PO7 |
| V   | 17. a. Explain the wind rose diagram with neat sketch.<br>b. What are various correction factors for runway as per ICAO?             | V   | U,R | E4210.5 | PO1, PO2, PO3, PO6, PO7 |
|     | 18. What are the classifications of harbor?                                                                                          | V   | R   | E4210.5 | PO1, PO2, PO3, PO6, PO7 |
|     | 19. a. What are the objectives and components of airport planning?<br>b. What are various correction factors for runway as per ICAO? | V   | R   | E4210.5 | PO1, PO2, PO3, PO6, PO7 |
|     | 20. Write a short note on spring, fenders and dolphins.                                                                              | V   | R   | E4210.5 | PO1, PO2, PO3, PO6, PO7 |

### QUESTION PAPER SETTING

The teaching learning process and assessment are being carried out in accordance with the revised Blooms Taxonomy. The question paper should consist of 90% questions based on Lower Order Thinking (LOTs) and the remaining 10% based on Higher Order Thinking (HOTs) as detailed below.

| Revised Bloom's<br>Taxonomy<br>Level | Lower order thinking skills<br>(LOTs) | Higher Order Thinking<br>Skills (HOTs) |
|--------------------------------------|---------------------------------------|----------------------------------------|
|                                      | R-Remember, U-Understand,<br>AP-Apply | An- Analyse, E-Evaluate,<br>C-Create   |
| % to be included                     | 90 %                                  | 10 %                                   |

**CEE4330– SOIL MECHANICS AND  
FOUNDATION ENGINEERING**

Programme Name : CIVIL ENGINEERING  
 Course Code : CEE4330  
 Semester : IV SEMESTER  
 Course Title : SOIL MECHANICS AND FOUNDATION  
 Course Type : PRACTICUM

| L | T | P | C |
|---|---|---|---|
| 2 | 0 | 2 | 3 |

**TEACHING AND SCHEME OF EXAMINATION**

No. of weeks per semester: 15 weeks

| Course                        | Instructions |                  | Examination         |                        |       |          |
|-------------------------------|--------------|------------------|---------------------|------------------------|-------|----------|
|                               | Hours / Week | Hours / Semester | Marks               |                        |       | Duration |
|                               |              |                  | Internal Assessment | Autonomous Examination | Total |          |
| Soil Mechanics and Foundation | 4            | 60               | 40                  | 100*                   | 100   | 3Hrs     |

**\*Examinations will be conducted for 100 marks and will be converted to 60 marks**

**TOPICS AND ALLOCATION OF HOURS**

| Unit         | Topics                                                | Time (Hrs) |
|--------------|-------------------------------------------------------|------------|
| I            | Soil properties and its classification                | 19         |
| II           | Permeability, total stress and shear strength of soil | 9          |
| III          | Consolidation and compaction                          | 14         |
| IV           | Types of foundation and bearing capacity of soil      | 8          |
| V            | Soil sampling & stabilization                         | 10         |
| <b>Total</b> |                                                       | <b>60</b>  |

**COURSE DESCRIPTION**

Civil Engineering diploma engineers are required to supervise the construction of roads and pavements, dams, embankments, and other Civil Engineering structures. As such, the knowledge of basic soil engineering is a pre-requisite for these engineers for effective discharge of their duties. This necessitates the introduction of Soil mechanics and foundation Engineering subject in the curriculum for Diploma Course in Civil Engineering. The subject covers only such topics as will enable the diploma engineers to identify and classify the different types of soils, their selection and proper use in the field for various types of engineering structures. The emphasis will be more on teaching practical aspects rather than theoretical concepts.

## COURSE OBJECTIVE

The objective of this course is to

- To impart knowledge about the index, Engineering properties of soil and its classification
- To impart knowledge about the methods of determination of soil properties
- To Estimate permeability and shear strength of soil
- To know the various methods of compaction, consolidation and determination of field density of soil
- To know the various types of foundations, bearing capacity of soil and its importance
- To learn various soil sampling & soil stabilization and its methods

## COURSE OUTCOMES

| After successful completion of this course, the students should be able to |                                                                                                                                  |
|----------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------|
| <b>E4330.1</b>                                                             | Identify and classify various types of soils. Interpret the physical properties of soil related to given Construction activities |
| <b>E4330.2</b>                                                             | Apply permeability, effective stress and shear strength test for foundation analysis                                             |
| <b>E4330.3</b>                                                             | Compute optimum values for moisture content for maximum dry density of soil                                                      |
| <b>E4330.4</b>                                                             | Interpret bearing capacity soil and selection of foundation.                                                                     |
| <b>E4330.5</b>                                                             | Apply different methods for improving the Engineering properties of soil, Soil sampling and Stabilization                        |

### Pre-requisites

Knowledge of Basics of soil properties and test methods

### CO-POs & PSOs Mapping matrix

| CO                       | PO1       | PO2      | PO3      | PO4       | PO5       | PO6       | PO7       | PSO1      | PSO2      | PSO3      |
|--------------------------|-----------|----------|----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| <b>E4330.1</b>           | 3         | 1        | 1        | 3         | 2         | 2         | 2         | 2         | 3         | 3         |
| <b>E4330.2</b>           | 3         | 1        | 1        | 2         | 2         | 2         | 2         | 2         | 3         | 3         |
| <b>E4330.3</b>           | 3         | 1        | 1        | 2         | 2         | 2         | 2         | 2         | 3         | 3         |
| <b>E4330.4</b>           | 3         | 1        | 1        | 2         | 2         | 2         | 2         | 2         | 3         | 3         |
| <b>E4330.5</b>           | 3         | 1        | 1        | 2         | 2         | 2         | 2         | 2         | 3         | 3         |
| <b>Total</b>             | <b>15</b> | <b>5</b> | <b>5</b> | <b>11</b> | <b>10</b> | <b>10</b> | <b>10</b> | <b>10</b> | <b>15</b> | <b>15</b> |
| <b>Correlation Level</b> | <b>3</b>  | <b>1</b> | <b>1</b> | <b>2</b>  | <b>2</b>  | <b>2</b>  | <b>2</b>  | <b>2</b>  | <b>3</b>  | <b>3</b>  |

Correlation level 1 – Slight (low)

Correlation level 2 – Moderate (Medium)

Correlation level 3 – Substantial (high)

### Instructional Strategy

The teacher while imparting instructions are expected to lay greater emphasis on the practical aspects rather than theory. To bring clarity regarding concepts and principles involved, teachers should organize demonstrations in the laboratories and fields. Efforts should be made in the practical classes that students perform practical exercises individually.

### Assessment Methodology

|                           | Continuous Assessment (40 marks) |                                 |                                |                                         | End Semester Examination (60 marks)            |
|---------------------------|----------------------------------|---------------------------------|--------------------------------|-----------------------------------------|------------------------------------------------|
|                           | CA1                              | CA2                             | CA3                            | CA4                                     |                                                |
| <b>Mode</b>               | Written Test Theory (1,2 Units)  | Written Test Theory (3,4 Units) | Practical Test (All Exercises) | Written Test (Complete Theory Portions) | Written Examination (Complete Theory Portions) |
| <b>Duration</b>           | 2 Periods                        | 2 Periods                       | 3 hours                        | 3 hours                                 | 3 hours                                        |
| <b>Exam Marks</b>         | 50                               | 50                              | 100                            | 100                                     | 100                                            |
| <b>Converted to</b>       | 10                               | 10                              | 10                             | 10                                      | 60                                             |
| <b>Marks</b>              | 40                               |                                 |                                |                                         | 60                                             |
| <b>Tentative Schedule</b> | 6 <sup>th</sup> Week             | 12 <sup>th</sup> Week           | 15 <sup>th</sup> Week          | 16 <sup>th</sup> Week                   |                                                |

#### Note:

- **CA1 and CA2:** Assessment written test should be conducted for 50 Marks. The marks scored will be converted to 10 Marks for each test.  
CA1 and CA2, Assessment written test should be conducted for two units as below.  
Answer any Five questions. (5 X 10 Marks = 50 Marks).  
Eight questions will be asked, students should write Five questions.  
Each unit Four questions can be asked.
- **CA 3:** All the exercises/experiments should be completed and kept for the practical test. The students shall be permitted to select any one experiment by lot for the test. The practical test should be conducted as per the scheme of evaluation as below. The marks awarded for 100 marks will be converted to 10 Marks for the internal mark.  
Practical documents should be maintained for every exercise / experiment immediately after completion of the practice. The practical document should be submitted for the practical test. Each exercise/experiment should be evaluated for 10 Marks. The total marks awarded should be converted to 30 Marks for the practical test as per the scheme of evaluation as below.

**The details of the practical documents to be prepared as per the instruction below.**

Each exercise observation and calculations should be completed on the day of practice. The same shall be evaluated for 10 marks on the day or next day of practice before commencement of the next exercise.

This documentation can be carried out in a separate notebook or printed manual or file. The reading and calculations and graph should be written by the student manually. The evaluated practical document should be submitted for the Practical Test (CA3). The mark scored by the students should be converted to 30 marks. The same should be included as per the allocation in the practical test.

The detailed date of the practices and its evaluation should be maintained in the course log book. The logbook and the practical documents should be submitted for the verification by the Flying Squad.

**SCHEME OF EVALUATION - Practical Test**

| S. No        | Description                         | Marks      |
|--------------|-------------------------------------|------------|
| A            | Aim/Apparatus required              | 10         |
| B            | Procedure/Observation               | 20         |
| C            | Formula/Calculation                 | 20         |
| D            | Result/Graph                        | 10         |
| E            | Practical document(All Practical's) | 30         |
| F            | Viva Voce                           | 10         |
| <b>Total</b> |                                     | <b>100</b> |

**CA4:** Model examination should be conducted for complete theory portions as per the end semester question pattern. The marks awarded should be converted to 10 marks for the internal assessment.

**Question Pattern:**

Answer ten questions by selecting two questions from each unit. Each question carries 10 marks each.

Four questions will be asked from every unit, students should write any two questions.

**QUESTION PAPER SETTING:**

The teaching learning process and assessment are being carried out in accordance with the revised Blooms Taxonomy. The question paper should consist of 90% questions based on Lower Order Thinking (LOTs) and the remaining 10% based on Higher Order Thinking (HOTs) as detailed below.

| <b>Revised Bloom's<br/>Taxonomy<br/>Level</b> | <b>Lower order thinking skills<br/>(LOTs)</b> | <b>Higher Order Thinking<br/>Skills (HOTs)</b> |
|-----------------------------------------------|-----------------------------------------------|------------------------------------------------|
|                                               | <b>R-Remember, U-Understand,<br/>AP-Apply</b> | <b>An- Analyse, E-Evaluate,<br/>C-Create</b>   |
| % to be included                              | 90 %                                          | 10 %                                           |

**CEE4330– SOIL MECHANICS AND  
FOUNDATION ENGINEERING**

| CEE4330                                                                                                                                                         |                                                       | SOIL MECHANICS AND FOUNDATION<br>ENGINEERING | L | T | P | C      |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------|----------------------------------------------|---|---|---|--------|
| PRACTICUM                                                                                                                                                       |                                                       |                                              | 2 | 0 | 2 | 3      |
| Unit- I                                                                                                                                                         | SOIL PROPERTIES AND ITS CLASSIFICATION                |                                              |   |   |   | 19Hrs  |
| Theory                                                                                                                                                          |                                                       |                                              |   |   |   |        |
| Introduction to Soil Mechanics                                                                                                                                  |                                                       |                                              |   |   |   | [1Hr]  |
| Origin of soil, Three phase diagram                                                                                                                             |                                                       |                                              |   |   |   | [1Hr]  |
| Definitions- Cohesive soil, Cohesion less soil, Void ratio, porosity, degree of saturation                                                                      |                                                       |                                              |   |   |   | [1Hr]  |
| Water content, specific gravity of soil grains, unit weights, density index and interrelationship of different parameters (Only formula)                        |                                                       |                                              |   |   |   | [1Hr]  |
| Simple problems- BIS soil classification.                                                                                                                       |                                                       |                                              |   |   |   | [1Hr]  |
| Practical                                                                                                                                                       |                                                       |                                              |   |   |   |        |
| 1.Determination of Specific gravity of sand                                                                                                                     |                                                       |                                              |   |   |   | [2Hrs] |
| 2.To determine the moisture content of a given sample of soil                                                                                                   |                                                       |                                              |   |   |   | [3Hrs] |
| 3.Calculate Voids ratio and porosity of sand ( If specific gravity, moisture content and degree of saturation value is given)                                   |                                                       |                                              |   |   |   | [2Hrs] |
| 4.Determine Grain size distribution of given soil sample by Sieve analysis                                                                                      |                                                       |                                              |   |   |   | [3Hrs] |
| 5.Determination of liquid limit and Plastic limit of the given soil sample                                                                                      |                                                       |                                              |   |   |   | [3Hrs] |
| Unit -II                                                                                                                                                        | PERMEABILITY, TOTAL STRESS AND SHEAR STRENGTH OF SOIL |                                              |   |   |   | 9Hrs   |
| Theory                                                                                                                                                          |                                                       |                                              |   |   |   |        |
| Permeability -Definition, Factors affecting permeability, Determination of coefficient of permeability (Constant head and falling head method - Procedure only) |                                                       |                                              |   |   |   | [2Hrs] |
| Darcy’s law- Differentiate Darcy velocity and seepage velocity                                                                                                  |                                                       |                                              |   |   |   | [1Hr]  |
| Definition and Significance of total stress, effective stress, Pore water pressure, Capillary phenomena& quick sand condition- Shear Strength                   |                                                       |                                              |   |   |   | [1Hr]  |
| Definition, Factors affecting shear strength of soil- Test on shear strength of soils (Name and uses only)                                                      |                                                       |                                              |   |   |   | [2Hrs] |
| Practical                                                                                                                                                       |                                                       |                                              |   |   |   |        |
| 6. Determination of shear strength of soil by direct shear                                                                                                      |                                                       |                                              |   |   |   | [3Hrs] |
| Unit- III                                                                                                                                                       | CONSOLIDATION AND COMPACTION                          |                                              |   |   |   | 12Hrs  |
| Consolidation-Definition, Factors affecting Consolidation - Compaction – Definition, Factors affecting compaction                                               |                                                       |                                              |   |   |   | [1Hr]  |
| Compaction Curve                                                                                                                                                |                                                       |                                              |   |   |   | [1Hr]  |
| Field methods of compaction - rolling, ramming and vibration. Suitability of different                                                                          |                                                       |                                              |   |   |   | [1Hr]  |
| Types of rollers - smooth wheel roller, sheep foot roller, pneumatic tyred roller.                                                                              |                                                       |                                              |   |   |   | [1Hr]  |
| CBR Test Procedure only                                                                                                                                         |                                                       |                                              |   |   |   | [1Hr]  |

|                                                                                                                                                                     |                                                         |             |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------|-------------|
| <b>Practical</b>                                                                                                                                                    |                                                         |             |
| 7.Determination of field density of soil by sand replacement method( <b>OR</b> )<br>Core cutter method.                                                             |                                                         | [4Hrs]      |
| 8.Determination of field density& optimum moisture content using<br>Proctor's compaction test ( <b>OR</b> ) Modified proctor compaction test                        |                                                         | [4Hrs]      |
| <b>Unit- IV</b>                                                                                                                                                     | <b>TYPES OF FOUNDATION AND BEARING CAPACITY OF SOIL</b> | <b>6Hrs</b> |
| Types of foundation–Suitability and application of Isolated, strip, raft, Pile,well foundation.                                                                     |                                                         | [1Hr]       |
| Uses of Pile groups and Sheet piles, Terzaghi's theory& Assumption and Equation bearing Capacity for different footing (only formula)                               |                                                         | [1Hr]       |
| Effect of water table on bearing capacity, Definition and significance of bearing capacity, ultimate bearing capacity                                               |                                                         | [1Hr]       |
| Net safe bearing capacity, Safe bearing capacity of soils and Negative skin friction                                                                                |                                                         | [1Hr]       |
| Factors affecting bearing capacity of soil.                                                                                                                         |                                                         | [1Hr]       |
| <b>Practical</b>                                                                                                                                                    |                                                         |             |
| 9.Using Standard penetration test, Identify various types of soil in Different layer and prepare detailed report (Demonstration with models / video / Field visit ) |                                                         | [2Hrs]      |
| <b>Unit- V</b>                                                                                                                                                      | <b>SOIL SAMPLING &amp; STABILIZATION</b>                | <b>6Hrs</b> |
| Sampling and types of samplers, undisturbed, disturbed and representative samples                                                                                   |                                                         | [2Hrs]      |
| Area ratio, recovery ratio of samples                                                                                                                               |                                                         | [1Hr]       |
| Materials used in soil stabilization-Geo-materials, Synthetic, natural polymers, Cement, Lime & Fly ash. Different methods of soil stabilization                    |                                                         | [1Hr]       |
| Deep Mixing Method, Grouting Method, Mechanical Stabilization of Soil.                                                                                              |                                                         | [1Hr]       |
| <b>Practical</b>                                                                                                                                                    |                                                         |             |
| 10. Using Auger boring (or) Any boring method, Identify various types of soil in Different layer.                                                                   |                                                         | [4Hrs]      |

#### **EQUIPMENTS REQUIRED (Batch strength: 30 students)**

| <b>S. No</b> | <b>LIST OF EQUIPMENTS</b>                                                                      | <b>QUANTITY REQUIRED</b> |
|--------------|------------------------------------------------------------------------------------------------|--------------------------|
| 1            | Pycnometer                                                                                     | 6 nos.                   |
| 2            | Hot air oven with all accessories such as Glass cup, Desiccators, etc.,                        | 1nos                     |
| 3            | Weighing balance 100kg,1kg                                                                     | Each 1 No.               |
| 4            | Sieve test for fine aggregate made of brass 200mm dia complete set.                            | 2 Sets                   |
| 5            | Sieve test for coarse aggregate made of brass 200mm dia complete set                           | 2 Sets                   |
| 6            | Liquid limit and plastic limit devices with all accessories                                    | Each 2 Nos.              |
| 7            | Direct shear machine with complete accessories                                                 | 1No.                     |
| 8            | Proctor's compaction test (OR) Modified proctor compaction test apparatus with all accessories | 2Nos.                    |

|    |                                                                                                  |       |
|----|--------------------------------------------------------------------------------------------------|-------|
| 9  | Sand replacement test Apparatus(OR)core cutter Devices with all accessories with all accessories | 1No.  |
| 10 | Auger boring (or) Any boring -Soil sampling Apparatus with all accessories                       | 1 No. |

#### Text Books

| S.NO | TITLE                                  | AUTHOR           | PUBLISHERWITHEDITION                                                                    |
|------|----------------------------------------|------------------|-----------------------------------------------------------------------------------------|
| 1.   | Principles of Geotechnical Engineering | Braja M Das      | 8th Edition, Cengage Learning India Private Limited, 2014.                              |
| 2.   | Geotechnical Engineering               | Venkatramaiah, C | 4 <sup>th</sup> Revised Edition, New Age International (P) Limited, Publishers, , 2012. |
| 3.   | Soil Mechanics and Foundations         | Punmia,B.C       | 16th Edition, Laxmi Publications Pvt. Ltd. New Delhi, 2017.                             |

#### Web-based/Online Resources

| S.No | Website/Links                                                                                                                                     |
|------|---------------------------------------------------------------------------------------------------------------------------------------------------|
| 1    | Video films on Geo-technical Laboratory Practices by Vinod Kumar; NITTTR, Chandigarh                                                              |
| 2    | e-books/e-tools/relevant software to be used as recommended by AICTE/UBTE/NITTTR, Chandigarh                                                      |
| 3    | <a href="https://nptel.ac.in/courses/105106142">https://nptel.ac.in/courses/105106142</a>                                                         |
| 4    | <a href="https://nptel.ac.in/courses/105101160">https://nptel.ac.in/courses/105101160</a>                                                         |
| 5    | <a href="http://law.resource.org/pub/in/bis/S03">http://law.resource.org/pub/in/bis/S03</a>                                                       |
| 6    | <a href="https://www.astm.org/standards/geotechnical-engineering-standards">https://www.astm.org/standards/geotechnical-engineering-standards</a> |
| 7    | <a href="http://law.resource.org/pub/in/bis/S03">http://law.resource.org/pub/in/bis/S03</a>                                                       |
| 8    | <a href="https://www.astm.org/standards/geotechnical-engineering-standards">https://www.astm.org/standards/geotechnical-engineering-standards</a> |

## MODEL QUESTION PAPER

### CEE4330–SOIL MECHANICS AND FOUNDATION ENGINEERING

Time :3 Hrs

Max.Marks:100

| Sl. No | Name of the Experiments                                                                                                                                           | CO      | PO                                 |
|--------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|------------------------------------|
| 1      | Determination of Specific gravity of sand                                                                                                                         | E4330.1 | PO1,PO2,PO3,PO4,PO5, PO6,PO7,      |
| 2      | To determine the moisture content of a given sample of soil                                                                                                       | E4330.1 | PO1, PO2, PO3, PO4, PO5, PO6, PO7, |
| 3      | Calculate Voids ratio and porosity of sand (If specific gravity, moisture content and degree of saturation value is given)                                        | E4330.1 | PO1, PO2, PO3, PO4, PO5, PO6, PO7, |
| 4      | Determine Grain size distribution of given soil sample by Sieve analysis                                                                                          | E4330.1 | PO1, PO2, PO3, PO4, PO5, PO6, PO7, |
| 5      | Determination of liquid limit and Plastic limit of the given soil sample                                                                                          | E4330.1 | PO1, PO2, PO3, PO4, PO5, PO6, PO7, |
| 6      | Determination of shear strength of soil by direct shear                                                                                                           | E4330.2 | PO1, PO2, PO3, PO4, PO5, PO6, PO7, |
| 7      | Determination of field density of soil by sand replacement method <b>(OR)</b> Core cutter method.                                                                 | E4330.3 | PO1, PO2, PO3, PO4, PO5, PO6, PO7, |
| 8      | Determination of field density& optimum moisture content using Proctor's compaction test <b>(OR)</b> Modified proctor compaction test                             | E4330.3 | PO1, PO2, PO3, PO4, PO5, PO6, PO7, |
| 9      | Using Standard penetration test, Identify various types of soil in Different layer and prepare detailed report (Demonstration with models / video / Field visit ) | E4330.4 | PO1, PO2, PO3, PO4, PO5, PO6, PO7, |
| 10     | Using Auger boring (or) Any boring method, Identify various types of soil in Different layer.                                                                     | E4330.5 | PO1, PO2, PO3, PO4, PO5, PO6, PO7, |

## CEE4440– CONCRETE TECHNOLOGY

Programme Name : CIVIL ENGINEERING  
 Course Code : CEE4440  
 Semester : IV SEMESTER  
 Course Title : CONCRETE TECHNOLOGY  
 Course Type : PRACTICUM

| L | T | P | C |
|---|---|---|---|
| 1 | 0 | 4 | 3 |

### TEACHING AND SCHEME OF EXAMINATION

No. of weeks per semester: 15 weeks

| Course              | Instructions |                  | Examination         |                        |       |          |
|---------------------|--------------|------------------|---------------------|------------------------|-------|----------|
|                     | Hours / Week | Hours / Semester | Marks               |                        |       | Duration |
|                     |              |                  | Internal Assessment | Autonomous Examination | Total |          |
| Concrete Technology | 5            | 75               | 40                  | 100*                   | 100   | 3Hrs     |

\*Examinations will be conducted for 100 marks and will be converted to 60 marks

### TOPICS AND ALLOCATION OF HOURS

| Unit         | Topics                                      | Time (Hrs) |
|--------------|---------------------------------------------|------------|
| I            | Cement                                      | 15         |
| II           | Aggregates and water                        | 15         |
| III          | Concrete and its properties                 | 15         |
| IV           | Concrete mix design and testing             | 15         |
| V            | Manufacture of concrete and quality control | 15         |
| <b>Total</b> |                                             | <b>75</b>  |

### COURSE DESCRIPTION

The objective of this course is to

Concrete is the most widely used building material. It is versatile, has desirable engineering properties, can be moulded into any shape. The knowledge of concrete's controlled production, maintenance and testing is vital for a designer to ensure its optimal use. The need for better understanding the behaviour of concrete, especially in challenging environmental conditions, it is required to have sound knowledge on selection of materials, mix proportioning and quality control methods.

### COURSE OBJECTIVE

On successful completion of this course, the students will be able to:

- Understand the properties and strength of cement and aggregates.
- Investigate the properties of cement and aggregate by conducting laboratory test.
- Determine the properties and strength of fresh and hardened concrete
- Design the mix proportioning of concrete.
- Describe the Manufacture of concrete, Form work and Quality control.

## COURSE OUTCOMES

| After successful completion of this course, the students should be able to |                                                                                  |
|----------------------------------------------------------------------------|----------------------------------------------------------------------------------|
| <b>E4440.1</b>                                                             | Explain the properties of cement, types and grades.                              |
| <b>E4440.2</b>                                                             | Explain the properties and classification of aggregate, water.                   |
| <b>E4440.3</b>                                                             | Describe the grades of concrete and properties of fresh and hardened concrete.   |
| <b>E4440.4</b>                                                             | Understand the concept of mix design and evaluate their strength.                |
| <b>E4440.5</b>                                                             | Understand the manufacturing process of concrete, form work and quality control. |

## Pre-requisites

Basic Science, Physical properties of various materials and their behavior.

## CO-POs & PSOs Mapping matrix

| CO                       | PO1       | PO2       | PO3       | PO4       | PO5      | PO6      | PO7      | PSO1      | PSO2      | PSO3      |
|--------------------------|-----------|-----------|-----------|-----------|----------|----------|----------|-----------|-----------|-----------|
| <b>E4440.1</b>           | 3         | 2         | 2         | 2         | 1        | 1        | 2        | 3         | 2         | 3         |
| <b>E4440.2</b>           | 3         | 2         | 2         | 2         | 1        | 1        | 2        | 3         | 2         | 3         |
| <b>E4440.3</b>           | 3         | 2         | 3         | 2         | 2        | 2        | 2        | 3         | 2         | 3         |
| <b>E4440.4</b>           | 3         | 2         | 3         | 2         | 1        | 1        | 1        | 3         | 2         | 3         |
| <b>E4440.5</b>           | 3         | 2         | 2         | 2         | 2        | 2        | 2        | 3         | 2         | 3         |
| <b>Total</b>             | <b>15</b> | <b>10</b> | <b>12</b> | <b>10</b> | <b>7</b> | <b>7</b> | <b>9</b> | <b>15</b> | <b>10</b> | <b>15</b> |
| <b>Correlation Level</b> | <b>3</b>  | <b>2</b>  | <b>2</b>  | <b>2</b>  | <b>1</b> | <b>1</b> | <b>1</b> | <b>3</b>  | <b>2</b>  | <b>3</b>  |

Correlation level 1 – Slight (low)

Correlation level 2 – Moderate (Medium)

Correlation level 3 – Substantial (high)

## Instructional Strategy

- The course content shall be delivered through lectures, PowerPoint presentations, and videos demonstrations and field visits
- The Activity criteria shall be conducted / executed by the student to be submitted to the faculty.
- The PRACTICE (Performance criteria) shall be conducted by the student and Report of work done to be submitted at the end of each session to the faculty.

### Assessment Methodology

|                           | Continuous Assessment (40Marks)    |                       |                       |                             | End Semester Examination (60Marks) |
|---------------------------|------------------------------------|-----------------------|-----------------------|-----------------------------|------------------------------------|
|                           | CA1                                | CA2                   | CA3                   | CA4                         |                                    |
| <b>Mode</b>               | Practical Test                     | Practical Test        | Written test          | Model Practical Examination | Practical Examination              |
| <b>Portion</b>            | Cycle I Exercises<br>50% Exercises | Cycle II Exercises    | All Units             | All Exercises               | All Exercises                      |
| <b>Duration</b>           | 2Periods                           | 2Periods              | Regularly             | 3Hours                      | 3Hours                             |
| <b>Exam Marks</b>         | 60                                 | 60                    | 100                   | 100                         | 100                                |
| <b>Converted to</b>       | 10                                 | 10                    | 10                    | 10                          | 60                                 |
| <b>Internal Marks</b>     | 40                                 |                       |                       |                             | 60                                 |
| <b>Tentative Schedule</b> | 7 <sup>th</sup> Week               | 14 <sup>th</sup> Week | 15 <sup>th</sup> Week | 16 <sup>th</sup> Week       | -                                  |

#### Note

**CA1 and CA2:** All the exercises/experiments as per the portions mentioned above should be completed and kept for the practical test. The students shall be permitted to select any one by lot for the test. The practical test should be conducted as per the scheme of evaluation as below. The marks awarded will be converted to 10 Marks for each assessment test. Practical documents should be maintained for every exercise / experiment immediately after completion of the practice. The practical document should be submitted for the practical test. The same should be evaluated for 10 Marks for each exercise/experiment. The total marks awarded should be converted to 10 Marks for the practical test as per the scheme of evaluation as below.

**The details of the documents to be prepared as per the instruction below.**

#### SCHEME OF EVALUATION

| PART  | DESCRIPTION                               | MARKS |
|-------|-------------------------------------------|-------|
| A     | Aim and Apparatus Required                | 5     |
| B     | Tabulation/Observation                    | 20    |
| C     | Graph/Sketch/Calculation                  | 20    |
| D     | Result                                    | 5     |
| TOTAL |                                           | 50    |
| E     | Practical Documents (As per the portions) | 10    |
|       |                                           | 60    |

**CA3:** Written Test for complete theory portions should be conducted for 100 Marks as per the question pattern below. The marks scored will be converted to 15 Marks for internal assessment.

**Question pattern – Written Test Theory**

| Description |                                                 | Marks        |           |
|-------------|-------------------------------------------------|--------------|-----------|
| Part – A    | 30 MCQ Questions.                               | 30 X 1 Mark  | 30 Marks  |
| Part – B    | 7 Questions to be answered out of 10 Questions. | 7 X 10 Marks | 70 Marks  |
| TOTAL       |                                                 |              | 100 Marks |

**CA4:** All the exercises/experiments should be completed and kept for the Model practical examination. The students shall be permitted to select any one by lot for the test. The model practical examination should be conducted as per the scheme of evaluation as below. The marks awarded should be converted to 10 Marks for the internal assessment.

**SCHEME OF EVALUATION**

**Model Practical Examination and End Semester Examination - Practical Exam**

| PART  | DESCRIPTION                | MARKS |
|-------|----------------------------|-------|
| A     | Aim and Apparatus Required | 10    |
| B     | Tabulation/Observation     | 20    |
| C     | Graph/Sketch /Calculation  | 20    |
| D     | Result                     | 10    |
| E     | Written Test               | 30    |
| F     | Viva Voce                  | 10    |
| TOTAL |                            | 100   |

**Note:** For the written test 30 MCQ shall be asked from the theory portions.

**CEE4440– CONCRETE TECHNOLOGY**

| CEE4440                                                                                                                                                                                                                                                                     |                             | CONCRETE TECHNOLOGY | L | T | P | C      |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------|---------------------|---|---|---|--------|
| PRACTICUM                                                                                                                                                                                                                                                                   |                             |                     | 1 | 0 | 4 | 3      |
| Unit-I                                                                                                                                                                                                                                                                      | CEMENT                      |                     |   |   |   | 15Hrs  |
| Theory                                                                                                                                                                                                                                                                      |                             |                     |   |   |   |        |
| 1.1 Chemical constituents: Bogue’s compound & their properties- hydration of cement Physical and chemical Properties of OPC cement-IS requirements of OPC& PPC.                                                                                                             |                             |                     |   |   |   | [3Hrs] |
| 1.2Laboratory tests: Fineness, Standard Consistency, Setting Time, Soundness, Compressive Strength -Different Grades of OPC-Storing of cement.                                                                                                                              |                             |                     |   |   |   | [3Hrs] |
| Exercises :                                                                                                                                                                                                                                                                 |                             |                     |   |   |   |        |
| 1) Determination of normal consistency and initial setting time of the given cement.                                                                                                                                                                                        |                             |                     |   |   |   | [3Hrs] |
| 2) Determination of soundness of cement by Le chatlier’s method                                                                                                                                                                                                             |                             |                     |   |   |   | [3Hrs] |
| 3) Determination of Compressive Strength of cement                                                                                                                                                                                                                          |                             |                     |   |   |   | [3Hrs] |
| Unit-II                                                                                                                                                                                                                                                                     | AGGREGATES AND WATER        |                     |   |   |   | 15Hrs  |
| 2.1 Aggregates: Classification According to Size and Shapes                                                                                                                                                                                                                 |                             |                     |   |   |   | [1Hr]  |
| 2.2 Fine Aggregates: Properties- Size- Specific Gravity- Bulk Density- Water Absorption Bulking-Fineness Modulus, Grading Zone of Sand, Silt content- Concept of Crushed Sand Requirements of good aggregate.                                                               |                             |                     |   |   |   | [1Hr]  |
| 2.3 Coarse Aggregates: Properties- Size- Shape- Surface texture- Water Absorption Soundness- Specific Gravity- Bulk Density- Fineness Modulus of Coarse Aggregate Grading of Coarse Aggregates- Crushing Value- Impact Value- Abrasion Value Requirements of good aggregate |                             |                     |   |   |   | [2Hrs] |
| 2.4 Water: Quality of Water- Impurities in Mixing water and Permissible Limits for Solids as per IS 456:2000.                                                                                                                                                               |                             |                     |   |   |   | [2Hrs] |
| Exercises:                                                                                                                                                                                                                                                                  |                             |                     |   |   |   |        |
| 1) Determination of silt content in sand                                                                                                                                                                                                                                    |                             |                     |   |   |   | [3Hrs] |
| 2) Determination of bulking of River sand / M-sand                                                                                                                                                                                                                          |                             |                     |   |   |   | [3Hrs] |
| 3) Determination of fineness modulus of fine /coarse aggregate by sieve analysis.                                                                                                                                                                                           |                             |                     |   |   |   | [3Hrs] |
| Unit-III                                                                                                                                                                                                                                                                    | CONCRETE AND ITS PROPERTIES |                     |   |   |   | 15Hrs  |
| 3.1 Grades of concrete                                                                                                                                                                                                                                                      |                             |                     |   |   |   |        |
| Different Grades of Concrete- Provisions of IS 456-Effect of Water Cement Ratio on Concrete- Duff Abram Water Cement(w/c) Ratio Law- Significance of w/c Ratio- Selection of w/c Ratio for Different Grades                                                                 |                             |                     |   |   |   | [2Hrs] |
| 3.2 Properties of Fresh Concrete                                                                                                                                                                                                                                            |                             |                     |   |   |   | [2Hrs] |
| Workability-Factors affecting Workability of Concrete-Workability Requirement for different types of Concrete Works- Segregation, Bleeding, honey combing and Preventive Measures                                                                                           |                             |                     |   |   |   |        |
| 3.3 Properties of Hardened Concrete                                                                                                                                                                                                                                         |                             |                     |   |   |   | [2Hrs] |

|                                                                                                                                                                                                                                                     |                                                    |              |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------|--------------|
| Strength, Durability, Impermeability of concrete                                                                                                                                                                                                    |                                                    |              |
| <b>Exercises:</b>                                                                                                                                                                                                                                   |                                                    |              |
| 1) Determination of workability of concrete by slump cone test                                                                                                                                                                                      |                                                    | [3Hrs]       |
| 2) Determination of workability of concrete by compaction factor test                                                                                                                                                                               |                                                    | [3Hrs]       |
| 3) Determination of workability by Vee- Bee Test                                                                                                                                                                                                    |                                                    | [3Hrs]       |
| <b>Unit-IV</b>                                                                                                                                                                                                                                      | <b>CONCRETE MIX DESIGN AND TESTING</b>             | <b>15Hrs</b> |
| <b>Concrete Mix Design</b>                                                                                                                                                                                                                          |                                                    |              |
| Concept of mix design- Factors influencing the choice of mix proportions-Methods of Mix Design- Procedural Steps of Mix Design as per IS-10262- Illustrative Example for Concrete Mix Design as per IS 10262:2019-Sampling and Acceptance criteria. |                                                    | [3Hrs]       |
| <b>Exercises:</b>                                                                                                                                                                                                                                   |                                                    |              |
| 1) Determination of compressive strength on concrete cubes                                                                                                                                                                                          |                                                    | [3Hrs]       |
| 2) Non-Destructive Testing of Concrete-Rebound Hammer Test                                                                                                                                                                                          |                                                    | [3Hrs]       |
| <b>Unit -V</b>                                                                                                                                                                                                                                      | <b>MANUFACTURE OF CONCRETE AND QUALITY CONTROL</b> | <b>15Hrs</b> |
| <b>5.1 Manufacture of concrete</b>                                                                                                                                                                                                                  |                                                    | [3Hrs]       |
| Concreting Operations-Batching-Mixing-Transportation, Placing, Compaction, Finishing, Curing                                                                                                                                                        |                                                    |              |
| <b>5.2 Formwork for concreting</b> -Types of form work for Beams, Slabs and Columns=Materials used for Formwork-Requirements of a Good Formwork Stripping time for Removal of Form work as per IS:456-2000                                          |                                                    | [3Hrs]       |
| <b>5.3 Quality Control of Concrete</b>                                                                                                                                                                                                              |                                                    |              |
| Necessity of supervision-Errors in concrete construction-Check list before commencing concreting.                                                                                                                                                   |                                                    | [3Hrs]       |
| <b>Exercises :</b>                                                                                                                                                                                                                                  |                                                    |              |
| 1) Determination of consistency of fresh concrete by flow table test.                                                                                                                                                                               |                                                    | [3Hrs]       |
| 2) Determination of carbonation depth on concrete                                                                                                                                                                                                   |                                                    | [3Hrs]       |

**EQUIPMENTS REQUIRED: (Batch strength: 30 students)**

| S. No | LIST OF EQUIPMENTS                                                                                    | QUANTITY REQUIRED |
|-------|-------------------------------------------------------------------------------------------------------|-------------------|
| 1     | Pycnometer                                                                                            | 6 nos.            |
| 2     | Hot air oven with all accessories such as Glass cup, Desiccators, etc.,                               | 1nos              |
| 3     | Weighing balance 100kg,1kg                                                                            | Each 1 No.        |
| 4     | Sieve test for fine aggregate made of brass 200mm dia complete set.                                   | 2 Sets            |
| 5     | Sieve test for coarse aggregate made of brass 200mm dia complete set                                  | 2 Sets            |
| 6     | Liquid limit and plastic limit devices with all accessories                                           | Each 2 Nos.       |
| 7     | Direct shear machine with complete accessories                                                        | 1No.              |
| 8     | Proctor's compaction test <b>(OR)</b> Modified proctor compaction test apparatus with all accessories | 2Nos.             |
| 9     | Sand replacement test Apparatus(OR)core cutter Devices with all accessories with all accessories      | 1No.              |
| 10    | Auger boring (or) Any boring -Soil sampling Apparatus with all accessories                            | 1 No.             |

**List of Suggested Student Activities:**

- Conduct field test on cement
- Compare properties of Manufactured sand with Natural River sand
- Study on Recycled coarse aggregate and prepare a report
- Visit the construction site and study the concrete operations and prepare a report
- Conduct a site visit to RMC plant /Cement plant and prepare a report.

**Text Books**

| S.NO | TITLE                                     | AUTHOR         | PUBLISHERWITHEDITION                    |
|------|-------------------------------------------|----------------|-----------------------------------------|
| 1.   | Concrete Technology (Theory and Practice) | M.S.Shetty     | 8th Edition, S.Chand& Company           |
| 2.   | Concrete Technology                       | M L Gambhir    | 5th Edition, McGraw Hill Education,2017 |
| 3.   | Concrete Technology                       | S.S.Bhavikatti | 1st Edition, Dream Tech Press, 2019.    |

**Web-based/Online Resources**

| S.No | Website/Links                                                                                                                                                                                 |
|------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1    | <a href="https://archive.nptel.ac.in/courses/105/102/105102012/">https://archive.nptel.ac.in/courses/105/102/105102012/</a>                                                                   |
| 2    | <a href="https://www.youtube.com/watch?v=cx5gPKp9QE&amp;list=PLbMVogVj5nJQU7M0LdA77p_XaaWBJniNc">https://www.youtube.com/watch?v=cx5gPKp9QE&amp;list=PLbMVogVj5nJQU7M0LdA77p_XaaWBJniNc</a>   |
| 3    | <a href="https://www.youtube.com/watch?v=gySKrFFswWE&amp;list=PLwOk-xleY47meXa-poHe6Iy_q-urnNv1e">https://www.youtube.com/watch?v=gySKrFFswWE&amp;list=PLwOk-xleY47meXa-poHe6Iy_q-urnNv1e</a> |

## MODEL QUESTION PAPER

### CEE4440–CONCRETE TECHNOLOGY

Time :3Hrs

Max.Marks:100

| S.No | Name of the Experiments                                                           | CO      | PO                                 |
|------|-----------------------------------------------------------------------------------|---------|------------------------------------|
| 1    | Determination of normal consistency and initial setting time of the given cement. | E4440.1 | PO1, PO2, PO3, PO4, PO5, PO6, PO7, |
| 2    | Determination of soundness of cement by Le chatlier's method                      | E4440.1 | PO1, PO2, PO3, PO4, PO5, PO6, PO7, |
| 3    | Determination of Compressive Strength of cement                                   | E4440.1 | PO1, PO2, PO3, PO4, PO5, PO6, PO7, |
| 4    | Determination of silt content in sand                                             | E4440.2 | PO1, PO2, PO3, PO4, PO5, PO6, PO7, |
| 5    | Determination of bulking of River sand / M-sand                                   | E4440.2 | PO1, PO2, PO3, PO4, PO5, PO6, PO7, |
| 6    | Determination of fineness modulus of fine /coarse aggregate by sieve analysis.    | E4440.2 | PO1, PO2, PO3, PO4, PO5, PO6, PO7, |
| 7    | Determination of workability of concrete by slump cone test                       | E4440.3 | PO1, PO2, PO3, PO4, PO5, PO6, PO7, |
| 8    | Determination of workability of concrete by compaction factor test                | E4440.3 | PO1, PO2, PO3, PO4, PO5, PO6, PO7, |
| 9    | Determination of workability by Vee- Bee Test                                     | E4440.3 | PO1, PO2, PO3, PO4, PO5, PO6, PO7, |
| 10   | Determination of compressive strength on concrete cubes                           | E4440.4 | PO1, PO2, PO3, PO4, PO5, PO6, PO7, |
| 11   | Non-Destructive Testing of Concrete-Rebound Hammer Test                           | E4440.4 | PO1, PO2, PO3, PO4, PO5, PO6, PO7, |
| 12   | Determination of consistency of fresh concrete by flow table test.                | E4440.5 | PO1, PO2, PO3, PO4, PO5, PO6, PO7, |
| 13   | Determination of carbonation depth on concrete                                    | E4440.5 | PO1, PO2, PO3, PO4, PO5, PO6, PO7, |

## CEE4540– CONSTRUCTION PRACTICES

Programme Name : CIVIL ENGINEERING  
 Course Code : CEE4540  
 Semester : IV SEMESTER  
 Course Title : CONSTRUCTION PRACTICES  
 Course Type : PRACTICUM

| L | T | P | C |
|---|---|---|---|
| 1 | 0 | 4 | 3 |

### TEACHING AND SCHEME OF EXAMINATION

No. of weeks per semester: 15 weeks

| Course                 | Instructions |                  | Examination         |                        |       |          |
|------------------------|--------------|------------------|---------------------|------------------------|-------|----------|
|                        | Hours / Week | Hours / Semester | Marks               |                        |       | Duration |
|                        |              |                  | Internal Assessment | Autonomous Examination | Total |          |
| Construction Practices | 5            | 75               | 40                  | 100*                   | 100   | 3Hrs     |

\*Examinations will be conducted for 100 marks and will be converted to 60 marks

### TOPICS AND ALLOCATION OF HOURS

| Unit         | Topics                        | Time (Hrs) |
|--------------|-------------------------------|------------|
| I            | Theory Portion / Introduction | 15         |
| II           | Theory Portion / Introduction | 15         |
| III          | Theory Portion / Introduction | 15         |
| IV           | Theory Portion / Introduction | 15         |
| V            | Theory Portion / Introduction | 15         |
| <b>Total</b> |                               | <b>75</b>  |

### COURSE DESCRIPTION

Building Construction is a core subject in Civil Engineering, which deals with the construction processes of substructure, superstructure, Building finishes and maintenance of buildings. This course essentially imparts the knowledge of construction technology along with the processes involved in it and various construction equipment used for effective execution of various construction activities. This knowledge shall be used for effective and efficient up keeping of building after construction. This will enable the students to undertake the activities in comparatively shorter period of time.

## **COURSE OBJECTIVE**

- Describe the different types of foundations and Set out foundation in the field for spread footing and column footing for a building
- Describe the classification of stone masonry & brick masonry. State the different types of doors, windows, lintels & stairs.
- Describe the types of floors and roofs.
- Describe the different methods of pointing, plastering and termite proofing.
- Describe procedure of colour washing, white washing, painting and varnishing.
- Cutting, hooking, cranking of specimen reinforcement bar and arrangement of reinforcement for a lintel cum sunshade, one way roof slab, beam, and column with footing
- Apply two or more coats of selected paint on the prepared base of a given wall surface
- Apply termite chemical on given damaged sample of timber

## **COURSE OUTCOMES**

| After successful completion of this course, the students should be able to |                                                                                                            |
|----------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------|
| <b>E4540.1</b>                                                             | Recommend suitable type of foundation and set out in the field.                                            |
| <b>E4540.2</b>                                                             | Identify suitable type of superstructure and recommend the appropriate construction techniques to be used. |
| <b>E4540.3</b>                                                             | Identifying doors, windows, ventilators types, applying suitable methods of water proofing & Damp proofing |
| <b>E4540.4</b>                                                             | Recommend suitable stair, flooring, & roof for different buildings                                         |
| <b>E4540.5</b>                                                             | Apply selected paints on wall surface and apply anti-termite chemical on damaged timber                    |

## **Pre-requisites**

Basic Science, Basic Mathematics, Physical properties of various materials

**CO-POs & PSOs Mapping matrix**

| CO/PO                    | PO1       | PO2       | PO3       | PO4       | PO5      | PO6      | PO7       | PSO1      | PSO2      | PSO3      |
|--------------------------|-----------|-----------|-----------|-----------|----------|----------|-----------|-----------|-----------|-----------|
| E4540.1                  | 3         | 2         | 2         | 2         | 1        | 1        | 2         | 3         | 2         | 3         |
| E4540.2                  | 3         | 2         | 2         | 2         | 1        | 1        | 2         | 3         | 2         | 3         |
| E4540.3                  | 3         | 2         | 2         | 2         | 1        | 1        | 2         | 3         | 2         | 3         |
| E4540.4                  | 3         | 2         | 3         | 2         | 1        | 1        | 2         | 3         | 2         | 3         |
| E4540.5                  | 3         | 2         | 2         | 2         | 1        | 1        | 2         | 3         | 2         | 3         |
| <b>Total</b>             | <b>10</b> | <b>10</b> | <b>11</b> | <b>10</b> | <b>5</b> | <b>5</b> | <b>15</b> | <b>10</b> | <b>10</b> | <b>10</b> |
| <b>Correlation Level</b> | <b>2</b>  | <b>2</b>  | <b>2</b>  | <b>2</b>  | <b>1</b> | <b>1</b> | <b>3</b>  | <b>2</b>  | <b>2</b>  | <b>2</b>  |

Correlation level 1 – Slight (low)

Correlation level 2 – Moderate (Medium)

Correlation level 3 – Substantial (high)

**Instructional Strategy**

NOTE 1: The course content shall be delivered through lectures, PowerPoint presentations, video demonstrations and field visits

NOTE 2: The Activity criteria shall be conducted / executed by the student to be submitted to the faculty.

NOTE 3: The PRACTICE (Performance criteria) shall be conducted by the student and observations and report to be submitted at the end of each session to the faculty

**Assessment Methodology**

|                           | Continuous Assessment (40 marks)   |                       |                       |                       | End Semester Examination (60 marks) |
|---------------------------|------------------------------------|-----------------------|-----------------------|-----------------------|-------------------------------------|
|                           | CA1                                | CA2                   | CA3                   | CA4                   |                                     |
| <b>Mode</b>               | Practical Test                     | Practical Test        | Written Test Theory   | Practical Test        | Practical Examination               |
| <b>Portion</b>            | Cycle I Exercises<br>50% Exercises | Cycle II Exercises    | All Units             | All Exercises         | All Exercises                       |
| <b>Duration</b>           | 2 Periods                          | 2 Periods             | 3 hours               | 3 hours               | 3 hours                             |
| <b>Exam Marks</b>         | 60                                 | 60                    | 100                   | 100                   | 100                                 |
| <b>Converted to</b>       | 10                                 | 10                    | 10                    | 10                    | 60                                  |
| <b>Marks</b>              | 40                                 |                       |                       |                       | 60                                  |
| <b>Tentative Schedule</b> | 7 <sup>th</sup> Week               | 14 <sup>th</sup> Week | 15 <sup>th</sup> Week | 16 <sup>th</sup> Week |                                     |

**Note**

**CA1 and CA2:** All the exercises/experiments should be completed as per the portions above and kept for the practical test. The students shall be permitted to select any one by lot for the test. The practical test should be conducted as per the scheme of evaluation as below. The marks awarded shall be converted to 10 Marks for each assessment test. Practical documents should be maintained for every exercise / experiment immediately after completion of the practice. The practical document should be submitted for the practical test. The same should be evaluated for 10 Marks for each exercise/experiment. The total marks awarded should be converted to 10 Marks for the practical test as per the scheme of evaluation as below.

**The details of the documents to be prepared as per the instruction below.**

**SCHEME OF EVALUATION**

| PART  | DESCRIPTION                               | MARKS |
|-------|-------------------------------------------|-------|
| A     | Aim and Apparatus Required                | 5     |
| B     | Tabulation/Observation                    | 20    |
| C     | Graph/Sketch/Calculation                  | 20    |
| D     | Result                                    | 5     |
| TOTAL |                                           | 50    |
| E     | Practical Documents (As per the portions) | 10    |
|       |                                           | 60    |

- **CA 3:** Written Test for complete theory portions should be conducted for 100 Marks as per the question pattern below. The marks scored will be converted to 10 Marks for internal assessment.

**Question pattern – Written Test Theory**

| Description |                                                     | Marks     |           |
|-------------|-----------------------------------------------------|-----------|-----------|
| Part – A    | 30 MCQ from the complete theory portions.           | 30X1Mark  | 30Marks   |
| Part – B    | Seven Questions to be answered out of 10 Questions. | 7X10Marks | 70Marks   |
| TOTAL       |                                                     |           | 100 Marks |

- **CA 4:** All the exercises/experiments should be completed and kept for the practical test. The students shall be permitted to select any one by lot for the test. The practical test should be conducted as per the scheme of evaluation below. After completion of all the exercises the practical test should be conducted as per End Semester Examination

question pattern scheme of evaluation. The marks awarded should be converted to 10 Marks for the internal assessment.

### SCHEME OF EVALUATION

#### Model Practical Examination and End Semester Examination - Practical Exam

| PART  | DESCRIPTION                | MARKS |
|-------|----------------------------|-------|
| A     | Aim and Apparatus Required | 10    |
| B     | Tabulation/Observation     | 20    |
| C     | Graph/Sketch /Calculation  | 20    |
| D     | Result                     | 10    |
| E     | Written Test               | 30    |
| F     | Viva Voce                  | 10    |
| TOTAL |                            | 100   |

**Note:** For the written test 30 MCQ shall be asked from the theory portions.

**CEE4540– CONSTRUCTION PRACTICES**

**Time :3Hrs**

**Max.Marks:100**

| CEE4540                                                                                                                                                                                                                                                                                                                             |                               | CONSTRUCTION PRACTICES | L | T | P | C      |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------|------------------------|---|---|---|--------|
| PRACTICUM                                                                                                                                                                                                                                                                                                                           |                               |                        | 1 | 0 | 4 | 3      |
| Unit I                                                                                                                                                                                                                                                                                                                              | THEORY PORTION / INTRODUCTION |                        |   |   |   | 15Hrs  |
| 1.1 INTRODUCTION TO STRUCTURES                                                                                                                                                                                                                                                                                                      |                               |                        |   |   |   |        |
| Permanent and temporary structures - Life of structures - Sub structure -super structure - load bearing structure - framed structure - concept of framed structure - advantages of framed structure.                                                                                                                                |                               |                        |   |   |   | [2Hrs] |
| 1.2 FOUNDATION                                                                                                                                                                                                                                                                                                                      |                               |                        |   |   |   |        |
| Definition - objectives of foundation - Bearing capacity of soil – Definition - maximum/ultimate and safe bearing capacity - Bearing capacity of different types of soils - Requirements of a good foundation - Types of foundations - - Deep foundation: Pile, Types of piles- Causes of failure of foundation - Remedial measures |                               |                        |   |   |   | [1Hr]  |
| 1.3 Practical Exercises                                                                                                                                                                                                                                                                                                             |                               |                        |   |   |   |        |
| 1.Prepare and develop a centre line plan, foundation Plan and set out spread footing in the field for the given line sketch of a building                                                                                                                                                                                           |                               |                        |   |   |   | [4Hrs] |
| 2.Prepare and develop a centre line plan, foundation Plan and set out the layout of columns and footing in the field for the given line sketch of a building (Framed structure).                                                                                                                                                    |                               |                        |   |   |   | [4Hrs] |
| 3. Study of Safe bearing capacity of soil by standard penetration test (SPT).                                                                                                                                                                                                                                                       |                               |                        |   |   |   | [4Hrs] |
| Unit II                                                                                                                                                                                                                                                                                                                             | THEORY PORTION / INTRODUCTION |                        |   |   |   | 15Hrs  |
| 2.1 STONE MASONRY                                                                                                                                                                                                                                                                                                                   |                               |                        |   |   |   |        |
| Definition - Common terms used -Classification of stone masonry - Rubble masonry - Ashlar masonry - points to be considered in the construction of stone masonry - Tools used(Names only).                                                                                                                                          |                               |                        |   |   |   | [2Hrs] |
| 2.2 BRICK MASONRY                                                                                                                                                                                                                                                                                                                   |                               |                        |   |   |   |        |
| Definition - Common terms used -Bond - Types Header, stretcher, English bond & Flemish bond –Features-Comparison-Points to be considered in the construction of brick masonry - Defects in brick masonry                                                                                                                            |                               |                        |   |   |   | [1Hrs] |
| 2.3 Practical Exercises                                                                                                                                                                                                                                                                                                             |                               |                        |   |   |   |        |
| 4. Arrangement of bricks using English bond in one brick thick wall and half brick thick for right angled corner .                                                                                                                                                                                                                  |                               |                        |   |   |   | [4Hrs] |
| 5. Arrangement of bricks using English bond in one brick thick wall and half brick thick for Tee junction .                                                                                                                                                                                                                         |                               |                        |   |   |   | [4Hrs] |
| 6. Arrangement of bricks using English bond in one brick thick wall and Two brick thick wall square pillars.                                                                                                                                                                                                                        |                               |                        |   |   |   | [4Hrs] |

| Unit III                                                                                                                                                                                                                              | THEORY PORTION / INTRODUCTION | 15Hrs  |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------|--------|
| <b>3.1 WATER PROOFING AND DAMP PROOFING</b><br>Dampness - Causes of dampness - Effects of dampness – Dampproofing - Damp proof courses (DPC) - Water proofing coats for sump / overhead tank wall - Methods of grouting.              |                               | [1Hr]  |
| <b>3.2 DOORS, WINDOWS AND VENTILATORS</b><br>Standard sizes of doors and windows - Location of doors and windows - Different materials used - Doors Component parts -Types – Windows- Types -Ventilators – Definition, purpose-Types. |                               | [1Hr]  |
| <b>3.3 BLOCK MASONRY CONSTRUCTIONS</b><br>Types of cement blocks-Consideration for use of hollow concrete blocks- Laying of hollow blocks-Compound walls in Block work.                                                               |                               | [1Hr]  |
| <b>3.4 Practical Exercises</b><br>7. Construct concrete block masonry wall of 1m height.                                                                                                                                              |                               | [4Hrs] |
| 8.Cutting, hooking, cranking of specimen reinforcement bar and arrangement of reinforcement for a Lintel cum sunshade.                                                                                                                |                               | [4Hrs] |
| 9.Apply two or more coats of Water proofing coats for sump / overhead tank wall on the prepared base of a given wall surface for the area of 1m x 1m using suitable brush/ rollers adopting safe practices.                           |                               | [4Hrs] |
| Unit IV                                                                                                                                                                                                                               | THEORY PORTION / INTRODUCTION | 15Hrs  |
| <b>4.1 STAIRS</b><br>Definition - Terms used - Location of stair- types                                                                                                                                                               |                               | [1Hr]  |
| <b>4.2 FLOORS AND FLOORING</b><br>Floors - Definition - Types - Materials used - Selection of flooring.                                                                                                                               |                               | [1Hr]  |
| <b>4.3 ROOFS</b><br>Definition - Types of roof - Technical terms – Types of trusses.                                                                                                                                                  |                               | [1Hr]  |
| <b>4.4 Practical Exercises</b><br>10.Cutting, hooking, cranking of specimen reinforcement bar and arrangement of reinforcement for a one way roof slab.                                                                               |                               | [4Hrs] |
| 11.Cutting, hooking, cranking of specimen reinforcement bar and arrangement of reinforcement for singly reinforced Beam.                                                                                                              |                               | [4Hrs] |
| 12. Cutting, hooking, cranking of specimen reinforcement bar and arrangement of reinforcement for a Column and footing.                                                                                                               |                               | [4Hrs] |

| Unit V                                                                                                                                                                                                                           | THEORY PORTION / INTRODUCTION | 15Hrs     |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------|-----------|
| <b>5.1 WEATHERING COURSE</b><br>Weathering course – Purpose –Laying Procedure.                                                                                                                                                   |                               | [1Hr]     |
| <b>5.2 POINTING</b><br>Objectives - Mortar for pointing - Types of pointing                                                                                                                                                      |                               | [1Hr]     |
| <b>5.3 PLASTERING</b><br>Definitions - Objectives – Methods of plastering-Defects in plastering.                                                                                                                                 |                               | [1Hr]     |
| <b>5.4 WHITE WASHING, COLOUR WASHING, DISTEMPERING,</b><br><b>5.5 PAINTING &amp; VARNISHING</b><br>White washing – preparation and application –Distempering- process and application-<br>Painting –preparation and application. |                               | [1Hr]     |
| <b>5.6 ANTI-TERMITE TREATMENT</b><br>Definition - objectives and uses - Methods of termite treatment.                                                                                                                            |                               |           |
| <b>5.7 Practical Exercises</b><br>13. Apply two or more coats of selected paint on the prepared base of a given wall surface for the area of 1m x 1m using suitable brush/ rollers adopting safe practices.                      |                               | [3Hrs]    |
| 14. Plastering with cement mortar on the prepared base of a given wall surface for the area of 1m x 1m adopting safe practices.                                                                                                  |                               | [3Hrs]    |
| 15. Apply the relevant termite chemical on given damaged sample of timber.                                                                                                                                                       |                               | [3Hrs]    |
| 16. Straightening cutting hooking and bar bending and arrangement of steel reinforcement bars doubly reinforced beam.                                                                                                            |                               | [3Hrs]    |
| <b>TOTAL</b>                                                                                                                                                                                                                     |                               | <b>75</b> |

**EQUIPMENTS REQUIRED : (Batch strength: 30 students)**

| S.No | LIST OF EQUIPMENTS                                                | QUANTITY REQUIRED |
|------|-------------------------------------------------------------------|-------------------|
| 1.   | Pegs, thread, Hammer, Measuring tape, Lime powder                 | As required       |
| 2.   | Steel rods, spirit level, straightedge, Trowel, string, plumb bob | As required       |
| 3.   | Consumables like Bricks, steel rods, string, etc                  | As required       |
| 4.   | Consumables like Water proof paints, anti-Termite chemical        | 1 litre each      |

**Text Books**

| S.NO | TITLE                                     | AUTHOR                                                                                                   | PUBLISHERWITHEDITION                                                   |
|------|-------------------------------------------|----------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------|
| 1.   | Building Materials                        | Duggal, S.K                                                                                              | 5th Edition , New Age International (P) Limited Publishers., Jan 2019, |
| 2.   | Civil Engineering Materials               | Peter A. Claisse                                                                                         | 1st Edition, Butterworth- Heinemann, 2016,                             |
| 3.   | Essentials of Civil Engineering Materials | Kathryn E. Schulte<br>Grahame, Steven W.<br>Cranford, Craig M.<br>Shillaber, and<br>Matthew J. Eckelman, | 1st Edition, Cognella Academic Publishing, San Diego, 2020.            |

**Web-based/Online Resources**

| S.No | Website/Links                                                                                                                                                                                     |
|------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1    | <a href="http://www.nptel.ac.in">www.nptel.ac.in</a>                                                                                                                                              |
| 2    | <a href="http://thebooksout.com/downloads/%20%20of%20building%20materials%20bc%20punmia%20%20ebook">http://thebooksout.com/downloads/%20%20of%20building%20materials%20bc%20punmia%20%20ebook</a> |
| 3    | <a href="https://sites.google.com/a/mitr.iitm.ac.in/iitmcivil/ce2330">https://sites.google.com/a/mitr.iitm.ac.in/iitmcivil/ce2330</a>                                                             |

## MODEL QUESTION PAPER

### CEE4540-CONSTRUCTION PRACTICES

**Time : 3 Hrs**

**Max.Marks:100**

| Si. No | Name of the Experiments                                                                                                                                                                                   | CO      | PO                                 |
|--------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|------------------------------------|
| 1      | Prepare and develop a centre line plan, foundation Plan and set out spread footing in the field for the given line sketch of a building                                                                   | E4540.1 | PO1, PO2, PO3, PO4, PO5, PO6, PO7, |
| 2      | Prepare and develop a centre line plan, foundation Plan and set out the layout of columns and footing in the field for the given line sketch of a building (Framed structure).                            | E4540.1 | PO1, PO2, PO3, PO4, PO5, PO6, PO7, |
| 3      | Study of Safe bearing capacity of soil by standard penetration test (SPT).                                                                                                                                | E4540.1 | PO1, PO2, PO3, PO4, PO5, PO6, PO7, |
| 4      | Arrangement of bricks using English bond in one brick thick wall and half brick thick for right angled corner .                                                                                           | E4540.2 | PO1, PO2, PO3, PO4, PO5, PO6, PO7, |
| 5      | Arrangement of bricks using English bond in one brick thick wall and half brick thick for Tee junction                                                                                                    | E4540.2 | PO1, PO2, PO3, PO4, PO5, PO6, PO7, |
| 6      | Arrangement of bricks using English bond in one brick thick wall and Two brick thick wall square pillars.                                                                                                 | E4540.2 | PO1, PO2, PO3, PO4, PO5, PO6, PO7, |
| 7      | Construct concrete block masonry wall of 1m height.                                                                                                                                                       | E4540.3 | PO1, PO2, PO3, PO4, PO5, PO6, PO7, |
| 8      | Cutting, hooking, cranking of specimen reinforcement bar and arrangement of reinforcement for a Lintel cum sunshade.                                                                                      | E4540.3 | PO1, PO2, PO3, PO4, PO5, PO6, PO7, |
| 9      | Apply two or more coats of Water proofing coats for sump / overhead tank wall on the prepared base of a given wall surface for the area of 1m x 1m using suitable brush/ rollers adopting safe practices. | E4540.3 | PO1, PO2, PO3, PO4, PO5, PO6, PO7, |
| 10     | Cutting, hooking, cranking of specimen reinforcement bar and arrangement of reinforcement for a one way roof slab.                                                                                        | E4540.4 | PO1, PO2, PO3, PO4, PO5, PO6, PO7, |
| 11     | Cutting, hooking, cranking of specimen reinforcement bar and arrangement of reinforcement for singly reinforced Beam.                                                                                     | E4540.4 | PO1, PO2, PO3, PO4, PO5, PO6, PO7, |

|    |                                                                                                                                                                      |         |                                    |
|----|----------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|------------------------------------|
| 12 | Cutting, hooking, cranking of specimen reinforcement bar and arrangement of reinforcement for a Column and footing.                                                  | E4540.4 | PO1, PO2, PO3, PO4, PO5, PO6, PO7, |
| 13 | Apply two or more coats of selected paint on the prepared base of a given wall surface for the area of 1m x 1m using suitable brush/ rollers adopting safe practices | E4540.5 | PO1, PO2, PO3, PO4, PO5, PO6, PO7, |
| 14 | Plastering with cement mortar on the prepared base of a given wall surface for the area of 1m x 1m adopting safe practices.                                          | E4540.5 | PO1, PO2, PO3, PO4, PO5, PO6, PO7, |
| 15 | Apply the relevant termite chemical on given damaged sample of timber.                                                                                               | E4540.5 | PO1, PO2, PO3, PO4, PO5, PO6, PO7, |
| 16 | Straightening cutting hooking and bar bending and arrangement of steel reinforcement bars doubly reinforced beam.                                                    | E4540.5 | PO1, PO2, PO3, PO4, PO5, PO6, PO7, |

### CEE4640–ESTIMATION AND COSTING

Programme Name : CIVIL ENGINEERING  
 Course Code : CEE4640  
 Semester : IV SEMESTER  
 Course Title : ESTIMATION AND COSTING  
 Course Type : PRACTICUM

| L | T | P | C |
|---|---|---|---|
| 1 | 0 | 4 | 3 |

#### TEACHING AND SCHEME OF EXAMINATION

No. of weeks per semester: 15 weeks

| Course                 | Instructions |                  | Examination         |                        |       |          |
|------------------------|--------------|------------------|---------------------|------------------------|-------|----------|
|                        | Hours / Week | Hours / Semester | Marks               |                        |       | Duration |
|                        |              |                  | Internal Assessment | Autonomous Examination | Total |          |
| Estimation and costing | 5            | 75               | 40                  | 100*                   | 100   | 3Hrs     |

\*Examinations will be conducted for 100 marks and will be converted to 60 marks

#### TOPICS AND ALLOCATION OF HOURS

| Unit         | Topics                                                    | Time (Hrs) |
|--------------|-----------------------------------------------------------|------------|
| I            | Introduction                                              | 15         |
| II           | Measurements & material requirements, preparation of data | 11         |
| III          | Specification and report writing                          | 11         |
| IV           | Trade system                                              | 15         |
| V            | Group system                                              | 23         |
| <b>Total</b> |                                                           | <b>75</b>  |

#### COURSE DESCRIPTION

Students enrolled in the Civil Engineering diploma program are expected to acquire essential skills and knowledge in estimation and costing, critical for managing construction sites and overseeing development projects such as townships, residential colonies, and public buildings. Proficiency in estimation and costing involves a comprehensive understanding of various concepts, principles, and methodologies utilized in the construction industry. Throughout the course, teachers will utilize a combination of lectures, demonstrations, hands-on practical sessions, and field visits to facilitate learning and comprehension of estimation and costing principles. Emphasis will be placed on developing critical thinking, problem-solving, and decision-making skills essential for successful careers in the construction industry.

## COURSE OBJECTIVES

The objective of this course is to enable the student:

- Understand the fundamental ideas behind estimation and costing in construction projects.
- Recognize the different methods used for estimating construction costs.
- Prepare effective budget planning for construction projects.
- Expertise in preparation of reports and writing specifications for proposed works
- Prepare bill of quantities for proposed works

## COURSE OUTCOMES:

| After successful completion of this course, the students should be able to |                                                                                                |
|----------------------------------------------------------------------------|------------------------------------------------------------------------------------------------|
| <b>E4640.1</b>                                                             | Understand the procedure of approximate estimate for various construction projects.            |
| <b>E4640.2</b>                                                             | Understand rate analysis for various items of works using Standard data and Schedule of Rates. |
| <b>E4640.3</b>                                                             | Write Technical reports on the proposed projects                                               |
| <b>E4640.4</b>                                                             | Write specification for various items of work.                                                 |
| <b>E4640.5</b>                                                             | Prepare detailed estimate of quantities of various items of works.                             |

### Pre-requisites

Knowledge of specification, dimensions, units, conversions, masonry, Construction materials.

### CO-POs & PSOs Mapping matrix

| CO/PO                    | PO1       | PO2       | PO3 | PO4 | PO5 | PO6      | PO7       | PSO1      | PSO2      | PSO3      |
|--------------------------|-----------|-----------|-----|-----|-----|----------|-----------|-----------|-----------|-----------|
| <b>E4640.1</b>           | 3         | 2         | -   | -   | -   | -        | 3         | 3         | 3         | 2         |
| <b>E4640.2</b>           | 3         | 2         | -   | -   | -   | -        | 3         | 3         | 3         | 2         |
| <b>E4640.3</b>           | 3         | 1         | -   | -   | -   | 2        | 3         | 3         | 3         | 2         |
| <b>E4640.4</b>           | 3         | 1         | -   | -   | -   | 2        | 3         | 3         | 3         | 2         |
| <b>E4640.5</b>           | 3         | 2         | -   | -   | -   | -        | 3         | 3         | 3         | 2         |
| <b>Total</b>             | <b>15</b> | <b>08</b> | -   | -   | -   | <b>4</b> | <b>15</b> | <b>15</b> | <b>15</b> | <b>10</b> |
| <b>Correlation Level</b> | <b>3</b>  | <b>1</b>  | -   | -   | -   | <b>1</b> | <b>3</b>  | <b>3</b>  | <b>3</b>  | <b>2</b>  |

Correlation level 1 – Slight (low)

Correlation level 2 – Moderate (Medium)

Correlation level 3 – Substantial (high)

### Instructional Strategy

- The teachers are expected to drive the attention of the students to improve the student's learning ability.
- Assist the students in learning and appreciating the concepts and objectives of estimating and cost analysis of the projects they come across.
- Making the students expertise in the subject by arranging suitable activities for all the topics.
- Activity based demonstration for better understanding.
- Guide the students to correct work on an activity where there could be source of errors.

### Assessment Methodology

|                           | Continuous Assessment (40 marks)   |                       |                       |                       | End Semester Examination (60 marks) |
|---------------------------|------------------------------------|-----------------------|-----------------------|-----------------------|-------------------------------------|
|                           | CA1                                | CA2                   | CA3                   | CA4                   |                                     |
| <b>Mode</b>               | Practical Test                     | Practical Test        | Written Test Theory   | Practical Test        | Practical Examination               |
| <b>Portion</b>            | Cycle I Exercises<br>50% Exercises | Cycle II Exercises    | All Units             | All Exercises         | All Exercises                       |
| <b>Duration</b>           | 2 Periods                          | 2 Periods             | 3 hours               | 3 hours               | 3 hours                             |
| <b>Exam Marks</b>         | 60                                 | 60                    | 100                   | 100                   | 100                                 |
| <b>Converted to</b>       | 10                                 | 10                    | 10                    | 10                    | 60                                  |
| <b>Marks</b>              | 40                                 |                       |                       |                       | 60                                  |
| <b>Tentative Schedule</b> | 7 <sup>th</sup> Week               | 14 <sup>th</sup> Week | 15 <sup>th</sup> Week | 16 <sup>th</sup> Week |                                     |

#### Note:

**CA1 and CA2:** All the exercises/experiments should be completed as per the portions above and kept for the practical test. The students shall be permitted to select any one by lot for the test. The practical test should be conducted as per the scheme of evaluation as below. The marks awarded shall be converted to 10 Marks for each assessment test. Practical documents should be maintained for every exercise / experiment immediately after completion of the practice. The practical document should be submitted for the practical test. The same should be evaluated for 10 Marks for each exercise/experiment. The total marks awarded should be converted to 10 Marks for the practical test as per the scheme of evaluation as below.

#### The details of the documents to be prepared as per the instruction below.

Each exercise should be completed on the day of practice. The same shall be evaluated for 10 marks on the day or next day of practice before commencement of the next exercise.

This documentation can be carried out in a separate notebook or printed manual or a file with documents. Students should write the procedure and draw the sketch manually.

The detailed date of the practices and its evaluations should be maintained in the course logbook. The log book and the practical documents should be submitted for the verification by the Flying Squad.

### SCHEME OF EVALUATION

| PART  | DESCRIPTION                               | MARKS |
|-------|-------------------------------------------|-------|
| A     | Aim and Apparatus Required                | 5     |
| B     | Tabulation/Observation                    | 20    |
| C     | Graph/Sketch/Calculation                  | 20    |
| D     | Result                                    | 5     |
| TOTAL |                                           | 50    |
| E     | Practical Documents (As per the portions) | 10    |
| TOTAL |                                           | 60    |

- **CA 3:** Written Test for complete theory portions should be conducted for 100 Marks as per the question pattern below. The marks scored will be converted to 10 Marks for internal assessment.

### Question pattern – Written Test Theory

| Description |                                                 | Marks     |           |
|-------------|-------------------------------------------------|-----------|-----------|
| Part – A    | 30 MCQ from the complete theory portions.       | 30X1Mark  | 30Marks   |
| Part – B    | 7 Questions to be answered out of 10 Questions. | 7X10Marks | 70Marks   |
| TOTAL       |                                                 |           | 100 Marks |

- **CA 4:** All the exercises/experiments should be completed and kept for the practical test. The students shall be permitted to select any one by lot for the test. The practical test should be conducted as per the scheme of evaluation below. After completion of all the exercises the practical test should be conducted as per End Semester Examination question pattern scheme of evaluation. The marks awarded should be converted to 10 Marks for the internal assessment.

### **SCHEME OF EVALUATION**

#### **Model Practical Examination and End Semester Examination - Practical Exam**

| <b>PART</b> | <b>DESCRIPTION</b>         | <b>MARKS</b> |
|-------------|----------------------------|--------------|
| A           | Aim and Apparatus Required | 10           |
| B           | Tabulation/Observation     | 20           |
| C           | Graph/Sketch /Calculation  | 20           |
| D           | Result                     | 10           |
| E           | Written Test               | 30           |
| F           | Viva Voce                  | 10           |
| TOTAL       |                            | 100          |

Note: For the written test 30 MCQ shall be asked from the theory portions.

**CEE4640 –ESTIMATION AND COSTING**

| CEE4640                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                                        | ESTIMATION AND COSTING | L | T | P | C                          |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------|------------------------|---|---|---|----------------------------|
| PRACTICUM                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                        |                        | 1 | 0 | 4 | 3                          |
| Unit I                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | INTRODUCTION                                           |                        |   |   |   | 15Hrs                      |
| <b>1.1 ESTIMATE:</b><br>Estimation–DefinitionofEstimate–Approximateestimate–Detailedestimate–Mainestimate–Revisedestimate–Supplementaryestimate<br>–Subestimate–Annualmaintenanceestimate–Repaiestimate–Completeestimate.                                                                                                                                                                                                                                                                                                                                                                 |                                                        |                        |   |   |   | [2Hrs]                     |
| <b>1.2 APPROXIMATE ESTIMATES:</b><br>Necessity–Types–Plinth area method–Cubical content method–Service unit method – Typical Bay method.                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                                        |                        |   |   |   | [1Hr]                      |
| <b>Practical exercises:</b><br>1. Prepare approximate cost for a proposed building comparing the cost of an existing one and considering the cost of escalation in materials and labour by Plinth area method.<br>2. Prepare approximate cost for a proposed building comparing the cost of an existing one and considering the cost of escalation in materials and labour by cubical content method.<br>3. Prepare approximate cost for a proposed building comparing the cost of an existing one and considering the cost of escalation in materials and labour by Service Unit Method. |                                                        |                        |   |   |   | [4Hrs]<br>[4Hrs]<br>[4Hrs] |
| Unit- II                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | MEASUREMENTS & MATERIALREQUIREMENTS, PREPARATIONOFDATA |                        |   |   |   | 11Hrs                      |
| <b>2.1 MEASUREMENTS&amp;MATERIALREQUIREMENTS:</b><br>Units of measurements for works and materials – Degree of accuracy in measurements –Deduction for openings in masonry, plastering andwhitewashingarea–Paintingco-efficient–outturnofworks-workingout of materials requirements — cement, sand, bricks, aggregates etc. based on thumb rules for different works.                                                                                                                                                                                                                     |                                                        |                        |   |   |   | [2Hrs]                     |
| <b>2.2 PREPARATIONOFDATA</b><br>Data–Types–Main and sub data–Observed data–lead statement–Schedule of rates — Standard data book — Sundries — Lump sum provision – Preparation of data using standard data and schedule of rates.                                                                                                                                                                                                                                                                                                                                                         |                                                        |                        |   |   |   | [1Hr]                      |
| <b>Practical exercises:</b><br>4. Prepare the list of items to be executed with units for detailed estimate of a given structure from the given drawing.<br>5. Prepare data for the given items of work with necessary sub data.                                                                                                                                                                                                                                                                                                                                                          |                                                        |                        |   |   |   | [4Hrs]<br>[4Hrs]           |

|                                                                                                                                                                                                                                                                                                                                                                                                   |                                         |              |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------|--------------|
| <b>Unit -III</b>                                                                                                                                                                                                                                                                                                                                                                                  | <b>SPECIFICATION AND REPORT WRITING</b> | <b>11Hrs</b> |
| <b>3.1 SPECIFICATION</b>                                                                                                                                                                                                                                                                                                                                                                          |                                         |              |
| Specification— Necessity— Types of specifications— Essential requirements of specifications —Specification for various materials like Cement, Sand, Brick, Timber, Reinforcement Steel, Stone Aggregate, Water-Specifications for various items of works—General Specifications for a building - Culvert - Concrete Roads.                                                                        |                                         | [3Hrs]       |
| <b>3.2 REPORT WRITING:</b>                                                                                                                                                                                                                                                                                                                                                                        |                                         |              |
| Report writing– Definition – Necessity of report- Points to be considered while writing a report- Documents to accompany the report.                                                                                                                                                                                                                                                              |                                         | [2Hrs]       |
| <b>Practical exercises</b>                                                                                                                                                                                                                                                                                                                                                                        |                                         |              |
| 6. Prepare a report on market rates for given material, labour wages hire charges of tools & equipment required to construct the given structure.                                                                                                                                                                                                                                                 |                                         | [4Hrs]       |
| 7. Prepare detailed Specification for Earthwork, Foundation concrete, R.C.C in Beam, R.C.C in Slab and Column.                                                                                                                                                                                                                                                                                    |                                         | [4Hrs]       |
| <b>Unit-IV</b>                                                                                                                                                                                                                                                                                                                                                                                    | <b>TRADESYSTEM</b>                      | <b>15Hrs</b> |
| <b>4. TRADESYSTEM:</b>                                                                                                                                                                                                                                                                                                                                                                            |                                         |              |
| Introduction - Taking off Quantities: Systems – Trade system – Group system – Methods – Long wall and Short wall method                                                                                                                                                                                                                                                                           |                                         | [2Hrs]       |
| Centre line method–Preparation of data–Lumpsum provision and contingencies                                                                                                                                                                                                                                                                                                                        |                                         | [1Hr]        |
| Quantity surveyor–Duties–Essential Qualities.                                                                                                                                                                                                                                                                                                                                                     |                                         |              |
| <b>Practical exercises</b>                                                                                                                                                                                                                                                                                                                                                                        |                                         |              |
| 8.Prepare detailed estimate for the given set of drawings using standard measurement sheet for load bearing residential structure using description of item from 1BHK building.                                                                                                                                                                                                                   |                                         | [4Hrs]       |
| 9.Prepare detailed estimate for the quantity of items of work from the given set of drawings using standard measurement sheet for RCC framed structure using description of item 1BHK building.                                                                                                                                                                                                   |                                         | [4Hrs]       |
| 10. Prepare detailed estimate for the given Septic tank.                                                                                                                                                                                                                                                                                                                                          |                                         | [4Hrs]       |
| <b>Unit -V</b>                                                                                                                                                                                                                                                                                                                                                                                    | <b>GROUPSYSTEM</b>                      | <b>23Hrs</b> |
| <b>5. GROUPSYSTEM:</b>                                                                                                                                                                                                                                                                                                                                                                            |                                         |              |
| Advantages of group system–Taking off and Recording Dimensions–Squaring Dimensions– Abstracting or Working up–Billing–Abbreviations. –Dimension paper–Dimensioning, Dimension, Squaring, Descriptive column – Cancellation of Dimensions – Descriptions–Spacing of Dimensions– Order of taking off–Squaring the Dimensions-Method of Squaring – Checking the Squaring – Casting up the dimensions |                                         | [2Hrs]       |
| Function of the Abstract–Order in the Abstract–Preparing the abstract –Casting and reducing the Abstract – Method of writing Bill –Checking the Bill.                                                                                                                                                                                                                                             |                                         | [1Hr]        |

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                                          |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------|
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                                          |
| <b>Practical exercises</b><br>11. Prepare detailed estimate for brick work for the given set of drawings using standard measurement sheet for load bearing residential structure (1BHK building).<br>12. Prepare detailed estimate for RCC for the given set of drawing using standard measurement sheet (1BHK building)<br>13. Prepare bar bending schedule for the given two way slab.<br>14. Prepare bar bending schedule for the given square column and square footing.<br>15. Prepare bar bending schedule for the given singly reinforced and doubly reinforced beams.<br>16. Prepare detailed estimate of over head tank from the given set of drawings. | [4Hrs]<br>[4Hrs]<br>[3Hrs]<br>[3Hrs]<br>[3Hrs]<br>[3Hrs] |
| <b>TOTAL</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | <b>75</b>                                                |

**Equipment / Facilities required to conduct the Practical Course. (Batch Strength: 30 Students)**

As required

**Text Books**

| S.NO | TITLE                                                                 | AUTHOR         | PUBLISHER WITH EDITION                                                    |
|------|-----------------------------------------------------------------------|----------------|---------------------------------------------------------------------------|
| 1    | Estimating and Costing in Civil Engineering                           | B.N. Dutta     | 28th edition, CBS Publishers and distributors Pvt. Ltd., 30 December 2020 |
| 2.   | Estimating, Costing, Specification and Valuation in Civil Engineering | M. Chakraborti | 24th Edition, M.K. Publishers and distributors Pvt Ltd., 2010             |
| 3.   | Estimating, Costing and Valuation                                     | Rangwala       | 17th edition, Charotar Publishing House Pvt. Ltd., 1 January 2017         |

**Web-based/Online Resources**

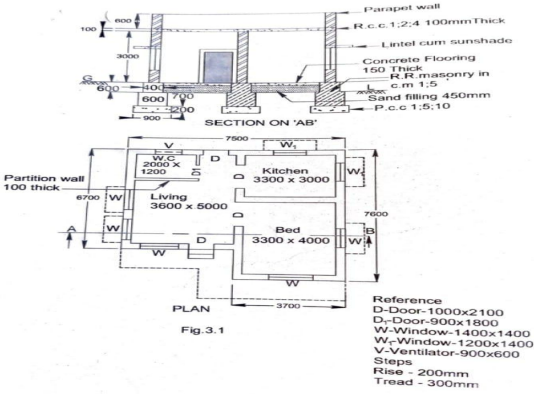
| S.No | Website/Links                                                                                         |
|------|-------------------------------------------------------------------------------------------------------|
| 1    | <a href="https://www.youtube.com/watch?v=lOUt8b-PzuU">https://www.youtube.com/watch?v=lOUt8b-PzuU</a> |
| 2    | <a href="https://www.youtube.com/watch?v=iRFjOwaMYdA">https://www.youtube.com/watch?v=iRFjOwaMYdA</a> |
| 3    | <a href="https://www.youtube.com/watch?v=HpNLucXrc54">https://www.youtube.com/watch?v=HpNLucXrc54</a> |
| 4    | <a href="https://www.youtube.com/watch?v=grJ8YLOk8kI">https://www.youtube.com/watch?v=grJ8YLOk8kI</a> |
| 5    | <a href="https://www.youtube.com/watch?v=ckRMZbzBDG4">https://www.youtube.com/watch?v=ckRMZbzBDG4</a> |
| 6    | <a href="https://www.youtube.com/watch?v=qmde_pRAjpM">https://www.youtube.com/watch?v=qmde_pRAjpM</a> |

## MODEL QUESTION PAPER

### CEE4640 –ESTIMATION AND COSTING

**Time :3Hrs**

**Max.Marks:100**

| Si.no | Name of the Experiments                                                                                                                                                                                                                                                                                                                                                                                                                                                     | CO      | PO                   |
|-------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|----------------------|
| 1     | Prepare approximate cost for a proposed building comparing the cost of an existing one and considering the cost of escalation in materials and labour by Plinth area method.                                                                                                                                                                                                                                                                                                | E4640.1 | PO1,PO2,PO3, PO4,PO7 |
| 2     | Prepare approximate cost for a proposed building comparing the cost of an existing one and considering the cost of escalation in materials and labour by cubical content method.                                                                                                                                                                                                                                                                                            | E4640.1 | PO1,PO2,PO3, PO4,PO7 |
| 3     | Prepare approximate cost for a proposed building comparing the cost of an existing one and considering the cost of escalation in materials and labour by Service Unit Method.                                                                                                                                                                                                                                                                                               | E4640.1 | PO1,PO2,PO3, PO4,PO7 |
| 4     | <p>Prepare the list of items to be executed with units for detailed estimate of a given structure from the given drawing.</p>  <p style="text-align: center;">Fig. 3.1</p> <p>Reference<br/> D-Door-1000x2100<br/> D<sub>1</sub>-Door-900x1500<br/> W-Window-1400x1400<br/> W<sub>1</sub>-Window-1200x1400<br/> V-Ventilator-900x600<br/> Steps<br/> Rise - 200mm<br/> Tread - 300mm</p> | E4640.2 | PO1,PO2,PO3, PO4,PO7 |
| 5     | Prepare data for the given items of work with necessary sub data.                                                                                                                                                                                                                                                                                                                                                                                                           | E4640.2 | PO1,PO2,PO3, PO4,PO7 |
| 6     | Prepare a report on market rates for given material, labour wages hire charges of tools & equipment required to construct the given structure.                                                                                                                                                                                                                                                                                                                              | E4640.3 | PO1,PO2,PO3, PO4,PO7 |



**CEE5110– DESIGN OF RCC STRUCTURES  
(LIMIT STATE METHOD)**

Programme Name : CIVIL ENGINEERING  
 Course Code : CEE5110  
 Semester : V SEMESTER  
 Course Title : DESIGN OF RCC STRUCTURES  
 (LIMIT STATE METHOD)  
 Course Type : THEORY

| L | T | P | C |
|---|---|---|---|
| 4 | 0 | 0 | 4 |

**TEACHING AND SCHEME OF EXAMINATION**

No. of weeks per semester: 15 weeks

| Course                                        | Instructions |                  | Examination         |                        |       |          |
|-----------------------------------------------|--------------|------------------|---------------------|------------------------|-------|----------|
|                                               | Hours / Week | Hours / Semester | Marks               |                        |       | Duration |
|                                               |              |                  | Internal Assessment | Autonomous Examination | Total |          |
| Design of RCC Structures (Limit State Method) | 4            | 60               | 40                  | 100*                   | 100   | 3 Hrs    |

\*Examinations will be conducted for 100 marks and will be converted to 60 marks

**TOPICS AND ALLOCATION OF HOURS**

| Unit         | Topics                                                | Time (Hrs.) |
|--------------|-------------------------------------------------------|-------------|
| I            | Introduction to reinforced cement concrete structures | 12          |
| II           | Design of rectangular beams for flexure and shear     | 12          |
| III          | Design of T-beams and continuous beams                | 12          |
| IV           | Design of slabs                                       | 12          |
| V            | Design of R.C.C. columns and column footings          | 12          |
| <b>Total</b> |                                                       | <b>60</b>   |

**COURSE DESCRIPTION**

This is a core subject which covers broad elements of RCC design of various structural elements. Diploma holders in Civil Engineering will be required to supervise RCC construction. They may also be required to design simple structural elements and make changes in design depending upon the availability of materials (bars of different diameters). This subject thus deals with elementary design principles as per Indian Standard practice IS:456 -2000 by limit state method.

## COURSE OBJECTIVE

The objectives of the course are to enable the students to

- Analyze and design simple RCC elements like singly, doubly reinforced rectangular beams, and singly reinforced simply supported T-beams for flexure and shear.
- Design One way/ Two way simply supported slabs.
- Design Axially loaded Columns and Footings.

## COURSE OUTCOMES

| After successful completion of this course, the students should be able to |                                                                                                   |
|----------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------|
| <b>E5110.1</b>                                                             | Demonstrate the basic concepts of reinforced cement concrete and the design of beams for flexure. |
| <b>E5110.2</b>                                                             | Describe the design of rectangular beams for shear and designing of staircase.                    |
| <b>E5110.3</b>                                                             | Analyse the T- beams and continuous beams and design for flexure.                                 |
| <b>E5110.4</b>                                                             | Design the one-way and two-way slabs.                                                             |
| <b>E5110.5</b>                                                             | Explain the design of columns and column footings.                                                |

### Pre-requisites

Mechanics of Materials and Mechanics of Structures.

### CO-POs & PSOs mapping matrix

| CO                       | PO1       | PO2       | PO3       | PO4      | PO5       | PO6      | PO7       | PSO1     | PSO2      | PSO3      |
|--------------------------|-----------|-----------|-----------|----------|-----------|----------|-----------|----------|-----------|-----------|
| <b>E5110.1</b>           | 3         | 3         | 2         | -        | 2         | -        | 3         | -        | 3         | 2         |
| <b>E5110.2</b>           | 3         | 3         | 2         | -        | 2         | -        | 3         | -        | 3         | 2         |
| <b>E5110.3</b>           | 3         | 3         | 2         | -        | 2         | -        | 3         | -        | 3         | 2         |
| <b>E5110.4</b>           | 3         | 3         | 2         | -        | 2         | -        | 3         | -        | 3         | 2         |
| <b>E5110.5</b>           | 3         | 3         | 2         | -        | 2         | -        | 3         | -        | 3         | 2         |
| <b>Total</b>             | <b>15</b> | <b>15</b> | <b>10</b> | <b>-</b> | <b>10</b> | <b>-</b> | <b>15</b> | <b>-</b> | <b>15</b> | <b>10</b> |
| <b>Correlation Level</b> | <b>3</b>  | <b>3</b>  | <b>2</b>  | <b>-</b> | <b>2</b>  | <b>-</b> | <b>3</b>  | <b>-</b> | <b>3</b>  | <b>2</b>  |

Correlation level 1 – Slight (low)

Correlation level 2 – Moderate (Medium)

Correlation level 3 – Substantial (high)

### Instructional Strategy

- This Course is introduced so that diploma holder in Civil Engineering may appreciate the concepts and principles of RCC structural elements of buildings and are able to apply the knowledge gained through the subjects of mechanics of materials and mechanics of structures.
- The design of simple structural elements like beams, slabs, column and footings will be demonstrate to the students to expose them in the field.
- Teacher should give simple exercises involving the applications of various concepts and principles being taught in the subject.
- Efforts should be made to prepare tutorial sheets on various topics and students should be encouraged guided to solve the tutorial problems independently and visit to local construction site to understand the behavior and uses of structural elements.
- Teacher may conduct weekly small quiz sessions to know the students' level of understanding.

### Assessment Methodology

|                    | Continuous Assessment(40marks) |                           |                                         |                       | End Semester Examination (60 marks) |
|--------------------|--------------------------------|---------------------------|-----------------------------------------|-----------------------|-------------------------------------|
|                    | CA1                            | CA2                       | CA3                                     | CA4                   |                                     |
| Mode               | Written test (Unit 1 & 2)      | Written test (Unit 3 & 4) | Quiz MCQ (Online/ Offline)              | Model Examination     | Written Examination                 |
| Duration           | 2Periods                       | 2Periods                  | 1Hour                                   | 3Hours                | 3Hours                              |
| Exam Marks         | 50                             | 50                        | 60                                      | 100                   | 100                                 |
| Converted to       | 10                             | 10                        | 10                                      | 10                    | 60                                  |
| Marks              | 40                             |                           |                                         |                       | 60                                  |
| Tentative Schedule | 6 <sup>th</sup> Week           | 12 <sup>th</sup> Week     | 13 <sup>th</sup> -14 <sup>th</sup> Week | 16 <sup>th</sup> Week |                                     |

### CONTINUOUS ASSESSMENT

**CA1and CA2:** Assessment written test should be conducted for 50Marks for two units. The marks scored will be converted to 10 Marks for the internal assessment.

**CA1and CA2, Assessment test should be conducted for two units as below**

- PARTA: (5X 10Marks=50Marks).
- Eight questions will be asked, students should write five questions. Four questions can be asked from each unit.

**CA3:** 60 MCQ can be asked by covering the entire portion. It may be conducted by Online / Offline. The marks scored should be converted to 10 marks for the internal assessment.

**CA4:** Model examination should be conducted as per the end semester question pattern. The marks should be converted to 10marks for the internal assessment.

**Question Pattern**

- Answer Ten questions by selecting two questions from each unit. Each question carries 10 marks.
- Four questions will be asked from every unit. Students should write any two questions.

**Question Pattern –Model Examination and End Semester Examination Theory Exam**

PART-A (5x2x10Marks=100Marks)

Note: Answer Ten questions by selecting two questions from each unit. Each question carries 10 marks.

**Sample**

|      |    |
|------|----|
| I    | 1  |
|      | 2  |
|      | 3  |
|      | 4  |
| II.  | 5  |
|      | 6  |
|      | 7  |
|      | 8  |
| III. | 9  |
|      | 10 |
|      | 11 |
|      | 12 |
| IV.  | 13 |
|      | 14 |
|      | 15 |
|      | 16 |
| V.   | 17 |
|      | 18 |
|      | 19 |
|      | 20 |

### QUESTION PAPER SETTING

The teaching learning process and assessment are being carried out in accordance with the revised Blooms Taxonomy. The question paper should consist of 90% questions based on Lower Order Thinking (LOTs) and the remaining 10% based on Higher Order Thinking (HOTs) as detailed below.

| Revised Bloom's<br>Taxonomy<br>Level | Lower order thinking skills<br>(LOTs) | Higher Order Thinking<br>Skills (HOTs) |
|--------------------------------------|---------------------------------------|----------------------------------------|
|                                      | R-Remember, U-Understand,<br>AP-Apply | An- Analyse, E-Evaluate,<br>C-Create   |
| % to be included                     | 90 %                                  | 10 %                                   |

**CEE5110– DESIGN OF RCC STRUCTURES  
(LIMIT STATE METHOD)**

| CEE5110                                                                                                                                                             |                                                       | DESIGN OF RCC STRUCTURES<br>(LIMIT STATE METHOD) |  | L | T | P     | C     |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------|--------------------------------------------------|--|---|---|-------|-------|
| THEORY                                                                                                                                                              |                                                       |                                                  |  | 4 | 0 | 0     | 4     |
| Unit-I                                                                                                                                                              | INTRODUCTION TO REINFORCED CEMENT CONCRETE STRUCTURES |                                                  |  |   |   |       | 12Hrs |
| 1.1 Introduction to Limit State Method of Design in Concrete                                                                                                        |                                                       |                                                  |  |   |   |       |       |
| Reinforced Cement Concrete Materials used in R.C.C and their basic requirement                                                                                      |                                                       |                                                  |  |   |   | [1Hr] |       |
| Purpose of providing reinforcement, Different types and grades of cement and steel                                                                                  |                                                       |                                                  |  |   |   | [1Hr] |       |
| Characteristic strength and grades of concrete as per IS 456 - 2000                                                                                                 |                                                       |                                                  |  |   |   | [1Hr] |       |
| Limit State Method - Concept -Advantages- Different limit states                                                                                                    |                                                       |                                                  |  |   |   | [1Hr] |       |
| Characteristic strength and design strength of materials - Characteristic loads and design loads                                                                    |                                                       |                                                  |  |   |   | [1Hr] |       |
| Partial safety factors for loads and material strength – Limit state of collapse in flexure                                                                         |                                                       |                                                  |  |   |   | [1Hr] |       |
| Assumptions -Limiting values of neutral axis of singly reinforced section for different grades of steel                                                             |                                                       |                                                  |  |   |   | [1Hr] |       |
| Moment of resistance of singly and doubly reinforced rectangular sections, Problems.                                                                                |                                                       |                                                  |  |   |   | [1Hr] |       |
| 1.2. Design of rectangular beams for flexure                                                                                                                        |                                                       |                                                  |  |   |   |       |       |
| Design requirements-Effective spans of cantilever and simply supported beams                                                                                        |                                                       |                                                  |  |   |   | [1Hr] |       |
| Breadth and depth requirements of beams– Control of deflection                                                                                                      |                                                       |                                                  |  |   |   |       |       |
| Minimum depth requirement for stiffness–Minimum concrete cover to reinforcement steel for durability and fire resistance                                            |                                                       |                                                  |  |   |   | [1Hr] |       |
| Minimum and maximum areas/ spacing for main reinforcement and side face reinforcement as per IS 456 -2000- Development Length - Anchorage values of bends and hooks |                                                       |                                                  |  |   |   | [1Hr] |       |
| Curtailment of reinforcements                                                                                                                                       |                                                       |                                                  |  |   |   |       |       |
| Design bending moments - Design of singly and doubly reinforced rectangular beams (Cantilevers and simply supported beams carrying udl only)- Problems.             |                                                       |                                                  |  |   |   | [1Hr] |       |
| Unit-II                                                                                                                                                             | DESIGN OF RECTANGULAR BEAMS FOR FLEXURE AND SHEAR     |                                                  |  |   |   |       | 12Hrs |
| 2.1 Design of beams for shear                                                                                                                                       |                                                       |                                                  |  |   |   |       | [1Hr] |
| Limit state of collapse in shear                                                                                                                                    |                                                       |                                                  |  |   |   | [1Hr] |       |
| Design shear strength of concrete                                                                                                                                   |                                                       |                                                  |  |   |   | [1Hr] |       |
| Design shear strengths of vertical / inclined stirrups and bent up bars                                                                                             |                                                       |                                                  |  |   |   | [1Hr] |       |
| Principle of shear design - Critical sections for shear- S.F                                                                                                        |                                                       |                                                  |  |   |   | [1Hr] |       |
| Coefficients specified by IS:456- 2000,Nominal shear stress                                                                                                         |                                                       |                                                  |  |   |   | [1Hr] |       |
| Minimum shear reinforcement                                                                                                                                         |                                                       |                                                  |  |   |   | [1Hr] |       |
| Design of rectangular beams using vertical stirrups by limit state method                                                                                           |                                                       |                                                  |  |   |   | [1Hr] |       |

|                                                                                                                                            |                                                     |              |
|--------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------|--------------|
| <b>2.2. Planning of staircase</b>                                                                                                          |                                                     |              |
| Types of stairs                                                                                                                            |                                                     | [1Hr]        |
| Effective span of stairs as per IS code                                                                                                    |                                                     | [1Hr]        |
| Classification based on structural behavior                                                                                                |                                                     | [1Hr]        |
| Standard dimensions- Planning of dog legged staircase.                                                                                     |                                                     | [1Hr]        |
| <b>Unit-III</b>                                                                                                                            | <b>DESIGN OF T-BEAMS AND CONTINUOUS BEAMS</b>       | <b>12Hrs</b> |
| <b>3.1 Design of T-beams for flexure</b>                                                                                                   |                                                     | [1Hr]        |
| Cross sections of Tee and L-beams                                                                                                          |                                                     | [1Hr]        |
| Effective width of flange- Neutral Axis and M.R of Singly Reinforced T-Sections                                                            |                                                     | [1Hr]        |
| Design of singly reinforced T-beams for flexure                                                                                            |                                                     | [1Hr]        |
| A problem on Simply supported T- beams carrying udl only.                                                                                  |                                                     | [2Hrs]       |
| <b>3.2 Design of continuous beams for flexure</b>                                                                                          |                                                     | [1Hr]        |
| Methods of analysis of continuous beams- Effective Span                                                                                    |                                                     | [1Hr]        |
| Arrangement of Loading for Critical Bending Moments                                                                                        |                                                     | [1Hr]        |
| B.M coefficients specified by IS:456-2000                                                                                                  |                                                     | [1Hr]        |
| Design of rectangular continuous beams (Singly Reinforced) using B.M.                                                                      |                                                     | [1Hr]        |
| Coefficients (equal spans & u.d.l only) for sagging and hogging moments.                                                                   |                                                     | [1Hr]        |
| <b>Unit-IV</b>                                                                                                                             | <b>DESIGN OF SLABS</b>                              | <b>12Hrs</b> |
| <b>4.1 Design of one-way slabs</b>                                                                                                         |                                                     |              |
| Classification of Slabs Effective spans                                                                                                    |                                                     | [1Hr]        |
| Loads (DL and IL) on floor/roof slabs and stairs (IS:875-1987)                                                                             |                                                     | [1Hr]        |
| Strength and Stiffness requirements                                                                                                        |                                                     | [1Hr]        |
| Minimum and maximum permitted size                                                                                                         |                                                     | [1Hr]        |
| spacing and area of main and secondary reinforcements as per IS 456 - 2000                                                                 |                                                     | [1Hr]        |
| Cover requirement to reinforcements in slabs                                                                                               |                                                     | [1Hr]        |
| Design of cantilever/simply supported one-way slabs by limit state method                                                                  |                                                     | [1Hr]        |
| Check for shear and stiffness.                                                                                                             |                                                     | [1Hr]        |
| <b>4.2 Design of two-way slabs</b>                                                                                                         |                                                     |              |
| Introduction -Effective spans                                                                                                              |                                                     | [1Hr]        |
| Thickness of slab for strength and stiffness requirements                                                                                  |                                                     | [1Hr]        |
| Middle and Edge strips                                                                                                                     |                                                     | [1Hr]        |
| B.M coefficients as per IS:456 for Simply supported and Continuous slabs                                                                   |                                                     | [1Hr]        |
| Design of simply supported two-way slabs                                                                                                   |                                                     | [1Hr]        |
| <b>Unit-V</b>                                                                                                                              | <b>DESIGN OF R.C.C. COLUMNS AND COLUMN FOOTINGS</b> | <b>12Hrs</b> |
| <b>5.1 Design of R.C.C Columns</b>                                                                                                         |                                                     |              |
| Limit state of collapse in compression                                                                                                     |                                                     | [2Hrs]       |
| Assumptions - Limiting strength of short axially loaded compression members                                                                |                                                     | [1Hr]        |
| Effective length of compression members - Slenderness limits for columns- Classification of columns -Minimum eccentricity for column loads |                                                     | [1Hr]        |
| Longitudinal and Transverse reinforcement requirements as per I S 456-2000                                                                 |                                                     | [1Hr]        |
| Cover requirement, Design of axially loaded short columns with lateral ties.                                                               |                                                     | [1Hr]        |

|                                                                              |           |
|------------------------------------------------------------------------------|-----------|
| <b>5.2 Design of Column Footing</b>                                          |           |
| Basic requirements of Footings                                               | [1Hr]     |
| Types of R.C footings - Minimum depth below GL                               | [1Hr]     |
| Footings with uniform thickness and varying thickness (sloped footing)       | [1Hr]     |
| Critical sections for BM, Transverse/Punching Shears – Minimum reinforcement | [1Hr]     |
| Development length, Anchorage, Cover, Minimum edge thickness requirements    | [1Hr]     |
| IS 456- 2000 Design of Isolated square and rectangular footings              | [1Hr]     |
| <b>TOTAL</b>                                                                 | <b>60</b> |

### Suggested List of Students Activities

Visits to nearby construction site and study about

- (i) Foundation and Footings
- (ii) Column reinforcements
- (iii) Grade beam and lintel level beam reinforcement arrangements
- (iv) Reinforcement details for beams and slabs
- (v) Study the bar bending details of structural drawings.
- (vi) Learning the reinforcement arrangements given in SP-34 (Hand book on concrete reinforcement and detailing)

### Text Books

| S.NO | TITLE                                     | AUTHOR         | PUBLISHERWITHEDITION                                  |
|------|-------------------------------------------|----------------|-------------------------------------------------------|
| 1.   | Limit state Design of Reinforced concrete | B.C.Punmia     | revised edition, Lakshmi publications, Delhi, 2016    |
| 2.   | Limit state design of reinforced concrete | P.C.Varghese   | 2nd edition PHI Learning Pvt. Ltd, 2008               |
| 3.   | Design of RCC and structural elements     | S.S.Bhavikatti | 1st edition, new age International Publications, 2016 |

### Web-based/Online Resources

|                                       |                                                                                                                 |
|---------------------------------------|-----------------------------------------------------------------------------------------------------------------|
| 1.Limit state method                  | <a href="https://youtu.be/jhVh4qNa_x8?si=YNSfiPtXo1DDZANC">https://youtu.be/jhVh4qNa_x8?si=YNSfiPtXo1DDZANC</a> |
| 2.Analysis of singly reinforced beams | <a href="https://youtu.be/o4-EAjGhzSw?si=ILD2GPM_ZcvIqx3e">https://youtu.be/o4-EAjGhzSw?si=ILD2GPM_ZcvIqx3e</a> |
| 3.Design of flanged beams in flexure  | <a href="https://youtu.be/BOtUb1yk8sI?si=RSfF6k9F_SHnZium">https://youtu.be/BOtUb1yk8sI?si=RSfF6k9F_SHnZium</a> |
| 4.Design of slabs                     | <a href="https://youtu.be/TQLehidE6Hc?si=eTEtZDufiXFmvp9-">https://youtu.be/TQLehidE6Hc?si=eTEtZDufiXFmvp9-</a> |
| 5.Design of columns                   | <a href="https://youtu.be/n-D56dTyiyk?si=SGY0E46YRd1LZucG">https://youtu.be/n-D56dTyiyk?si=SGY0E46YRd1LZucG</a> |

**MODEL QUESTION PAPER****CEE5110– DESIGN OF RCC STRUCTURES  
(LIMIT STATE METHOD)****Time : 3 Hrs.****Max. Mark: 100**

| <b>PART – A (5x2x10=100 MARKS)</b>                                                                           |                                                                                                                                                                                                                                                                                          |             |                      |           |                              |
|--------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|----------------------|-----------|------------------------------|
| <b>Answer Ten questions by selecting two questions from each unit. Each questions carries 10 marks each.</b> |                                                                                                                                                                                                                                                                                          |             |                      |           |                              |
| <b>S.no</b>                                                                                                  | <b>Questions</b>                                                                                                                                                                                                                                                                         | <b>Unit</b> | <b>Bloom's level</b> | <b>Co</b> | <b>Po</b>                    |
| <b>I</b>                                                                                                     | 1 What are the assumptions in limit state of design.                                                                                                                                                                                                                                     | I           | R                    | E5110.1   | PO1,PO2,PO3,PO4              |
|                                                                                                              | 2 Find the moment of resistance of a beam 250mm wide and 500mm deep overall is reinforced with 2 Nos. of 12mm dia. Bars in compression zone and 4 Nos. 20mm bars in tension zone, each at an effective cover of 40mm. Concrete grade M20 and steel Fe415 are used.                       | I           | AN                   | E5110.1   | PO1,PO2,PO3                  |
|                                                                                                              | 3 A cantilever beam of rectangular section 250 mm wide and 500 mm overall depth has to carry an udl of 24kN/m (inclusive of self-weight) over an effective span of 3.4metre. Design the reinforcement for flexure by limit state method. Use M20 grade concrete a                        | I           | AN                   | E5110.1   | PO1,PO2,PO3,PO4, PO5,PO6,PO7 |
|                                                                                                              | 4. A beam section 300mm wide and 540mm deep overall is reinforced with 5 Nos. of 25mm dia. in tension zone and 2 Nos. of 16mm dia. in the compression zone. The cover to the centre of both steel is 40mm. Determine the moment of resistance of the section, if M25 and Fe415 are used. | I           | AN                   | E5110.1   | PO1,PO2,PO3,PO4, PO5,PO6,PO7 |
| <b>II</b>                                                                                                    | 5. Briefly explain the principle of shear design.                                                                                                                                                                                                                                        | II          | U                    | E5110.2   | PO1,PO2,PO3                  |
|                                                                                                              | 6. A reinforced concrete beam of 250 mm wide and 400 mm effective depth is subjected to a factored shear force of 140 KN at the supports. The tensile reinforcement at the support is 0.5%. Design the shear reinforcement. Use M20 grade concrete and Fe 415 steel.                     | II          | AN                   | E5110.2   | PO1,PO2,PO3,PO4, PO5,PO6,PO7 |
|                                                                                                              | 7. The vertical height between two successive floors of a multi stored residential building is 3.2m. The clear size of the staircase room is 2.10 m X 4.25 m. Plan a dog legged stair case for the building.                                                                             | II          | AN                   | E5110.2   | PO1,PO2,PO3,PO4, PO5,PO6,PO7 |
|                                                                                                              | 8. List the different types of stairs used in a building. Draw a neat sketch of any one type.                                                                                                                                                                                            | II          | U                    | E5110.2   | PO1,PO2,PO3                  |

|     |                                                                                                                                                                                                                                                                                                                                                                         |     |    |         |                              |
|-----|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|----|---------|------------------------------|
| III | 9. The support section of a continuous rectangular beam is subjected to a shear force of 150 KN. The effective size of the section is 300 mm x 510 mm. The beam has 3 number of 20 mm dia Fe 500 grade bars at support as tension reinforcement. Design the shear reinforcement for the support section using Fe 500 grade steel by LSM. Concrete used is of grade M20. | III | AN | E5110.3 | PO1,PO2,PO3,PO4, PO5,PO6,PO7 |
|     | 10. Draw neatly a three span continuous beam and mark the B.M coefficients                                                                                                                                                                                                                                                                                              | III | U  | E5110.3 | PO1,PO2,PO3                  |
|     | 11. A Tee beam with rib width 230 mm, breadth of flange 1600 mm, and thickness of flange 100 mm has to carry an udl of 36 KN/m over its full span. The clear span of the beam is 6metre. Width of supports is 300 mm. Design the mid span section of the beam for limit state of collapse in flexure using M20 grade concrete and Fe 415 grade steel.                   | III | AP | E5110.3 | PO1,PO2,PO3,PO4, PO5,PO6,PO7 |
|     | 12. How the effective spans are determined for a continuous beam?                                                                                                                                                                                                                                                                                                       | III | U  | E5110.3 | PO1,PO2,PO3                  |
| IV  | 13. Write the strength and stiffness requirements of slabs.                                                                                                                                                                                                                                                                                                             | IV  | U  | E5110.4 | PO1,PO2,PO3                  |
|     | 14. Design a R.C slab simply supported on masonry walls 3.8m apart with 300mm thick walls. It carries an imposed load (not fixed) of 5kN/m <sup>2</sup> and a floor finish load of 0.5kN/m <sup>2</sup> . Use M20 grade concrete and Fe 415 steel.                                                                                                                      | IV  | AP | E5110.4 | PO1,PO2,PO3,PO4, PO5,PO6,PO7 |
|     | 15.(i) State the necessity for providing distribution steel in slab.<br>(ii) Write the minimum tension reinforcement and maximum spacing for slab.                                                                                                                                                                                                                      | IV  | U  | E5110.4 | PO1,PO2,PO3                  |
|     | 16. Design a one-way floor slab with a clear span of 3.6m simply supported on 230mm thick masonry walls to support a live load of 3kN/m <sup>2</sup> and a floor finish of 1kN/m <sup>2</sup> . Use M20 grade concrete and Fe 415 grade steel.                                                                                                                          | IV  | AP | E5110.4 | PO1,PO2,PO3,PO4, PO5,PO6,PO7 |
| V   | 17. Write the procedure for arrangement of transverse reinforcement for R.C.C columns.                                                                                                                                                                                                                                                                                  | V   | R  | E5110.5 | PO1,PO2,PO3,PO4              |
|     | 18. Design a square footing of uniform thickness for a RC Column carrying an axial load of 1800 KN. Size of column is 400 mm x 400 mm Safe bearing capacity of soil is 150 KN/m <sup>2</sup> Use M20 grade concrete and Fe 415 grade steel. Check for shear not required.                                                                                               | V   | AP | E5110.5 | PO1,PO2,PO3,PO4, PO5,PO6,PO7 |
|     | 19. Write the assumptions in limit state of collapse in compression member.                                                                                                                                                                                                                                                                                             | V   | U  | E5110.5 | PO1,PO2,PO3                  |
|     | 20.Design a rectangular R.C footing of uniform thickness for a R.C. Column of 300mm x 400mm size, carrying an axial load of 1100 KN, using M20 grade concrete and Fe 415 grade steel reinforcement. The safe bearing capacity is 150 KN/m <sup>2</sup> .                                                                                                                | V   | AN | E5110.5 | PO1,PO2,PO3,PO4, PO5,PO6,PO7 |

### QUESTION PAPER SETTING

The teaching learning process and assessment are being carried out in accordance with the revised Blooms Taxonomy. The question paper should consist of 90% questions based on Lower Order Thinking (LOTs) and the remaining 10% based on Higher Order Thinking (HOTs) as detailed below.

| Revised Bloom's<br>Taxonomy<br>Level | Lower order thinking skills<br>(LOTs) | Higher Order Thinking<br>Skills (HOTs) |
|--------------------------------------|---------------------------------------|----------------------------------------|
|                                      | R-Remember, U-Understand,<br>AP-Apply | An- Analyse, E-Evaluate,<br>C-Create   |
| % to be included                     | 90 %                                  | 10 %                                   |

**CEE5211– MECHANICAL, ELECTRICAL AND  
PLUMBING SERVICES**

Programme Name : CIVIL ENGINEERING

Course Code : CEE5211

Semester : V SEMESTER

Course Title : MECHANICAL, ELECTRICAL AND PLUMBING SERVICES

Course Type : THEORY

| L | T | P | C |
|---|---|---|---|
| 3 | 0 | 0 | 3 |

**TEACHING AND SCHEME OF EXAMINATION**

No. of weeks per semester: 15 weeks

| Course                                       | Instructions |                  | Examination         |                        |       |          |
|----------------------------------------------|--------------|------------------|---------------------|------------------------|-------|----------|
|                                              | Hours / Week | Hours / Semester | Marks               |                        |       | Duration |
|                                              |              |                  | Internal Assessment | Autonomous Examination | Total |          |
| Mechanical, Electrical and Plumbing services | 3            | 45               | 40                  | 100*                   | 100   | 3 Hrs    |

\*Examinations will be conducted for 100 marks and will be converted to 60 marks

**TOPICS AND ALLOCATION OF HOURS**

| Unit         | Topics                                        | Time (Hrs) |
|--------------|-----------------------------------------------|------------|
| I            | Introduction to MEP                           | 6          |
| II           | HVAC system design                            | 9          |
| III          | Electrical system design                      | 9          |
| IV           | Plumbing system design                        | 9          |
| V            | Calculation for HVAC, electrical and plumbing | 12         |
| <b>Total</b> |                                               | <b>45</b>  |

**COURSE DESCRIPTION**

- Diploma holders in Civil Engineering are expected to coordinate with Mechanical, Electrical and Plumbing works in a structure while construction.
- Apart from Civil Engineering, some of the topics dealing with HVAC, Electrical and Plumbing are discussed in this subject to impart theoretical knowledge to the students

## COURSE OBJECTIVE

The objectives of the course are to enable the students to

- Mechanical systems encompass heating, ventilation, and air conditioning (HVAC), ensuring indoor comfort and air quality.
- Electrical systems for designing power distribution, lighting, and security systems, ensuring a safe and efficient electrical supply.
- Plumbing systems incorporated water supply, drainage, and fire protection systems, ensuring proper sanitation and safety measures.
- Calculate Heat load, Electrical panel schedule and assigning size of a pipe.

## COURSE OUTCOMES

| After successful completion of this course, the students should be able to |                                                                                                           |
|----------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------|
| <b>E5211.1</b>                                                             | Describe the MEP services and its importance                                                              |
| <b>E5211.2</b>                                                             | Encompass the heating, ventilation, and air conditioning (HVAC) systems                                   |
| <b>E5211.3</b>                                                             | Aspect of installation of electrical wiring, lighting, power distribution, and safety systems.            |
| <b>E5211.4</b>                                                             | Know the Plumbing system deals with water supply, drainage, sewage, and fire fighting systems.            |
| <b>E5211.5</b>                                                             | Calculate the Heat load for HVAC, Electrical panel schedule and assigning size of a pipe used in plumbing |

### Pre-requisites

Environmental Engineering

### CO-POs & PSOs mapping matrix

| CO                       | PO1       | PO2       | PO3 | PO4       | PO5       | PO6       | PO7      | PSO1 | PSO2      | PSO3      |
|--------------------------|-----------|-----------|-----|-----------|-----------|-----------|----------|------|-----------|-----------|
| <b>E5211.1</b>           | 2         | 2         | -   | 3         | 3         | 2         | 1        | -    | 3         | 2         |
| <b>E5211.2</b>           | 2         | 2         | -   | 3         | 3         | 2         | 1        | -    | 3         | 2         |
| <b>E5211.3</b>           | 2         | 2         | -   | 3         | 3         | 2         | 1        | -    | 3         | 2         |
| <b>E5211.4</b>           | 2         | 2         | -   | 3         | 3         | 2         | 1        | -    | 3         | 2         |
| <b>E5211.5</b>           | 2         | 2         | -   | 3         | 3         | 2         | 1        | -    | 3         | 2         |
| <b>Total</b>             | <b>15</b> | <b>10</b> | -   | <b>15</b> | <b>15</b> | <b>10</b> | <b>5</b> | -    | <b>15</b> | <b>10</b> |
| <b>Correlation Level</b> | <b>3</b>  | <b>2</b>  | -   | <b>3</b>  | <b>3</b>  | <b>2</b>  | <b>1</b> | -    | <b>3</b>  | <b>2</b>  |

Correlation level 1 – Slight (low)

Correlation level 2 – Moderate (Medium)

Correlation level 3 – Substantial (high)

### Instructional Strategy

- This subject introduced to the Diploma students to expose the MEP (Mechanical, Electrical, and Plumbing) works that will be installed in a building for effective functioning of various services.
- Nowadays, the diploma Engineers also expected to carried out these works during construction with the help of other services personnel. Hence these subject gains importance now to learn the basics of MEP.
- Faculty should give simple exercises involving the applications of various concepts and principles being taught in the subject.
- Efforts should be made to prepare tutorial sheets on various topics and students should be encouraged / guided to solve the tutorial problems independently and visit to local construction site to understand the behavior and uses of MEP.

Faculty may conduct weekly small quiz sessions in every week to know the students' level of understanding.

### Assessment Methodology

|                    | Continuous Assessment(40marks) |                           |                                         |                       | End Semester Examination (60 marks) |
|--------------------|--------------------------------|---------------------------|-----------------------------------------|-----------------------|-------------------------------------|
|                    | CA1                            | CA2                       | CA3                                     | CA4                   |                                     |
| Mode               | Written test (Unit 1 & 2)      | Written test (Unit 3 & 4) | Quiz MCQ (Online/ Offline)              | Model Examination     | Written Examination                 |
| Duration           | 2Periods                       | 2Periods                  | 1Hour                                   | 3Hours                | 3Hours                              |
| Exam Marks         | 50                             | 50                        | 60                                      | 100                   | 100                                 |
| Converted to       | 10                             | 10                        | 10                                      | 10                    | 60                                  |
| Marks              | 40                             |                           |                                         |                       | 60                                  |
| Tentative Schedule | 6 <sup>th</sup> Week           | 12 <sup>th</sup> Week     | 13 <sup>th</sup> -14 <sup>th</sup> Week | 16 <sup>th</sup> Week |                                     |

### CONTINUOUS ASSESSMENT

**CA1and CA2:** Assessment written test should be conducted for 50Marks for two units. The marks scored will be converted to 10 Marks for the internal assessment.

**CA1and CA2, Assessment test should be conducted for two units as below**

- PARTA: (5X 10Marks=50Marks).
- Eight questions will be asked, students should write five questions. Four questions can be asked from each unit.

**CA3:** 60 MCQ can be asked by covering the entire portion. It may be conducted by Online / Offline. The marks scored should be converted to 10 marks for the internal assessment.

**CA4:** Model examination should be conducted as per the end semester question pattern. The marks should be converted to 10marks for the internal assessment.

**Question Pattern**

- Answer Ten questions by selecting two questions from each unit. Each question carries 10 marks.
- Four questions will be asked from every unit. Students should write any two questions.

**Question Pattern –Model Examination and End Semester Examination Theory Exam**

PART-A (5x2x10=100)

Note: Answer Ten questions by selecting two questions from each unit. Each question carries 10 marks

**Sample:**

- |      |    |
|------|----|
| I.   | 1  |
|      | 2  |
|      | 3  |
|      | 4  |
| II.  | 5  |
|      | 6  |
|      | 7  |
|      | 8  |
| III. | 9  |
|      | 10 |
|      | 11 |
|      | 12 |
| IV.  | 13 |
|      | 14 |
|      | 15 |
|      | 16 |
| V.   | 17 |
|      | 18 |
|      | 19 |
|      | 20 |

### QUESTION PAPER SETTING

The teaching learning process and assessment are being carried out in accordance with the revised Blooms Taxonomy. The question paper should consist of 90% questions based on Lower Order Thinking (LOTs) and the remaining 10% based on Higher Order Thinking (HOTs) as detailed below.

| <b>Revised Bloom's<br/>Taxonomy<br/>Level</b> | <b>Lower order thinking skills<br/>(LOTs)</b> | <b>Higher Order Thinking<br/>Skills (HOTs)</b> |
|-----------------------------------------------|-----------------------------------------------|------------------------------------------------|
|                                               | <b>R-Remember, U-Understand,<br/>AP-Apply</b> | <b>An- Analyse, E-Evaluate,<br/>C-Create</b>   |
| % to be included                              | 90 %                                          | 10 %                                           |

**CEE5211– MECHANICAL, ELECTRICAL AND  
PLUMBING SERVICES**

| CEE5211                                                                                                                                                                |                          | MECHANICAL, ELECTRICAL AND<br>PLUMBING SERVICES | L | T | P | C      |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------|-------------------------------------------------|---|---|---|--------|
| THEORY                                                                                                                                                                 |                          |                                                 | 3 | 0 | 0 | 3      |
| Unit -I                                                                                                                                                                | INTRODUCTION TO MEP      |                                                 |   |   |   | 6Hrs   |
| Introduction to MEP – MEP services - Scope, Importance and future application                                                                                          |                          |                                                 |   |   |   | [2Hrs] |
| Types of building                                                                                                                                                      |                          |                                                 |   |   |   | [2Hrs] |
| Introduction to AutoCAD, Revit software and other software’s                                                                                                           |                          |                                                 |   |   |   | [1Hr]  |
| Study of building components.                                                                                                                                          |                          |                                                 |   |   |   | [1Hr]  |
| Unit- II                                                                                                                                                               | HVAC SYSTEM DESIGN       |                                                 |   |   |   | 9Hrs   |
| Introduction to HVAC- scope, importance and future- functions of HVAC systems – heating – ventilation and air-conditioning                                             |                          |                                                 |   |   |   | [2Hrs] |
| Codes and standards – ASHRAE, ISHRAE, IMC- Ducts and its types, Duct fittings, Flexible ducts etc. Duct elbows selections, Vanes, dampers and their importance –       |                          |                                                 |   |   |   | [2Hrs] |
| Duct designing methods (manual calculations) using Equal friction/Velocity reduction method-Pipe sizing methods-                                                       |                          |                                                 |   |   |   | [2Hrs] |
| Chilled water pipe sizing, Pump size – Introduction to Software’s – MACQUAY, HAP, Trane Trace 700.                                                                     |                          |                                                 |   |   |   | [1Hr]  |
| Unit- III                                                                                                                                                              | ELECTRICAL SYSTEM DESIGN |                                                 |   |   |   | 9Hrs   |
| Introduction to Electrical System-Symbols-NEC codes                                                                                                                    |                          |                                                 |   |   |   | [2Hrs] |
| Types and selection of wiring systems, wires and cables                                                                                                                |                          |                                                 |   |   |   | [2Hrs] |
| Lighting, power circuit -Types of Light fittings and power sockets- wiring diagrams-sensors and applications-Conduit Layout Design, Lighting and Power load estimation |                          |                                                 |   |   |   | [1Hr]  |
| Load balancing-Types and selection of Circuit Breakers and underground cables                                                                                          |                          |                                                 |   |   |   | [1Hr]  |
| UPS & Inverters- Fire protection and Alarm System                                                                                                                      |                          |                                                 |   |   |   | [1Hr]  |
| Earthing and lightning protection system- Introduction to software                                                                                                     |                          |                                                 |   |   |   | [1Hr]  |
| Electrical system drafting (CAD) and modelling (Revit), Come check, Visual, Dialux.                                                                                    |                          |                                                 |   |   |   | [1Hr]  |
| Unit -IV                                                                                                                                                               | PLUMBING SYSTEM DESIGN   |                                                 |   |   |   | 9Hrs   |
| Fundamentals of plumbing system - fixtures, faucets & fixture fittings –                                                                                               |                          |                                                 |   |   |   | [2Hrs] |
| IPC code and symbols                                                                                                                                                   |                          |                                                 |   |   |   | [1Hr]  |
| External & internal water supply and return system –Sanitary drainage system - vent pipe system                                                                        |                          |                                                 |   |   |   | [2Hrs] |
| Storm water drainage system – Gas line - Fire Fighting Systems                                                                                                         |                          |                                                 |   |   |   | [2Hrs] |
| Fire Extinguisher and Sprinkler System – Dry & Wet Riser Systems – Pipe selection and Sizing.                                                                          |                          |                                                 |   |   |   | [2Hrs] |

| Unit -V                                                             | Calculation for HVAC, Electrical and Plumbing | 12Hrs     |
|---------------------------------------------------------------------|-----------------------------------------------|-----------|
| <b>HVAC</b>                                                         |                                               |           |
| Heat Dissipation – Internal Heat Load – External Heat Load          |                                               | [2Hrs]    |
| Temperature differential – outside temperature – Inside temperature |                                               | [2Hrs]    |
| Heat load calculation for a building.                               |                                               | [2Hrs]    |
| <b>ELECTRICAL for a building</b>                                    |                                               |           |
| Lighting, ceiling fan, receptacles watts                            |                                               | [2Hrs]    |
| Panel schedules for a building.                                     |                                               | [2Hrs]    |
| <b>PLUMBING</b>                                                     |                                               |           |
| Velocity pressure - Pipe selection and Sizing for a building.       |                                               | [2Hrs]    |
| <b>Total</b>                                                        |                                               | <b>45</b> |

### Suggested List of Students Activities

- Visit to nearby construction site and study about
  - HVAC
  - Electrical works
  - Plumbing works
- Study the MEP drawings.
- Do MEP design for a small building.

### Text Books

| S.NO | TITLE                                                     | AUTHOR                                                | PUBLISHERWITHEDITION                                         |
|------|-----------------------------------------------------------|-------------------------------------------------------|--------------------------------------------------------------|
| 1.   | Mechanical and Electrical Equipment for Buildings         | Walter T.Grondzik, Alison G. Kwok and Benjamin Stein, | 11 <sup>th</sup> edition, Wiley Publisher, 2009              |
| 2.   | Electrical and Mechanical Services in High Rise Buildings | A K Mittal                                            | 2 <sup>nd</sup> edition, CBS Publishers & Distributors, 2015 |
| 3.   | Electrical Engineering: Principles & Applications         | Allan R. Hambley                                      | 6 <sup>th</sup> edition, Pearson Education India, 2016       |

### Web-based/Online Resources

| S.No | Website/Links                                                                                                                                               |
|------|-------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1    | <a href="https://www.youtube.com/watch?v=zjfLuiMk16g">https://www.youtube.com/watch?v=zjfLuiMk16g</a>                                                       |
| 2    | <a href="https://www.youtube.com/watch?v=FwGay2rhEFQ">https://www.youtube.com/watch?v=FwGay2rhEFQ</a>                                                       |
| 3    | <a href="https://www.youtube.com/watch?v=NcvwKxKzzmw">https://www.youtube.com/watch?v=NcvwKxKzzmw</a>                                                       |
| 4    | <a href="https://www.youtube.com/watch?v=bsdt310LESw">https://www.youtube.com/watch?v=bsdt310LESw</a>                                                       |
| 5    | <a href="https://www.youtube.com/watch?v=Y3wLzo-nIX4">https://www.youtube.com/watch?v=Y3wLzo-nIX4</a>                                                       |
| 6    | <a href="https://www.youtube.com/watch?app=desktop&amp;v=lgX9SH297qM&amp;t=192s">https://www.youtube.com/watch?app=desktop&amp;v=lgX9SH297qM&amp;t=192s</a> |
| 7    | <a href="https://www.youtube.com/watch?v=6Z5ymsIdkh0">https://www.youtube.com/watch?v=6Z5ymsIdkh0</a>                                                       |

|   |                                                                                                       |
|---|-------------------------------------------------------------------------------------------------------|
| 8 | <a href="https://www.youtube.com/watch?v=sDxX89JZJdU">https://www.youtube.com/watch?v=sDxX89JZJdU</a> |
|---|-------------------------------------------------------------------------------------------------------|

### MODEL QUESTION PAPER

#### CEE5211– MECHANICAL, ELECTRICAL AND PLUMBING SERVICES

Time : 3 Hrs.

Max.Mark: 100

| PART – A (5x2x10=100 MARKS)                                                                          |                                                                                   |      |               |         |                           |
|------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|------|---------------|---------|---------------------------|
| Answer Ten questions by selecting two questions from each unit. Each question carries 10 marks each. |                                                                                   |      |               |         |                           |
| S. No                                                                                                | QUESTIONS                                                                         | UNIT | BLOOM'S LEVEL | CO      | PO                        |
| I                                                                                                    | 1. Define Mechanical components of MEP                                            | I    | U             | E5211.1 | PO1, PO2, PO3<br>PO4, PO7 |
|                                                                                                      | 2. Briefly explain Scope, Importance and future application of MEP                | I    | R             | E5211.1 | PO1, PO2, PO3<br>PO4, PO7 |
|                                                                                                      | 3. Define the role of MEP drawings                                                | I    | U             | E5211.1 | PO1, PO2, PO3<br>PO4, PO7 |
|                                                                                                      | 4. Explain the types of MEP buildings                                             | I    | U             | E5211.1 | PO1, PO2, PO3<br>PO4, PO7 |
| II                                                                                                   | 5. Define Charging of Refrigerant in a refrigeration System                       | II   | U             | E5211.2 | PO1, PO2, PO3<br>PO4, PO7 |
|                                                                                                      | 6. What is the Pump down of refrigerant from the refrigeration System             | II   | R             | E5211.2 | PO1, PO2, PO3<br>PO4, PO7 |
|                                                                                                      | 7. Determination of capacity of evaporator coil of window / Split Air conditioner | II   | U             | E5211.2 | PO1, PO2, PO3<br>PO4, PO7 |
|                                                                                                      | 8. Define Setting and Adjusting the thermostat.                                   | II   | U             | E5211.2 | PO1, PO2, PO3<br>PO4, PO7 |
| III                                                                                                  | 9. What are the steps in designing an electrical system?                          | III  | R             | E5211.3 | PO1, PO2, PO3<br>PO4, PO7 |
|                                                                                                      | 10. Explain the Types and selection of wiring systems, wires and cables           | III  | U             | E5211.3 | PO1, PO2, PO3<br>PO4, PO7 |
|                                                                                                      | 11. Define software Electrical system drafting (CAD) and modeling (Revit)         | III  | U             | E5211.3 | PO1, PO2, PO3<br>PO4, PO7 |
|                                                                                                      | 12. Explain the Types and selection of Circuit Breakers and underground cables    | III  | U, C          | E5211.3 | PO1, PO2, PO3<br>PO4, PO7 |
| IV                                                                                                   | 13. Define Fundamentals of plumbing system fixtures, faucets & fixture fittings   | IV   | U             | E5211.4 | PO1, PO2, PO3<br>PO4, PO7 |
|                                                                                                      | 14. Detail about External & internal water supply and return system               | IV   | U             | E5211.4 | PO1, PO2, PO3<br>PO4, PO7 |
|                                                                                                      | 15. Classified the Sanitary drainage system                                       | IV   | R             | E5211.4 | PO1, PO2, PO3<br>PO4, PO7 |
|                                                                                                      | 16. Write the notes about Pipe selection and Sizing.                              | IV   | R             | E5211.4 | PO1, PO2, PO3<br>PO4, PO7 |

|   |                                                            |   |   |         |                        |
|---|------------------------------------------------------------|---|---|---------|------------------------|
| V | 17.Explain About HVAC                                      | V | U | E5211.5 | PO1,PO2,PO3<br>PO4,PO7 |
|   | 18. Write a short note about electrical for a building     | V | R | E5211.5 | PO1,PO2,PO3<br>PO4,PO7 |
|   | 19. Explain Heat load calculation for a building.          | V | U | E5211.5 | PO1,PO2,PO3<br>PO4,PO7 |
|   | 20. Classify the Pipe selection and Sizing for a building. | V | R | E5211.5 | PO1,PO2,PO3<br>PO4,PO7 |

### QUESTION PAPER SETTING

The teaching learning process and assessment are being carried out in accordance with the revised Blooms Taxonomy. The question paper should consist of 90% questions based on Lower Order Thinking (LOTs) and the remaining 10% based on Higher Order Thinking (HOTs) as detailed below.

| Revised Bloom's<br>Taxonomy<br>Level | Lower order thinking skills<br>(LOTs) | Higher Order Thinking<br>Skills (HOTs) |
|--------------------------------------|---------------------------------------|----------------------------------------|
|                                      | R-Remember, U-Understand,<br>AP-Apply | An- Analyse, E-Evaluate,<br>C-Create   |
| % to be included                     | 90 %                                  | 10 %                                   |

**CEE5212– IRRIGATION AND WATER  
RESOURCES ENGINEERING**

Programme Name : CIVIL ENGINEERING  
 Course Code : CEE5212  
 Semester : V SEMESTER  
 Course Title : IRRIGATION AND WATER RESOURCES ENGINEERING  
 Course Type : THEORY

| L | T | P | C |
|---|---|---|---|
| 3 | 0 | 0 | 3 |

**TEACHING AND SCHEME OF EXAMINATION**

No. of weeks per semester: 15 weeks

| Course                                     | Instructions |                  | Examination         |                        |       |          |
|--------------------------------------------|--------------|------------------|---------------------|------------------------|-------|----------|
|                                            | Hours / Week | Hours / Semester | Marks               |                        |       | Duration |
|                                            |              |                  | Internal Assessment | Autonomous Examination | Total |          |
| Irrigation And Water Resources Engineering | 3            | 45               | 40                  | 100*                   | 100   | 3 Hrs    |

\*Examinations will be conducted for 100 marks and will be converted to 60 marks

**TOPICS AND ALLOCATION OF HOURS**

| Unit         | Topics                                                              | Time (Hrs) |
|--------------|---------------------------------------------------------------------|------------|
| I            | Irrigation and its methods                                          | 9          |
| II           | Soil water plant relationship and water requirements of crops       | 9          |
| III          | Hydrology and ground water                                          | 9          |
| IV           | Dams spillways and diversion head works                             | 9          |
| V            | Irrigation channels cross drainage works and canal regulation works | 9          |
| <b>Total</b> |                                                                     | <b>45</b>  |

**COURSE DESCRIPTION**

Diploma holders in civil engineering have to supervise the construction, repair and maintenance of canals, head works, cross drainage works, regulatory and other works. Some of diploma holders are also engaged for preventing water logging and irrigation by various methods. This subject imparts knowledge regarding basics of Irrigation, Methods of Irrigation, soil water plant relationship, Crop water Requirement, Hydrology, Ground water, constructional features of head works, cross drainage works, causes and prevention of water logging.

## COURSE OBJECTIVE

The objectives of the course are to enable the students to

- Understand the concept of necessity of irrigation in India
- Recognize different crops and their water requirements
- Know about rainfall and runoff
- Understand the components of hydrological cycle and hydrograph.
- Understand the occurrence of ground water and ground water exploration methods.
- Know about measurement of rainfall and read rain gauges and hydrographs
- Monitor construction and maintenance work of canal and canal linings
- Supervise maintenance and construction work of canal head works and cross regulators

## COURSE OUTCOMES

| After successful completion of this course, the students should be able to |                                                                                                                                         |
|----------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------|
| <b>E5212.1</b>                                                             | Describe the different methods to increase the yield of Crops, various methods of irrigation and their suitability.                     |
| <b>E5212.2</b>                                                             | Explain the soil-water plant relationship, water requirements of crops and cropping pattern in India.                                   |
| <b>E5212.3</b>                                                             | Explain the concept of Hydrology, measurement of rain gauge , ground water resources and measurement of yield of well,                  |
| <b>E5212.4</b>                                                             | Design the different hydraulic structures like dams, spillways, weir and Barrages and the concepts of maintenance shall also form part. |
| <b>E5212.5</b>                                                             | Describe about the construction and maintenance work of canal and canal linings, canal head works and cross regulators                  |

### Pre-requisites

Nil

### CO-POs & PSOs mapping matrix

| CO                       | PO1       | PO2       | PO3      | PO4      | PO5       | PO6       | PO7      | PSO1 | PSO2 | PSO3 |
|--------------------------|-----------|-----------|----------|----------|-----------|-----------|----------|------|------|------|
| <b>E5212.1</b>           | 3         | 2         | 1        | 1        | 2         | 2         | 2        | -    | 3    | 2    |
| <b>E5212.2</b>           | 3         | 3         | 1        | 1        | 2         | 2         | 2        | -    | 3    | 2    |
| <b>E5212.3</b>           | 3         | 3         | 1        | 1        | 2         | 2         | 2        | -    | 3    | 2    |
| <b>E5212.4</b>           | 3         | 2         | 1        | 1        | 2         | 2         | 1        | -    | 3    | 2    |
| <b>E5212.5</b>           | 3         | 2         | 3        | 1        | 2         | 2         | 1        | -    | 3    | 2    |
| <b>Total</b>             | <b>15</b> | <b>12</b> | <b>7</b> | <b>5</b> | <b>10</b> | <b>10</b> | <b>8</b> | -    | 15   | 10   |
| <b>Correlation Level</b> | <b>3</b>  | <b>2</b>  | <b>1</b> | <b>1</b> | <b>2</b>  | <b>2</b>  | <b>2</b> | -    | 3    | 2    |

Correlation level 1 – Slight (low)

Correlation level 2 – Moderate (Medium)

Correlation level 3 – Substantial (high)

### Instructional Strategy

- It is advised that teachers take steps to pique pupils' attention and boost their learning confidence.
- To help students learn and appreciate numerous concepts and principles in each area, teachers should provide examples from daily life, realistic situations, and real-world engineering and technological applications.
- The demonstration can make the subject exciting and foster in the students a scientific mindset. Student activities should be planned on all the topics.
- Throughout the course, a theory-demonstrate-practice-activity strategy may be used to ensure that learning is outcome and employability-based.
- Do not let students work on an activity or an experiment with the expected outcome, rather allow students to be honest about whatever the results of the experiment are. If the results are different from the expectations, students should do an analysis where they could be the source of error, if any.

### Assessment Methodology

|                    | Continuous Assessment(40marks) |                           |                                         |                       | End Semester Examination (60 marks) |
|--------------------|--------------------------------|---------------------------|-----------------------------------------|-----------------------|-------------------------------------|
|                    | CA1                            | CA2                       | CA3                                     | CA4                   |                                     |
| Mode               | Written test (Unit 1 & 2)      | Written test (Unit 3 & 4) | Quiz MCQ (Online/ Offline)              | Model Examination     | Written Examination                 |
| Duration           | 2Periods                       | 2Periods                  | 1Hour                                   | 3Hours                | 3Hours                              |
| Exam Marks         | 50                             | 50                        | 60                                      | 100                   | 100                                 |
| Converted to       | 10                             | 10                        | 10                                      | 10                    | 60                                  |
| Marks              | 40                             |                           |                                         |                       | 60                                  |
| Tentative Schedule | 6 <sup>th</sup> Week           | 12 <sup>th</sup> Week     | 13 <sup>th</sup> -14 <sup>th</sup> Week | 16 <sup>th</sup> Week |                                     |

### CONTINUOUS ASSESSMENT

**CA1and CA2:** Assessment written test should be conducted for 50Marks for two units. The marks scored will be converted to 10 Marks for the internal assessment.

**CA1and CA2, Assessment test should be conducted for two units as below**

- PARTA: (5X 10Marks=50Marks).
- Eight questions will be asked, students should write five questions. Four questions can be asked from each unit.

**CA3:** 60 MCQ can be asked by covering the entire portion. It may be conducted by Online / Offline. The marks scored should be converted to 10 marks for the internal assessment.

**CA4:** Model examination should be conducted as per the end semester question pattern. The marks should be converted to 10marks for the internal assessment.

**Question Pattern:**

- Answer Ten questions by selecting two questions from each unit. Each question carries 10 marks.
- Four questions will be asked from every unit. Students should write any two questions.

**Question Pattern –Model Examination and End Semester Examination Theory Exam**

PART-A (5x2x10=100)

Note: Answer Ten questions by selecting two questions from each unit. Each question carries 10 marks.

**Sample**

- |      |    |
|------|----|
| I.   | 1  |
|      | 2  |
|      | 3  |
|      | 4  |
| II.  | 5  |
|      | 6  |
|      | 7  |
|      | 8  |
| III. | 9  |
|      | 10 |
|      | 11 |
|      | 12 |
| IV.  | 13 |
|      | 14 |
|      | 15 |
|      | 16 |
| V.   | 17 |
|      | 18 |
|      | 19 |
|      | 20 |

**QUESTION PAPER SETTING**

The teaching learning process and assessment are being carried out in accordance with the revised Blooms Taxonomy. The question paper should consist of 90% questions based on Lower Order Thinking (LOTs) and the remaining 10% based on Higher Order Thinking (HOTs) as detailed below.

| Revised Bloom's Taxonomy Level | Lower order thinking skills (LOTs) | Higher Order Thinking Skills (HOTs) |
|--------------------------------|------------------------------------|-------------------------------------|
|                                | R-Remember, U-Understand, AP-Apply | An- Analyse, E-Evaluate, C-Create   |
| % to be included               | 90 %                               | 10 %                                |

**CEE5212– IRRIGATION AND WATER  
RESOURCES ENGINEERING**

| CEE5212                                                                                                                                                                  |                                                                  | IRRIGATION AND WATER RESOURCES<br>ENGINEERING | L | T | P | C      |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------|-----------------------------------------------|---|---|---|--------|
| THEORY                                                                                                                                                                   |                                                                  |                                               | 3 | 0 | 0 | 3      |
| Unit -I                                                                                                                                                                  | IRRIGATION AND ITS METHODS                                       |                                               |   |   |   | 9Hrs   |
| 1.1 INTRODUCTION                                                                                                                                                         |                                                                  |                                               |   |   |   |        |
| Definition of Irrigation – Water resources in India – Necessity                                                                                                          |                                                                  |                                               |   |   |   | [1Hr]  |
| Benefits of Irrigation – Ill-effects of Irrigation                                                                                                                       |                                                                  |                                               |   |   |   | [1Hr]  |
| Types of Irrigation - Command area development                                                                                                                           |                                                                  |                                               |   |   |   | [1Hr]  |
| Impact of irrigation on environment                                                                                                                                      |                                                                  |                                               |   |   |   | [1Hr]  |
| 1.2 METHODS OF IRRIGATION                                                                                                                                                |                                                                  |                                               |   |   |   |        |
| Function of Irrigation water – Standards of Irrigation water                                                                                                             |                                                                  |                                               |   |   |   | [1Hr]  |
| Methods of applying water to crops – Surface irrigation - Uncontrolled flooding                                                                                          |                                                                  |                                               |   |   |   | [1Hr]  |
| Free flooding – Contour Laterals – Border strip method – Check flooding                                                                                                  |                                                                  |                                               |   |   |   | [1Hr]  |
| Basin flooding – Zig-Zag method                                                                                                                                          |                                                                  |                                               |   |   |   | [1Hr]  |
| Furrow method – Contour farming – Sub-Surface Irrigation – Micro irrigation                                                                                              |                                                                  |                                               |   |   |   |        |
| Drip Irrigation – Sprinkler irrigation                                                                                                                                   |                                                                  |                                               |   |   |   | [1Hr]  |
| Unit- II                                                                                                                                                                 | SOIL WATER PLANT RELATIONSHIP AND WATER<br>REQUIREMENTS OF CROPS |                                               |   |   |   | 9Hrs   |
| 2.1 SOIL - WATER PLANT RELATIONSHIP                                                                                                                                      |                                                                  |                                               |   |   |   |        |
| Soil-water plant relationship - Soil moisture contents- Depth of soil water available to plants - Infiltration - Permanent and Ultimate Wilting point – Soil Fertility.  |                                                                  |                                               |   |   |   | [1Hr]  |
|                                                                                                                                                                          |                                                                  |                                               |   |   |   | [1Hr]  |
| 2.2 WATER REQUIREMENTS OF CROPS                                                                                                                                          |                                                                  |                                               |   |   |   |        |
| Depth and Frequencies of Irrigation - Duty and Delta of water                                                                                                            |                                                                  |                                               |   |   |   | [1Hr]  |
| Factors affecting duty - Problems - Command area and Intensity of Irrigation                                                                                             |                                                                  |                                               |   |   |   | [2Hrs] |
| Consumptive use of water and Evapo-Transpiration - Irrigation Efficiencies                                                                                               |                                                                  |                                               |   |   |   | [2Hrs] |
| Problems Crops and crop seasons in India - Cropping pattern - Crop Rotation - Assessment of Irrigation water.                                                            |                                                                  |                                               |   |   |   | [2Hrs] |
| UNIT -III                                                                                                                                                                | HYDROLOGY AND GROUND WATER                                       |                                               |   |   |   | 9Hrs   |
| 3.1 HYDROLOGY                                                                                                                                                            |                                                                  |                                               |   |   |   |        |
| Introduction - Definition -Application of Hydrology in engineering - Hydrological cycle - Precipitation- forms of Precipitation - measurements of rain fall - Rain gauge |                                                                  |                                               |   |   |   | [2Hrs] |
|                                                                                                                                                                          |                                                                  |                                               |   |   |   | [2Hrs] |
| Types of rain gauges - Rain gauge network - Mean rainfall over a drainage Basin                                                                                          |                                                                  |                                               |   |   |   | [1Hr]  |
| Methods - Radar and Satellite Measurements of rainfall runoff                                                                                                            |                                                                  |                                               |   |   |   | [1Hr]  |
| Estimation of runoff - Losses - Hydrograph - Unit Hydrograph - Uses                                                                                                      |                                                                  |                                               |   |   |   | [1Hr]  |

|                                                                                                                                                                                       |                                                                            |             |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------|-------------|
| <b>3.2 GROUND WATER</b>                                                                                                                                                               |                                                                            |             |
| Ground water resources- Zones of Ground water-Aquifer Types- Terms used -porosity, permeability, yield, specific yield, specific retention, coefficient of storage, specific capacity |                                                                            | [1Hr]       |
| Measurement of yield of well - Pumping test- Recuperation test- Ground water exploration.                                                                                             |                                                                            | [1Hr]       |
| <b>Unit- IV</b>                                                                                                                                                                       | <b>DAMS SPILLWAYS AND DIVERSION HEAD WORKS</b>                             | <b>9Hrs</b> |
| <b>4.1 DAMS AND SPILLWAYS</b>                                                                                                                                                         |                                                                            |             |
| Classification of Dams – Comparison of Earthen and Gravity Dams - Earthen Dams                                                                                                        |                                                                            | [2Hrs]      |
| Components and their function, typical cross section –                                                                                                                                |                                                                            | [2Hrs]      |
| Types of failures of earthen dams and remedial measures - Gravity Dams –                                                                                                              |                                                                            | [2Hrs]      |
| Typical cross section - Drainage gallery – Spillways –Definition, function, location and components –Types.                                                                           |                                                                            |             |
| <b>4.2 DIVERSION HEAD WORKS</b>                                                                                                                                                       |                                                                            |             |
| Diversion Head Works –                                                                                                                                                                |                                                                            | [2Hrs]      |
| Components, layout, function and types - canal head regulator, silt excluders and silt ejectors. Barrages – components and their function - Difference between weir and barrage.      |                                                                            | [1Hr]       |
| <b>Unit-V</b>                                                                                                                                                                         | <b>IRRIGATION CHANNELS CROSS DRAINAGE WORKS AND CANAL REGULATION WORKS</b> | <b>9Hrs</b> |
| <b>5.1 DESIGN OF IRRIGATION CHANNEL</b>                                                                                                                                               |                                                                            |             |
| Canals - Classification of canals - Design of the most economical canal section                                                                                                       |                                                                            | [2Hrs]      |
| Comparison of Kennedy's silt theory and Lacey's regime theory - Canal lining Definition                                                                                               |                                                                            | [2Hrs]      |
| Types and advantages of canal lining - Properties of good canal lining material – Water Logging                                                                                       |                                                                            | [2Hrs]      |
| Causes of Water-Logging – Remedial Measures.                                                                                                                                          |                                                                            | [1Hr]       |
| <b>5.2 CROSS DRAINAGE WORKS AND CANAL REGULATION WORKS</b>                                                                                                                            |                                                                            |             |
| Cross Drainage Works (CD Works)                                                                                                                                                       |                                                                            | [1Hr]       |
| Types of CD works – Canal Fall – Canal Escapes – Cross regulator and Distributors head regulator - Canal Outlet.                                                                      |                                                                            | [1Hr]       |
| <b>TOTAL</b>                                                                                                                                                                          |                                                                            | <b>45</b>   |

**Suggested List of Students Activities:**

- Presentation/Seminars by students on any recent technological developments based on the Irrigation
- Periodic class quizzes conducted on a weekly/fortnightly based on the course
- Prepare Models of dams/ spillways
- Compare various irrigation methods and identify the suitable irrigation method for the various crops.
- Presentation/Seminars by students on the necessities of cross drainage works and canal regulation work

### Text Books

| S.NO | TITLE                                     | AUTHOR                                                              | PUBLISHERWITHEDITION                                                                |
|------|-------------------------------------------|---------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| 1.   | Hydrology and water resources engineering | Santhosh Kumar Garg                                                 | 25 <sup>th</sup> edition, khanna publishers, Delhi, 2018                            |
| 2.   | Engineering hydrology                     | K.Subramanya                                                        | 5 <sup>th</sup> edition, Tata McGraw-Hill publishing company Ltd., New Delhi, 2020. |
| 3.   | Introductory Irrigation Engineering,      | B.C. Punmia, Ashok Kumar Jain ,Arun Kumar Jain ,Pande Brij Basi Lal | 17 <sup>th</sup> edition, Laxmi Publication, Delhi, 2021                            |

### Web-based/Online Resources

| S.No | Website/Links                                                           |
|------|-------------------------------------------------------------------------|
| 1    | <a href="https://youtu.be/ibzY0LjHu38">https://youtu.be/ibzY0LjHu38</a> |
| 2    | <a href="https://youtu.be/mg6UoXcBkyA">https://youtu.be/mg6UoXcBkyA</a> |
| 3    | <a href="https://youtu.be/e7pckUDQ9oI">https://youtu.be/e7pckUDQ9oI</a> |
| 4    | <a href="https://youtu.be/tSA18XoqMVQ">https://youtu.be/tSA18XoqMVQ</a> |
| 5    | <a href="https://youtu.be/rZ4c-nB0ukQ">https://youtu.be/rZ4c-nB0ukQ</a> |
| 6    | <a href="https://youtu.be/tZ1K3PFF0NU">https://youtu.be/tZ1K3PFF0NU</a> |
| 7    | <a href="https://youtu.be/aMPRw71MIyw">https://youtu.be/aMPRw71MIyw</a> |

# MODEL QUESTION PAPER

## CEE5212– IRRIGATION AND WATER RESOURCES ENGINEERING

Time : 3 Hrs.

Max. Mark: 100

| PART – A (5x2x10=100)                                                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |      |                  |         |                              |
|-------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|------------------|---------|------------------------------|
| Answer Ten questions by selecting two questions from each unit. Each questions carries 10 marks each. |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |      |                  |         |                              |
| S.No                                                                                                  | QUESTIONS                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | UNIT | BLOOM'S<br>LEVEL | CO      | PO                           |
| I                                                                                                     | 1. Explain about impact of irrigation on environment.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | I    | U                | E5212.1 | PO1,PO2,PO3                  |
|                                                                                                       | 2. Compare drip and sprinkler irrigation.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | I    | U                | E5212.1 | PO1,PO2,PO3                  |
|                                                                                                       | 3. Write short notes on i) Check flooding (3)<br>ii) Basin Flooding (3) and Draw simple sketches (1)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | I    | R                | E5212.1 | PO1,PO2                      |
|                                                                                                       | 4. Explain about the various methods of applying water to the crop.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | I    | U                | E5212.1 | PO1,PO2,PO3                  |
| II                                                                                                    | 5. Explain the factors affecting the duty.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | II   | U                | E5212.2 | PO1,PO2,PO3                  |
|                                                                                                       | 6. Discharge of 150 lit/sec was delivered from canal and 110 Lit /sec reached the field. In 8 hr, 2.2 Ha areas was irrigated. <ul style="list-style-type: none"> <li>Runoff Loss in the field = 445m<sup>3</sup></li> <li>Depth of water Penetration varies linearly from 1.5m at the head End of the field to 1.1m at the tail end.</li> <li>Effective Root Zone Depth = 1.5m Available moisture holding capacity of soil is 200mm per m depth of soil.</li> <li>Note that irrigation was started at a moisture extracted level of 50%.</li> </ul> Then, Find a) Ns b) Nd. Assume suitable data, if necessary. | II   | AP               | E5212.2 | PO1,PO2,PO3, PO4,PO5 PO6,PO7 |
|                                                                                                       | 7. Write short notes on i) Permanent Wilting Point (4) ii) Ultimate Wilting Point (3).                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | II   | R                | E5212.2 | PO1,PO2                      |
|                                                                                                       | 8. A Discharge of 150 lit/sec was delivered from canal and 110 Lit /sec reached the field. In 8 hr, 2.2 Ha area was irrigated. <ul style="list-style-type: none"> <li>Runoff Loss in the field = 445m<sup>3</sup></li> <li>Depth of water Penetration varies Linearly from 1.5m at the head End of the field to 1.1m at the tail end.</li> </ul>                                                                                                                                                                                                                                                                | II   | AN               | E5212.2 | PO1,PO2,PO3, PO4,PO5 PO6,PO7 |

|     |                                                                                                                                                                                                                                                                           |     |   |         |             |
|-----|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|---|---------|-------------|
|     | <p>Effective Root Zone Depth = 1.5m</p> <p>Available moisture holding capacity of soil is 200mm per m depth of soil.</p> <p>Note that irrigation was started at a moisture extracted level of 50%.</p> <p>Then, Find a) Nc b) Na. Assume suitable data, if necessary.</p> |     |   |         |             |
| III | 9. Describe the applications of Hydrology in engineering                                                                                                                                                                                                                  | III | U | E5212.3 | PO1,PO2,PO3 |
|     | 10. Explain about Rain Gauge and its types.                                                                                                                                                                                                                               | III | U | E5212.3 | PO1,PO2,PO3 |
|     | 11. Describe about the estimation of runoff                                                                                                                                                                                                                               | III | U | E5212.3 | PO1,PO2,PO3 |
|     | 12. Explain about Pumping test                                                                                                                                                                                                                                            | III | U | E5212.3 | PO1,PO2,PO3 |
| IV  | 13. Compare Earthen and Gravity Dams.                                                                                                                                                                                                                                     | IV  | R | E5212.4 | PO1,PO2     |
|     | 14. List the barrage components and explain their functions.                                                                                                                                                                                                              | IV  | U | E5212.4 | PO1,PO2,PO3 |
|     | 15. Draw the typical cross section of the Earthen Dam (3) and Gravity Dam (4).                                                                                                                                                                                            | IV  | R | E5212.4 | PO1,PO2     |
|     | 16. Explain about Diversion Head Works.                                                                                                                                                                                                                                   | IV  | U | E5212.4 | PO1,PO2,PO3 |
| V   | 17. List of the procedure for the design of most economical rectangular canal section.                                                                                                                                                                                    | V   | U | E5212.5 | PO1,PO2,PO3 |
|     | 18. Explain about cross drainage works.                                                                                                                                                                                                                                   | V   | U | E5212.5 | PO1,PO2,PO3 |
|     | 19. Compare Kennedy's silt theory and Lacey's regime theory.                                                                                                                                                                                                              | V   | U | E5212.5 | PO1,PO2,PO3 |
|     | 20. Explain about types and advantages of canal lining.                                                                                                                                                                                                                   | V   | U | E5212.5 | PO1,PO2,PO3 |

### QUESTION PAPER SETTING

The teaching learning process and assessment are being carried out in accordance with the revised Blooms Taxonomy. The question paper should consist of 90% questions based on Lower Order Thinking (LOTs) and the remaining 10% based on Higher Order Thinking (HOTs) as detailed below.

| Revised Bloom's Taxonomy Level | Lower order thinking skills (LOTs) | Higher Order Thinking Skills (HOTs) |
|--------------------------------|------------------------------------|-------------------------------------|
|                                | R-Remember, U-Understand, AP-Apply | An- Analyse, E-Evaluate, C-Create   |
| % to be included               | 90 %                               | 10 %                                |

**CEE5213– DEFECTS IN BUILDING AND  
REMEDIES**

Programme Name : CIVIL ENGINEERING  
 Course Code : CEE5213  
 Semester : V SEMESTER  
 Course Title : DEFECTS IN BUILDING AND REMEDIES  
 Course Type : THEORY

| L | T | P | C |
|---|---|---|---|
| 3 | 0 | 0 | 3 |

**TEACHING AND SCHEME OF EXAMINATION**

No. of weeks per semester: 15 weeks

| Course                           | Instructions |                  | Examination         |                        |       |          |
|----------------------------------|--------------|------------------|---------------------|------------------------|-------|----------|
|                                  | Hours / Week | Hours / Semester | Marks               |                        |       | Duration |
|                                  |              |                  | Internal Assessment | Autonomous Examination | Total |          |
| Defects in building and remedies | 3            | 45               | 40                  | 100*                   | 100   | 3 Hrs    |

\*Examinations will be conducted for 100 marks and will be converted to 60 marks

**TOPICS AND ALLOCATION OF HOURS**

| Unit         | Topics                                   | Time (Hrs) |
|--------------|------------------------------------------|------------|
| I            | Cracks in buildings and maintenance      | 9          |
| II           | Defects in building and their assessment | 9          |
| III          | Methods and inspection techniques        | 9          |
| IV           | Repairing materials for RCC members      | 9          |
| V            | Repair and strengthening of RCC members  | 9          |
| <b>Total</b> |                                          | <b>45</b>  |

**COURSE DESCRIPTION**

This course is framed to offer an inclusive introduction to the field of Construction and Maintenance of Civil Engineering Infrastructure to catering essential knowledge through various sub-disciplines with in this field .It is tailored to meet the educational requirements typically outlined in the syllabus for diploma studies in Civil Engineering. A diploma holder in Civil Engineering is expected to acquire the knowledge and training to supervise and construct the building and to detect the defects in building and remedies. They should also be aware of the maintenance of building in effective manner.

## COURSE OBJECTIVE

The objective of this course is to enable the students to,

- Classify the type of cracks.
- Understand the causes of cracks in building.
- Know the methods of maintenance of building.
- Examine the defects in building and
- Study the assessment methodology of damaged building.
- Choose the suitable repairing materials required for damaged building.
- Understand the methods and inspection technique required for damaged building.
- Have knowledge of repair and strengthening of RCC members.

## COURSE OUTCOMES

| After successful completion of this course, the students should be able to |                                                                              |
|----------------------------------------------------------------------------|------------------------------------------------------------------------------|
| E5213.1                                                                    | Detect the reason for cracks and method of maintenance required in building. |
| E5213.2                                                                    | Observe the defects in building and their assessment methodology.            |
| E5213.3                                                                    | Select the suitable repairing materials needed for damaged building.         |
| E5213.4                                                                    | Examine the methods and inspection technique required for damaged building.  |
| E5213.5                                                                    | Be familiar with repair and strengthening of RCC members.                    |

**Pre-requisites:** Construction Materials and Practice.

### CO-POs & PSOs mapping matrix

| CO                       | PO1       | PO2      | PO3      | PO4       | PO5       | PO6      | PO7       | PSO1     | PSO2      | PSO3      |
|--------------------------|-----------|----------|----------|-----------|-----------|----------|-----------|----------|-----------|-----------|
| E5213.1                  | 3         | 1        | 1        | 2         | 3         | 1        | 3         | -        | 3         | 2         |
| E5213.2                  | 3         | 1        | 1        | 2         | 3         | 1        | 3         | -        | 3         | 2         |
| E5213.3                  | 3         | 1        | 1        | 2         | 3         | 1        | 3         | -        | 3         | 2         |
| E5213.4                  | 3         | 1        | 1        | 2         | 3         | 1        | 3         | -        | 3         | 2         |
| E5213.5                  | 3         | 1        | 1        | 2         | 3         | 1        | 3         | -        | 3         | 2         |
| <b>Total</b>             | <b>15</b> | <b>5</b> | <b>5</b> | <b>10</b> | <b>15</b> | <b>5</b> | <b>15</b> | <b>-</b> | <b>15</b> | <b>10</b> |
| <b>Correlation Level</b> | <b>3</b>  | <b>1</b> | <b>1</b> | <b>2</b>  | <b>3</b>  | <b>1</b> | <b>3</b>  | <b>-</b> | <b>3</b>  | <b>2</b>  |

Correlation level 1 – Slight (low)

Correlation level 2 – Moderate (Medium)

Correlation level 3 – Substantial (high)

### Instructional Strategy

- Engage and Motivate: Teachers should actively engage students to boost their learning confidence.
- Real – world Relevance: Teachers are expected to physically show various causes of development of cracks while imparting the instructions. Students should be encouraged to collect the various reasons for the development of cracks and failure of RCC structure.
- Interactive Learning: Teachers are expected to organize demonstration and field visits to show about the various operations involved in the repair and rehabilitation of RCC structures.
- Application – Based Learning: Throughout the course, a theory demonstrates – practice – activity strategy may be used to ensure the outcome of the learning is employability-based one.
  - Simulation and Real–World Practice: In addition to the theoretical Instructions different activities pertaining to the simulated Environment transition into real – world scenarios, when possible, like expert lectures, seminars, visits to Construction plant may also be organized.
  - Encourage Critical Analysis: Foster an environment where students can understand the experiment outcomes and infer the potential sources of error in case of any discrepancies.

### Assessment Methodology

|                           | Continuous Assessment(40marks) |                           |                                         |                       | End Semester Examination (60 marks) |
|---------------------------|--------------------------------|---------------------------|-----------------------------------------|-----------------------|-------------------------------------|
|                           | CA1                            | CA2                       | CA3                                     | CA4                   |                                     |
| <b>Mode</b>               | Written test (Unit 1 & 2)      | Written test (Unit 3 & 4) | Quiz MCQ (Online/ Offline)              | Model Examination     | Written Examination                 |
| <b>Duration</b>           | 2Periods                       | 2Periods                  | 1Hour                                   | 3Hours                | 3Hours                              |
| <b>Exam Marks</b>         | 50                             | 50                        | 60                                      | 100                   | 100                                 |
| <b>Converted to</b>       | 10                             | 10                        | 10                                      | 10                    | 60                                  |
| <b>Marks</b>              | 40                             |                           |                                         |                       | 60                                  |
| <b>Tentative Schedule</b> | 6 <sup>th</sup> Week           | 12 <sup>th</sup> Week     | 13 <sup>th</sup> -14 <sup>th</sup> Week | 16 <sup>th</sup> Week |                                     |

## CONTINUOUS ASSESSMENT

**CA1and CA2:** Assessment written test should be conducted for 50Marks for two units. The marks scored will be converted to 10 Marks for the internal assessment.

**CA1and CA2, Assessment test should be conducted for two units as below**

- PARTA: (5X 10Marks=50Marks).
- Eight questions will be asked, students should write five questions. Four questions can be asked from each unit.

**CA3:** 60 MCQ can be asked by covering the entire portion. It may be conducted by Online / Offline. The marks scored should be converted to 10 marks for the internal assessment.

**CA4:** Model examination should be conducted as per the end semester question pattern. The marks should be converted to 10marks for the internal assessment

### **Question Pattern:**

- Answer Ten questions by selecting two questions from each unit. Each question carries 10 marks.
- Four questions will be asked from every unit. Students should write any two questions.

### **Question Pattern –Model Examination and End Semester Examination Theory Exam**

PART-A

(5x2x10=100)

Note: Answer Ten questions by selecting two questions from each unit. Each question carries 10 marks.

**Sample**

- I. 1
- 2
- 3
- 4
- II. 5
- 6
- 7
- 8
- III. 9
- 10
- 11
- 12
- IV. 13
- 14
- 15
- 16
- V. 17
- 18
- 19
- 20

**QUESTION PAPER SETTING**

The teaching learning process and assessment are being carried out in accordance with the revised Blooms Taxonomy. The question paper should consist of 90% questions based on Lower Order Thinking (LOTs) and the remaining 10% based on Higher Order Thinking(HOTs) as detailed below.

| <b>Revised Bloom's<br/>Taxonomy<br/>Level</b> | <b>Lower order thinking skills<br/>(LOTs)</b> | <b>Higher Order Thinking<br/>Skills (HOTs)</b> |
|-----------------------------------------------|-----------------------------------------------|------------------------------------------------|
|                                               | <b>R-Remember, U-Understand,<br/>AP-Apply</b> | <b>An- Analyse, E-Evaluate,<br/>C-Create</b>   |
| % to be included                              | 90 %                                          | 10 %                                           |

**CEE5213– DEFECTS IN BUILDING AND  
REMEDIES**

| CEE5213                                                                                                                                                                |                                                 | L           | T | P | C      |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------|-------------|---|---|--------|
| THEORY                                                                                                                                                                 |                                                 | 3           | 0 | 0 | 3      |
| <b>Unit-I</b>                                                                                                                                                          | <b>CRACKS IN BUILDINGS AND MAINTENANCE</b>      | <b>9Hrs</b> |   |   |        |
| Cracks – Definition - Reasons for cracks in concrete                                                                                                                   |                                                 |             |   |   | [2Hrs] |
| Classification of cracks –Wall cracks – Micro cracks – Macro cracks –Plastic shrinkage cracks                                                                          |                                                 |             |   |   | [2Hrs] |
| Plastic Settlement cracks – Drying Settlement cracks                                                                                                                   |                                                 |             |   |   | [1Hr]  |
| Thermal cracks –Map cracks due to alkali aggregate reaction –Longitudinal cracks                                                                                       |                                                 |             |   |   | [1Hr]  |
| Due to corrosion Transverse cracks due to loading –Shear cracks due to loading. Maintenance                                                                            |                                                 |             |   |   | [1Hr]  |
| Definition Objective of maintenance –Maintenance Services –Safety of Buildings                                                                                         |                                                 |             |   |   | [1Hr]  |
| Classification of Maintenance – Names only.                                                                                                                            |                                                 |             |   |   | [1Hr]  |
| <b>Unit-II</b>                                                                                                                                                         | <b>DEFECTS IN BUILDING AND THEIR ASSESSMENT</b> | <b>9Hrs</b> |   |   |        |
| Defects – Definition                                                                                                                                                   |                                                 |             |   |   | [2Hrs] |
| Damage assessment procedure - Visual observation                                                                                                                       |                                                 |             |   |   | [2Hrs] |
| Sketches of typical defects found by visual inspection                                                                                                                 |                                                 |             |   |   |        |
| Testing of concrete - Quality Control tests - Slump tests - Compression test                                                                                           |                                                 |             |   |   | [2Hrs] |
| Non-destructive test Rebound / Schmidt hammer test - Ultrasonic Pulse Velocity Test                                                                                    |                                                 |             |   |   |        |
| Acoustic Emission Test - Cover thickness survey - Rapid Chloride Permeability Test                                                                                     |                                                 |             |   |   | [2Hrs] |
| Sorptivity Test - Core sampling and testing – Precautions during core drilling.                                                                                        |                                                 |             |   |   | [1Hr]  |
| <b>Unit- III</b>                                                                                                                                                       | <b>METHODS AND INSPECTION TECHNIQUES</b>        | <b>9Hrs</b> |   |   |        |
| Inspection – Definition - First Survey - Second Survey                                                                                                                 |                                                 |             |   |   | [2Hrs] |
| Carbonation test - Corrosion of reinforcing bars - Assessment of cracks                                                                                                |                                                 |             |   |   | [2Hrs] |
| Assessment of evidence of water leakage - Deterioration of concrete strength                                                                                           |                                                 |             |   |   | [2Hrs] |
| Assessment of a large deflection - Assessment of surface deterioration                                                                                                 |                                                 |             |   |   | [1Hr]  |
| Third Survey - Corrosion of beam                                                                                                                                       |                                                 |             |   |   | [1Hr]  |
| Cracking - Water leakage - Large deflection - Surface deterioration.                                                                                                   |                                                 |             |   |   | [1Hr]  |
| <b>Unit-IV</b>                                                                                                                                                         | <b>REPAIRING MATERIALS FOR RCC MEMBERS</b>      | <b>9Hrs</b> |   |   |        |
| Repair – Definition - Repair materials                                                                                                                                 |                                                 |             |   |   | [2Hrs] |
| Criteria for selection of repair materials                                                                                                                             |                                                 |             |   |   | [2Hrs] |
| Methodology for selection of repair materials - Material properties - Factors affecting the selection of a repair material - Essential parameters for repair materials |                                                 |             |   |   | [1Hr]  |
| Classification of repair materials - Patch repairing - Cement patching mortar and concrete                                                                             |                                                 |             |   |   | [1Hr]  |
| Polymer concrete and mortar - Epoxy resin mortar and concrete –                                                                                                        |                                                 |             |   |   | [1Hr]  |
| Quick setting compounds – Ferro cement – SIFLON – SIMCON – Grouts – Concrete                                                                                           |                                                 |             |   |   | [1Hr]  |
| Bonding agents.                                                                                                                                                        |                                                 |             |   |   | [1Hr]  |

| Unit-V                                                                                      | REPAIR AND STRENGTHENING OF RCC MEMBERS | 9Hrs      |
|---------------------------------------------------------------------------------------------|-----------------------------------------|-----------|
| Rehabilitation – Retrofitting – Definition - Crack injection repair to concrete structures  |                                         | [1Hr]     |
| Epoxy resins - Polyurethane resins – Jacketing - Plate bonding                              |                                         | [2Hrs]    |
| Strengthening of foundation - Techniques to restore original strength of Columns            |                                         | [2Hrs]    |
| Beam and Slabs Stitching - Repair procedure for corrosion damaged elements                  |                                         | [2Hrs]    |
| Treatment of distressed floor in Toilets / Kitchen Strengthening solution using FRP Plates. |                                         | [2Hrs]    |
| <b>TOTAL</b>                                                                                |                                         | <b>45</b> |

#### Suggested List of Students Activity (Ungraded)

- Prepare a report of a field visit to nearby construction site.
- Prepare a report of a field visit to nearby damaged building.
- Study the development of cracks in the existing building and prepare the report.
- Study the causes of collapse of existing building and prepare the report.
- Periodicclassquizzesconductedonaweekly/fortnightlybasedonthecourse.

#### Text Books

| S.NO | TITLE                               | AUTHOR                                                  | PUBLISHERWITHEDITION                   |
|------|-------------------------------------|---------------------------------------------------------|----------------------------------------|
| 1.   | Learning from Failures              | R.N. Raikar                                             | Dhanpatrai& Sons, New Delhi, 2008.     |
| 2.   | Building Materials and Technologies | K.S.Jagadish, B.Reddy,V. Venkatarama&Rao, K.S. Nanjunda | New Age Publisher, New Delhi, 2007.    |
| 3.   | Building repairs and maintenance    | Dr.S.Thirugnanasambandam                                | Annamalai University, Tamil Nadu, 2023 |

#### Web-based/Online Resources

| S.No | Website/Links                                                                                                                                                                                           |
|------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1    | <a href="https://www.academia.edu/33846701/General_Building_Defects_Causes_Symptoms_and_Remedial_Work">https://www.academia.edu/33846701/General_Building_Defects_Causes_Symptoms_and_Remedial_Work</a> |
| 2    | <a href="https://www.irjet.net/archives/V6/i3/IRJET-V6I31180.pdf">https://www.irjet.net/archives/V6/i3/IRJET-V6I31180.pdf</a>                                                                           |
| 3    | <a href="https://www.bd.gov.hk/en/safety-inspection/building-safety/index_bsi_defects.html">https://www.bd.gov.hk/en/safety-inspection/building-safety/index_bsi_defects.html</a>                       |

## MODEL QUESTION PAPER

### CEE5213– DEFECTS IN BUILDING AND REMEDIES

**Time : 3Hrs**

**Max Mark: 100**

| S. No | PART – A (5X2x10=100 MARKS)                                                                           |      |               |         |             |
|-------|-------------------------------------------------------------------------------------------------------|------|---------------|---------|-------------|
|       | Answer Ten questions by selecting two questions from each unit. Each questions carries 10 marks each. |      |               |         |             |
| S. No | QUESTIONS                                                                                             | UNIT | BLOOM'S LEVEL | CO      | PO          |
| I     | 1. Define reasons for cracks in concrete                                                              | I    | U             | E5213.1 | PO1,PO2,PO3 |
|       | 2. Write a short note about safety of buildings and its measures                                      | I    | R             | E5213.1 | PO1,PO2     |
|       | 3. Classify the types of cracks happened in buildings                                                 | I    | U             | E5213.1 | PO1,PO2,PO3 |
|       | 4. What are the objectives of maintenance                                                             | I    | R             | E5213.1 | PO1,PO2     |
| II    | 5. Explain Defects in building and their assessment                                                   | II   | U             | E5213.2 | PO1,PO2,PO3 |
|       | 6. Define Damage assessment procedure                                                                 | II   | R             | E5213.2 | PO1,PO2     |
|       | 7. What are the types of test used in concrete                                                        | II   | R             | E5213.2 | PO1,PO2     |
|       | 8. Explain Core sampling and testing and its Precautions                                              | II   | U             | E5213.2 | PO1,PO2,PO3 |
| III   | 9. Write a short note about methods and inspection techniques                                         | III  | R             | E5213.3 | PO1,PO2,PO3 |
|       | 10. What are steps involved in inspection process                                                     | III  | R             | E5213.3 | PO1,PO2     |
|       | 11. Explain about Assessment of surface deterioration                                                 | III  | U             | E5213.3 | PO1,PO2,PO3 |
|       | 12. Differentiate between first survey and second survey                                              | III  | U             | E5213.3 | PO1,PO2,PO3 |
| IV    | 13. What are the materials used for repairing RCC members                                             | IV   | R             | E5213.4 | PO1,PO2     |
|       | 14. Explain detail about Polymer concrete and mortar                                                  | IV   | U             | E5213.4 | PO1,PO2,PO3 |
|       | 15. What are the Factors affecting the selection of a repair material                                 | IV   | R             | E5213.4 | PO1,PO2     |
|       | 16. What is the difference between mortar and concrete patches?                                       | IV   | R             | E5213.4 | PO1,PO2     |

|   |                                                                                 |   |   |         |             |
|---|---------------------------------------------------------------------------------|---|---|---------|-------------|
| V | 17. Define Crack injection and explain its types                                | V | U | E5213.5 | PO1,PO2,PO3 |
|   | 18. Write a steps for Repair procedure for corrosion damaged elements           | V | R | E5213.5 | PO1,PO2     |
|   | 19. Explain Techniques to restore original strength of Columns, Beam and Slabs. | V | U | E5213.5 | PO1,PO2,PO3 |
|   | 20. Define Plate bonding Strengthening of foundation                            | V | R | E5213.5 | PO1,PO2     |

### QUESTION PAPER SETTING

The teaching learning process and assessment are being carried out in accordance with the revised Blooms Taxonomy. The question paper should consist of 90% questions based on Lower Order Thinking (LOTs) and the remaining 10% based on Higher Order Thinking (HOTs) as detailed below.

| Revised Bloom's<br>Taxonomy<br>Level | Lower order thinking skills<br>(LOTs) | Higher Order Thinking<br>Skills (HOTs) |
|--------------------------------------|---------------------------------------|----------------------------------------|
|                                      | R-Remember, U-Understand,<br>AP-Apply | An- Analyse, E-Evaluate,<br>C-Create   |
| % to be included                     | 90 %                                  | 10 %                                   |

**CEE5214– URBAN PLANNING AND  
DEVELOPMENT**

Programme Name : CIVIL ENGINEERING  
 Course Code : CEE5214  
 Semester : V SEMESTER  
 Course Title : URBAN PLANNING AND DEVELOPMENT  
 Course Type : THEORY

| L | T | P | C |
|---|---|---|---|
| 3 | 0 | 0 | 3 |

**TEACHING AND SCHEME OF EXAMINATION**

No. of weeks per semester: 15 weeks

| Course                         | Instructions |                  | Examination         |                        |       |          |
|--------------------------------|--------------|------------------|---------------------|------------------------|-------|----------|
|                                | Hours / Week | Hours / Semester | Marks               |                        |       | Duration |
|                                |              |                  | Internal Assessment | Autonomous Examination | Total |          |
| Urban planning and development | 3            | 45               | 40                  | 100*                   | 100   | 3 Hrs    |

**\*Examinations will be conducted for 100 marks and will be converted to 60 marks**

**TOPICS AND ALLOCATION OF HOURS**

| Unit         | Topics                                        | Time (Hrs) |
|--------------|-----------------------------------------------|------------|
| I            | Town planning principles                      | 8          |
| II           | Housing and slums                             | 10         |
| III          | Master plan and re-planning of existing towns | 10         |
| IV           | Urban roads and traffic management            | 10         |
| V            | Building bye laws & sustainable planning      | 07         |
| <b>Total</b> |                                               | <b>45</b>  |

**COURSE DESCRIPTION**

Urban planning and development also known as town planning, city planning, regional planning, or rural planning in specific contexts, is a technical and political process that focuses on the development and design of land use and the built environment. Urban planning focuses on the physical layout of cities, including buildings, roads, parks, and public spaces. It considers how different activities (residential, commercial, industrial) are distributed within the urban area. Urban planning aims to enhance the quality of life for residents by addressing social needs and equity. In the late 20th century, the concept of sustainable development gained prominence. It aims to meet present needs without compromising the ability of future generations to meet their own needs.

## COURSE OBJECTIVE

The object of this course is to enable the student to

- Introduction to Urban Planning and Development Understanding the basic terms & Principles of Town Planning.
- Gain Knowledge about housing agencies.
- Familiarize students with the Master plan and Deplaning.
- Students can able to understand the basic functions of Traffic Management.
- Awareness of advancements in town planning.

## COURSE OUTCOMES

| After successful completion of this course, the students should be able to |                                                                                                  |
|----------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------|
| <b>E5214.1</b>                                                             | Understand the principles of town planning and surveys                                           |
| <b>E5214.2</b>                                                             | To know the requirements of housing and slum clearance                                           |
| <b>E5214.3</b>                                                             | Prepare master plan and re planning of existing towns                                            |
| <b>E5214.4</b>                                                             | Understand the requirements and types of urban roads and traffic management                      |
| <b>E5214.5</b>                                                             | Describe the various policies and schemes of town planning and sustainable development planning. |

**Pre-requisites:** Knowledge of basic science

## CO-POs & PSOs mapping matrix

| CO                       | PO1       | PO2      | PO3       | PO4      | PO5      | PO6       | PO7       | PSO1     | PSO2      | PSO3      |
|--------------------------|-----------|----------|-----------|----------|----------|-----------|-----------|----------|-----------|-----------|
| <b>E5214.1</b>           | 3         | -        | 3         | -        | 2        | 3         | 3         | -        | 3         | 2         |
| <b>E5214.2</b>           | 3         | -        | 2         | 2        | -        | -         | 3         | -        | 3         | 2         |
| <b>E5214.3</b>           | 3         | 2        | 3         | -        | 2        | 3         | 2         | -        | 3         | 2         |
| <b>E5214.4</b>           | 2         | 2        | 2         | 2        | -        | 2         | 2         | -        | 3         | 2         |
| <b>E5214.5</b>           | 2         | -        | 3         | -        | -        | 3         | 2         | -        | 3         | 2         |
| <b>Total</b>             | <b>13</b> | <b>4</b> | <b>13</b> | <b>4</b> | <b>4</b> | <b>11</b> | <b>12</b> | <b>-</b> | <b>15</b> | <b>10</b> |
| <b>Correlation Level</b> | <b>3</b>  | <b>1</b> | <b>3</b>  | <b>1</b> | <b>2</b> | <b>2</b>  | <b>2</b>  | <b>-</b> | <b>3</b>  | <b>2</b>  |

Correlation level 1 – Slight (low)

Correlation level 2 – Moderate (Medium)

Correlation level 3 – Substantial (high)

### Instructional Strategy

It is advised that teachers take steps to pique pupils' attention and boost their learning confidence.

- To help students learn and appreciate numerous concepts and principles in each area, teachers should provide examples from daily life, realistic situations, and real-world engineering and technological applications.
- The demonstration can make the subject exciting and foster in the students a scientific mindset. Student activities should be planned on all the topics.
- Throughout the course, a theory-demonstrate-practice-activity strategy may be used to ensure that learning is outcome and employability-based.

Do not let students work on an activity or an experiment with the expected outcome, rather allow students to be honest about whatever the results of the experiment are. If the results are different from the expectations, students should do an analysis where they could be the source

### Assessment Methodology

|                           | Continuous Assessment(40marks) |                           |                                         |                       | End Semester Examination (60 marks) |
|---------------------------|--------------------------------|---------------------------|-----------------------------------------|-----------------------|-------------------------------------|
|                           | CA1                            | CA2                       | CA3                                     | CA4                   |                                     |
| <b>Mode</b>               | Written test (Unit 1 & 2)      | Written test (Unit 3 & 4) | Quiz MCQ (Online/ Offline)              | Model Examination     | Written Examination                 |
| <b>Duration</b>           | 2Periods                       | 2Periods                  | 1Hour                                   | 3Hours                | 3Hours                              |
| <b>Exam Marks</b>         | 50                             | 50                        | 60                                      | 100                   | 100                                 |
| <b>Converted to</b>       | 10                             | 10                        | 10                                      | 10                    | 60                                  |
| <b>Marks</b>              | 40                             |                           |                                         |                       | 60                                  |
| <b>Tentative Schedule</b> | 6 <sup>th</sup> Week           | 12 <sup>th</sup> Week     | 13 <sup>th</sup> -14 <sup>th</sup> Week | 16 <sup>th</sup> Week |                                     |

## CONTINUOUS ASSESSMENT

**CA1and CA2:** Assessment written test should be conducted for 50Marks for two units. The marks scored will be converted to 10 Marks for the internal assessment.

**CA1and CA2, Assessment test should be conducted for two units as below**

- PARTA:(5x2x10=100)
- Eight questions will be asked, students should write five questions. Four questions can be asked from each unit.

**CA3:** 60 MCQ can be asked by covering the entire portion. It may be conducted by Online / Offline. The marks scored should be converted to 10 marks for the internal assessment.

**CA4:** Model examination should be conducted as per the end semester question pattern. The marks should be converted to 10marks for the internal assessment.

### Question Pattern

- Answer Ten questions by selecting two questions from each unit. Each question carries 10 marks.
- Four questions will be asked from every unit. Students should write any two questions.

### Question Pattern –Model Examination and End Semester Examination Theory Exam

#### PART-A (5x2x10=100)

Note: Answer Ten questions by selecting two questions from each unit. Each question carries 10 marks.

#### Sample

- |      |    |
|------|----|
| I.   | 1  |
|      | 2  |
|      | 3  |
|      | 4  |
| II.  | 5  |
|      | 6  |
|      | 7  |
|      | 8  |
| III. | 9  |
|      | 10 |
|      | 11 |
|      | 12 |
| IV.  | 13 |
|      | 14 |
|      | 15 |
|      | 16 |
| V.   | 17 |
|      | 18 |
|      | 19 |
|      | 20 |

## QUESTION PAPER SETTING

The teaching learning process and assessment are being carried out in accordance with the revised Blooms Taxonomy. The question paper should consist of 90% questions based on Lower Order Thinking (LOTs) and the remaining 10% based on Higher Order Thinking (HOTs) as detailed below.

| <b>Revised Bloom's<br/>Taxonomy<br/>Level</b> | <b>Lower order thinking skills<br/>(LOTs)</b> | <b>Higher Order Thinking<br/>Skills (HOTs)</b> |
|-----------------------------------------------|-----------------------------------------------|------------------------------------------------|
|                                               | <b>R-Remember, U-Understand,<br/>AP-Apply</b> | <b>An- Analyse, E-Evaluate,<br/>C-Create</b>   |
| % to be included                              | 90 %                                          | 10 %                                           |

**CEE5214-URBAN PLANNING AND DEVELOPMENT**

| CEE5214                                                                                   |                                              | URBAN PLANNING AND DEVELOPMENT |  | L | T | P | C      |
|-------------------------------------------------------------------------------------------|----------------------------------------------|--------------------------------|--|---|---|---|--------|
| THEORY                                                                                    |                                              |                                |  | 3 | 0 | 0 | 3      |
| Unit I                                                                                    | TOWN PLANNING PRINCIPLES                     |                                |  |   |   |   | 8Hrs   |
| 1.1General-Evolutionofplanning-Objectsoftownplanning                                      |                                              |                                |  |   |   |   | [1Hr]  |
| Economic justification for town planning-Principles of Town planning                      |                                              |                                |  |   |   |   | [1Hr]  |
| Necessity of town planning                                                                |                                              |                                |  |   |   |   | [1Hr]  |
| Types of Urban Planning                                                                   |                                              |                                |  |   |   |   | [1Hr]  |
| 1.2Surveys – Zoning - Origin of towns- Growth of towns                                    |                                              |                                |  |   |   |   | [1Hr]  |
| Stages in town development                                                                |                                              |                                |  |   |   |   | [1Hr]  |
| Distribution of land-Forms of planning-Site for an ideal town-Requirements of new         |                                              |                                |  |   |   |   | [1Hr]  |
| Towns Planning of a modern town-Cost of Town planning-Present position of Town            |                                              |                                |  |   |   |   | [1Hr]  |
| Planning in India.                                                                        |                                              |                                |  |   |   |   |        |
| Unit-II                                                                                   | HOUSING AND SLUMS                            |                                |  |   |   |   | 10Hrs  |
| 2.1 HOUSING                                                                               |                                              |                                |  |   |   |   |        |
| General - Importance of housing - Demand for houses - Building site                       |                                              |                                |  |   |   |   | [2Hrs] |
| Requirements of residential buildings                                                     |                                              |                                |  |   |   |   | [2Hrs] |
| Classification of residential buildings - Design of residential areas - Rural Housing     |                                              |                                |  |   |   |   | [2Hrs] |
| Agencies for housing -Investment in housing - HUDCO – CIDCO - Housing problems in India.  |                                              |                                |  |   |   |   | [1Hr]  |
| 2.2 SLUMS                                                                                 |                                              |                                |  |   |   |   |        |
| General - Causes of slums                                                                 |                                              |                                |  |   |   |   | [1Hr]  |
| Characteristics of slums - Effects of slums - Slum clearance                              |                                              |                                |  |   |   |   | [1Hr]  |
| Problems in removing slums - Resources for slum clearance Programmes - The Indian slums.  |                                              |                                |  |   |   |   | [1Hr]  |
| Unit-III                                                                                  | MASTER PLAN AND RE-PLANNING OF EXISTINGTOWNS |                                |  |   |   |   | 10Hrs  |
| 3.1 MASTER PLAN                                                                           |                                              |                                |  |   |   |   |        |
| General–Objects–Necessity-Factors to be considered                                        |                                              |                                |  |   |   |   | [1Hr]  |
| Data to be collected-Drawings to be prepared-                                             |                                              |                                |  |   |   |   | [1Hr]  |
| Features of master plan-Planning standards–Report                                         |                                              |                                |  |   |   |   | [2Hrs] |
| Stages of preparation–Method of Execution-Conclusion.                                     |                                              |                                |  |   |   |   | [2Hrs] |
| 3.2 RE-PLANNING                                                                           |                                              |                                |  |   |   |   |        |
| General-Objects of re-planning                                                            |                                              |                                |  |   |   |   | [1Hr]  |
| Analyzing the defects of existing towns-Urban renewal projects-merging of sub urban areas |                                              |                                |  |   |   |   | [1Hr]  |
| Decentralization-Satellite Towns–Smart cities                                             |                                              |                                |  |   |   |   | [1Hr]  |
| Planning-definition and features – principles of design of public buildings and           |                                              |                                |  |   |   |   | [1Hr]  |
| classification of public building.                                                        |                                              |                                |  |   |   |   |        |

| Unit-IV                                                                                                                                                                                                                                                                                                                                     | URBAN ROADS AND TRAFFIC MANAGEMENT       | 10Hrs                              |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------|------------------------------------|
| <b>4.1URBAN ROADS</b><br>General - Objects - Requirements of good city road<br>Factors to be considered - Classification of urban roads<br>Types of street systems - Through and By-pass roads - Outer and inner ring roads<br>Expressways -Freeways - Precincts - Road aesthetics.                                                         |                                          | [1Hr]<br>[1Hr]<br>[1Hr]<br>[1Hr]   |
| <b>4.2 TRAFFICMANAGEMENT</b><br>General - Object - Traffic survey - Traffic congestion –Traffic control - Traffic diversion<br>Road junction - Parking - Traffic capacity of road - One way traffic<br>Road traffic problems - Use of island and flyovers at crossings<br>Causes of road accidents-Traffic signal- Road sign -Road marking. |                                          | [2Hrs]<br>[2Hrs]<br>[1Hr]<br>[1Hr] |
| Unit-V                                                                                                                                                                                                                                                                                                                                      | BUILDING BYE LAWS & SUSTAINABLE PLANNING | 7Hrs                               |
| <b>5.1 BUILDING BYE LAWS</b><br>General-Objects of bye-laws- Importance of bye-laws<br>Function of local authority – Plot coverage –Set back- Floor space index<br>Development control rules –General rules of metropolitan Area –CMDA rules<br>Tamil Nadu Combined Development and Building Rules - 2019.                                  |                                          | [1Hr]<br>[1Hr]<br>[1Hr]<br>[1Hr]   |
| <b>5.2SUSTAINABLE PLANNING</b><br>Urban Development Missions in India Sustainable Planning Techniques - Social Infrastructure<br>Green Buildings - Sustainable Building Planning<br>Urban Planning Using Remote Sensing- Industrial Corridors.                                                                                              |                                          | [1Hr]<br>[1Hr]<br>[1Hr]            |
| <b>TOTAL HOURS</b>                                                                                                                                                                                                                                                                                                                          |                                          | <b>45</b>                          |

### Suggested List of Students Activities

- Presentation/Seminars by students on any recent technological developments in Urban Planning and Development
- Periodic class quizzes conducted on a weekly/fortnightly based on the course.
- Presentation/Seminars by students on the Urban Development Missions in India

### Text Books

| S.NO | TITLE                               | AUTHOR                        | PUBLISHERWITHEDITION                                                |
|------|-------------------------------------|-------------------------------|---------------------------------------------------------------------|
| 1.   | Town Planning                       | K.S.Rangwala and P.S.Rangwala | Publishing House,15th Edition,1999.                                 |
| 2.   | Sustainable Transportation Planning | Tumlin Jeffrey                | Tools for Creating Vibrant Healthy and Resilient Communities, 2012. |
| 3.   | National Building                   | John Wiley                    | India- Part-III.(2005).                                             |

**Web-based/Online Resources**

| S.No | Website/Links                                                                                                                                          |
|------|--------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1    | TOWN PLANNING PRINCIPLES: <a href="https://youtu.be/6N-1KWw0-mQ?si=cwka_pup7-BZAYU0">https://youtu.be/6N-1KWw0-mQ?si=cwka_pup7-BZAYU0</a>              |
| 2    | HOUSE AND SLUMS : <a href="https://youtu.be/JRx6RapPJIs?si=OY9ZjXPawm0zDUK7">https://youtu.be/JRx6RapPJIs?si=OY9ZjXPawm0zDUK7</a>                      |
| 3    | MASTER PLAN AND RE-PLANNING:<br><a href="https://youtu.be/KXaWHd34jPY?si=SaXVbl8oPqOR0CSN">https://youtu.be/KXaWHd34jPY?si=SaXVbl8oPqOR0CSN</a>        |
| 4    | URBAN ROADS AND TRAFFIC MANAGEMENT:<br><a href="https://youtu.be/RmtdMBpb6PA?si=0rOXjKhJuQUFYgkg">https://youtu.be/RmtdMBpb6PA?si=0rOXjKhJuQUFYgkg</a> |
| 5    | SUSTAINABLE IN TOWN PLANNING:<br><a href="https://youtu.be/XE_2DBCAOh0?si=qNXnaWtOeJukkeWY">https://youtu.be/XE_2DBCAOh0?si=qNXnaWtOeJukkeWY</a>       |

## MODEL QUESTION PAPER

### CEE5214– URBAN PLANNING AND DEVELOPMENT

**Time :3 Hrs.**

**Max. Mark: 100**

| <b>PART – A</b>                                                                                              |                                                                  |             |                      |           |              |
|--------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------|-------------|----------------------|-----------|--------------|
| <b>(5x2x10=100)</b>                                                                                          |                                                                  |             |                      |           |              |
| <b>Answer Ten questions by selecting two questions from each unit. Each questions carries 10 marks each.</b> |                                                                  |             |                      |           |              |
| <b>S.no</b>                                                                                                  | <b>Questions</b>                                                 | <b>Unit</b> | <b>Bloom's level</b> | <b>Co</b> | <b>Po</b>    |
| I                                                                                                            | 1.Explain the Principles of Town Planning                        | I           | R                    | E5214.1   | PO1,PO2      |
|                                                                                                              | 2. Discuss the growth of towns according to origin and direction | I           | U                    | E5214.1   | PO1,PO2, PO3 |
|                                                                                                              | 3.Explain about Forms of planning                                | I           | R                    | E5214.1   | PO1,PO2      |
|                                                                                                              | 4. State and explain the forms of planning in detail.            | I           | R                    | E5214.1   | PO1,PO2      |
| II                                                                                                           | 5.Briefly Explain the functions of CIDCO                         | II          | U                    | E5214.2   | PO1,PO2, PO3 |
|                                                                                                              | 6. Explain about the classifications of residential buildings    | II          | R                    | E5214.2   | PO1,PO2      |
|                                                                                                              | 7. Discuss the housing problems in India.                        | II          | U                    | E5214.2   | PO1,PO2, PO3 |
|                                                                                                              | 8. What are the various agencies for housing? Explain any one?   | II          | R                    | E5214.2   | PO1,PO2      |
| III                                                                                                          | 9. Describe methods of execution of master plan.                 | III         | U                    | E5214.3   | PO1,PO2, PO3 |
|                                                                                                              | 10. Briefly Explain the functions of CIDCO                       | III         | U                    | E5214.3   | PO1,PO2, PO3 |
|                                                                                                              | 11. State the features of master plan?                           | III         | R                    | E5214.3   | PO1,PO2      |
|                                                                                                              | 12. Write short notes on refuse disposal methods.                | III         | U                    | E5214.3   | PO1,PO2, PO3 |
| IV                                                                                                           | 13. Explain any two Types of street systems.                     | IV          | R                    | E5214.4   | PO1,PO2      |
|                                                                                                              | 14. List out Road traffic problems.                              | IV          | U                    | E5214.4   | PO1,PO2, PO3 |
|                                                                                                              | 15. What are the requirements of good city road?                 | IV          | R                    | E5214.4   | PO1,PO2      |
|                                                                                                              | 16. Explain the objects and various methods of traffic control.  | IV          | R                    | E5214.4   | PO1,PO2      |

|   |                                                                |   |   |         |              |
|---|----------------------------------------------------------------|---|---|---------|--------------|
| V | 17. What is the Function of local authority?                   | V | R | E5214.5 | PO1,PO2      |
|   | 18. Briefly Explain about Urban Development Missions in India. | V | U | E5214.5 | PO1,PO2, PO3 |
|   | 19. Define setbacks and state the necessity of setback.        | V | R | E5214.5 | PO1,PO2      |
|   | 20. Write short notes on urban planning using remote sensing.  | V | R | E5214.5 | PO1,PO2      |

### QUESTION PAPER SETTING

The teaching learning process and assessment are being carried out in accordance with the revised Blooms Taxonomy. The question paper should consist of 90% questions based on Lower Order Thinking (LOTs) and the remaining 10% based on Higher Order Thinking (HOTs) as detailed below.

| Revised Bloom's Taxonomy Level | Lower order thinking skills (LOTs) | Higher Order Thinking Skills (HOTs) |
|--------------------------------|------------------------------------|-------------------------------------|
|                                | R-Remember, U-Understand, AP-Apply | An- Analyse, E-Evaluate, C-Create   |
| % to be included               | 90 %                               | 10 %                                |

**CEE5215 –BUILDING BYE-LAWS AND STATUTORY  
DRAWINGS**

Programme Name : CIVIL ENGINEERING

Course Code : CEE5215

Semester : V SEMESTER

Course Title : BUILDING BYE-LAWS AND STATUTORY DRAWINGS

Course Type : THEORY

| L | T | P | C |
|---|---|---|---|
| 3 | 0 | 0 | 3 |

**TEACHING AND SCHEME OF EXAMINATION**

No. of weeks per semester: 15 weeks

| Course                                   | Instructions |                  | Examination         |                        |       |          |
|------------------------------------------|--------------|------------------|---------------------|------------------------|-------|----------|
|                                          | Hours / Week | Hours / Semester | Marks               |                        |       | Duration |
|                                          |              |                  | Internal Assessment | Autonomous Examination | Total |          |
| Building bye-laws and statutory drawings | 3            | 45               | 40                  | 100*                   | 100   | 3 Hrs    |

\*Examinations will be conducted for 100 marks and will be converted to 60 marks

**TOPICS AND ALLOCATION OF HOURS**

| Unit         | Topics                                  | Time (Hrs) |
|--------------|-----------------------------------------|------------|
| I            | Introduction to Building Bye laws       | 8          |
| II           | Legal Framework and Compliance          | 10         |
| III          | Safety and Structural Regulations       | 8          |
| IV           | Statutory Drawings                      | 10         |
| V            | Building Planning as per Vaastu Science | 9          |
| <b>Total</b> |                                         | <b>45</b>  |

**COURSE DESCRIPTION**

This course provides an in-depth understanding of building bye-laws, regulations, codes, statutory drawings, Vaastu that govern the construction and maintenance of buildings. Students will learn about the legal framework, safety standards, and environmental considerations involved in building design and construction.

## COURSE OBJECTIVE

The objective of this course is to

- Understand the fundamental principles of bye-laws in India.
- Explore the legal framework governing construction practices, including permit procedures and regulatory compliance.
- Gain insight into the role of regulatory bodies and their enforcement mechanisms in ensuring building safety and sustainability.
- Learn to interpret and apply structural design standards, fire safety regulations, and environmental considerations in building projects.
- Develop practical skills for navigating the complexities of building bye-laws through case studies and real-world scenarios.
- Acquire knowledge of ethical and professional responsibilities in upholding building regulations and safety standards.

## COURSE OUTCOMES

| After successful completion of this course, the students should be able to |                                                                                                                                                                                                           |
|----------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>E5215.1</b>                                                             | Understand the fundamental principles of building bye-laws in India.                                                                                                                                      |
| <b>E5215.2</b>                                                             | Interpret and apply relevant building regulations, including permit procedures and compliance standards. Evaluate building plans and designs to ensure compliance with legal and regulatory requirements. |
| <b>E5215.3</b>                                                             | Analyse structural design principles, fire safety regulations, and environmental considerations in building projects.                                                                                     |
| <b>E5215.4</b>                                                             | Demonstrate proficiency in drafting statutory drawings and documentation required for building permits. Contribute positively to the development of safe, sustainable, and compliant built environments.  |
| <b>E5215.5</b>                                                             | Understand the principles of Vaastu science and can apply wherever it is necessary                                                                                                                        |

Pre-requisites: Knowledge of the basic Science, Engineering graphics

### CO-POs & PSOs mapping matrix

| CO                       | PO1       | PO2       | PO3       | PO4       | PO5       | PO6      | PO7       | PSO1     | PSO2      | PSO3      |
|--------------------------|-----------|-----------|-----------|-----------|-----------|----------|-----------|----------|-----------|-----------|
| E5215.1                  | 1         | 1         | 2         | 2         | 2         | 1        | 2         | -        | 3         | 2         |
| E5215.2                  | 2         | 3         | 3         | 3         | 3         | 1        | 2         | -        | 3         | 2         |
| E5215.3                  | 2         | 3         | 3         | 1         | 3         | -        | 3         | -        | 3         | 2         |
| E5215.4                  | 3         | 2         | 2         | 2         | 1         | -        | 2         | -        | 3         | 2         |
| E5215.5                  | 3         | 1         | 1         | 2         | 1         | -        | 1         | -        | 3         | 2         |
| <b>Total</b>             | <b>11</b> | <b>10</b> | <b>10</b> | <b>10</b> | <b>10</b> | <b>2</b> | <b>11</b> | <b>-</b> | <b>15</b> | <b>10</b> |
| <b>Correlation Level</b> | <b>2</b>  | <b>2</b>  | <b>2</b>  | <b>2</b>  | <b>2</b>  | <b>1</b> | <b>2</b>  | <b>-</b> | <b>3</b>  | <b>2</b>  |

Correlation level 1 – Slight (low)

Correlation level 2 – Moderate (Medium)

Correlation level 3 – Substantial (high)

### Instructional Strategy

- To engage the students by explaining basic concepts applied in our daily life and real world applications.
- To make the students understand the views by the use of 3D drawings and realistic approach.
- To explain about the laws and principles through real life situations to the students.

### Assessment Methodology

|                           | Continuous Assessment(40marks) |                           |                                         |                       | End Semester Examination (60 marks) |
|---------------------------|--------------------------------|---------------------------|-----------------------------------------|-----------------------|-------------------------------------|
|                           | CA1                            | CA2                       | CA3                                     | CA4                   |                                     |
| <b>Mode</b>               | Written test (Unit 1 & 2)      | Written test (Unit 3 & 4) | Quiz MCQ (Online/ Offline)              | Model Examination     | Written Examination                 |
| <b>Duration</b>           | 2Periods                       | 2Periods                  | 1Hour                                   | 3Hours                | 3Hours                              |
| <b>Exam Marks</b>         | 50                             | 50                        | 60                                      | 100                   | 100                                 |
| <b>Converted to</b>       | 10                             | 10                        | 10                                      | 10                    | 60                                  |
| <b>Marks</b>              | 40                             |                           |                                         |                       | 60                                  |
| <b>Tentative Schedule</b> | 6 <sup>th</sup> Week           | 12 <sup>th</sup> Week     | 13 <sup>th</sup> -14 <sup>th</sup> Week | 16 <sup>th</sup> Week |                                     |

## CONTINUOUS ASSESSMENT

**CA1and CA2:** Assessment written test should be conducted for 50Marks for two units. The marks scored will be converted to 10 Marks for the internal assessment.

**CA1and CA2, Assessment test should be conducted for two units as below**

- PARTA: (5X 10Marks=50Marks).
- Eight questions will be asked, students should write five questions. Four questions can be asked from each unit.

**CA3:** 60 MCQ can be asked by covering the entire portion. It may be conducted by Online / Offline. The marks scored should be converted to 10 marks for the internal assessment.

**CA4:** Model examination should be conducted as per the end semester question pattern. The marks should be converted to 10marks for the internal assessment.

### Question Pattern

- Answer Ten questions by selecting two questions from each unit. Each question carries 10 marks.
- Four questions will be asked from every unit. Students should write any two questions.

### Question Pattern –Model Examination and End Semester Examination Theory Exam

#### PART-A

(5x2x10=100)

Note: Answer Ten questions by selecting two questions from each unit. Each question carries 10 marks.

#### Sample:

- |      |    |
|------|----|
| I.   | 1  |
|      | 2  |
|      | 3  |
|      | 4  |
| II.  | 5  |
|      | 6  |
|      | 7  |
|      | 8  |
| III. | 9  |
|      | 10 |
|      | 11 |
|      | 12 |
| IV.  | 13 |
|      | 14 |
|      | 15 |
|      | 16 |
| V.   | 17 |
|      | 18 |
|      | 19 |
|      | 20 |

## QUESTION PAPER SETTING

The teaching learning process and assessment are being carried out in accordance with the revised Blooms Taxonomy. The question paper should consist of 90% questions based on Lower Order Thinking (LOTs) and the remaining 10% based on Higher Order Thinking (HOTs) as detailed below.

| <b>Revised Bloom's<br/>Taxonomy<br/>Level</b> | <b>Lower order thinking skills<br/>(LOTs)</b> | <b>Higher Order Thinking<br/>Skills (HOTs)</b> |
|-----------------------------------------------|-----------------------------------------------|------------------------------------------------|
|                                               | <b>R-Remember, U-Understand,<br/>AP-Apply</b> | <b>An- Analyse, E-Evaluate,<br/>C-Create</b>   |
| % to be included                              | 90 %                                          | 10 %                                           |

**CEE5215 – BUILDING BYE-LAWS AND  
STATUTORY DRAWINGS**

| CEE5215                                                                                                                                                    |                                   | BUILDING BYE-LAWS AND STATUTORY<br>DRAWINGS | L | T | P | C      |
|------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------|---------------------------------------------|---|---|---|--------|
| THEORY                                                                                                                                                     |                                   |                                             | 3 | 0 | 0 | 3      |
| Unit -I                                                                                                                                                    | INTRODUCTION TO BUILDING BYE LAWS |                                             |   |   |   | 8Hrs   |
| Introduction – Scope and Applicability of bye-laws –Definition of terms                                                                                    |                                   |                                             |   |   |   | [2Hrs] |
| Role of regulatory bodies (BIS) and local authorities                                                                                                      |                                   |                                             |   |   |   | [2Hrs] |
| Classification of buildings - Residential, commercial, industrial, and institutional buildings.                                                            |                                   |                                             |   |   |   | [1Hr]  |
| Special regulations for heritage structures and earthquake-prone areas                                                                                     |                                   |                                             |   |   |   | [1Hr]  |
| Written permission for development of land (layout)                                                                                                        |                                   |                                             |   |   |   | [1Hr]  |
| Competent authority for approval.                                                                                                                          |                                   |                                             |   |   |   | [1Hr]  |
| Unit- II                                                                                                                                                   | LEGAL FRAME WORK AND COMPLIANCE   |                                             |   |   |   | 10Hrs  |
| 2.1 Legal Framework Overview - Regulatory Bodies Role - Building Classification Systems                                                                    |                                   |                                             |   |   |   | [2Hrs] |
| Types of Occupancies - Understanding Zoning Laws                                                                                                           |                                   |                                             |   |   |   | [2Hrs] |
| Urban Planning Fundamentals – Development Authorities Functions - Compliance Importance                                                                    |                                   |                                             |   |   |   | [1Hr]  |
| 2.2 Rules for obtaining building permission as per National Building Code                                                                                  |                                   |                                             |   |   |   | [1Hr]  |
| Submission of Building Plans -Application Process - Plan Scrutiny - Compliance Check                                                                       |                                   |                                             |   |   |   | [1Hr]  |
| Approval Process - Issuance of Building Permission - Inspections and Monitoring                                                                            |                                   |                                             |   |   |   | [1Hr]  |
| Completion Certificate - Occupancy Certificate                                                                                                             |                                   |                                             |   |   |   | [1Hr]  |
| Stability certificate for commercial and institutional buildings -Renewal and Amendments.                                                                  |                                   |                                             |   |   |   | [1Hr]  |
| Unit-III                                                                                                                                                   | SAFETY AND STRUCTURAL REGULATIONS |                                             |   |   |   | 8Hrs   |
| 3.1 Structural design principles and standards - Compliance requirements for earthquake, resistant buildings                                               |                                   |                                             |   |   |   | [2Hrs] |
| Standards for parts of building such as basement, wall, floor, roof, parapet, chimney - Exit requirements                                                  |                                   |                                             |   |   |   | [2Hrs] |
| Types of exits - Number and size of exits                                                                                                                  |                                   |                                             |   |   |   | [2Hrs] |
| Arrangements of exits - Passenger elevators or lifts.                                                                                                      |                                   |                                             |   |   |   | [1Hr]  |
| 3.2 Fire safety regulations and prevention measures Fire resistance ratings for building materials                                                         |                                   |                                             |   |   |   | [1Hr]  |
| Fire resistance of a building or its structural and non-structural elements                                                                                |                                   |                                             |   |   |   | [1Hr]  |
| Emergency evacuation procedures - fire safety equipment.                                                                                                   |                                   |                                             |   |   |   | [1Hr]  |
| Unit-IV                                                                                                                                                    | STATUTORY DRAWINGS                |                                             |   |   |   | 10Hrs  |
| 4.1 Importance and purpose of statutory drawings                                                                                                           |                                   |                                             |   |   |   | [1Hr]  |
| Overview of regulatory approval process                                                                                                                    |                                   |                                             |   |   |   | [1Hr]  |
| Types of statutory drawings - Site Plans - layout, dimensions, setbacks and site features - Floor Plans- layout of interior spaces, dimensions, room names |                                   |                                             |   |   |   | [1Hr]  |
| Elevations - exterior views of the building, material specifications -Sections - vertical views showing building components and heights.                   |                                   |                                             |   |   |   | [1Hr]  |
| 4.2 Development of Site plan - Site survey and data collection                                                                                             |                                   |                                             |   |   |   | [1Hr]  |

|                |                                                                                                                             |             |
|----------------|-----------------------------------------------------------------------------------------------------------------------------|-------------|
|                | Plotting site boundaries, contours, and utilities                                                                           | [1Hr]       |
|                | Creating a comprehensive site plan with all necessary details - List of forms required for Approval as per NBC (Names only) | [1Hr]       |
|                |                                                                                                                             | [1Hr]       |
| <b>Unit -V</b> | <b>BUILDING PLANNING AS PER VAASTU SCIENCE</b>                                                                              | <b>9Hrs</b> |
|                | 5.1 Definition - Importance of Vaastu - Five Elements and Directions                                                        | [1Hr]       |
|                | Concept of Pancha Bhutas (Five Elements)                                                                                    | [1Hr]       |
|                | Influence of directional energies                                                                                           | [1Hr]       |
|                | Significance of cardinal directions (North, South, East, West)                                                              | [1Hr]       |
|                | Site Selection and Evaluation - Criteria for selecting a suitable site.                                                     | [1Hr]       |
|                | 5.2 Remedies for site defects and imbalances                                                                                | [1Hr]       |
|                | Building Layout and Orientation - Principles of building orientation                                                        | [1Hr]       |
|                | Ideal placement of rooms, entrances, and utilities - Designing according to Vaastu                                          | [1Hr]       |
|                | Vaastu Remedies and Corrections Implementation of Vaastu in existing buildings.                                             | [1Hr]       |
|                | <b>TOTAL</b>                                                                                                                | <b>45</b>   |

#### Suggested List of Students Activity

- Students have to submit a report after visiting a local building approval authority such as Town and Country Planning office.
- Students have to visit an Architect office and prepare a report on the learning.
- Students have to develop a comprehensive checklist of building bylaws at national, state, and local levels.
- Students have to identify and map zoning regulations and land use classifications in urban areas.
- Students have to analyse the layout, orientation and design elements of building related to Vaastu principles and discuss the effectiveness of Vaastu based design.
- Students have to prepare a building plan for a congested area in their locality by applying bye-laws and Vaastu sciences after doing site survey.

#### Text Books

| S.NO | TITLE                                              | AUTHOR | PUBLISHER WITH EDITION                           |
|------|----------------------------------------------------|--------|--------------------------------------------------|
| 1.   | National Building code Volume 1                    | -      | Third Revision, Bureau of Indian Standards, 2016 |
| 2.   | National Building code Volume 2                    | -      | Third Revision, Bureau of Indian Standards, 2016 |
| 3.   | Tamil Nadu Combined Development and Building Rules | -      | Government of Tamil Nadu, 2019                   |

### Web-based/Online Resources

| S.No | Website/Links                                                                                                                                                                                                           |
|------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1    | <a href="https://www.youtube.com/watch?v=Dpy40oDxtfw&amp;list=PLjAhkhzIQqze_YT8wtZJXVE8DlXFdlo-W&amp;index=17">https://www.youtube.com/watch?v=Dpy40oDxtfw&amp;list=PLjAhkhzIQqze_YT8wtZJXVE8DlXFdlo-W&amp;index=17</a> |
| 2    | <a href="https://www.youtube.com/watch?v=XQHBLcnS-r0&amp;list=PLjAhkhzIQqze_YT8wtZJXVE8DlXFdlo-W&amp;index=5">https://www.youtube.com/watch?v=XQHBLcnS-r0&amp;list=PLjAhkhzIQqze_YT8wtZJXVE8DlXFdlo-W&amp;index=5</a>   |
| 3    | <a href="https://www.youtube.com/watch?v=ufg47bzzobI&amp;t=54s">https://www.youtube.com/watch?v=ufg47bzzobI&amp;t=54s</a>                                                                                               |
| 4    | <a href="https://www.youtube.com/watch?v=9_UIJOkwFog">https://www.youtube.com/watch?v=9_UIJOkwFog</a>                                                                                                                   |

## MODEL QUESTION PAPER

### CEE5215– BUILDING BYE-LAWS AND STATUTORY DRAWINGS

**Time : 3 Hrs.**

**Max.Mark: 100**

| <b>PART – A (5x2x10=100)</b>                                                                                 |                                                                                                                                                            |             |                      |           |                      |
|--------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|----------------------|-----------|----------------------|
| <b>Answer Ten questions by selecting two questions from each unit. Each questions carries 10 marks each.</b> |                                                                                                                                                            |             |                      |           |                      |
| <b>S.no</b>                                                                                                  | <b>Questions</b>                                                                                                                                           | <b>Unit</b> | <b>Bloom's level</b> | <b>Co</b> | <b>Po</b>            |
| <b>I</b>                                                                                                     | 1. Define building byelaws and their significance in construction projects. Discuss the scope and applicability of building byelaws.                       | I           | U                    | E5215.1   | PO1,PO2,PO3 ,PO5,PO7 |
|                                                                                                              | 2. Who is the competent authority for approving land development layouts? Discuss the compliance requirements for heritage structures.                     | I           | R                    | E5215.1   | PO1,PO2,PO3 ,PO5,PO7 |
|                                                                                                              | 3. Explain the role of regulatory bodies such as BIS and local authorities. What are the classifications of buildings according to byelaws?                | I           | U                    | E5215.1   | PO1,PO2,PO3 ,PO5,PO7 |
|                                                                                                              | 4. Discuss the classification of buildings into residential, commercial, industrial, and institutional Categories. What are their regulatory implications? | I           | U                    | E5215.1   | PO1,PO2,PO3 ,PO5,PO7 |
| <b>II</b>                                                                                                    | 5. Outline the legal framework overview and the roles of regulatory bodies. How are building classification systems determined?                            | II          | R                    | E5215.2   | PO1,PO2,PO3 ,PO5,PO7 |
|                                                                                                              | 6. Explain the rules for obtaining building permission as per the National Building Code. What is involved in the submission of building plans?            | II          | U                    | E5215.2   | PO1,PO2,PO3 ,PO5,PO7 |
|                                                                                                              | 7. Discuss the urban planning fundamentals and functions of development authorities. Why is compliance with building regulations important?                | II          | U                    | E5215.2   | PO1,PO2,PO3 ,PO5,PO7 |
|                                                                                                              | 8. Outline the application process for building permission and the scrutiny of plans. How is compliance checks conducted?                                  | II          | R                    | E5215.2   | PO1,PO2,PO3 ,PO5,PO7 |

|     |                                                                                                                                                       |     |   |         |                     |
|-----|-------------------------------------------------------------------------------------------------------------------------------------------------------|-----|---|---------|---------------------|
| III | 9. Explain the structural design principles and compliance requirements for earthquake-resistant buildings. What standards apply to building parts?   | III | U | E5215.3 | PO1,PO2,PO3,PO5,PO7 |
|     | 10. Explain the fire resistance of buildings and their structural elements. How are emergency evacuation procedures implemented?                      | III | U | E5215.3 | PO1,PO2,PO3,PO5,PO7 |
|     | 11. Discuss the exit requirements in buildings and the types of exits. How are the number and size of exits regulated?                                | III | U | E5215.3 | PO1,PO2,PO3,PO5,PO7 |
|     | 12. Describe the compliance requirements for passenger elevators or lifts in buildings. How are safety standards ensured?                             | III | U | E5215.3 | PO1,PO2,PO3,PO5,PO7 |
| IV  | 13. Discuss the importance and purpose of statutory drawings in construction projects. What are the types of statutory drawings?                      | IV  | U | E5215.4 | PO1,PO2,PO3,PO5,PO7 |
|     | 14. Outline the layout of interior spaces and room names in floor plans. What information is included in elevations?                                  | IV  | R | E5215.4 | PO1,PO2,PO3,PO5,PO7 |
|     | 15. Explain the overview of the regulatory approval process for statutory drawings. How are site plans created?                                       | IV  | U | E5215.4 | PO1,PO2,PO3,PO5,PO7 |
|     | 16. Discuss the significance of material specifications in elevations. What do sections in statutory drawings show?                                   | IV  | U | E5215.4 | PO1,PO2,PO3,PO5,PO7 |
| V   | 17. Define Vaastu and its importance in building planning. What are the five elements and directions in Vaastu?                                       | V   | U | E5215.5 | PO1,PO2,PO3,PO5,PO7 |
|     | 18. Describe the principles of building orientation and layout according to Vaastu. How are rooms, entrances and utilities ideally placed?            | V   | U | E5215.5 | PO1,PO2,PO3,PO5,PO7 |
|     | 19. Discuss the significance of cardinal directions (North, South, East, West) in Vaastu. What criteria are considered for selecting a suitable site? | V   | U | E5215.5 | PO1,PO2,PO3,PO5,PO7 |
|     | 20. Explain the process of designing according to Vaastu principles. How are site defects and imbalances remedied?                                    | V   | U | E5215.5 | PO1,PO2,PO3,PO5,PO7 |

### QUESTION PAPER SETTING

The teaching learning process and assessment are being carried out in accordance with the revised Blooms Taxonomy. The question paper should consist of 90% questions based on Lower Order Thinking (LOTs) and the remaining 10% based on Higher Order Thinking(HOTs) as detailed below.

| <b>Revised Bloom's<br/>Taxonomy<br/>Level</b> | <b>Lower order thinking skills<br/>(LOTs)</b> | <b>Higher Order Thinking<br/>Skills (HOTs)</b> |
|-----------------------------------------------|-----------------------------------------------|------------------------------------------------|
|                                               | <b>R-Remember, U-Understand,<br/>AP-Apply</b> | <b>An- Analyse, E-Evaluate,<br/>C-Create</b>   |
| % to be included                              | 90 %                                          | 10 %                                           |

## CEE5320-COMPUTER APPLICATIONS IN CIVIL ENGINEERING

Programme Name : CIVIL ENGINEERING

Course Code : CEE5320

Semester : V SEMESTER

Course Title : COMPUTER APPLICATION IN CIVIL ENGINEERING

Course Type : PRACTICAL

| L | T | P | C |
|---|---|---|---|
| 0 | 0 | 4 | 2 |

### TEACHING AND SCHEME OF EXAMINATION

No. of weeks per semester: 15 weeks

| Course                                    | Instructions |                  | Examination         |                        |       |          |
|-------------------------------------------|--------------|------------------|---------------------|------------------------|-------|----------|
|                                           | Hours / Week | Hours / Semester | Marks               |                        |       | Duration |
|                                           |              |                  | Internal Assessment | Autonomous Examination | Total |          |
| Computer application in civil engineering | 4            | 60               | 40                  | 100*                   | 100   | 3Hrs     |

\*Examinations will be conducted for 100 marks and will be converted to 60 marks

### TOPICS AND ALLOCATION OF HOURS

| PART         | Topics                                 | Time (Hrs) |
|--------------|----------------------------------------|------------|
| A            | Electronic spread sheet using software | 16         |
| B            | Analysis of RCC structures             | 28         |
| C            | Drafting of RCC structures             | 16         |
| <b>Total</b> |                                        | <b>60</b>  |

### COURSE DESCRIPTION

Computers play a very vital role in present day life, more so, in all the professional life of engineering. In order to enable the students, use the computers effectively in problem solving, this course offers various engineering applications of computers in civil engineering

### COURSE OBJECTIVES

- To provide hands-on experience for the students with software's in structural analysis, design and estimating.
- To enable the students to do the practical problems by using the available application software packages.
- To impart the knowledge of 3D building modelling

### COURSE OUTCOMES

| After successful completion of this course, the students should be able to |                                                                              |
|----------------------------------------------------------------------------|------------------------------------------------------------------------------|
| <b>E5215.1</b>                                                             | Prepare the estimation sheet and design data using Electronics Spread sheet. |
| <b>E5215.2</b>                                                             | Carry out the analysis and design of structures using a available software   |
| <b>E5215.3</b>                                                             | Develop detailed 3D drawing of building                                      |

**Pre-requisites**

Students should have enough knowledge in Mechanics of Structures, Estimation and Costing, Design of RCC Structures subjects.

**CO-POs & PSOs mapping matrix**

| CO/PO                    | PO1      | PO2      | PO3      | PO4      | PO5      | PO6      | PO7      | PSO1     | PSO2     | PSO3     |
|--------------------------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|
| E5215.1                  | 1        | -        | -        | 3        | -        | -        | 1        | -        | 3        | 2        |
| E5215.2                  | -        | -        | 2        | 3        | -        | -        | 1        | -        | 3        | 2        |
| E5215.3                  | -        | -        | -        | 3        | -        | -        | 1        | -        | 3        | 2        |
| <b>Total</b>             | <b>1</b> | <b>-</b> | <b>2</b> | <b>9</b> | <b>-</b> | <b>-</b> | <b>3</b> | <b>-</b> | <b>9</b> | <b>6</b> |
| <b>Correlation Level</b> | <b>1</b> | <b>-</b> | <b>1</b> | <b>3</b> | <b>-</b> | <b>-</b> | <b>1</b> | <b>-</b> | <b>3</b> | <b>2</b> |

Correlation level 1 – Slight (low)

Correlation level 2 – Moderate (Medium)

Correlation level 3 – Substantial (high)

**Instructional Strategy**

- Align the lab activities with the overall course curriculum, ensuring that each lab session complements the theoretical concepts taught in lectures.
- Define clear objectives for each lab session.
- Provide step-by-step tutorials and hands-on practice sessions to familiarize students with available software's.
- Regularly update lab materials, incorporate new technologies and software tools, and adapt teaching strategies based on student needs and industry trends.

**Assessment Methodology**

|                           | Continuous Assessment (40 marks)   |                                             |                       |                       | End Semester Examination (60 marks) |
|---------------------------|------------------------------------|---------------------------------------------|-----------------------|-----------------------|-------------------------------------|
|                           | CA1                                | CA2                                         | CA3                   | CA4                   |                                     |
| <b>Mode</b>               | Practical Test                     | Practical Test                              | Practical Document    | Practical Test        | Practical Examination               |
| <b>Portion</b>            | Cycle I Exercises<br>50% Exercises | Cycle II Exercises<br>Another 50% Exercises | All Exercises         | All Exercises         | All Exercises                       |
| <b>Duration</b>           | 2 Periods                          | 2 Periods                                   | Regularly             | 3 hours               | 3 hours                             |
| <b>Exam Marks</b>         | 50                                 | 50                                          | 100                   | 100                   | 100                                 |
| <b>Converted to</b>       | 10                                 | 10                                          | 10                    | 10                    | 60                                  |
| <b>Marks</b>              | 40                                 |                                             |                       |                       | 60                                  |
| <b>Tentative Schedule</b> | 7 <sup>th</sup> Week               | 14 <sup>th</sup> Week                       | 15 <sup>th</sup> Week | 16 <sup>th</sup> Week |                                     |

**Note**

**CA1 and CA2:** All the exercises/experiments as per the portions mentioned above should be completed and kept for the practical test. The students shall be permitted to select any one by lot for the test. The practical test should be conducted as per the scheme of evaluation as below. The marks awarded will be converted to 10 Marks for each assessment test.

**SCHEME OF EVALUATION**

| PART  | DESCRIPTION                   | MARKS |
|-------|-------------------------------|-------|
| A     | Aim and Apparatus Required    | 5     |
| B     | Free Hand Sketch              | 20    |
| C     | Execution/Printout and Result | 25    |
| TOTAL |                               | 50    |

- **CA 3:** Practical document should be maintained for every exercise immediately after completion of the practice. The same should be evaluated for 10 Marks. The total marks awarded should be converted to 10 Marks for the internal assessment. The practical document should be submitted for the Practical Test and End Semester Examination with a Bonafide certificate.

**The details of the documents to be prepared as per the instruction below.**

The exercise should be completed on the day of practice. The same shall be evaluated for 10 marks on the day or next day of practice before commencement of the next exercise.

This documentation can be carried out in a separate notebook / file. The procedure and sketch should be written by the student manually. The detailed date of the practices and its evaluations should be maintained in the course logbook. The log book and the practical documents should be submitted for the verification by the Flying Squad.

**CA 4:** All the exercises should be completed and kept for the practical test. The practical test should be conducted as per the scheme of evaluation as below. The marks awarded should be converted to 10 Marks for the internal assessment.

**SCHEME OF EVALUATION**

| PART  | DESCRIPTION                | MARKS |
|-------|----------------------------|-------|
| A     | Aim and Apparatus Required | 10    |
| B     | Free Hand Sketch           | 20    |
| C     | Execution/Printout         | 20    |
| D     | Result                     | 10    |
| E     | Written Test               | 30    |
| F     | Viva Voce                  | 10    |
| TOTAL |                            | 100   |

**CEE5320– COMPUTER APPLICATIONS IN CIVIL  
ENGINEERING**

| CEE5320       | COMPUTER APPLICATIONS IN CIVIL                                                                                                                               | L            | T | P | C         |
|---------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------|---|---|-----------|
| PRACTICAL     | ENGINEERING                                                                                                                                                  | 0            | 0 | 4 | 2         |
| <b>PART A</b> | <b>ELECTRONIC SPREAD SHEET USING SOFTWARE</b>                                                                                                                | <b>16Hrs</b> |   |   |           |
| 1.            | Prepare the Estimate and Abstract sheet with given data (provide all the measurement details) and calculate the quantity and Total Amount using formula bar. | [4Hrs]       |   |   |           |
| 2.            | Calculate Effective depth “d” and Area of Steel “Ast” using Formula Bar for given singly reinforced section.                                                 | [4Hrs]       |   |   |           |
| 3.            | Finding centre of gravity; $I_{xx}$ and $I_{yy}$ of I, L, T and channel sections.                                                                            | [4Hrs]       |   |   |           |
| 4.            | Calculate Area and Elongation using formula bar                                                                                                              | [4Hrs]       |   |   |           |
| <b>PART B</b> | <b>ANALYSIS OF RCC STRUCTURES</b>                                                                                                                            | <b>28Hrs</b> |   |   |           |
| Note:         | Analyse the Structure using any one of the available Software Packages- Staad pro, SAP, etabs, Tekla, Cads3d etc.)                                           |              |   |   |           |
| 5.            | Carryout the analysis of Continuous Beam with given size                                                                                                     | [6Hrs]       |   |   |           |
| 6.            | Carryout the analysis of Portal Frame structure with given size                                                                                              | [6Hrs]       |   |   |           |
| 7.            | Carryout the analysis of king post roof truss                                                                                                                | [8Hrs]       |   |   |           |
| 8.            | Carry out the analysis and design of 1 BHK residential house with given structure                                                                            | [8Hrs]       |   |   |           |
| <b>PART C</b> | <b>DRAFTING OF RCC STRUCTURES</b>                                                                                                                            | <b>16Hrs</b> |   |   |           |
| Note:         | Draw the Structure using any one of the available 3D drafting Software Packages – Autodesk Revit Architecture, Archie CAD, Autodesk Civil3D, Sketch up etc.. |              |   |   |           |
| 9.            | Preparation of plan, section and elevation of a House with single bed room and attached bathroom with R.C.C. flat roof(Framed structure)                     | [6Hrs]       |   |   |           |
| 10.           | Preparation of plan, section and elevation of a Single storied School building with R.C.C flat roof (Framed structure)                                       | [6Hrs]       |   |   |           |
| 11.           | Carryout the analysis of king post roof truss                                                                                                                | [4Hrs]       |   |   |           |
| <b>TOTAL</b>  |                                                                                                                                                              |              |   |   | <b>60</b> |

**Suggested List of Students Activity**

- Task students with creating complex 3D models of civil engineering structures using advanced features in software
- Assign exercises where students model and analyze complex structures, considering material properties, boundary conditions, and loading scenarios.
- Explore advanced BIM concepts using software

**EQUIPMENTS REQUIRED: (Batch strength: 30 students)**

| S.No | LIST OF EQUIPMENTS                            | QUANTITY REQUIRED |
|------|-----------------------------------------------|-------------------|
| 1    | Computers                                     | 30 Nos.           |
| 2    | Suitable Software for Electronic Spread Sheet | 30 Users          |
| 3    | Suitable Structural Analysis Software         | 30 Users          |
| 4    | Suitable 3D drafting Software                 | 30 Users          |

**Text Books**

| S.NO | TITLE                                            | AUTHOR       | PUBLISHER WITH EDITION                                  |
|------|--------------------------------------------------|--------------|---------------------------------------------------------|
| 1.   | Staad Pro V8i for Beginners With Indian Examples | T.S.Sharma   | 1st edition, Notion Press, 2014                         |
| 2.   | Revit 2019 Architecture Training Guide           | Linkan Sagar | 1st Edition, BPB PUBLICATIONS, 2018                     |
| 3.   | Computer Application in Civil Engineering        | R.K.Anand    | 1 <sup>st</sup> Edition, Vayu Education of India, 2013. |

**Web-based/Online Resources**

| S.No | Website/Links                                                                                                   |
|------|-----------------------------------------------------------------------------------------------------------------|
| 1    | <a href="https://youtu.be/zR4fndvVEFU?si=bv7LZ1VW-NWH3hbW">https://youtu.be/zR4fndvVEFU?si=bv7LZ1VW-NWH3hbW</a> |
| 2    | <a href="https://youtu.be/w5-Qx61s-eA?si=0cMNNyD9Cqrxshep">https://youtu.be/w5-Qx61s-eA?si=0cMNNyD9Cqrxshep</a> |
| 3    | <a href="https://youtu.be/qNm_6inyqQc?si=nm74Dg5Z5niJHz-J">https://youtu.be/qNm_6inyqQc?si=nm74Dg5Z5niJHz-J</a> |
| 4    | <a href="https://youtu.be/aa4tqsCbtjU?si=-dDFWP1FIBsSxC5K">https://youtu.be/aa4tqsCbtjU?si=-dDFWP1FIBsSxC5K</a> |

### MODEL QUESTION PAPER

#### CEE5320– COMPUTER APPLICATIONS IN CIVIL ENGINEERING

**Duration : 3Hrs**

**Max. Marks: 100**

**NB: 1. Answer all the questions from part A; which Carry 90 marks.**

| S. No                       | Name of the Experiments                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | CO      | PO              |
|-----------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|-----------------|
| <b>PART- A(90 Marks)</b>    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |         |                 |
| 1                           | Using spreadsheet calculations find centre of gravity and moment of inertia about major axis ( $I_{xx}$ ) of a channel section of following dimensions:<br>width of top flange = 200 mm<br>width of bottom flange = 200 mm<br>overall depth of section = 300 mm<br>thickness of the section (flange and web) = 20 mm<br>Present the results on a spreadsheet and generate a pdf.<br>Aim and Apparatus Required 5<br>Procedure 10<br>Tabulation/Observation Free Hand 20<br>Sketch<br>Execution 40<br>Printout 10<br>Result 5 | E5320-4 | PO1,PO3,PO4,PO7 |
| <b>Viva–voce – 10 marks</b> |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |         |                 |

|                                                            |
|------------------------------------------------------------|
| <b>CEE5440-CONSTRUCTION MANAGEMENT AND SAFETY PRACTICE</b> |
|------------------------------------------------------------|

Programme Name : CIVIL ENGINEERING

Course Code : CEE5440

Semester : V SEMESTER

Course Title : CONSTRUCTION MANAGEMENT AND SAFETY PRACTICE

Course Type : PRACTICUM

| L | T | P | C |
|---|---|---|---|
| 1 | 0 | 4 | 3 |

### TEACHING AND SCHEME OF EXAMINATION

No. of weeks per semester: 15 weeks

| Course                                      | Instructions |                  | Examination         |                        |       |          |
|---------------------------------------------|--------------|------------------|---------------------|------------------------|-------|----------|
|                                             | Hours / Week | Hours / Semester | Marks               |                        |       | Duration |
|                                             |              |                  | Internal Assessment | Autonomous Examination | Total |          |
| Construction Management and Safety Practice | 5            | 75               | 40                  | 100*                   | 100   | 3Hrs.    |

\*Examinations will be conducted for 100 marks and will be converted to 60 marks

### TOPICS AND ALLOCATION OF HOURS

| Unit         | Topics                                       | Time (Hrs) |
|--------------|----------------------------------------------|------------|
| I            | Construction sector in India                 | 3          |
| II           | Contract Management                          | 3          |
| III          | Scheduling and time Management               | 3          |
| IV           | Quality Management and Construction disputes | 3          |
| V            | Safety in Construction                       | 3          |
| <b>Total</b> |                                              | <b>15</b>  |

### COURSE DESCRIPTION

This course combines essential aspects of construction management and safety practices to equip students with the skills needed for successful careers in the construction industry. Students learn project management fundamentals such as planning, scheduling, resource management, and budgeting, alongside estimation and costing techniques crucial for overseeing development projects. Microsoft Project is a powerful project management software that will be introduced to students as a tool for planning, scheduling, and managing construction projects effectively. In parallel, emphasis is placed on safety practices, covering occupational health and safety regulations, hazard identification, risk assessment, and emergency response protocols.

## COURSE OBJECTIVES

The objective of this course is to enable the student:

- Describe the importance of construction Management
- Carryout the Feasibility study of a project
- Understand contract documents and different types of contracts.
- Prepare construction scheduling and resource management.
- Describe the aspects of inspection and quality control methods
- Describe the labour laws and legislation.
- Know about the safety practices followed in construction project

## COURSE OUTCOMES

| After successful completion of this course, the students should be able to |                                                                                                                                                           |
|----------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>E5440.1</b>                                                             | Understand how construction projects are managed, assess their feasibility, and plan resources effectively for civil engineering projects.                |
| <b>E5440.2</b>                                                             | Understand contracts and tenders, as well as how construction companies manage money and paperwork, including the importance of keeping good records.     |
| <b>E5440.3</b>                                                             | Understand how to plan construction projects, schedule activities, and manage resources to meet project goals within budget and time constraints.         |
| <b>E5440.4</b>                                                             | Understand the importance of quality in construction, learn methods to maintain it, and gain knowledge about resolving disputes in construction projects. |
| <b>E5440.5</b>                                                             | Understand the importance of safety in construction and the roles of different parties involved in safety management                                      |

### Pre-requisites

Nil

### CO-POs & PSOs mapping matrix

| CO/PO                    | PO1       | PO2      | PO3      | PO4      | PO5      | PO6       | PO7       | PSO1     | PSO2      | PSO3      |
|--------------------------|-----------|----------|----------|----------|----------|-----------|-----------|----------|-----------|-----------|
| <b>E5440.1</b>           | 3         | -        | -        | -        | 1        | 2         | 3         | -        | 3         | 2         |
| <b>E5440.2</b>           | 3         | -        | -        | -        | 1        | 2         | 3         | -        | 3         | 2         |
| <b>E5440.3</b>           | 3         | 1        | 1        | 2        | 1        | 2         | 3         | -        | 3         | 2         |
| <b>E5440.4</b>           | 3         | -        | -        | 2        | 1        | 2         | 3         | -        | 3         | 2         |
| <b>E5440.5</b>           | 3         | 1        | 1        | 2        | 1        | 2         | 3         | -        | 3         | 2         |
| <b>Total</b>             | <b>15</b> | <b>2</b> | <b>2</b> | <b>6</b> | <b>5</b> | <b>10</b> | <b>15</b> | <b>-</b> | <b>15</b> | <b>10</b> |
| <b>Correlation Level</b> | <b>3</b>  | <b>1</b> | <b>1</b> | <b>1</b> | <b>1</b> | <b>2</b>  | <b>3</b>  | <b>-</b> | <b>3</b>  | <b>2</b>  |

Correlation level 1 – Slight (low)

Correlation level 2 – Moderate (Medium)

Correlation level 3 – Substantial (high)

### Instructional Strategy

- Employ strategies to capture students' interest and enhance their confidence in learning.
- Use real-life examples, case studies, and practical scenarios to illustrate concepts and principles, fostering relevance and applicability.
- Use real-life examples, case studies, and practical scenarios to illustrate concepts and principles, fostering relevance and applicability.
- Emphasize learning outcomes and employability skills throughout the course, ensuring that students acquire the knowledge and competencies essential for success in the construction industry.
- Create a supportive environment where students are encouraged to question, explore, and critically evaluate their findings, fostering a scientific mindset and problem-solving skills.
- Promote an environment where students feel comfortable exploring outcomes that may differ from their expectations

### Assessment Methodology

|                           | Continuous Assessment (40 marks)   |                                             |                       |                       | End Semester Examination (60 marks) |
|---------------------------|------------------------------------|---------------------------------------------|-----------------------|-----------------------|-------------------------------------|
|                           | CA1                                | CA2                                         | CA3                   | CA4                   |                                     |
| <b>Mode</b>               | Practical Test                     | Practical Test                              | Written Test Theory   | Practical Test        | Practical Examination               |
| <b>Portion</b>            | Cycle I Exercises<br>50% Exercises | Cycle II Exercises<br>Another 50% Exercises | All Units             | All Exercises         | All Exercises                       |
| <b>Duration</b>           | 2 Periods                          | 2 Periods                                   | 3 hours               | 3 hours               | 3 hours                             |
| <b>Exam Marks</b>         | 60                                 | 60                                          | 100                   | 100                   | 100                                 |
| <b>Converted to</b>       | 10                                 | 10                                          | 10                    | 10                    | 60                                  |
| <b>Marks</b>              | 40                                 |                                             |                       |                       | 60                                  |
| <b>Tentative Schedule</b> | 7 <sup>th</sup> Week               | 14 <sup>th</sup> Week                       | 15 <sup>th</sup> Week | 16 <sup>th</sup> Week |                                     |

### Note

**CA1 and CA2:** All the exercises/experiments should be completed as per the portions above and kept for the practical test. The students shall be permitted to select any one by lot for the test. The practical test should be conducted as per the scheme of evaluation as below. The marks awarded shall be converted to 10 Marks for each assessment test. Practical documents should be maintained for every exercise / experiment immediately after completion of the practice. The practical document should be submitted for the practical test. The same should be evaluated for

10 Marks for each exercise/experiment. The total marks awarded should be converted to 10 Marks for the practical test as per the scheme of evaluation as below.

**The details of the documents to be prepared as per the instruction below.**

Each exercise should be completed on the day of practice. The same shall be evaluated for 10 marks on the day or next day of practice before commencement of the next exercise. This documentation can be carried out in a separate notebook or printed manual or a file with documents. Students should write the procedure and draw the sketch manually. The detailed date of the practices and its evaluations should be maintained in the course logbook. The log book and the practical documents should be submitted for the verification by the Flying Squad.

**The details of the documents to be prepared as per the instruction below.**

#### SCHEME OF EVALUATION

| PART  | DESCRIPTION                               | MARKS |
|-------|-------------------------------------------|-------|
| A     | Aim and Apparatus Required                | 5     |
| B     | Tabulation/Observation                    | 20    |
| C     | Graph/Sketch/Calculation                  | 20    |
| D     | Result                                    | 5     |
| TOTAL |                                           | 50    |
| E     | Practical Documents (As per the portions) | 10    |
| TOTAL |                                           | 60    |

- **CA 3:** Written Test for complete theory portions should be conducted for 100 Marks as per the question pattern below. The marks scored will be converted to 10 Marks for internal assessment.

#### Question pattern – Written Test Theory

| Description |                                                 | Marks     |           |
|-------------|-------------------------------------------------|-----------|-----------|
| Part – A    | 30 MCQ from the complete theory portions.       | 30X1Mark  | 30Marks   |
| Part – B    | 7 Questions to be answered out of 10 Questions. | 7X10Marks | 70Marks   |
| TOTAL       |                                                 |           | 100 Marks |

- **CA 4:** All the exercises/experiments should be completed and kept for the practical test. The students shall be permitted to select any one by lot for the test. The practical test should be conducted as per the scheme of evaluation below. After completion of all the exercises the practical test should be conducted as per End Semester Examination question pattern scheme of evaluation. The marks awarded should be converted to 10 Marks for the internal assessment.

## SCHEME OF EVALUATION

### Model Practical Examination and End Semester Examination - Practical Exam

| PART  | DESCRIPTION                | MARKS |
|-------|----------------------------|-------|
| A     | Aim and Apparatus Required | 10    |
| B     | Tabulation/Observation     | 20    |
| C     | Graph/Sketch /Calculation  | 20    |
| D     | Result                     | 10    |
| E     | Written Test               | 30    |
| F     | Viva Voce                  | 10    |
| TOTAL |                            | 100   |

**CEE5440–CONSTRUCTION MANAGEMENT AND SAFETY  
PRACTICE**

| CEE5440         | CONSTRUCTION MANAGEMENT AND                                                                                                                                                                                                                                                                                                                                                                                                         | L      | T | P | C |
|-----------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------|---|---|---|
| PRACTICUM       | SAFETY PRACTICE                                                                                                                                                                                                                                                                                                                                                                                                                     | 1      | 0 | 4 | 3 |
| <b>UNIT-I</b>   | <b>1.1 CONSTRUCTION SECTOR IN INDIA</b><br>Construction Management –Definition–Need – Scope–Role of government and private construction agencies–Types of construction sectors – Construction practice: - the owner, consultant, and contractor -Duties and responsibilities – List of various stages of a construction project.                                                                                                    | [1Hr]  |   |   |   |
|                 | <b>1.2 FEASIBILITY STUDY AND PLANNING OF CIVIL ENGINEERING PROJECT</b><br>Feasibility– Technical feasibility, Financial, feasibility, Ecological feasibility, Resource feasibility - Economical Analysis – Objectives of planning administrative approval–Technical sanction.                                                                                                                                                       | [2Hrs] |   |   |   |
| <b>UNIT-II</b>  | <b>2.1 CONTRACT MANAGEMENT</b><br>Types of contracts - Contract documents - Tender notice – Types – Earnest Money Deposit (EMD) and Security Deposits (SD) - Scrutiny and acceptance of a tender - Contract agreement —Work order — Subcontract-Rights and duties of sub-contractor.                                                                                                                                                | [1Hr]  |   |   |   |
|                 | <b>2.2 CONSTRUCTION ORGANISATIONS AND DEPARTMENTAL PROCEDURE</b><br>Forms of business organizations -Decentralization -Percentage completion report - Organization of P.W.D.- Accounting procedure (administrative sanctions, technical sanctions, payment of bills) – Imprest and Temporary accounts – Cash book - Works register —Importance of M-book and its entries– Nominal Muster Roll (N.M.R)– Daily Labour Reports (D.L.R) | [2Hrs] |   |   |   |
| <b>UNIT-III</b> | <b>3.1 SCHEDULING AND TIME MANAGEMENT</b><br>Definition — uses and advantages – Classification of Schedules – Methods of scheduling — Activity— Event— Dummies— Rules for developing networks –Fulkerson’s rule for numbering the events - Critical Path Method Critical and Subcritical paths– Critical and Non critical activities/events–Significance of critical path.                                                          | [1Hr]  |   |   |   |
|                 | <b>3.2 RESOURCE MANAGEMENT</b><br>Definition –Need for resource management—Optimum utilization of resources - Resource planning – Resource levelling and its objectives – Construction planning–Crashing –Need for crashing an activity– Methods and tips for crashing– Time Vs Cost optimization curve – Cost slope and its significance in crashing.                                                                              | [2Hrs] |   |   |   |

|                            |                                                                                                                                                                                                                                                                                                            |           |
|----------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|
| <b>UNIT IV</b>             | <b>4.1 QUALITY MANAGEMENT AND CONSTRUCTION DISPUTES</b><br>Importance of quality – Elements of quality – Quality assurance techniques (inspection, testing, sampling) – Construction Disputes - Introduction– Development of disputes–Categories of disputes– Modes of settlements-Arbitration.            | [1Hr]     |
|                            | <b>4.2 CONSTRUCTION LABOUR AND LEGISLATION:</b> Need for legislation-Payment of wages Act – Factories Act–Contract labour (Regulation and abolition) Act–Employees Provident Fund (EPF)Act.                                                                                                                | [2Hrs]    |
| <b>UNIT-V</b>              | <b>5.1 SAFETY IN CONSTRUCTION</b><br>Importance of safety –Causes of accidents – Role of various parties (designer /employer/worker) in safety management–Benefits – Approaches to improve safety in construction                                                                                          | [1Hr]     |
|                            | <b>5.2 ETHICS IN ENGINEERING</b><br>Human values - Definition of Ethics - Engineering ethics - Engineering as a profession - Qualities of professional - Professional institutions - Code of ethics - Major ethical issues - Ethical judgement - Engineering and management decision - Value based ethics. | [2Hrs]    |
| <b>PRACTICAL EXERCISES</b> |                                                                                                                                                                                                                                                                                                            |           |
| 1                          | Problems to find EST, EFT, LST, LFT using MS Project and Excel.                                                                                                                                                                                                                                            | [6Hrs]    |
| 2                          | Preparation of Key Plan, Job Layout using BIM tool like Revit /Sketch up/AutoCAD.                                                                                                                                                                                                                          | [6Hrs]    |
| 3                          | Problems on PERT network – TE, TL and slack using MS Project and Excel.                                                                                                                                                                                                                                    | [6Hrs]    |
| 4                          | Problems to find Standard deviation and Variance using MS Project and Excel.                                                                                                                                                                                                                               | [6Hrs]    |
| 5                          | Writing M- book using MS Excel                                                                                                                                                                                                                                                                             | [6Hrs]    |
| 6                          | Prepare comparative statements in selecting tender using MS Excel.                                                                                                                                                                                                                                         | [6Hrs]    |
| 7                          | Calculate man hours for construction activity and link with scheduling.                                                                                                                                                                                                                                    | [6Hrs]    |
| 8                          | Site visit and prepare safety checklist for construction activity.                                                                                                                                                                                                                                         | [6Hrs]    |
| 9                          | MS project – CPM                                                                                                                                                                                                                                                                                           | [6Hrs]    |
| 10                         | MS project – PERT Analysis                                                                                                                                                                                                                                                                                 | [6Hrs]    |
| <b>TOTAL</b>               |                                                                                                                                                                                                                                                                                                            | <b>75</b> |

**Suggested List of Students Activity**

- **Site visits:** Organize visits to construction sites where students can observe safety practices.
- **Guest lecturers:** Invite professionals from the construction industry, including project managers, safety officers, and engineers, to speak to the class. They can share their experiences, insights, and best practices in construction management and safety.

**EQUIPMENTS REQUIRED**

| S.No | LIST OF EQUIPMENTS                            | QUANTITY REQUIRED |
|------|-----------------------------------------------|-------------------|
| 1    | Computers                                     | 30 Nos.           |
| 2    | Laser Printers                                | 3 Nos             |
| 3    | CAD Software                                  | 30 Users          |
| 4    | Suitable software for Electronic Spread Sheet | 30 Users          |
| 5    | Suitable Project Management Software          | 30 Users          |

**Text Books**

| S.NO | TITLE                             | AUTHOR            | PUBLISHER WITH EDITION                                          |
|------|-----------------------------------|-------------------|-----------------------------------------------------------------|
| 1.   | Construction Project Management   | K.K.Chikkara      | McGraw Hill Education, 26 October 2010                          |
| 2.   | Construction Project Management   | Kumar Neeraj Jha  | 2nd Edition, Pearson Education India, 1 January 2015            |
| 3.   | Safety Management in Construction | S.K.Bhattacharjee | Principles and Practices, 1st edition , Khanna Publishers, 2011 |

**Web-based/Online Resources**

| S.No | Website/Links                                                                                                                                                                                                                                                                     |
|------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1    | Significance and objectives of Construction management<br>: <a href="https://www.youtube.com/watch?v=olvs23_VaT0&amp;list=PLm_MSClsnwm8ZfOLmf8XJqE3rVe8BByzl&amp;index=2">https://www.youtube.com/watch?v=olvs23_VaT0&amp;list=PLm_MSClsnwm8ZfOLmf8XJqE3rVe8BByzl&amp;index=2</a> |
| 2    | Network Terminology<br>: <a href="https://www.youtube.com/watch?v=K6VvMVTh4iU&amp;list=PLm_MSClsnwm8ZfOLmf8XJqE3rVe8BByzl&amp;index=9">https://www.youtube.com/watch?v=K6VvMVTh4iU&amp;list=PLm_MSClsnwm8ZfOLmf8XJqE3rVe8BByzl&amp;index=9</a>                                    |
| 3    | Common causes of accidents on construction sites<br>: <a href="https://www.youtube.com/watch?v=ZdeetmkhpKs&amp;list=PLm_MSClsnwm8ZfOLmf8XJqE3rVe8BByzl&amp;index=21">https://www.youtube.com/watch?v=ZdeetmkhpKs&amp;list=PLm_MSClsnwm8ZfOLmf8XJqE3rVe8BByzl&amp;index=21</a>     |

|   |                                                                                                                                                                                                                                                                                               |
|---|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 4 | Concept of Quality Control & Inspection:<br><a href="https://www.youtube.com/watch?v=nM_dS4tobQs&amp;list=PLm_MSClsnwm8ZfOLmf8XJqE3rVe8BByzl&amp;index=22">https://www.youtube.com/watch?v=nM_dS4tobQs&amp;list=PLm_MSClsnwm8ZfOLmf8XJqE3rVe8BByzl&amp;index=22</a>                           |
| 5 | Need for Legislation and Importance of Labour Laws and Principles:<br><a href="https://www.youtube.com/watch?v=WK8hSg_653I&amp;list=PLm_MSClsnwm8ZfOLmf8XJqE3rVe8BByzl&amp;index=23">https://www.youtube.com/watch?v=WK8hSg_653I&amp;list=PLm_MSClsnwm8ZfOLmf8XJqE3rVe8BByzl&amp;index=23</a> |
| 6 | Construction site safety rules: <a href="https://www.youtube.com/watch?v=YLH-Ih8omjI">https://www.youtube.com/watch?v=YLH-Ih8omjI</a>                                                                                                                                                         |
| 7 | Professional Ethics: <a href="https://www.youtube.com/watch?v=5LiRgVVqsg0">https://www.youtube.com/watch?v=5LiRgVVqsg0</a>                                                                                                                                                                    |

## CEE5540–ENVIRONMENTAL ENGINEERING

Programme Name : CIVIL ENGINEERING  
 Course Code : CEE5540  
 Semester : V SEMESTER  
 Course Title : ENVIRONMENTAL ENGINEERING  
 Course Type : PRACTICUM

| L | T | P | C |
|---|---|---|---|
| 1 | 0 | 4 | 3 |

### TEACHING AND SCHEME OF EXAMINATION

No. of weeks per semester: 15 weeks

| Course                    | Instructions |                  | Examination         |                        |       |          |
|---------------------------|--------------|------------------|---------------------|------------------------|-------|----------|
|                           | Hours / Week | Hours / Semester | Marks               |                        |       | Duration |
|                           |              |                  | Internal Assessment | Autonomous Examination | Total |          |
| Environmental Engineering | 5            | 75               | 40                  | 100*                   | 100   | 3 Hrs    |

\*Examinations will be conducted for 100 marks and will be converted to 60 marks

### TOPICS AND ALLOCATION OF HOURS

| Unit         | Topics                        | Time (Hrs) |
|--------------|-------------------------------|------------|
| I            | Quantity and quality of water | 19         |
| II           | Treatment of water            | 19         |
| III          | Distribution system           | 07         |
| IV           | Sanitary engineering          | 15         |
| V            | Primary treatment of sewage   | 15         |
| <b>Total</b> |                               | <b>75</b>  |

### COURSE DESCRIPTION

Diploma holders in Civil Engineering are expected to supervise construction of water supply and waste water treatment works. They are also responsible for waste disposal activities. This subject aims at imparting skills for preparing water supply and waste water engineering drawings to develop competencies for reading the drawings, and their execution in their field.

In addition, Civil Engineering diploma holders must have the knowledge of different types of environmental aspects due to development activities so that they may help in maintaining the ecological balance and control pollution. They should also be aware of the environmental laws for effectively combating environmental pollution.

## COURSE OBJECTIVES

The objective of this course is to enable the student:

- Know the procedure of estimating water requirements for a water supply scheme.
- Select suitable sources of water supply and pipe materials.
- Determine the quality of water, testing procedures and standards for drinking water
- Understand the methods of purification of water.
- Understand the systems of distribution for a water supply scheme.
- Understand the basic facts of sanitary engineering, the methods of collection and conveyance of sewage.
- Understand the primary and secondary treatment of sewage and disposal.
- Know the methods of disposal of sludge and solid wastes.
- Identify the various types of pollution and their prevention.
- Create awareness about environmental impact assessment.
- Understand the Cutting, threading and joining of G.I. Pipes/cutting and pasting of PVC pipes using solvents.
- Make suction and delivery pipe connections to a centrifugal pump (making indents, drawing a neat sketch of the connection with details).

## COURSE OUTCOMES

| After successful completion of this course, the students should be able to |                                                                                                                                                                                                                                 |
|----------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>E5540.1</b>                                                             | Describe the process in water supply scheme, types of pipes, pipe joints, laying & testing of pipes for the conveyance of water supply, physical, chemical & biological test on the water samples, standards of drinking water. |
| <b>E5540.2</b>                                                             | Analyze the process of primary, secondary & tertiary treatment of water and their transmission along with disinfection, softening of water.                                                                                     |
| <b>E5540.3</b>                                                             | Plan and design the water distribution networks, Layouts of different Distribution networks suitable for appropriate location, Systems of Water Supply                                                                          |
| <b>E5540.4</b>                                                             | Plan and design the sewerage systems, Characterization of Sewage, select the appropriate appurtenances in the sewerage systems.                                                                                                 |
| <b>E5540.5</b>                                                             | Describe the process of Primary Treatment of Sewage such as Screening, Grit Chamber, Skimming Tank, Sedimentation, and Coagulation of Sewage.                                                                                   |

### Pre-requisites

Knowledge of basic science

### CO/PO Mapping

| CO/PO                    | PO1       | PO2       | PO3      | PO4       | PO5       | PO6       | PO7       | PSO1     | PSO2      | PSO3      |
|--------------------------|-----------|-----------|----------|-----------|-----------|-----------|-----------|----------|-----------|-----------|
| E5540.1                  | 3         | 2         | 1        | 3         | 3         | 2         | 2         | -        | 3         | 2         |
| E5540.2                  | 3         | 2         | 1        | 3         | 3         | 2         | 2         | -        | 3         | 2         |
| E5540.3                  | 3         | 2         | 3        | 3         | 3         | 2         | 2         | -        | 3         | 2         |
| E5540.4                  | 3         | 2         | 3        | 3         | 3         | 2         | 2         | -        | 3         | 2         |
| E5540.5                  | 3         | 2         | 1        | 3         | 3         | 2         | 2         | -        | 3         | 2         |
| <b>Total</b>             | <b>15</b> | <b>10</b> | <b>9</b> | <b>15</b> | <b>15</b> | <b>10</b> | <b>10</b> | <b>-</b> | <b>15</b> | <b>10</b> |
| <b>Correlation Level</b> | <b>3</b>  | <b>2</b>  | <b>2</b> | <b>3</b>  | <b>3</b>  | <b>2</b>  | <b>2</b>  | <b>-</b> | <b>3</b>  | <b>2</b>  |

Correlation level 1 – Slight (low)

Correlation level 2 – Moderate (Medium)

Correlation level 3 – Substantial (high)

### Instructional Strategy

- It is advised that teachers take steps to pique pupils' attention and boost their learning confidence.
- To help students learn and appreciate numerous concepts and principles in each area, teachers should provide examples from daily life, realistic situations, and real-world engineering and technological applications.
- The demonstration can make the subject exciting and foster in the students a scientific mindset. Student activities should be planned on all the topics.
- Throughout the course, a theory-demonstrate-practice-activity strategy may be used to ensure that learning is outcome - and employability-based.

Do not let students work on an activity or an experiment with the expected outcome, rather allow students to be honest about whatever the results of the experiment are. If the results are different from the expectations, students should do an analysis where they could be the source of error, if any.

### Assessment Methodology

|                           | Continuous Assessment (40 marks)   |                                             |                       |                       | End Semester Examination (60 marks) |
|---------------------------|------------------------------------|---------------------------------------------|-----------------------|-----------------------|-------------------------------------|
|                           | CA1                                | CA2                                         | CA3                   | CA4                   |                                     |
| <b>Mode</b>               | Practical Test                     | Practical Test                              | Written Test Theory   | Practical Test        | Practical Examination               |
| <b>Portion</b>            | Cycle I Exercises<br>50% Exercises | Cycle II Exercises<br>Another 50% Exercises | All Units             | All Exercises         | All Exercises                       |
| <b>Duration</b>           | 2 Periods                          | 2 Periods                                   | 3 hours               | 3 hours               | 3 hours                             |
| <b>Exam Marks</b>         | 60                                 | 60                                          | 100                   | 100                   | 100                                 |
| <b>Converted to</b>       | 10                                 | 10                                          | 10                    | 10                    | 60                                  |
| <b>Marks</b>              | 40                                 |                                             |                       |                       | 60                                  |
| <b>Tentative Schedule</b> | 7 <sup>th</sup> Week               | 14 <sup>th</sup> Week                       | 15 <sup>th</sup> Week | 16 <sup>th</sup> Week |                                     |

#### Note:

**CA1 and CA2:** All the exercises/experiments should be completed as per the portions above and kept for the practical test. The students shall be permitted to select any one by lot for the test. The practical test should be conducted as per the scheme of evaluation as below. The marks awarded shall be converted to 10 Marks for each assessment test. Practical documents should be maintained for every exercise / experiment immediately after completion of the practice. The practical document should be submitted for the practical test. The same should be evaluated for 10 Marks for each exercise/experiment. The total marks awarded should be converted to 10 Marks for the practical test as per the scheme of evaluation as below.

#### The details of the documents to be prepared as per the instruction below.

Each exercise should be completed on the day of practice. The same shall be evaluated for 10 marks on the day or next day of practice before commencement of the next exercise. This documentation can be carried out in a separate notebook or printed manual or a file with documents. Students should write the procedure and draw the sketch manually. The detailed date of the practices and its evaluations should be maintained in the course logbook. The log book and the practical documents should be submitted for the verification by the Flying Squad.

### SCHEME OF EVALUATION

| PART  | DESCRIPTION                               | MARKS |
|-------|-------------------------------------------|-------|
| A     | Aim and Apparatus Required                | 5     |
| B     | Tabulation/Observation                    | 20    |
| C     | Graph/Sketch/Calculation                  | 20    |
| D     | Result                                    | 5     |
| E     | Practical Documents (As per the portions) | 10    |
| TOTAL |                                           | 60    |

- **CA 3:** Written Test for complete theory portions should be conducted for 100 Marks as per the question pattern below. The marks scored will be converted to 10 Marks for internal assessment.

#### Question pattern – Written Test Theory

| Description |                                                 | Marks     |           |
|-------------|-------------------------------------------------|-----------|-----------|
| Part – A    | 30 MCQ from the complete theory portions.       | 30X1Mark  | 30Marks   |
| Part – B    | 7 Questions to be answered out of 10 Questions. | 7X10Marks | 70Marks   |
| TOTAL       |                                                 |           | 100 Marks |

- **CA 4:** All the exercises/experiments should be completed and kept for the practical test. The students shall be permitted to select any one by lot for the test. The practical test should be conducted as per the scheme of evaluation below. After completion of all the exercises the practical test should be conducted as per End Semester Examination question pattern scheme of evaluation. The marks awarded should be converted to 10 Marks for the internal assessment.

### SCHEME OF EVALUATION

#### Model Practical Examination and End Semester Examination - Practical Exam

| PART | DESCRIPTION                | MARKS |
|------|----------------------------|-------|
| A    | Aim and Apparatus Required | 10    |
| B    | Tabulation/Observation     | 20    |
| C    | Graph/Sketch /Calculation  | 20    |
| D    | Result                     | 10    |
| E    | Written Test               | 30    |
| F    | Viva Voce                  | 10    |
|      | Total                      | 100   |

Note: For the written test 30 MCQ shall be asked from the theory portions.

**CEE5540– ENVIRONMENTAL ENGINEERING**

| CEE5540                                                                                               |                                                                                                                                                                                                                                                                                                                     | ENVIRONMENTAL ENGINEERING                                                                                                             | L | T | P       | C      |       |
|-------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------|---|---|---------|--------|-------|
| PRACTICUM                                                                                             |                                                                                                                                                                                                                                                                                                                     |                                                                                                                                       | 1 | 0 | 4       | 3      |       |
| Unit-I                                                                                                | QUANTITY AND QUALITY OF WATER                                                                                                                                                                                                                                                                                       |                                                                                                                                       |   |   |         | 19Hrs  |       |
|                                                                                                       | Water Supply–Flow Chart of a Water Supply Scheme - Need for Protected Water Supply                                                                                                                                                                                                                                  |                                                                                                                                       |   |   |         | [1Hr]  |       |
|                                                                                                       | Types of Demand-Per Capita Demand - Sources of Water—Surface Sources—Underground Water Sources - Intakes - Types of Intakes - Pipes for Conveyance of Water - Cast Iron, G.I., Cement Concrete, R.C.C., Hume and PVC Pipes - Pipe Joints - Laying and Testing of Pipe Lines. Impurities in Water - Testing of Water |                                                                                                                                       |   |   |         | [1Hr]  |       |
|                                                                                                       | Collection of Water Sample - Physical, Chemical, Bacteriological Tests - Standards of Drinking Water - Water Borne Diseases and their Causes.                                                                                                                                                                       |                                                                                                                                       |   |   |         | [1Hr]  |       |
|                                                                                                       | <b>Practical exercises</b>                                                                                                                                                                                                                                                                                          |                                                                                                                                       |   |   |         |        |       |
|                                                                                                       | 1 Estimation of pH, TDS and Hardness of water sample                                                                                                                                                                                                                                                                |                                                                                                                                       |   |   |         | [4Hrs] |       |
|                                                                                                       | 2. Estimation of Sulphate content from the Collected water samples from sources.                                                                                                                                                                                                                                    |                                                                                                                                       |   |   |         | [4Hrs] |       |
|                                                                                                       | 3. Determine the dissolved oxygen in the given sample of water                                                                                                                                                                                                                                                      |                                                                                                                                       |   |   |         | [4Hrs] |       |
|                                                                                                       | 4. Determine the chloride content in the given sample of water by silver nitrate titration method.                                                                                                                                                                                                                  |                                                                                                                                       |   |   |         | [4Hrs] |       |
|                                                                                                       | Unit- II                                                                                                                                                                                                                                                                                                            | TREATMENT OF WATER                                                                                                                    |   |   |         |        | 19Hrs |
|                                                                                                       |                                                                                                                                                                                                                                                                                                                     | Objective of water treatment - Flow Diagram of a Treatment Plant-functions of units - Sedimentation–                                  |   |   |         |        | [1Hr] |
|                                                                                                       |                                                                                                                                                                                                                                                                                                                     | Types of Sedimentation Tank—principal of Coagulation—Flocculation-Usual Coagulants—feeding of coagulants - mixing devices - Jar test. |   |   |         |        | [1Hr] |
|                                                                                                       |                                                                                                                                                                                                                                                                                                                     | <b>Practical exercises</b>                                                                                                            |   |   |         |        |       |
| 5. Determine the optimum dose of coagulant in a given raw water sample by jar test.                   |                                                                                                                                                                                                                                                                                                                     |                                                                                                                                       |   |   | [4Hrs]  |        |       |
| 6. Prepare a report along with photo copies of a field visit to water treatment plant. (Not for Exam) |                                                                                                                                                                                                                                                                                                                     |                                                                                                                                       |   |   | [12Hrs] |        |       |

| Unit-III | DISTRIBUTION SYSTEM                                                                                                                                                                         | 7Hrs                    |
|----------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------|
|          | Distribution System Gravity System, Pumping System, Combined System - Systems of Water Supply                                                                                               | [1Hr]                   |
|          | Continuous and Intermittent Supply of Water-Layouts of Distribution-Dead End, Grid Iron, Radial and Circular Systems.                                                                       | [1Hr]<br>[1Hr]          |
|          | <b>Practical exercises</b>                                                                                                                                                                  |                         |
|          | 7. Study of various pipe fitting used in water supply (with actual models displayed onboard). (Not for Exam)                                                                                | [4Hrs]                  |
| UNIT-IV  | SANITARY ENGINEERING                                                                                                                                                                        | 15Hrs                   |
|          | Sanitation - Systems of Sanitation - Variation in Rate of Flow of Sewage - Estimation of storm water - Minimum Size of Sewer—Shapes of Sewer (names only) –                                 | [1Hr]                   |
|          | Materials used for Sewer-Joints in Sewer Line–Ventilation of Sewers–Cleaning of Sewers. Sewer Appurtenances Manhole-Lamp Hole-Catch Basin-Street-Inlet-Grease and Oil Trap - Flushing Tanks | [1Hr]                   |
|          | Drainage Arrangements in Buildings - Sanitary Fittings - Sewage Pumps Necessity - Types of Sewage Pumps (names only).                                                                       | [1Hr]                   |
|          | <b>Practical exercises</b>                                                                                                                                                                  |                         |
|          | 8. Study of various sanitary wares. (Not for Exam)                                                                                                                                          | [4Hrs]                  |
|          | 9. Making a bathroom connection from an existing water supply main (making indents, drawing a neat sketch of the connection with details).                                                  | [4Hrs]                  |
|          | 10. Making suction and delivery pipe connections to a centrifugal pump (making indents, drawing a neat sketch of the connection with details).                                              | [4Hrs]                  |
| UNIT-V   | PRIMARY TREATMENT OF SEWAGE                                                                                                                                                                 | 15Hrs                   |
|          | Introduction-Flow Diagram of Sewage Treatment plant –Screens – Grit Chamber – Skimming Tank – plain sedimentation tank-Primary clarifiers Secondary clarifiers – coagulation of sewage.     | [1Hr]<br>[1Hr]<br>[1Hr] |
|          | <b>Practical exercises:</b>                                                                                                                                                                 |                         |
|          | 11.Prepare a report along with photo copies of a field visit to sewage treatment plant. (Not for Exam)                                                                                      | [6Hrs]                  |
|          | 12. Making suction and delivery pipe connections to a reciprocating pump.                                                                                                                   | [6Hrs]                  |
|          | <b>TOTAL</b>                                                                                                                                                                                | <b>75</b>               |

#### Suggested List of Students Activities

- Choose any one study area and estimate the quantity of water required to meet the demand.
- Design and build a physical model of a water treatment plant.

- Group discussion about the distribution network and various layouts of distribution.
- Identify the suitable appurtenances for the appropriate location in the water distribution network system.
- Demonstrate and discussion on the process of coagulation and flocculation.
- Periodic class quizzes conducted on a weekly/fortnightly based on the course
- Case study on the quality standards of drinking water in your locality

**EQUIPMENTS REQUIRED: (Batch strength: 30 students)**

| S.No | LIST OF EQUIPMENTS                                                                              | QUANTITY REQUIRED |
|------|-------------------------------------------------------------------------------------------------|-------------------|
| 1.   | Spectrophotometer                                                                               | 1No.              |
| 2.   | Jar Test Apparatus                                                                              | 1No.              |
| 3.   | Turbidity Meter                                                                                 | 1No.              |
| 4.   | Dissolved Oxygen Meter                                                                          | 1No.              |
| 5.   | Drying Oven                                                                                     | 1No.              |
| 6.   | Analytical Balance                                                                              | 1No.              |
| 7.   | Desiccators                                                                                     | 1No.              |
| 8.   | Dish tongs                                                                                      | 1No.              |
| 9.   | Evaporating Dish                                                                                | 1No.              |
| 10.  | Filter Membrane                                                                                 | 1No.              |
| 11.  | Vacuum Pump                                                                                     | 1No.              |
| 12.  | Crucible                                                                                        | 1No.              |
| 13.  | Watt Man Filter Paper                                                                           | Required Nos.     |
| 14.  | Wash Bottle                                                                                     | 2 Nos.            |
| 15.  | Pipette, Burette, Funnel, Conical Flask, Beaker, Bunsen Burner, Stand, Wire Gauge, Filter Paper | As Required       |
| 16.  | Pipe Fitting used in Water Supply                                                               | As Required       |
| 17.  | Sanitary Ware Specials                                                                          | As Required       |
| 18.  | Specials of Bathroom Connections                                                                | As Required       |
| 19.  | pH Tester                                                                                       | 1 No.             |
| 20.  | TDS testing device                                                                              | 1 No.             |
| 21.  | Necessary reagents and Chemicals                                                                | As Required       |
| 22.  | Necessary Sample Preparation Utilities                                                          | As Required       |
| 23.  | Centrifugal Pump (0.5 HP)                                                                       | 1 No.             |

**Text Books**

| S.NO | TITLE                                 | AUTHOR                     | PUBLISHERWITHEDITION                                   |
|------|---------------------------------------|----------------------------|--------------------------------------------------------|
| 1.   | Environmental Engineering,            | A.K. Jain                  | 1 <sup>st</sup> Edition, Khanna Publishers, 2022.      |
| 2.   | Water Supply and Sanitary Engineering | G.S. Birdie and J.S.Birdie | 9 <sup>th</sup> Edition, Dhanpat Rai Publishers, 2014. |
| 3.   | Water Supply and Sanitary Engineering | S.K. Husain                | 3 <sup>rd</sup> Edition, CBS Publishers, 2018.         |

**Web-based/Online Resources**

| S. No | Website/Links                                                                                                                                                           |
|-------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1     | <a href="https://archive.nptel.ac.in/courses/105/105/105105201/">https://archive.nptel.ac.in/courses/105/105/105105201/</a>                                             |
| 2     | <a href="https://youtube.com/playlist?list=PL1BFC82F3A63B4172&amp;si=wJVMJip1kcMrhm9s">https://youtube.com/playlist?list=PL1BFC82F3A63B4172&amp;si=wJVMJip1kcMrhm9s</a> |

## CEE5654–INNOVATION & STARTUP

Programme Name : CIVIL ENGINEERING  
 Course Code : CEE5654  
 Semester : V SEMESTER  
 Course Title : INNOVATION & STARTUP  
 Course Type : PRACTICUM

| L | T | P | C |
|---|---|---|---|
| 1 | 0 | 2 | 2 |

### TEACHING AND SCHEME OF EXAMINATION

No. of weeks per semester: 15 weeks

| Course               | Instructions |                  | Examination         |                        |       |          |
|----------------------|--------------|------------------|---------------------|------------------------|-------|----------|
|                      | Hours / Week | Hours / Semester | Marks               |                        |       | Duration |
|                      |              |                  | Internal Assessment | Autonomous Examination | Total |          |
| Innovation & Startup | 3            | 45               | 40                  | 100*                   | 100   | 3Hrs     |

\*Examinations will be conducted for 100 marks and will be converted to 60 marks

### TOPICS AND ALLOCATION OF HOURS

| Unit         | Topics                                                      | Time (Hrs) |
|--------------|-------------------------------------------------------------|------------|
| I            | Introduction to innovation                                  | 6          |
| II           | Incubation clubs, IPR, patents and copyrights               | 6          |
| III          | Government and non-government funding schemes for start-ups | 6          |
| IV           | Sanitary engineering                                        | 9          |
| V            | Exposure to industry                                        | 18         |
| <b>Total</b> |                                                             | <b>45</b>  |

### COURSE DESCRIPTION

The integration of Innovation and Start-ups concept within the syllabus is testament to the forward thinking nature of educational institutions. By introducing this concept, students are provided with a solid foundation upon which they can build their skills in Innovation and Start-ups. This course can bridge the gap between theory and practice. It allows students to apply the knowledge they have acquired in a realworld context, thereby enhancing their understanding and retention of the above concept. This experimental learning approach not only fosters a deeper level of engagement but also trains student with practical skills necessary to navigate the complexities of the business world. This also empowers students to become an Innovator or Entrepreneur. With necessary tools and knowledge, educational institutions are preparing the next generation of entrepreneurs to tackle the challenges and opportunities that lie ahead. This syllabus will explore the different facets of innovation, including its importance, types and strategies for fostering a culture of innovation with in organizations

## COURSE OBJECTIVES

The objective of this course is to enable the students

- To understand the concept of Innovation and Start-ups.
- To acquire knowledge of Prototype development, IPR, Patents and Copyrights.
- To have practical experience in preparing Business plan for Start-ups.
- To visit the existing nearby industry to prepare a project report about the present challenges of that industry.
- To know the different funding supports available from Government and Non-Government schemes for Start-ups.

## COURSE OUTCOMES

| After successful completion of this course, the students should be able to |                                                                                                                    |
|----------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------|
| <b>E5654.1</b>                                                             | Differentiate between Innovation and Start-ups                                                                     |
| <b>E5654.2</b>                                                             | Explain the importance of IPR, Patents and Copyrights.                                                             |
| <b>E5654.3</b>                                                             | Describe the methodology to be adopted for preparing the Business Plan                                             |
| <b>E5654.4</b>                                                             | Gain practical experience by Industrial training and visiting the nearby industry                                  |
| <b>E5654.5</b>                                                             | Explore and identify various funding facilities available from Government and Non-Government Schemes for Start-ups |

### Pre-requisites

There are no specific prerequisites for this course, although a basic understanding of business and technology concepts would be beneficial.

### CO/PO Mapping

| CO/PO                    | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PSO1 | PSO2 | PSO3 |
|--------------------------|-----|-----|-----|-----|-----|-----|-----|------|------|------|
| <b>E5654.1</b>           | -   | -   | 1   | -   | 2   | 3   | 3   | -    | 3    | 2    |
| <b>E5654.2</b>           | -   | -   | 1   | -   | 2   | 3   | 3   | -    | 3    | 2    |
| <b>E5654.3</b>           | -   | -   | 1   | -   | 2   | 3   | 3   | -    | 3    | 2    |
| <b>E5654.4</b>           | -   | -   | 1   | -   | 2   | 3   | 3   | -    | 3    | 2    |
| <b>E5654.5</b>           | -   | -   | 1   | -   | 2   | 3   | 3   | -    | 3    | 2    |
| <b>Total</b>             | -   | -   | 5   | -   | 10  | 15  | 15  | -    | 15   | 10   |
| <b>Correlation Level</b> | -   | -   | 1   | -   | 2   | 3   | 3   | -    | 3    | 2    |

Correlation level 1 – Slight (low)

Correlation level 2 – Moderate (Medium)

Correlation level 3 – Substantial (high)

## Assessment Methodology

|              | Continuous Assessment (40 marks)        |                                 |                                                      | End Semester Examination (60 marks) |
|--------------|-----------------------------------------|---------------------------------|------------------------------------------------------|-------------------------------------|
|              | CA1                                     | CA2                             | CA3                                                  |                                     |
| Mode         | Class Assessment (Unit I,II & Unit III) | Seminar Presentations (Unit IV) | Submission of Industry Visit Project Report (Unit V) | Practical Examination (Project)     |
| Duration     | 2 hours                                 | ---                             | ---                                                  | 3 hours                             |
| Exam Marks   | 50                                      | 20                              | 30                                                   | 100                                 |
| Converted to | 10                                      | 10                              | 20                                                   | 60                                  |
| <b>Marks</b> | <b>10</b>                               | <b>10</b>                       | <b>20</b>                                            | <b>60</b>                           |

### Continuous Assessment - 40 marks

| Description                                                                                                                                                                                                                 | Marks           |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|
| <b>Class Assessment (50 marks) - Unit – I,II&amp; III</b><br>Written Examination - Theory Questions<br>10 questions out of 15 questions (10 x 3 marks :30 marks)<br>4 questions out of 6 questions (4 x 5 marks : 20 marks) | 10 marks        |
| <b>Seminar Presentations (20 marks- each topic carries 10 marks) - Unit IV</b><br>Students should present any two topics with PPTs                                                                                          | 10 marks        |
| Submission of Industry Visit Project Report - <b>(30 marks)</b><br><b>Unit V</b>                                                                                                                                            | 20 marks        |
| <b>Total</b>                                                                                                                                                                                                                | <b>40 marks</b> |

### SCHEME OF EVALUATION

| PART         | DESCRIPTION                                                                                                                                                                                                                  | MARKS     |
|--------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|
| CA1          | <b>Class Assessment (50 marks) - Unit – I, II&amp; III</b><br>Written Examination - Theory Questions<br>10 questions out of 15 questions (10 x 3 marks :30 marks)<br>4 questions out of 6 questions (4 x 5 marks : 20 marks) | 10        |
| CA2          | <b>Seminar Presentations (20 marks- each topic carries 10 marks) - Unit IV</b><br>Students should present any two topics with PPTs                                                                                           | 10        |
| CA3          | Submission of Industry Visit Project Report<br><b>(30 marks) - Unit V</b>                                                                                                                                                    | 20        |
| <b>Total</b> |                                                                                                                                                                                                                              | <b>40</b> |

**CEE5654-INNOVATION& STARTUP**

| <b>CEE5654</b>   |                                                                                                                                                                                                        | <b>L</b> | <b>T</b> | <b>P</b> | <b>C</b>    |
|------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|----------|----------|-------------|
| <b>PRACTICUM</b> |                                                                                                                                                                                                        | <b>1</b> | <b>0</b> | <b>2</b> | <b>2</b>    |
| <b>Unit-I</b>    | <b>INTRODUCTION TO INNOVATION</b>                                                                                                                                                                      |          |          |          | <b>6Hrs</b> |
|                  | An Introduction to Innovation and Creativity                                                                                                                                                           |          |          |          | [1Hr]       |
|                  | Innovation in current Environment                                                                                                                                                                      |          |          |          | [1Hr]       |
|                  | Types of Innovation                                                                                                                                                                                    |          |          |          | [1Hr]       |
|                  | Challenges of Innovation                                                                                                                                                                               |          |          |          | [1Hr]       |
|                  | Steps of Innovation Management - Divergent v/s Convergent thinking                                                                                                                                     |          |          |          | [1Hr]       |
|                  | Design thinking and Entrepreneurship                                                                                                                                                                   |          |          |          | [1Hr]       |
| <b>Unit- II</b>  | <b>INCUBATION CLUBS, IPR, PATENTS AND COPYRIGHTS</b>                                                                                                                                                   |          |          |          | <b>6Hrs</b> |
|                  | Idea Generation - Incubation Clubs - Prototype Development                                                                                                                                             |          |          |          | [1Hr]       |
|                  | Marketing of Innovation                                                                                                                                                                                |          |          |          | [1Hr]       |
|                  | Management of Innovation                                                                                                                                                                               |          |          |          | [1Hr]       |
|                  | Creation of IPR -Types of IPR                                                                                                                                                                          |          |          |          | [1Hr]       |
|                  | Patents and Copyrights Patents in India                                                                                                                                                                |          |          |          | [1Hr]       |
|                  | T Ethnological and Non-Technological Innovation Process.                                                                                                                                               |          |          |          | [1Hr]       |
| <b>Unit-III</b>  | <b>GOVERNMENT AND NON-GOVERNMENT FUNDING SCHEMES FOR START-UPS</b>                                                                                                                                     |          |          |          | <b>6Hrs</b> |
|                  | An introduction to Start-up - Start-ups in India                                                                                                                                                       |          |          |          | [1Hr]       |
|                  | Procedure for registration of Start-ups -                                                                                                                                                              |          |          |          | [1Hr]       |
|                  | Business Model- Business Plan - Case Studies                                                                                                                                                           |          |          |          | [1Hr]       |
|                  | Opportunities and Challenges                                                                                                                                                                           |          |          |          | [1Hr]       |
|                  | Funding supports from Government Schemes -MUDRA, TANSEED                                                                                                                                               |          |          |          | [1Hr]       |
|                  | NEEDS, PMEGP, and UYEGP – Non-Government Schemes - CSR Fund                                                                                                                                            |          |          |          | [1Hr]       |
|                  | Angel Investors - Venture Capitalist.                                                                                                                                                                  |          |          |          |             |
| <b>UNIT-IV</b>   |                                                                                                                                                                                                        |          |          |          | <b>9Hrs</b> |
|                  | All the students have to select a minimum of 2 topics from the list given below. They are expected to collect the resources with the help of faculty assigned to them to prepare PPTs for presentation |          |          |          | 9Hrs        |
|                  | 1. Idea Generation.                                                                                                                                                                                    |          |          |          |             |
|                  | 2. Innovation Management.                                                                                                                                                                              |          |          |          |             |
|                  | 3. Product Development.                                                                                                                                                                                |          |          |          |             |
|                  | 4. Business Model Innovation.                                                                                                                                                                          |          |          |          |             |
|                  | 5. Organizational Culture and Change Management.                                                                                                                                                       |          |          |          |             |
|                  | 6. Leadership and Innovation.                                                                                                                                                                          |          |          |          |             |
|                  | 7. Barriers to Innovation.                                                                                                                                                                             |          |          |          |             |
|                  | 8. Innovation Marketing.                                                                                                                                                                               |          |          |          |             |
|                  | 9. E-Commerce success stories (any one).                                                                                                                                                               |          |          |          |             |
|                  | 10. Role of Start-ups in Higher Education.                                                                                                                                                             |          |          |          |             |
|                  | 11. Professional Networking in Building Brands.                                                                                                                                                        |          |          |          |             |
|                  | 12. How to start a start-up in India.                                                                                                                                                                  |          |          |          |             |

| UNIT V | EXPOSURE TO INDUSTRY                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 18Hrs     |
|--------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|
|        | All the students should visit and study the nearby industries, incubation centres, start-ups etc., and select any one to prepare a project report which covers the Name of the Industry/Organization, Introduction of the Industry, Type of the Industry, Scope of the Industry, Plant Layout and Location, Details of Plant and Machineries, Process flow chart, Manufacturing Methods, Process of Manufacturing, Product Manufacturing, Quality Control, Marketing, Product selling - Conclusion. |           |
|        | <b>TOTAL</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | <b>45</b> |

### End Semester Examination - Project Exam

Students should be assessed for 100 Marks both by the internal examiner and external examiner appointed by the Chairperson Autonomous Examinations.

### Detailed Allocation of Marks

| S. No     | Description                                                | Marks      |
|-----------|------------------------------------------------------------|------------|
| Part A    | Written Examination – Unit –I,II& III                      | 45         |
|           | Theory Questions                                           |            |
| i)        | 10 questions out of 15 questions (10 x 3 marks = 30 marks) |            |
| ii)       | 3 questions either or pattern (3 x 5 marks = 15 marks)     |            |
| Part B i) | Presentation of Industry Visit Project Report              | 25         |
| ii)       | Interaction and Evaluation                                 | 30         |
|           | <b>TOTAL</b>                                               | <b>100</b> |

## CEE5773–INDUSTRIAL TRAINING

Programme Name : CIVIL ENGINEERING  
Course Code : CEE5773  
Semester : V SEMESTER  
Course Title : INDUSTRIAL TRAINING  
Course Type : INTERNSHIP

|          |   |
|----------|---|
| Summer   | C |
| Vacation | 2 |

### COURSE DESCRIPTION

Industrial training is a crucial component of the diploma engineering curriculum, designed to bridge the gap between theoretical knowledge and practical application. Typically conducted during vacation periods, this two-week training program provides students with hands-on experience in their respective engineering fields. The primary objectives are to enhance practical skills, familiarize students with industry standards, and prepare them for future employment.

Two-week industrial training during vacation periods is an invaluable part of diploma engineering education. It not only equips students with practical skills but also provides a comprehensive understanding of the industry, preparing them for successful engineering careers.

### COURSE OBJECTIVES

1. Practical Exposure: Students gain direct exposure to real-world engineering practices, tools, and technologies.
2. Skill Enhancement: The training helps in developing technical and soft skills that are essential for professional growth.
3. Industry Insight: Students learn about the working environment, operational procedures, and challenges faced by industries.
4. Professional Networking: The training offers opportunities to interact with industry professionals, which can be beneficial for career prospects.
5. Application of Knowledge: It allows students to apply classroom knowledge to solve practical problems, enhancing their understanding and retention of engineering concepts.

### Structure of the Training Program

- Orientation: Introduction to the company, its operations, and safety protocols.
- Project Assignment: Students are assigned specific projects or tasks relevant to their field of study.
- Supervision and Mentorship: Industry professionals guide and mentor students throughout the training.
- Skill Development Workshops: Sessions on technical skills, software tools, and industry best practices.
- Assessment and Feedback: Performance evaluations and constructive feedback to help students improve.

### Benefits for Students

- Enhanced Employability: Practical experience makes students more attractive to potential employers.
- Confidence Building: Working in a real-world setting boosts confidence and professional demeanour.
- Clarified Career Goals: Exposure to various roles and responsibilities helps students define their career paths.

### COURSE OUTCOMES

| After successful completion of this course, the students should be able to |                                                                                                                  |
|----------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------|
| E5773.1                                                                    | Demonstrate proficiency in using industrial machinery, tools, and software.                                      |
| E5773.2                                                                    | Able to identify, analyze, and solve engineering problems using industry-standard methods and practices.         |
| E5773.3                                                                    | Gain a comprehensive understanding of industrial manufacturing processes, quality control, and safety practices. |
| E5773.4                                                                    | Exhibit improved communication, teamwork, and professional behavior in an industrial setting.                    |
| E5773.5                                                                    | Apply theoretical concepts learned in their coursework to practical engineering tasks and projects.              |

### Duties Responsibilities of the Faculty Mentor

One faculty mentor should be assigned for every 30 students by the HOD / Principal. Faculty mentors shall play a crucial role in overseeing and guiding students during their industrial training program in Diploma engineering.

#### Pre-Training Responsibilities

##### 1. Orientation and Preparation:

- Conduct orientation sessions to familiarize students with the objectives, expectations, and guidelines of the industrial training program.
- Assist students in understanding the importance of industrial training in their academic and professional development.

##### 2. Placement Coordination:

- Collaborate with the placement cell or industry liaison office to secure suitable training placements for students that align with their academic specialization and career interests.
- Facilitate communication between the institution and host organizations to ensure smooth coordination of training arrangements.

##### 3. Training Plan Development:

- Help students develop a detailed training plan outlining learning objectives, tasks, and expected outcomes for the training period.
- Guide students in setting SMART (Specific, Measurable, Achievable, Relevant, Time-bound) goals for their training experience.

### **During Training Responsibilities:**

#### **4. Monitoring and Support:**

- Regularly monitor the progress of students during their industrial training. Maintain communication with both students and industry supervisors to track performance and address any issues that may arise.
- Provide ongoing support and guidance to students, offering advice on technical challenges, professional conduct, and workplace etiquette.

#### **5. Technical Guidance:**

- Offer technical guidance and mentorship related to the specific engineering discipline or specialization of the students. Help them apply theoretical knowledge to practical situations encountered in the industry.

#### **6. Problem-Solving Assistance:**

- Assist students in overcoming obstacles or challenges encountered during their training. Encourage them to develop problem-solving skills and resilience in real-world engineering scenarios.

#### **7. Feedback and Evaluation**

- Provide constructive feedback on students' performance based on reports, assessments, and observations gathered from industry supervisors.
- Evaluate students' achievements in relation to their training objectives and competencies developed during the program.

### **Post-Training Responsibilities**

#### **8. Reflection and Debriefing:**

- Conduct debriefing sessions with students to reflect on their training experiences, discuss lessons learned, and identify areas for further improvement.
- Help students articulate their learning outcomes and how these experiences contribute to their professional growth.

#### **9. Documentation and Reporting:**

- Ensure comprehensive documentation of students' training activities, achievements, and feedback received from industry supervisors.
- Prepare reports summarizing students' performance and submit these to relevant departments or committees for review and assessment.

#### **10. Career Counselling:**

- Provide career guidance and counselling to students based on their industrial training experiences. Assist them in leveraging these experiences for future job applications or further academic pursuits.

#### **11. Continuous Improvement:**

- Collaborate with industry partners to continuously improve the quality and relevance of the industrial training program.
- Incorporate feedback from students and industry supervisors to enhance the effectiveness of future training placements.
- By fulfilling these duties and responsibilities, faculty mentors contribute significantly to the overall educational experience and professional development of Diploma engineering students during their industrial training program.

## **Instructions to the students**

### **Before Starting Industrial Training**

#### **1. Orientation and Preparation**

- Attend orientation sessions conducted by the institution or faculty mentors to understand the objectives, expectations, and guidelines of the industrial training program.
- Familiarize yourself with the specific policies, procedures, and safety regulations of the host organization where you will be undergoing training.

#### **2. Setting Goals**

- Set clear and specific goals for your industrial training period. Define what skills, knowledge, and experiences you aim to gain during this time.
- Discuss your goals with your faculty mentor and seek their guidance in developing a training plan that aligns with your career aspirations.

#### **3. Professional Attire and Conduct:**

- Dress appropriately and professionally according to the standards of the industry and host organization.
- Maintain a positive attitude, demonstrate punctuality, and adhere to workplace etiquette and norms.

### **During Industrial Training**

#### **4. Learning and Engagement:**

- Actively engage in all assigned tasks and projects. Seek opportunities to learn new skills and technologies relevant to your field of study.
- Take initiative in asking questions, seeking clarification, and participating in discussions with supervisors and colleagues.

#### **5. Adaptability and Flexibility:**

- Adapt to the work environment and demonstrate flexibility in handling various responsibilities and challenges that arise during your training.
- Be open to different roles and tasks assigned to you, as this will broaden your experience and skill set.

#### **6. Professionalism and Communication:**

- Communicate effectively with supervisors, colleagues, and clients as required. Practice clear and concise verbal and written communication.
- Demonstrate professionalism in all interactions, respecting confidentiality, and adhering to company policies and procedures.

#### **7. Safety and Compliance:**

- Prioritize safety at all times. Familiarize yourself with safety protocols, procedures, and emergency exits in the workplace.
- Follow all safety guidelines and regulations to ensure your well-being and that of others around you.

## **After Completing Industrial Training:**

### **8. Reflection and Documentation:**

- Reflect on your training experience. Evaluate what you have learned, the challenges you faced, and how you have grown professionally.
- Maintain a journal or log documenting your daily activities, achievements, and lessons learned during the training period.

### **9. Feedback and Evaluation:**

- Seek feedback from your industry supervisor and faculty mentor on your performance and areas for improvement.
- Use constructive feedback to enhance your skills and competencies for future career opportunities.

### **10. Career Planning:**

- Use your industrial training experience to inform your career planning and decision-making process.
- Discuss your career goals and aspirations with your faculty mentor or career counsellor for guidance on next steps after completing your diploma.

By following these instructions, Diploma engineering students can make the most of their industrial training experience, gain valuable insights into their chosen field, and prepare themselves effectively for future professional endeavours.

## **Attendance Certification**

Every student has to get their attendance certified by the industrial supervisor in the prescribed form supplied to them. Students have also to put their signature on the form and submit it to the institution faculty mentor.

## **Training Reports**

The students have to prepare reports: The report in the form of a diary to be submitted to the concerned faculty mentor of the institution. This will be reviewed while awarding Internal assessment.

## **Industrial Training Diary**

Students are required to maintain the record of day-to-day work done. Such a record is called Industrial training Diary. Students have to write this report regularly. All days for the week should be accounted for clearly giving attendance particulars (Presence, absence, Leave, Holidays etc.). The concern of the Industrial supervisor is to periodically check these progress reports.

In addition to the diary, students are required to submit a comprehensive report on training with details of the organisation where the training was undergone after attestation by the supervisors. The comprehensive report should incorporate study of plant / product / process / construction along with intensive in-depth study on any one of the topics such as processes, methods, tooling, construction and equipment, highlighting aspects of quality, productivity and system. The comprehensive report should be completed in the last week of Industrial training. Any data, drawings etc. should be incorporated with the consent of the Organisation.

### Scheme of Evaluation

#### Internal Assessment

Students should be assessed for 40 Marks by industry supervisor and polytechnic faculty mentor for the Internal Assessment.

| Sl. No. | Description                                                                                   | Marks |
|---------|-----------------------------------------------------------------------------------------------|-------|
| A       | Punctuality and regularity. (Attendance)                                                      | 10    |
| B       | Level / proficiency of practical skills acquired.<br>Initiative in learning / working at site | 10    |
| C       | Ability to solve practical problems. Sense of responsibility                                  | 10    |
| D       | Self expression / communication skills. Interpersonal skills / Human Relation.                | 10    |
| E       | Report and Presentation.                                                                      | 10    |
| Total   |                                                                                               | 50    |

#### End Semester Examination - Project Exam

Students should be assessed for 100 Marks both by the internal examiner and external examiner appointed by the Chairperson Autonomous of Examinations after the completion of industrial training. The marks scored will be converted to 60 marks for the End Semester Examination.

| Sl. No. | Description                                                                                        | Marks |
|---------|----------------------------------------------------------------------------------------------------|-------|
| A       | Daily Activity Report and Attendance certificate.                                                  | 20    |
| B       | Comprehensive report on Internship, Relevant Internship Certificate from the concerned department. | 30    |
| C       | Presentation by the student at the end of the Internship.                                          | 30    |
| D       | Viva Voce                                                                                          | 20    |
| Total   |                                                                                                    | 100   |

## CEE6111 – ADVANCED ENGINEERING MATHEMATICS

Programme Name : CIVIL ENGINEERING  
 Course Code : CEE6111  
 Semester : VI SEMESTER  
 Course Title : ADVANCED ENGINEERING MATHEMATICS  
 Course Type : THEORY

| L | T | P | C |
|---|---|---|---|
| 3 | 0 | 0 | 3 |

### TEACHING AND SCHEME OF EXAMINATION

No. of weeks per semester: 15 weeks

| Course                           | Instructions |                  | Examination         |                        |       |          |
|----------------------------------|--------------|------------------|---------------------|------------------------|-------|----------|
|                                  | Hours / Week | Hours / Semester | Marks               |                        |       | Duration |
|                                  |              |                  | Internal Assessment | Autonomous Examination | Total |          |
| Advanced Engineering Mathematics | 3            | 45               | 40                  | 100*                   | 100   | 3Hrs     |

\*Examinations will be conducted for 100 marks and will be converted to 60 marks

### TOPICS AND ALLOCATION OF HOURS

| Unit                       | Topics                         | Time (Hrs) |
|----------------------------|--------------------------------|------------|
| I                          | Eigenvalues and Eigenvectors   | 07         |
| II                         | Functions of Several variables | 07         |
| III                        | Vector calculus                | 07         |
| IV                         | Differential equations         | 07         |
| V                          | Laplace transforms             | 07         |
| <b>Total</b>               |                                | <b>35</b>  |
| <b>Test &amp; Revision</b> |                                | <b>10</b>  |
| <b>Total</b>               |                                | <b>45</b>  |

### COURSE DESCRIPTION

Mathematics is essential for engineering students to understand core engineering course. It provides the framework for engineers to solve problems in engineering domains. This course is designed to bridge the gap between diploma mathematics and B.E/B.Tech mathematics in matrix algebra, differential calculus, vector calculus, differential equations, and Laplace transforms.

## COURSE OBJECTIVE

The objective of this course is to enable the students to

- Understand the concepts of eigen-values and eigen-vectors of matrices.
- Learn the notation of partial differentiation and determine the extremities of functions of two variables.
- Acquire knowledge in vector calculus which is significantly used to solve engineering problems.
- Formulate and solve differential equations.
- Understand Laplace transformation and its engineering applications.

## COURSE OUTCOMES

| After successful completion of this course, the students should be able to |                                                                                                                |
|----------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------|
| <b>E6111.1</b>                                                             | Find eigenvalues and corresponding eigenvectors of a square matrix.                                            |
| <b>E6111.2</b>                                                             | Apply the knowledge of partial differentiation to evaluate Jacobian and extremities of two variable functions. |
| <b>E6111.3</b>                                                             | Evaluate the gradient of a scalar field and the divergence and curl of vector fields.                          |
| <b>E6111.4</b>                                                             | Solve ordinary differential equations using various techniques.                                                |
| <b>E6111.5</b>                                                             | Use Laplace transforms to solve first-order ordinary differential equations.                                   |

### Pre-requisites

Matrices, Determinants, Differentiation, Integration and Vector Algebra.

## CO-POs & PSOs mapping matrix

| CO                       | PO1       | PO2       | PO3       | PO4      | PO5      | PO6      | PO7       | PSO1      | PSO2      | PSO3      |
|--------------------------|-----------|-----------|-----------|----------|----------|----------|-----------|-----------|-----------|-----------|
| <b>E6111.1</b>           | 3         | 3         | 2         | 1        | 1        | 1        | 3         | 2         | 3         | 2         |
| <b>E6111.2</b>           | 3         | 3         | 2         | 1        | 1        | 1        | 3         | 2         | 3         | 2         |
| <b>E6111.3</b>           | 3         | 3         | 2         | 1        | 1        | 1        | 3         | 2         | 3         | 2         |
| <b>E6111.4</b>           | 3         | 3         | 2         | 1        | 1        | 1        | 3         | 2         | 3         | 2         |
| <b>E6111.5</b>           | 3         | 3         | 2         | 1        | 1        | 1        | 3         | 2         | 3         | 2         |
| <b>Total</b>             | <b>15</b> | <b>15</b> | <b>10</b> | <b>5</b> | <b>5</b> | <b>5</b> | <b>15</b> | <b>10</b> | <b>15</b> | <b>10</b> |
| <b>Correlation Level</b> | <b>3</b>  | <b>3</b>  | <b>2</b>  | <b>1</b> | <b>1</b> | <b>1</b> | <b>3</b>  | <b>2</b>  | <b>3</b>  | <b>2</b>  |

Correlation level 1 – Slight (low)

Correlation level 2 – Moderate (Medium)

Correlation level 3 – Substantial (high)

### Instructional Strategy

- A theory-demonstrate-practice-activity strategy may be used to ensure that learning is outcome-based.
- All demonstrations/Hands-on practices might be under a simulated environment.
- Use an inductor-deductive approach to achieve the desired learning objectives.
- Use open-ended questions to nurture the problem-solving and reasoning skills among students.
- Support and guide the students for self-study.
- State the need for mathematics with engineering studies and provide real-life examples.

### Assessment Methodology

|                           | Continuous Assessment(40marks) |                           |                                         |                       | End Semester Examination (60 marks) |
|---------------------------|--------------------------------|---------------------------|-----------------------------------------|-----------------------|-------------------------------------|
|                           | CA1                            | CA2                       | CA3                                     | CA4                   |                                     |
| <b>Mode</b>               | Written test (Unit 1 & 2)      | Written test (Unit 3 & 4) | Quiz MCQ (Online/ Offline)              | Model Examination     | Written Examination                 |
| <b>Duration</b>           | 2Periods                       | 2Periods                  | 1Hour                                   | 3Hours                | 3Hours                              |
| <b>Exam Marks</b>         | 50                             | 50                        | 60                                      | 100                   | 100                                 |
| <b>Converted to</b>       | 10                             | 10                        | 10                                      | 10                    | 60                                  |
| <b>Marks</b>              | 40                             |                           |                                         |                       | 60                                  |
| <b>Tentative Schedule</b> | 6 <sup>th</sup> Week           | 12 <sup>th</sup> Week     | 13 <sup>th</sup> -14 <sup>th</sup> Week | 16 <sup>th</sup> Week |                                     |

### CONTINUOUS ASSESSMENT

**CA1and CA2:** Assessment written test should be conducted for 50Marks for two units. The marks scored will be converted to 10 Marks for the internal assessment.

**CA1and CA2, Assessment test should be conducted for two units as below**

- PART A:(5X 10Marks=50Marks).
- Eight questions will be asked, students should write five questions. Four questions can be asked from each unit.

**CA3:** 60 MCQ can be asked by covering the entire portion. It may be conducted by Online / Offline. The marks scored should be converted to 10 marks for the internal assessment.

**CA4:** Model examination should be conducted as per the end semester question pattern. The marks should be converted to 10marks for the internal assessment.

### Question Pattern:

- Answer Ten questions by selecting two questions from each unit. Each question carries 10 marks.
- Four questions will be asked from every unit. Students should write any two questions.

## Question Pattern –Model Examination and End Semester Examination Theory Exam

### PART-A

(5x2x10Marks=100Marks)

Note: Answer Ten questions by selecting two questions from each unit. Each question carries 10 marks.

#### Sample:

- I. 1  
2  
3  
4
- II. 5  
6  
7  
8
- III. 9  
10  
11  
12
- IV. 13  
14  
15  
16
- V. 17  
18  
19  
20

### QUESTION PAPER SETTING

The teaching learning process and assessment are being carried out in accordance with the revised Blooms Taxonomy. The question paper should consist of 90% questions based on Lower Order Thinking (LOTs) and the remaining 10% based on Higher Order Thinking (HOTs) as detailed below.

| Revised Bloom's<br>Taxonomy<br>Level | Lower order thinking skills<br>(LOTs) | Higher Order Thinking<br>Skills (HOTs) |
|--------------------------------------|---------------------------------------|----------------------------------------|
|                                      | R-Remember, U-Understand,<br>AP-Apply | An- Analyse, E-Evaluate,<br>C-Create   |
| % to be included                     | 90 %                                  | 10 %                                   |

**CEE6111 - ADVANCED ENGINEERING MATHEMATICS**

| CEE6111                                                                                              | ADVANCED ENGINEERING MATHEMATICS      | L           | T | P | C      |
|------------------------------------------------------------------------------------------------------|---------------------------------------|-------------|---|---|--------|
| THEORY                                                                                               |                                       | 3           | 0 | 0 | 3      |
| <b>Unit-I</b>                                                                                        | <b>EIGEN VALUES AND EIGEN VECTORS</b> | <b>7Hrs</b> |   |   |        |
| Characteristic equation                                                                              |                                       |             |   |   | [1Hr]  |
| Eigen-values of $2 \times 2$ and $3 \times 3$ real matrices                                          |                                       |             |   |   | [1Hr]  |
| Eigen-vectors of $2 \times 2$ real matrices                                                          |                                       |             |   |   | [1Hr]  |
| Properties of eigen-values (excluding proof)                                                         |                                       |             |   |   | [1Hr]  |
| Cayley-Hamilton theorem (excluding proof)                                                            |                                       |             |   |   | [1Hr]  |
| Simple problems                                                                                      |                                       |             |   |   | [2Hrs] |
| <b>Unit-II</b>                                                                                       | <b>FUNCTIONS OF SEVERAL VARIABLES</b> | <b>7Hrs</b> |   |   |        |
| Partial derivatives of two variable and three variable functions (up to second order)                |                                       |             |   |   | [1Hr]  |
| Homogeneous functions                                                                                |                                       |             |   |   | [1Hr]  |
| Euler's theorem (excluding proof)                                                                    |                                       |             |   |   | [1Hr]  |
| Jacobian matrix and determinant                                                                      |                                       |             |   |   | [1Hr]  |
| Maxima and minima of functions of two variables                                                      |                                       |             |   |   | [1Hr]  |
| Simple problems.                                                                                     |                                       |             |   |   | [2Hrs] |
| <b>Unit-III</b>                                                                                      | <b>VECTOR CALCULUS</b>                | <b>7Hrs</b> |   |   |        |
| Scalar field and Vector field                                                                        |                                       |             |   |   | [1Hr]  |
| Vector differential operator                                                                         |                                       |             |   |   | [1Hr]  |
| Gradient of a scalar field                                                                           |                                       |             |   |   | [1Hr]  |
| Directional derivative                                                                               |                                       |             |   |   | [1Hr]  |
| Divergence and curl of a vector field (excluding properties)                                         |                                       |             |   |   | [1Hr]  |
| Solenoidal and irrotational vector fields                                                            |                                       |             |   |   | [2Hrs] |
| Simple problems.                                                                                     |                                       |             |   |   |        |
| <b>Unit-IV</b>                                                                                       | <b>DIFFERENTIAL EQUATIONS</b>         | <b>7Hrs</b> |   |   |        |
| Differential equation, Formation, Order and degree                                                   |                                       |             |   |   |        |
| Solution of a differential equation                                                                  |                                       |             |   |   | [1Hr]  |
| Equations of first order and first degree, Variable separable method                                 |                                       |             |   |   | [1Hr]  |
| Leibnitz's Linear equations                                                                          |                                       |             |   |   | [1Hr]  |
| Second order equations of the form $(aD^2 + bD + c)y = e^{nx}$ where $a, b, c$ and $n$ are constants |                                       |             |   |   | [1Hr]  |
| and the auxiliary equation $am^2 + bm + c = 0$ has only real roots) Complementary function           |                                       |             |   |   | [1Hr]  |
| Particular integral – General solution                                                               |                                       |             |   |   | [2Hrs] |
| Simple problems.                                                                                     |                                       |             |   |   |        |

| Unit-V                                                                                            | LAPLACE TRANSFORMS | 7Hrs      |
|---------------------------------------------------------------------------------------------------|--------------------|-----------|
| Definition of Laplace transform                                                                   |                    |           |
| Laplace transforms of standard functions                                                          |                    | [1Hr]     |
| Linearity and change of scale property (excluding proofs)                                         |                    | [1Hr]     |
| First shifting property, Laplace transforms of derivatives, Properties (excluding proofs) Inverse |                    | [1Hr]     |
| Laplace transforms, Properties (excluding proofs)                                                 |                    | [1Hr]     |
| Solving first order ordinary differential equation using Laplace transforms                       |                    | [2Hrs]    |
| Simple problems.                                                                                  |                    |           |
| <b>Test &amp; Revision</b>                                                                        |                    | <b>10</b> |
| <b>Total</b>                                                                                      |                    | <b>45</b> |

#### Suggested list of Students Activity,

- Demonstrate the applications of eigen-values in stability analysis, decouple of three-phase systems and vibration analysis.
- Demonstrate maxima and minima of two variable functions using GeoGebra graphing calculator.
- Demonstrate solenoidal vector field and irrotational vector field using engineering applications.
- Demonstrate the applications of differential equations in solving engineering problems.
- Presentation /Seminars by students.
- Quizzes.

#### Text Books

| S.NO | TITLE                                   | AUTHOR                                                       | PUBLISHERWITHEDITION                               |
|------|-----------------------------------------|--------------------------------------------------------------|----------------------------------------------------|
| 1.   | Higher Engineering Mathematics          | John Bird                                                    | Routledge, 9 <sup>th</sup> Edition, 2021.          |
| 2.   | Higher Engineering Mathematics          | Grewal, B.S                                                  | Khanna Publishers, 42 <sup>nd</sup> Edition, 2012. |
| 3.   | Differential Equations and Applications | Arumugam, S.,<br>Thangapandi Isaac, A.<br>& Somasundaram, A. | Yes, Dee Publishing Pvt. Ltd., 2020.               |
| 4.   | Vector Analysis                         | Duraipandian, P., &<br>KayalalPachaiyappa,                   | S Chand and Company Limited, 2014.                 |
| 5.   | Calculus Volume I and II                | Narayanan, S.,<br>&Manicavachagom<br>Pillai T.K              | Viswanathan Publishers Pvt. Ltd., 2007             |

### Web-based/Online Resources

| S.No | Website/Links                                                                         |
|------|---------------------------------------------------------------------------------------|
| 1    | <a href="https://www.khanacademy.org/math/">https://www.khanacademy.org/math/</a>     |
| 2    | <a href="https://www.mathportal.org/">https://www.mathportal.org/</a>                 |
| 3    | <a href="https://openstax.org/subjects/math/">https://openstax.org/subjects/math/</a> |
| 4    | <a href="https://www.mathhelp.com/">https://www.mathhelp.com/</a>                     |
| 5    | <a href="https://www.geogebra.org/">https://www.geogebra.org/</a>                     |
| 6    | <a href="https://www.desmos.com/">https://www.desmos.com/</a>                         |
| 7    | <a href="https://phet.colorado.edu/">https://phet.colorado.edu/</a>                   |

# MODEL QUESTION PAPER

## CEE6115– ADVANCED ENGINEERING MATHEMATICS

Time : 3Hrs

MaxMarks:100

PART-A

(5x2x10Marks=100Marks)

Note: Answer Ten questions by selecting two questions from each unit.

Each question carries 10 marks

| s.no | Questions                                                                                                                                                                                                                                           | Unit | Bloom's Level | Course Outcom | Program Outcomes |
|------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|---------------|---------------|------------------|
| I    | 1.Find all Eigen values and corresponding eigenvectors for the matrix A if $\begin{pmatrix} 2 & -3 & 0 \\ 2 & -5 & 0 \\ 0 & 0 & 3 \end{pmatrix}$                                                                                                    | I    | R             | E6111.1       | PO2,PO5, PO7     |
|      | 2. Find Eigen values and eigenvectors Corresponding to counterclockwise rotation through the angle $\pi/2$ about the origin in $R^2$ .                                                                                                              | I    | R             | E6111.1       | PO2,PO5, PO7     |
|      | 3. The following matrix represents a rotation of a drone in three-dimensional space. Find its axis of rotation. $A = \begin{pmatrix} \sqrt{3}/2 & -0 & 0.5 \\ 0 & 1 & 0 \\ -0.5 & 0 & \sqrt{3}/2 \end{pmatrix}$                                     | I    | U             | E6111.1       | PO2,PO5, PO7     |
|      | 4. Given the matrices $A = \begin{pmatrix} 0 & 2 \\ 1 & 1 \end{pmatrix}$ and $A^{-1} = \begin{pmatrix} -0.5 & 1 \\ 0.5 & 0 \end{pmatrix}$ find their eigen values and the eigenvectors. How are the trace and the eigen values of a matrix related? | I    | R             | E6111.1       | PO2,PO5, PO7     |
| II   | 5.Determine the partial derivative of the functions:<br>$f(x,y) = 3x + 4y$<br>$f(x,y) = x^2y + \sin x + \cos y$ .                                                                                                                                   | II   | R             | E6111.2       | PO2,PO5, PO7     |
|      | 6.Find the 1st order partial derivative of $F(x,y,z) = 4x^3y^2 - e^zy^4 + \frac{z^2}{x^2} + 4y - x^{16}$ .                                                                                                                                          | II   | U             | E6111.2       | PO2,PO5, PO7     |
|      | 7. Find $\frac{\partial z}{\partial x}$ and $\frac{\partial z}{\partial y}$ for the following function.<br>$x^2 \sin(y^3) + xe^{3z} - \cos(z^2) = 3y - 6z + 8$                                                                                      | II   | R             | E6111.2       | PO2,PO5, PO7     |
|      | 8. Find the second partial derivatives of $f(x, y) = \sin(x)y^2$                                                                                                                                                                                    | II   | R             | E6111.2       | PO2,PO5, PO7     |
| III  | 9. Calculate the angle between two vectors $\vec{i} - 2\vec{j} + 3\vec{k}$ and $3\vec{i} - 2\vec{j} + \vec{k}$ .                                                                                                                                    | III  | R             | E6111.3       | PO2,PO5, PO7     |
|      | 10. A girl walks 4 kilometres west, then 3 kilometres in a direction 30 degrees east of north, before coming to a halt. Determine the girl's distance from her starting position.                                                                   | III  | U             | E6111.3       | PO2,PO5, PO7     |

|    |                                                                                                                                                        |     |   |         |              |
|----|--------------------------------------------------------------------------------------------------------------------------------------------------------|-----|---|---------|--------------|
|    | 11. Prove that the given point A, B, C are collinear using vector method A(6,-7,-1), B(2,-3,1) and C(4,-5,0).                                          | III | U | E6111.3 | PO2,PO5, PO7 |
|    | 12. Show that the parallelograms on the same base and between the same parallels are equal in area using the vector method.                            | III | R | E6111.3 | PO2,PO5, PO7 |
| IV | 13. Form the differential equation of the family of circles having a centre on y-axis and radius 3 units.                                              | IV  | R | E6111.4 | PO2,PO5, PO7 |
|    | 14. Find the equation of a curve passing through (1, $\pi/4$ ) if the slope of the tangent to the curve at any point P (x, y) is $y/x - \cos^2(y/x)$ . | IV  | U | E6111.4 | PO2,PO5, PO7 |
|    | 15. Given that $dy/dx = e^{-2y}$ and $y = 0$ when $x = 5$ . Find the value of x when $y = 3$ .                                                         | IV  | R | E6111.4 | PO2,PO5, PO7 |
|    | 16. Solve the initial value problem: $\cos(a+b)dy = dx$ , $y(0) = 0$ .                                                                                 | IV  | R | E6111.4 | PO2,PO5, PO7 |
| V  | 17. Find the Laplace transform of $3+t^5+\sin(\pi t)$                                                                                                  | V   | U | E6111.5 | PO2,PO5, PO7 |
|    | 18. Solve $x''+x=u(t-1)$ for initial conditions $x(0)=0$ and $x'(0)=0$ .                                                                               | V   | R | E6111.5 | PO2,PO5, PO7 |
|    | 19. Find the transfer function form $x''+cx'+kx=f(t)$ (assuming the initial conditions are zero).                                                      | V   | R | E6111.5 | PO2,PO5, PO7 |
|    | 20. Solve $x(t) = e^{-t} + \int_0^t \cos(t-\tau)x(\tau) d\tau$ .                                                                                       | V   | U | E6111.5 | PO2,PO5, PO7 |

### QUESTION PAPER SETTING

The teaching learning process and assessment are being carried out in accordance with the revised Blooms Taxonomy. The question paper should consist of 90% questions based on Lower Order Thinking (LOTs) and the remaining 10% based on Higher Order Thinking (HOTs) as detailed below.

| Revised Bloom's Taxonomy Level | Lower order thinking skills (LOTs) | Higher Order Thinking Skills (HOTs) |
|--------------------------------|------------------------------------|-------------------------------------|
|                                | R-Remember, U-Understand, AP-Apply | An- Analyse, E-Evaluate, C-Create   |
| % to be included               | 90 %                               | 10 %                                |

## CEE6112 -ENTREPRENEURSHIP

Programme Name : CIVIL ENGINEERING  
 Course Code : CEE6112  
 Semester : VI SEMESTER  
 Course Title : ENTREPRENEURSHIP  
 Course Type : THEORY

| L | T | P | C |
|---|---|---|---|
| 3 | 0 | 0 | 3 |

### TEACHING AND SCHEME OF EXAMINATION

No. of weeks per semester: 15 weeks

| Course           | Instructions |                  | Examination         |                        |       |          |
|------------------|--------------|------------------|---------------------|------------------------|-------|----------|
|                  | Hours / Week | Hours / Semester | Marks               |                        |       | Duration |
|                  |              |                  | Internal Assessment | Autonomous Examination | Total |          |
| Entrepreneurship | 3            | 45               | 40                  | 100*                   | 100   | 3 Hrs    |

\*Examinations will be conducted for 100 marks and will be converted to 60 marks

### TOPICS AND ALLOCATION OF HOURS

| Unit                       | Topics                                      | Time (Hrs) |
|----------------------------|---------------------------------------------|------------|
| I                          | Entrepreneurship – Introduction and process | 07         |
| II                         | Business Idea                               | 07         |
| III                        | Banking                                     | 07         |
| IV                         | Pricing and Cost Analysis                   | 07         |
| V                          | Business plan preparation                   | 07         |
| <b>Test &amp; Revision</b> |                                             | <b>10</b>  |
| <b>Total</b>               |                                             | <b>45</b>  |

### COURSE DESCRIPTION

Development of a diploma curriculum is a dynamic process responsive to the society and reflecting the needs and aspirations of its learners. Fast changing society deserves changes in educational curriculum particularly to establish relevance to emerging socio-economic Environments to ensure equity of opportunity and participation and finally promote concern for excellence. In this context the course on entrepreneurship and star ups aims at instilling and stimulating human urge for excellence by realizing individual potential for generating and putting to use the inputs relevant to social prosperity and thereby ensuring good means of living for every individual, providing jobs and developing the Indian economy.

### COURSE OBJECTIVE

After completing this subject, the student will be able to

- Acquire entrepreneurial spirit and resourcefulness
- Familiarize Acquire knowledge about the business idea and product selection

- Analyze the banking and financial institutions
- Understand the pricing policy and cost analysis
- Get knowledge about the business plan preparation

## COURSE OUTCOMES

| After successful completion of this course, the students should be able to |                                                                     |
|----------------------------------------------------------------------------|---------------------------------------------------------------------|
| <b>E6112.1</b>                                                             | Explain the process of entrepreneurship                             |
| <b>E6112.2</b>                                                             | Analyse the importance of generation of ideas and product selection |
| <b>E6112.3</b>                                                             | Familiarization of various financial and non financial schemes      |
| <b>E6112.4</b>                                                             | Acquire various cost components to arrive pricing of the product    |
| <b>E6112.5</b>                                                             | Learn the preparation of project feasibility report                 |

### Pre-requisites

Knowledge of basics of Engineering and Industrial engineering

### CO-POs & PSOs mapping matrix

| CO                       | PO1 | PO2      | PO3      | PO4      | PO5       | PO6       | PO7       | PSO1      | PSO2      | PSO3      |
|--------------------------|-----|----------|----------|----------|-----------|-----------|-----------|-----------|-----------|-----------|
| <b>E6112.1</b>           | -   | -        | -        | -        | 3         | 1         | 3         | 2         | 2         | 2         |
| <b>E6112.2</b>           | -   | -        | -        | -        | 3         | 3         | 3         | 2         | 2         | 2         |
| <b>E6112.3</b>           | -   | -        | -        | 1        | -         | 3         | 2         | 2         | 2         | 2         |
| <b>E6112.4</b>           | -   | 1        | 3        | 3        | 2         | 3         | 2         | 2         | 2         | 2         |
| <b>E6112.5</b>           | -   | 2        | 3        | 3        | 3         | 3         | 3         | 2         | 2         | 2         |
| <b>Total</b>             | -   | <b>3</b> | <b>6</b> | <b>7</b> | <b>11</b> | <b>13</b> | <b>13</b> | <b>10</b> | <b>10</b> | <b>10</b> |
| <b>Correlation Level</b> | -   | <b>1</b> | <b>1</b> | <b>1</b> | <b>2</b>  | <b>3</b>  | <b>3</b>  | <b>2</b>  | <b>2</b>  | <b>2</b>  |

Correlation level 1 – Slight (low)

Correlation level 2 – Moderate (Medium)

Correlation level 3 – Substantial (high)

### Instructional Strategy

- Engage and Motivate: Instructors should actively engage students to boost their learning confidence.
- Real-World Relevance: Incorporate relatable, real-life examples and applications to help students understand and appreciate course concepts.
- Interactive Learning: Utilize demonstrations and plan interactive student activities for an engaging learning experience.
- Application-Based Learning: Employ a theory-demonstrate-practice- activity strategy throughout the course to ensure outcome-driven learning and employability.
- Simulation and Real-World Practice: Conduct demonstrations and hands-on activities in a simulated environment, transitioning to real- world scenarios when possible.

**Assessment Methodology:**

|                           | Continuous Assessment(40marks) |                          |                                         |                       | End Semester Examination (60 marks) |
|---------------------------|--------------------------------|--------------------------|-----------------------------------------|-----------------------|-------------------------------------|
|                           | CA1                            | CA2                      | CA3                                     | CA4                   |                                     |
| <b>Mode</b>               | Writtentest (Unit 1 & 2)       | Writtentest (Unit 3 & 4) | Quiz MCQ (Online/ Offline)              | Model Examination     | Written Examination                 |
| <b>Duration</b>           | 2Periods                       | 2Periods                 | 1Hour                                   | 3Hours                | 3Hours                              |
| <b>Exam Marks</b>         | 50                             | 50                       | 60                                      | 100                   | 100                                 |
| <b>Converted to</b>       | 10                             | 10                       | 10                                      | 10                    | 60                                  |
| <b>Marks</b>              | 40                             |                          |                                         |                       | 60                                  |
| <b>Tentative Schedule</b> | 6 <sup>th</sup> Week           | 12 <sup>th</sup> Week    | 13 <sup>th</sup> -14 <sup>th</sup> Week | 16 <sup>th</sup> Week |                                     |

**CONTINUOUS ASSESSMENT**

**CA1and CA2:** Assessment written test should be conducted for 50Marks for two units. The marks scored will be converted to 10 Marks for the internal assessment.

**CA1and CA2, Assessment test should be conducted for two units as below**

- PART A:(5X 10Marks=50Marks).
- Eight questions will be asked, students should write five questions. Four questions can be asked from each unit.

**CA3:** 60 MCQ can be asked by covering the entire portion. It may be conducted by Online / Offline. The marks scored should be converted to 10 marks for the internal assessment.

**CA4:** Model examination should be conducted as per the end semester question pattern. The marks should be converted to 10marks for the internal assessment.

**Question Pattern:**

- Answer Ten questions by selecting two questions from each unit. Each question carries 10 marks.
- Four questions will be asked from every unit. Students should write any two questions.

## Question Pattern –Model Examination and End Semester Examination Theory Exam

PART-A (5x2x10Marks=100Marks)

Note: Answer Ten questions by selecting two questions from each unit. Each question carries 10 marks.

### Sample:

- I. 1
- 2
- 3
- 4
- II. 5
- 6
- 7
- 8
- III. 9
- 10
- 11
- 12
- IV. 13
- 14
- 15
- 16
- V. 17
- 18
- 19
- 20

## QUESTION PAPER SETTING

The teaching learning process and assessment are being carried out in accordance with the revised Blooms Taxonomy. The question paper should consist of 90% questions based on Lower Order Thinking (LOTs) and the remaining 10% based on Higher Order Thinking (HOTs) as detailed below.

| Revised Bloom's<br>Taxonomy<br>Level | Lower order thinking skills<br>(LOTs) | Higher Order Thinking<br>Skills (HOTs) |
|--------------------------------------|---------------------------------------|----------------------------------------|
|                                      | R-Remember, U-Understand,<br>AP-Apply | An- Analyse, E-Evaluate,<br>C-Create   |
| % to be included                     | 90 %                                  | 10 %                                   |

**CEE6112– ENTREPRENEURSHIP**

| CEE6112                                                                                           |                                             | ENTREPRENEURSHIP | L | T | P | C      |
|---------------------------------------------------------------------------------------------------|---------------------------------------------|------------------|---|---|---|--------|
| THEORY                                                                                            |                                             |                  | 3 | 0 | 0 | 3      |
| Unit-I                                                                                            | ENTREPRENEURSHIP – INTRODUCTION AND PROCESS |                  |   |   |   | 7 Hrs  |
| Concept of entrepreneurship - Importance, Myths about Entrepreneurship,                           |                                             |                  |   |   |   | [1Hr]  |
| Pros and Cons of Entrepreneurship, Process of Entrepreneurship                                    |                                             |                  |   |   |   | [1Hr]  |
| Competencies and characteristics of an entrepreneur                                               |                                             |                  |   |   |   | [1Hr]  |
| Ethical Entrepreneurship, Entrepreneurial Values and Attitudes, Creativity,                       |                                             |                  |   |   |   | [1Hr]  |
| Innovation and entrepreneurship                                                                   |                                             |                  |   |   |   | [1Hr]  |
| Entrepreneurs - as problem solvers - Mindset of an employee and an entrepreneur, -                |                                             |                  |   |   |   | [2Hrs] |
| Risk Taking-Concepts – Roll of networking in entrepreneurship                                     |                                             |                  |   |   |   |        |
| Unit-II                                                                                           | BUSINESS IDEA                               |                  |   |   |   | 7 Hrs  |
| Types of Business Manufacturing,                                                                  |                                             |                  |   |   |   | [1Hr]  |
| Trading and Services, Stakeholders sellers, vendors and consumers and Competitors,                |                                             |                  |   |   |   | [1Hr]  |
| E-commerce Business Models,                                                                       |                                             |                  |   |   |   | [1Hr]  |
| business idea generation -Types of Resources - Human                                              |                                             |                  |   |   |   |        |
| Capital and Entrepreneurial tools and resources, etc.,- setting business goals- Patent, copyright |                                             |                  |   |   |   | [1Hr]  |
| and Intellectual property rights, Customer Relations and Vendor Management                        |                                             |                  |   |   |   | [1Hr]  |
| Business Ideas vs Business Opportunities, Opportunity – SWOT ANALYSIS of a business idea          |                                             |                  |   |   |   | [1Hr]  |
| Business Failure – causes and remedies- Types of business risks.                                  |                                             |                  |   |   |   | [1Hr]  |
| Unit-III                                                                                          | BANKING                                     |                  |   |   |   | 7 Hrs  |
| Size and capital based                                                                            |                                             |                  |   |   |   | [1Hr]  |
| classification of business enterprises-                                                           |                                             |                  |   |   |   | [1Hr]  |
| Role of financial institutions,                                                                   |                                             |                  |   |   |   | [1Hr]  |
| Role of Government policy,                                                                        |                                             |                  |   |   |   | [1Hr]  |
| Entrepreneurial support systems,                                                                  |                                             |                  |   |   |   | [1Hr]  |
| Incentive schemes for state government, and Incentive schemes for Central governments.            |                                             |                  |   |   |   | [2Hrs] |
| Unit -IV                                                                                          | PRICING AND COST ANALYSIS                   |                  |   |   |   | 7 Hrs  |
| Types of Costs Variable Fixed- Operational Costs                                                  |                                             |                  |   |   |   | [1Hr]  |
| Break Even Analysis - for single product or service                                               |                                             |                  |   |   |   | [1Hr]  |
| financial Business Case Study, Understand the meaning and concept of the term Cash                |                                             |                  |   |   |   | [1Hr]  |
| Inflow and Cash Outflow- Pricing                                                                  |                                             |                  |   |   |   | [1Hr]  |
| Calculate Per Unit Cost of a single product                                                       |                                             |                  |   |   |   | [1Hr]  |
| Understand the importance and preparation of Income Statement                                     |                                             |                  |   |   |   | [1Hr]  |
| Prepare a Cash Flow Projection- Factors affecting pricing.- GST.                                  |                                             |                  |   |   |   | [1Hr]  |

|                                                                                           |                                  |             |
|-------------------------------------------------------------------------------------------|----------------------------------|-------------|
| <b>Unit-V</b>                                                                             | <b>BUSINESS PLAN PREPARATION</b> | <b>7Hrs</b> |
| Feasibility Report                                                                        |                                  | [1Hr]       |
| Technical analysis, financial analysis- Market Research                                   |                                  | [1Hr]       |
| Concept, Importance and Process- tools for market research- Market Sensing and Testing    |                                  | [1Hr]       |
| Marketing and Sales strategy, Digital marketing, Branding - Business name, logo, tag line |                                  | [1Hr]       |
| Promotion strategy, Business Plan Preparation,                                            |                                  | [1Hr]       |
| Concept and Importance, Execution of Business Plan.                                       |                                  | [2Hrs]      |
| <b>Test &amp; Revision</b>                                                                |                                  | <b>10</b>   |
| <b>Total</b>                                                                              |                                  | <b>45</b>   |

### Suggested list of Students Activity

1. Students can explore app development or web design. They'll learn about technology, user experience, and marketing.
2. Hosting events, workshops, or conferences allows students to practice project management, networking, and marketing skills.
3. Encourage students to address social or environmental issues through innovative business solutions. This fosters empathy and creativity.
4. Part of entrepreneurship clubs or organizations provides networking opportunities, mentorship, and exposure to real-world challenges.
5. Competitions like business plan contests or pitch events allow students to showcase their ideas and receive feedback.
6. Students can create and sell handmade crafts, artwork, or other products. This teaches them about production, pricing, and customer relations.
7. Students can provide consulting services in areas they're knowledgeable about, such as social media marketing or financial planning.
8. Encourage students to create and manage their own small business or offer freelance services. This hands-on experience helps them understand various aspects of entrepreneurship.

### Text Books

| S. NO | TITLE                            | AUTHOR        | PUBLISHER WITH EDITION                                             |
|-------|----------------------------------|---------------|--------------------------------------------------------------------|
| 1.    | Fundamentals of Entrepreneurship | G.K. Varshney | Sahitya Bhawan Publications, Agra., 2019                           |
| 2.    | Fundamentals of Entrepreneurship | H.Nandan      | Prentice Hall India Learning Private Limited, Third Edition, 2013. |
| 3.    | Entrepreneurship Development &   | R.K. Singal   | Management, S K Kataria and Sons, 2013.                            |

### Web-based/Online Resources

| S. No | Website/Links                                                                                                                                                                         |
|-------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1     | <a href="https://ocw.mit.edu/courses/15-390-new-enterprises-spring-2013/resources/lecture-1/">https://ocw.mit.edu/courses/15-390-new-enterprises-spring-2013/resources/lecture-1/</a> |
| 2     | <a href="https://onlinecourses.nptel.ac.in/noc20_ge08/preview">https://onlinecourses.nptel.ac.in/noc20_ge08/preview</a>                                                               |

## MODEL QUESTION PAPER

### CEE6112– ENTREPRENEURSHIP

**Time: 3Hrs**

**Max Marks: 100**

PART-A

(5x2x10Marks=100Marks)

Note: Answer Ten questions by selecting two questions from each unit.

Each question carries 10 marks

| s.no | Questions                                                                                                                        | Unit | Blooms Level | Course Outcome | Program Outcomes |
|------|----------------------------------------------------------------------------------------------------------------------------------|------|--------------|----------------|------------------|
| I    | 1.(i) Explain about the Process of entrepreneurship<br>(ii)Explain about the Pros and Cons of Entrepreneurship                   | I    | R            | E6112.1        | PO1, PO2, PO3    |
|      | 2.(i)Explain about the Competencies and characteristics of an entrepreneur<br>(ii)Explain about the Ethical Entrepreneurship     | I    | U            | E6112.1        | PO1, PO2         |
|      | 3.(i)Explain about the Entrepreneurial Values and Attitudes<br>(ii)Explain about the Mind set of an employee and an entrepreneur | I    | R            | E6112.1        | PO1, PO2, PO3    |
|      | 4.(i)Explain about Risk Taking<br>(ii)Write shot notes on Myths aboutEntrepreneurship                                            | I    | U            | E6112.1        | PO1, PO2, PO3    |
| II   | 5.Explain about the Types of Business                                                                                            | II   | R            | E6112.2        | PO1, PO2, PO3    |
|      | 6.Explain about the E-commerce Business Models                                                                                   | II   | R            | E6112.2        | PO1, PO2, PO3    |
|      | 7.Explain about the SWOT ANALYSIS of a business idea                                                                             | II   | U            | E6112.2        | PO1, PO2, PO3    |
|      | 8.Explain about the Causes and remedies Business Failure                                                                         | II   | R            | E6112.2        | PO1, PO2         |
| III  | 9.Explain about the classification of business enterprises                                                                       | III  | U            | E6112.3        | PO1, PO2         |
|      | 10.Explain about the Role of financial institutions & Government policy                                                          | III  | U            | E6112.3        | PO2, PO3         |
|      | 11.Explain about the Incentive schemes for state government                                                                      | III  | U            | E6112.3        | PO2, PO3         |
|      | 12. Explain about the Incentive schemes for Central governments.                                                                 | III  | U            | E6112.3        | PO2, PO3         |

|    |                                                                                            |    |    |         |                       |
|----|--------------------------------------------------------------------------------------------|----|----|---------|-----------------------|
| VI | 13.Explain about the Break Even Analysis for single product or service                     | IV | U  | E6112.4 | PO2, PO3              |
|    | 14.(i)Explain about Cash Inflow and Cash outflow<br>(ii)Explain about the Income Statement | IV | R  | E6112.4 | PO2, PO3, PO4         |
|    | 15.How to Prepare a Cash Flow Projection                                                   | IV | R  | E6112.4 | PO2, PO3, PO4         |
|    | 16. Explain about the Factors affecting pricing.                                           | IV | U  | E6112.4 | PO1,PO2,PO3, PO4      |
| V  | 17.Explain about the Technical analysis & financial analysis                               | V  | U  | E6112.5 | PO1, PO2, PO3, PO4    |
|    | 18.Explain about the Market Sensing and Testing                                            | V  | AP | E6112.5 | PO1,PO2,PO3, PO4, PO5 |
|    | 19.(i)Explain about the Sales strategy<br>(ii)Explain about the Digital marketing          | V  | R  | E6112.5 | PO2, PO3, PO4         |
|    | 20.(i)Explain about Branding<br>(ii)Explain about Execution of Business Plan.              | V  | U  | E6112.5 | PO1, PO2, PO3, PO4    |

### QUESTION PAPER SETTING

The teaching learning process and assessment are being carried out in accordance with the revised Blooms Taxonomy. The question paper should consist of 90% questions based on Lower Order Thinking (LOTs) and the remaining 10% based on Higher Order Thinking (HOTs) as detailed below.

| Revised Bloom's Taxonomy Level | Lower order thinking skills (LOTs) | Higher Order Thinking Skills (HOTs) |
|--------------------------------|------------------------------------|-------------------------------------|
|                                | R-Remember, U-Understand, AP-Apply | An- Analyse, E-Evaluate, C-Create   |
| % to be included               | 90 %                               | 10 %                                |

**CEE6113 – PROJECT MANAGEMENT**

Programme Name : CIVIL ENGINEERING  
 Course Code : CEE6113  
 Semester : VI SEMESTER  
 Course Title : PROJECT MANAGEMENT  
 Course Type : THEORY

| L | T | P | C |
|---|---|---|---|
| 3 | 0 | 0 | 3 |

**TEACHING AND SCHEME OF EXAMINATION**

No. of weeks per semester: 15 weeks

| Course             | Instructions |                  | Examination         |                        |       |          |
|--------------------|--------------|------------------|---------------------|------------------------|-------|----------|
|                    | Hours / Week | Hours / Semester | Marks               |                        |       | Duration |
|                    |              |                  | Internal Assessment | Autonomous Examination | Total |          |
| Project management | 3            | 45               | 40                  | 100*                   | 100   | 3 Hrs    |

\*Examinations will be conducted for 100 marks and will be converted to 60 marks

**TOPICS AND ALLOCATION OF HOURS**

| Unit                       | Topics                                                                                                                                                             | Time (Hrs) |
|----------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|
| I                          | Project management – an overview, project portfolio management system and structure, steps in defining project and project delays                                  | 07         |
| II                         | Various stages and components of project feasibility studies, phases of a project, stages in project life cycle and project constraints                            | 07         |
| III                        | Project evaluation under certainty and uncertainty, project evaluation, commercial and social cost benefit analysis                                                | 07         |
| IV                         | Developing project network using PERT and CPM, project appraisal and control process.                                                                              | 07         |
| V                          | Project managing versus leading of project, qualities of project manager and managing project teams, team building models and performance teams and team pitfalls. | 07         |
| <b>Test &amp; Revision</b> |                                                                                                                                                                    | <b>10</b>  |
| <b>Total</b>               |                                                                                                                                                                    | <b>45</b>  |

**COURSE DESCRIPTION**

Project management is the systematic application of knowledge, skills, tools, and techniques to project activities to meet specific project requirements. It involves planning, organizing, and managing resources to achieve project goals within defined scope, time, and budget constraints. Project management encompasses several key processes and phases, including initiation, planning, and execution, monitoring and controlling, and closing. It is essential across various industries to ensure projects are completed successfully, efficiently, and effectively, aligning with organizational objectives and stakeholder expectations. Project managers play a crucial role in leading teams, managing risks, ensuring quality, and communicating with stakeholders to drive project success.

## COURSE OBJECTIVE

After completing this subject, the student will be able,

- To understand the concept, characteristics and elements of projects.
- To understand the stages in Project Life Cycle.
- To appreciate the need for Project Portfolio Management System.
- To know the considerations in choosing appropriate project management structure.
- To understand the components of techno-economic feasibility studies.
- To know about the detailed project report
- To learn about project constraints.
- To understand the techniques of evaluation.
- To get insight into the Social Cost Benefit Analysis Method.
- To know how to construct project networks using PERT and CPM.
- To learn how to crash project networks
- To understand the meaning of project appraisal.
- To understand the meaning of project audits.
- To know the qualities of an effective project manager.
- To understand the stages in the Team Development model.

## COURSE OUTCOMES

| After successful completion of this course, the students should be able to |                                                      |
|----------------------------------------------------------------------------|------------------------------------------------------|
| <b>E6113.1</b>                                                             | Explain the principles of project management         |
| <b>E6113.2</b>                                                             | Create and manage project schedules.                 |
| <b>E6113.3</b>                                                             | Create structure and manage the project commitments. |
| <b>E6113.4</b>                                                             | Acquire to gain enterprise support.                  |
| <b>E6113.5</b>                                                             | Prepare a detailed project report (DPR)              |

### Pre-requisites

Basic Knowledge

### CO-POs & PSOs mapping matrix

| CO                       | PO1       | PO2      | PO3      | PO4      | PO5      | PO6       | PO7      | PSO1      | PSO2      | PSO3      |
|--------------------------|-----------|----------|----------|----------|----------|-----------|----------|-----------|-----------|-----------|
| <b>E6113.1</b>           | 3         | -        | -        | -        | -        | 3         | 1        | 3         | 3         | 2         |
| <b>E6113.2</b>           | 3         | -        | -        | -        | 1        | 3         | 1        | 3         | 3         | 2         |
| <b>E6113.3</b>           | 3         | -        | -        | 1        | 1        | 3         | 1        | 3         | 3         | 2         |
| <b>E6113.4</b>           | 3         | -        | -        | -        | 1        | 3         | 1        | 3         | 3         | 2         |
| <b>E6113.5</b>           | 3         | -        | -        | 1        | 1        | 3         | 1        | 3         | 3         | 2         |
| <b>Total</b>             | <b>15</b> | <b>-</b> | <b>-</b> | <b>2</b> | <b>4</b> | <b>15</b> | <b>5</b> | <b>15</b> | <b>15</b> | <b>10</b> |
| <b>Correlation Level</b> | <b>3</b>  | <b>-</b> | <b>-</b> | <b>1</b> | <b>1</b> | <b>3</b>  | <b>1</b> | <b>3</b>  | <b>3</b>  | <b>2</b>  |

Correlation level 1 – Slight (low)

Correlation level 2 – Moderate (Medium)

Correlation level 3 – Substantial (high)

### Instructional Strategy

- It is advised that teachers take steps to pique pupils' attention and boost their curiosity to learn.

- Implement task-based learning activities where students work on specific tasks or projects.
- Incorporate technology tools and resources, such as online platforms, interactive multimedia, and virtual communication tools, to enhance engagement and provide additional practice opportunities.
- All demonstrations/Hand-on practices may be followed in the real environment as far as possible.

#### Assessment Methodology:

|                           | Continuous Assessment (40marks) |                          |                                         |                       | End Semester Examination (60 marks) |
|---------------------------|---------------------------------|--------------------------|-----------------------------------------|-----------------------|-------------------------------------|
|                           | CA1                             | CA2                      | CA3                                     | CA4                   |                                     |
| <b>Mode</b>               | Writtentest (Unit 1 & 2)        | Writtentest (Unit 3 & 4) | Quiz MCQ (Online/ Offline)              | Model Examination     | Written Examination                 |
| <b>Duration</b>           | 2Periods                        | 2Periods                 | 1Hour                                   | 3Hours                | 3Hours                              |
| <b>Exam Marks</b>         | 50                              | 50                       | 60                                      | 100                   | 100                                 |
| <b>Converted to</b>       | 10                              | 10                       | 10                                      | 10                    | 60                                  |
| <b>Marks</b>              | 40                              |                          |                                         |                       | 60                                  |
| <b>Tentative Schedule</b> | 6 <sup>th</sup> Week            | 12 <sup>th</sup> Week    | 13 <sup>th</sup> -14 <sup>th</sup> Week | 16 <sup>th</sup> Week |                                     |

#### CONTINUOUS ASSESSMENT

**CA1and CA2:** Assessment written test should beconducted for 50Marks for two units. The marks scored will be converted to 10 Marks for the internal assessment.

**CA1and CA2, Assessment test should be conducted for two units as below**

- PART A:(5X10Marks=50Marks).
- Eight questions will be asked, students should write five questions. Four questions can be asked from each unit.

**CA3:** 60 MCQ can be asked by covering the entire portion. It may be conducted by Online / Offline. The marks scored should be converted to 10 marks for the internal assessment.

**CA4:** Model examination should be conducted as per the end semester question pattern. The marks should be converted to 10marks for theinternal assessment.

#### Question Pattern:

Answer Ten questions by selecting two questions from each unit. Each question carries 10 marks.

- Four questions will be asked from every unit. Students should
- Write any two questions.

## Question Pattern –Model Examination and End Semester Examination Theory Exam

### PART-A

(5x2x10Marks=100Marks)

Note: Answer Ten questions by selecting two questions from each unit. Each question carries 10 marks.

#### Sample:

- I  
1  
2  
3  
4  
II.  
5  
6  
7  
8  
III.  
9  
10  
11  
12  
IV.  
13  
14  
15  
16  
V.  
17  
18  
19  
20

#### QUESTION PAPER SETTING:

The teaching learning process and assessment are being carried out in accordance with the revised Blooms Taxonomy. The question paper should consist of 90% questions based on Lower Order Thinking (LOTs) and the remaining 10% based on Higher Order Thinking (HOTs) as detailed below.

| Revised Bloom's<br>Taxonomy<br>Level | Lower order thinking skills<br>(LOTs) | Higher Order Thinking<br>Skills (HOTs) |
|--------------------------------------|---------------------------------------|----------------------------------------|
|                                      | R-Remember, U-Understand,<br>AP-Apply | An- Analyse, E-Evaluate,<br>C-Create   |
| % to be included                     | 90 %                                  | 10 %                                   |

**CEE6113 - PROJECT MANAGEMENT**

| CEE6113                                                                                                                         |                                                                                                                                         | PROJECT MANAGEMENT | L | T | P | C     |
|---------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------|--------------------|---|---|---|-------|
| THEORY                                                                                                                          |                                                                                                                                         |                    | 3 | 0 | 0 | 3     |
| Unit-I                                                                                                                          | PROJECT MANAGEMENT – AN OVERVIEW, PROJECT PORTFOLIO MANAGEMENT SYSTEM AND STRUCTURE, STEPS IN DEFINING PROJECT AND PROJECT DELAYS       |                    |   |   |   | 7Hrs  |
| Project – Classification                                                                                                        |                                                                                                                                         |                    |   |   |   | [1Hr] |
| Importance of Project Management                                                                                                |                                                                                                                                         |                    |   |   |   | [1Hr] |
| An Integrated Approach – Project Portfolio Management System – The Need – Choosing the appropriate Project Management Structure |                                                                                                                                         |                    |   |   |   | [1Hr] |
| Organizational considerations and project considerations                                                                        |                                                                                                                                         |                    |   |   |   | [1Hr] |
| Steps in defining the project – project Rollup – Process breakdown structure                                                    |                                                                                                                                         |                    |   |   |   | [1Hr] |
| Responsibility Matrices – External causes of delay and internal constraints.                                                    |                                                                                                                                         |                    |   |   |   | [1Hr] |
| Unit-II                                                                                                                         | VARIOUS STAGES AND COMPONENTS OF PROJECT FEASIBILITY STUDIES, PHASES OF A PROJECT, STAGES IN PROJECT LIFE CYCLE AND PROJECT CONSTRAINTS |                    |   |   |   | 7Hrs  |
| Project feasibility studies Opportunity studies,                                                                                |                                                                                                                                         |                    |   |   |   | [1Hr] |
| General opportunity studies, specific opportunity studies                                                                       |                                                                                                                                         |                    |   |   |   | [1Hr] |
| pre-feasibility studies, functional studies or support studies, feasibility study                                               |                                                                                                                                         |                    |   |   |   | [1Hr] |
| components of project feasibility studies – Managing Project resources flow                                                     |                                                                                                                                         |                    |   |   |   | [1Hr] |
| project planning to project completion: Pre-investment phase,                                                                   |                                                                                                                                         |                    |   |   |   | [1Hr] |
| Investment Phase and operational phase                                                                                          |                                                                                                                                         |                    |   |   |   | [1Hr] |
| Project Life Cycle – Project constraints                                                                                        |                                                                                                                                         |                    |   |   |   | [1Hr] |
| Unit-III                                                                                                                        | PROJECT EVALUATION UNDER CERTAINTY AND UNCERTAINTY, PROJECT EVALUATION, COMMERCIAL AND SOCIAL COST BENEFIT ANALYSIS                     |                    |   |   |   | 7Hrs  |
| Project Evaluation under certainty                                                                                              |                                                                                                                                         |                    |   |   |   | [1Hr] |
| Net Present Value (Problems - Case Study)                                                                                       |                                                                                                                                         |                    |   |   |   | [1Hr] |
| Benefit Cost Ratio, Internal Rate of Return, Urgency, Payback Period ARR                                                        |                                                                                                                                         |                    |   |   |   | [1Hr] |
| Project Evaluation under uncertainty                                                                                            |                                                                                                                                         |                    |   |   |   | [1Hr] |
| Methodology for project evaluation                                                                                              |                                                                                                                                         |                    |   |   |   | [1Hr] |
| Commercial vs. National Profitability – Social Cost Benefit Analysis, Commercial or                                             |                                                                                                                                         |                    |   |   |   | [1Hr] |
| National Profitability, social or national profitability.                                                                       |                                                                                                                                         |                    |   |   |   | [1Hr] |

|                                                                                                              |                                                                                                                                                                           |             |
|--------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|
| <b>Unit-IV</b>                                                                                               | <b>DEVELOPING PROJECT NETWORK USING PERT AND CPM, PROJECT APPRAISAL AND CONTROL PROCESS</b>                                                                               | <b>7Hrs</b> |
| Developing a Project Plan - Developing the Project Network                                                   |                                                                                                                                                                           | [1Hr]       |
| Constructing a Project Network (Problems) – PERT – CPM – Crashing of Project Network (Problems - Case Study) |                                                                                                                                                                           | [1Hr]       |
| Resource Leveling and Resource Allocation – how to avoid cost and time overruns                              |                                                                                                                                                                           | [1Hr]       |
| Steps in Project Appraisal Process – Project Control Process – Control Issues                                |                                                                                                                                                                           | [1Hr]       |
| Project Audits – the Project Audit Process – project closure – team,                                         |                                                                                                                                                                           | [1Hr]       |
| Team member and project manager evaluations.                                                                 |                                                                                                                                                                           | [1Hr]       |
| <b>Unit-V</b>                                                                                                | <b>PROJECT MANAGING VERSUS LEADING OF PROJECT, QUALITIES OF PROJECT MANAGER AND MANAGING PROJECT TEAMS, TEAM BUILDING MODELS AND PERFORMANCE TEAMS AND TEAM PITFALLS.</b> | <b>7Hrs</b> |
| Managing versus leading a project                                                                            |                                                                                                                                                                           | [1Hr]       |
| Managing project stakeholders – social network building                                                      |                                                                                                                                                                           | [1Hr]       |
| (Including management by wandering around)                                                                   |                                                                                                                                                                           | [1Hr]       |
| Qualities of an effective project manager                                                                    |                                                                                                                                                                           | [1Hr]       |
| Managing project teams – Five Stage Team Development Model – Situational factors                             |                                                                                                                                                                           | [1Hr]       |
| affecting team development                                                                                   |                                                                                                                                                                           | [1Hr]       |
| project team pitfalls.                                                                                       |                                                                                                                                                                           | [1Hr]       |
| <b>Total &amp; Revision</b>                                                                                  |                                                                                                                                                                           | <b>10</b>   |
| <b>Total</b>                                                                                                 |                                                                                                                                                                           | <b>45</b>   |

#### **Suggested list of Students Activity,**

##### **Project Simulation and Role-Playing:**

- Activity: Participate in simulated project scenarios where students take on different roles within a project team (e.g., project manager, team member, stakeholder).
- Purpose: This helps students understand the dynamics of project management, including leadership, communication, and team collaboration.

##### **Case Study Analysis:**

- Activity: Analyze real-world case studies of successful and failed projects.
- Purpose: This activity enables students to apply theoretical knowledge to practical situations, identify best practices, and learn from the challenges and solutions implemented in real projects.

##### **Project Plan Development:**

- Activity: Develop a comprehensive project plan for a hypothetical or real project, including scope, schedule, budget, risk management, and quality management plans.
- Purpose: This allows students to practice creating detailed and structured project plans, honing their skills in planning and organizing project activities.

##### **Group Project:**

- Activity: Work in teams to manage a project from initiation to closure, simulating a real project environment.

- Purpose: Group projects help students learn how to work collaboratively, manage group dynamics, and apply project management tools and techniques in a team setting.

#### **Project Management Software Training:**

- Activity: Gain hands-on experience with project management software such as Microsoft Project, Asana, or Trello.
- Purpose: This activity equips students with practical skills in using technology to plan, track, and manage project tasks and resources efficiently.

#### **Text Books**

| S.NO | TITLE                            | AUTHOR                              | PUBLISHER WITH EDITION                                                                                   |
|------|----------------------------------|-------------------------------------|----------------------------------------------------------------------------------------------------------|
| 1.   | Project Management               | Clifford F. Gray And Erik W. Larson | The Managerial Process, Tata Mcgraw Hill.                                                                |
| 2.   | Project Management Toolbox       | Dragan Z. Milosevic                 | Tools And Techniques For The Practicing Project Manager,                                                 |
| 3.   | Textbook Of Project Management   | Gopalakrishnan, P/ Ramamoorthy, V E | Macmillan India. Ltd.                                                                                    |
| 4.   | Project Management               | Harold Kerzne                       | Systems Approach to Planning, Scheduling, And Controlling, Eighth Edition, John Wiley & Sons             |
| 5.   | Project Management Methodologies | Jason Charvat                       | Implementing, And Supporting Methodologies And Processes For Projects, John Wiley & Sons                 |
| 6.   | Visualizing Project Management   | Kevin Forsberg                      | A Model For Business And Technical Success, Second Edition, Pmp And Howard Cotterman, John Wiley & Sons. |

#### **Web-based/Online Resources**

| S.No | Website/Links                                                           |
|------|-------------------------------------------------------------------------|
| 1    | <a href="https://youtu.be/pc9nvBsXsuM">https://youtu.be/pc9nvBsXsuM</a> |
| 2    | NPTEL Courses                                                           |
| 3    | <a href="https://youtu.be/PqQqTAu_FiM">https://youtu.be/PqQqTAu_FiM</a> |

#### **QUESTION PAPER SETTING**

The teaching learning process and assessment are being carried out in accordance with the revised Blooms Taxonomy. The question paper should consist of 90% questions based on Lower Order Thinking (LOTs) and the remaining 10% based on Higher Order Thinking (HOTs) as detailed below.

| Revised Bloom's Taxonomy Level | Lower order thinking skills (LOTs) | Higher Order Thinking Skills (HOTs) |
|--------------------------------|------------------------------------|-------------------------------------|
|                                | R-Remember, U-Understand, AP-Apply | An- Analyse, E-Evaluate, C-Create   |
| % to be included               | 90 %                               | 10 %                                |

**MODEL QUESTION PAPER****CEE6113 - PROJECT MANAGEMENT****Time: 3Hrs****Max Marks: 100****PART-A****(5x2x10Marks=100Marks)**

Note: Answer Ten questions by selecting two questions from each unit. Each question carries 10 marks

| S.no | Questions                                                                              | Unit | Blooms Level | Course Outcome | Program Outcomes |
|------|----------------------------------------------------------------------------------------|------|--------------|----------------|------------------|
| I    | 1. What is the Importance of Project Management?                                       | I    | U            | E6113.1        | PO1,PO5,PO7      |
|      | 2.Explain Project Portfolio Management System                                          | I    | U            | E6113.1        | PO1,PO5,PO7      |
|      | 3.Explain Process break down structure                                                 | I    | U            | E6113.1        | PO1,PO5,PO7      |
|      | 4.Explain External causes of delay and internal constraints                            | I    | R            | E6113.1        | PO1,PO5,PO7      |
| II   | 5.(i) Explain General opportunity studies<br>(ii) Explain specific opportunity studies | II   | R            | E6113.2        | PO1,PO5,PO7      |
|      | 6.Explain components of project feasibility studies                                    | II   | R            | E6113.2        | PO1,PO5,PO7      |
|      | 7.(i) Explain Pre-investment phase<br>(ii) Explain Investment Phase                    | II   | U            | E6113.2        | PO1,PO5,PO7      |
|      | 8.Explain Project Life Cycle                                                           | II   | R            | E6113.2        | PO1,PO5,PO7      |
| III  | 9.What are the Benefit of Cost Ratio                                                   | III  | U            | E6113.3        | PO1,PO5,PO7      |
|      | 10.Explain Internal Rate of Return                                                     | III  | U            | E6113.3        | PO1,PO5,PO7      |
|      | 11.Explain Methodology for project evaluation                                          | III  | U            | E6113.3        | PO1,PO5,PO7      |
|      | 12.Explain Commercial or National Profitability                                        | III  | U            | E6113.3        | PO1,PO5,PO7      |
| IV   | 13.(i) Explain PERT<br>(ii) Explain CPM                                                | IV   | R            | E6113.4        | PO1,PO5,PO7      |
|      | 14.Explain Crashing of Project Network                                                 | IV   | U            | E6113.4        | PO1,PO5,PO7      |
|      | 15.Explain Steps in Project Appraisal Process                                          | IV   | R            | E6113.4        | PO1,PO5,PO7      |
|      | 16.Explain project manager evaluations                                                 | IV   | R            | E6113.4        | PO1,PO5,PO7      |
| V    | 17.Explain social network building                                                     | V    | U            | E6113.5        | PO1,PO5,PO7      |
|      | 18.Explain qualities of an effective project manager                                   | V    | U            | E6113.5        | PO1,PO5,PO7      |
|      | 19.Explain Five Stage Team Development Model                                           | V    | R            | E6113.5        | PO1,PO5,PO7      |
|      | 20.Explain project team pitfalls                                                       | V    | U            | E6113.5        | PO1,PO5,PO7      |

**QUESTION PAPER SETTING**

The teaching learning process and assessment are being carried out in accordance with the revised Blooms Taxonomy. The question paper should consist of 90% questions based on Lower Order Thinking (LOTs) and the remaining 10% based on Higher Order Thinking (HOTs) as detailed below.

| Revised Bloom's Taxonomy Level | Lower order thinking skills (LOTs) | Higher Order Thinking Skills (HOTs) |
|--------------------------------|------------------------------------|-------------------------------------|
|                                | R-Remember, U-Understand, AP-Apply | An- Analyse, E-Evaluate, C-Create   |
| % to be included               | 90 %                               | 10 %                                |

## CEE6114– FINANCE FUNDAMENTALS

Programme Name : CIVIL ENGINEERING  
 Course Code : CEE6114  
 Semester : VI SEMESTER  
 Course Title : FINANCE FUNDAMENTALS  
 Course Type : THEORY

| L | T | P | C |
|---|---|---|---|
| 3 | 0 | 0 | 3 |

### TEACHING AND SCHEME OF EXAMINATION

No. of weeks per semester: 15 weeks

| Course               | Instructions |                  | Examination         |                        |       |          |
|----------------------|--------------|------------------|---------------------|------------------------|-------|----------|
|                      | Hours / Week | Hours / Semester | Marks               |                        |       | Duration |
|                      |              |                  | Internal Assessment | Autonomous Examination | Total |          |
| Finance Fundamentals | 3            | 45               | 40                  | 100*                   | 100   | 3 Hrs    |

\*Examinations will be conducted for 100 marks and will be converted to 60 marks

### TOPICS AND ALLOCATION OF HOURS

| Unit            | Topics           | Time (Hrs) |
|-----------------|------------------|------------|
| I               | Personal Finance | 7          |
| II              | Business Funding | 7          |
| III             | Finance Language | 7          |
| IV              | Budgeting.       | 7          |
| V               | Marginal Costing | 7          |
| Test & Revision |                  | 10         |
| Total           |                  | 45         |

### COURSE DESCRIPTION

This course gives a deep insight into the finance fundamentals such as money management and the process of acquiring needed funds. It also encompasses the oversight, creation, and study of money, banking, credit, investments, assets, liabilities that make up financial systems and improves overall financial literacy.

## COURSE OBJECTIVE

The objective of this course is to

1. Identify different ways to save money for future
2. Understand various techniques to raise capital
3. Get acquainted with the essential terminologies used in finance language
4. Get exposed to different types of budgeting
5. In still the concept of costing and its impact on profitability

## COURSE OUTCOMES

| After successful completion of this course, the students should be able to |                                                                                                    |
|----------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------|
| <b>E6114.1</b>                                                             | Manage financial resources effectively to achieve personal goals                                   |
| <b>E6114.2</b>                                                             | Explain the procedure for Business Funding                                                         |
| <b>E6114.3</b>                                                             | Exhibit financial literacy through the usage of different terminologies appropriate to the context |
| <b>E6114.4</b>                                                             | Differentiate the types of budgeting and allocate the resources                                    |
| <b>E6114.5</b>                                                             | Apply the idea of marginal costing in decision making                                              |

## Pre-requisites

Knowledge of basic mathematics

## CO-POs & PSOs mapping matrix

| CO                       | PO1       | PO2 | PO3 | PO4 | PO5      | PO6 | PO7       | PSO1      | PSO2      | PSO3      |
|--------------------------|-----------|-----|-----|-----|----------|-----|-----------|-----------|-----------|-----------|
| <b>E6114.1</b>           | 3         | -   | -   | -   | 1        | -   | 2         | 2         | 3         | 2         |
| <b>E6114.2</b>           | 3         | -   | -   | -   | 1        | -   | 2         | 2         | 3         | 2         |
| <b>E6114.3</b>           | 3         | -   | -   | -   | 1        | -   | 2         | 2         | 3         | 2         |
| <b>E6114.4</b>           | 3         | -   | -   | -   | 1        | -   | 2         | 2         | 3         | 2         |
| <b>E6114.5</b>           | 3         | -   | -   | -   | 1        | -   | 2         | 2         | 3         | 2         |
| <b>Total</b>             | <b>15</b> | -   | -   | -   | <b>5</b> | -   | <b>10</b> | <b>10</b> | <b>15</b> | <b>10</b> |
| <b>Correlation Level</b> | <b>3</b>  | -   | -   | -   | <b>1</b> | -   | <b>2</b>  | <b>2</b>  | <b>3</b>  | <b>2</b>  |

Correlation level 1 – Slight (low)

Correlation level 2 – Moderate (Medium)

Correlation level 3 – Substantial (high)

**Instructional Strategy:**

- Engage and Motivate: Instructors should actively engage students to boost their learning confidence.
- Real-World Relevance: Incorporate relatable, real-life examples and applications to help students understand and appreciate course concepts.
- Interactive Learning: Utilize demonstrations and plan interactive student activities for an engaging learning experience.
- Application-Based Learning: Employ a theory-demonstrate-practice- activity strategy throughout the course to ensure outcome-driven learning and employability.
- Simulation and Real-World Practice: Conduct demonstrations and hands-on activities in a simulated environment, transitioning to real- world scenarios when possible.

**Assessment Methodology:**

|                           | Continuous Assessment (40marks) |                           |                                         |                       | End Semester Examination (60 marks) |
|---------------------------|---------------------------------|---------------------------|-----------------------------------------|-----------------------|-------------------------------------|
|                           | CA1                             | CA2                       | CA3                                     | CA4                   |                                     |
| <b>Mode</b>               | Written test (Unit 1 & 2)       | Written test (Unit 3 & 4) | Quiz MCQ (Online/ Offline)              | Model Examination     | Written Examination                 |
| <b>Duration</b>           | 2 Periods                       | 2 Periods                 | 1Hour                                   | 3 Hours               | 3 Hours                             |
| <b>Exam Marks</b>         | 50                              | 50                        | 60                                      | 100                   | 100                                 |
| <b>Converted to</b>       | 10                              | 10                        | 10                                      | 10                    | 60                                  |
| <b>Marks</b>              | 40                              |                           |                                         |                       | 60                                  |
| <b>Tentative Schedule</b> | 6 <sup>th</sup> Week            | 12 <sup>th</sup> Week     | 13 <sup>th</sup> -14 <sup>th</sup> Week | 16 <sup>th</sup> Week |                                     |

**CONTINUOUS ASSESSMENT**

**CA1and CA2:** Assessment written test should be conducted for 50Marks for two units. The marks scored will be converted to 10 Marks for the internal assessment.

**CA1and CA2, Assessment test should be conducted for two units as below**

- PART A :(5X 10Marks=50Marks).
- Eight questions will be asked, students should write five questions. Four questions can be asked from each unit.

**CA3:** 60 MCQ can be asked by covering the entire portion. It may be conducted by Online / Offline. The marks scored should be converted to 10 marks for the internal assessment.

**CA4:** Model examination should be conducted as per the end semester question pattern. The marks should be converted to 10marks for the internal assessment.

**Question Pattern:**

- Answer Ten questions by selecting two questions from each unit. Each question carries 10 marks.
- Four questions will be asked from every unit. Students should write any two questions.

## Question Pattern –Model Examination and End Semester Examination Theory Exam

PART-A (5x2x10Marks=100Marks)

Note: Answer Ten questions by selecting two questions from each unit. Each question carries 10 marks.

### Sample:

- I. 1  
2  
3  
4
- II. 5  
6  
7  
8
- III. 9  
10  
11  
12
- IV. 13  
14  
15  
16
- V. 17  
18  
19  
20

## QUESTION PAPER SETTING

The teaching learning process and assessment are being carried out in accordance with the revised Blooms Taxonomy. The question paper should consist of 90% questions based on Lower Order Thinking (LOTs) and the remaining 10% based on Higher Order Thinking (HOTs) as detailed below.

| Revised Bloom's<br>Taxonomy<br>Level | Lower order thinking skills<br>(LOTs) | Higher Order Thinking<br>Skills (HOTs) |
|--------------------------------------|---------------------------------------|----------------------------------------|
|                                      | R-Remember, U-Understand,<br>AP-Apply | An- Analyse, E-Evaluate,<br>C-Create   |
| % to be included                     | 90 %                                  | 10 %                                   |

**CEE6114– FINANCE FUNDAMENTALS**

| CEE6114                                                                              |                  | FINANCE FUNDAMENTALS | L | T | P | C      |
|--------------------------------------------------------------------------------------|------------------|----------------------|---|---|---|--------|
| THEORY                                                                               |                  |                      | 3 | 0 | 0 | 3      |
| Unit-I                                                                               | PERSONAL FINANCE |                      |   |   |   | 7Hrs   |
| Personal Finance – Meaning, Objectives and advantages                                |                  |                      |   |   |   | [1Hr]  |
| Individual Perspective – Family Perspective                                          |                  |                      |   |   |   | [1Hr]  |
| Time Value of Money – Personal Savings: Meaning, Different modes of Saving           |                  |                      |   |   |   | [1Hr]  |
| Bank Deposit, Online Investments, Insurance, Stocks, Gold, Real Estate               |                  |                      |   |   |   | [1Hr]  |
| Returns Vs Risk – Financial Discipline                                               |                  |                      |   |   |   | [1Hr]  |
| Setting Alerts for commitments (With Real time Examples).                            |                  |                      |   |   |   | [2Hrs] |
| Unit-II                                                                              | BUSINESS FUNDING |                      |   |   |   | 7Hrs   |
| Sources: Personal Savings                                                            |                  |                      |   |   |   | [1Hr]  |
| Borrowings - Venture Capital                                                         |                  |                      |   |   |   | [1Hr]  |
| Venture Capital Process                                                              |                  |                      |   |   |   | [1Hr]  |
| Commercial Banks                                                                     |                  |                      |   |   |   | [1Hr]  |
| Government Grants                                                                    |                  |                      |   |   |   | [1Hr]  |
| Scheme.                                                                              |                  |                      |   |   |   | [2Hrs] |
| Unit-III                                                                             | FINANCE LANGUAGE |                      |   |   |   | 7Hrs   |
| Capital – Drawing – Income – Expenditure – Revenue Vs Capital Items                  |                  |                      |   |   |   | [1Hr]  |
| Assets – Fixed Assets – Current Assets – Fictitious Assets – Liabilities             |                  |                      |   |   |   | [1Hr]  |
| Long-term Liabilities – Current Liabilities – Internal Liabilities                   |                  |                      |   |   |   | [1Hr]  |
| External Liabilities – Shareholders fund:                                            |                  |                      |   |   |   | [1Hr]  |
| Equity Share capital, Preference Share Capital, Reserve & Surplus                    |                  |                      |   |   |   | [1Hr]  |
| Borrowings: Debentures, Bank Loan, Other Loan – Depreciation – Reserve Vs Provision. |                  |                      |   |   |   | [2Hrs] |
| Unit-IV                                                                              | BUDGETING        |                      |   |   |   | 7Hrs   |
| Budgetary Control – Meaning                                                          |                  |                      |   |   |   | [1Hr]  |
| Preparation of various budgets                                                       |                  |                      |   |   |   | [1Hr]  |
| Purchase budget – Sales Budget                                                       |                  |                      |   |   |   | [1Hr]  |
| Production budget                                                                    |                  |                      |   |   |   | [1Hr]  |
| Cash Budget                                                                          |                  |                      |   |   |   | [1Hr]  |
| Flexible budgets (With Problems)                                                     |                  |                      |   |   |   | [2Hrs] |

| Unit-V                                                           | MARGINAL COSTING | 7Hrs      |
|------------------------------------------------------------------|------------------|-----------|
| Marginal Costing                                                 |                  | [1Hr]     |
| Meaning – Marginal Costing Vs Absorption Costing                 |                  | [1Hr]     |
| Concepts of Variable Cost, Fixed Cost and Contribution           |                  | [1Hr]     |
| PV Ratio Break Even Point – Margin of Safety – Key Factor        |                  | [1Hr]     |
| Application of Marginal Costing in decision making – Make or Buy |                  | [1Hr]     |
| Shutdown or Continue – Exploring New Markets (With Problems)     |                  | [2Hrs]    |
| <b>Test &amp; Revision</b>                                       |                  | <b>10</b> |
| <b>Total</b>                                                     |                  | <b>45</b> |

### **Suggested list of Students Activity**

#### **Financial Statement Analysis:**

- Activity: Analyze and interpret financial statements, including balance sheets, income statements, and cash flow statements of different companies.
- Purpose: This activity helps students understand the financial health and performance of organizations, developing skills in financial analysis and critical thinking.

#### **Investment Portfolio Management:**

- Activity: Create and manage a simulated investment portfolio, making decisions on asset allocation, stock selection, and diversification.
- Purpose: This allows students to apply theoretical concepts in a practical setting, learning how to evaluate investment opportunities and manage financial risk.

#### **Case Study Analysis:**

- Activity: Examine real-world case studies involving financial decisions made by companies, such as capital budgeting, mergers and acquisitions, and financial restructuring.
- Purpose: Case studies provide insights into the application of finance principles in business scenarios, enhancing problem-solving and decision-making skills.

#### **Classroom Discussions and Debates:**

- Activity: Participate in discussions and debates on current financial issues, market trends, and economic policies.
- Purpose: Engaging in discussions helps students stay informed about the latest developments in finance, develop their communication skills, and form well-rounded opinions on financial

### Text Books

| S. NO | TITLE                          | AUTHOR                             | PUBLISHER WITH EDITION |
|-------|--------------------------------|------------------------------------|------------------------|
| 1.    | Banking Theory, Law & Practice | Dr.L.Natarajan                     | Margham Publications   |
| 2.    | Corporate Accounting           | T.S.Reddy and Dr.A.Murthy          | Margham Publications.  |
| 3.    | Management Accounting          | T.S.Reddy and Dr.Y.Hariprasd Reddy | Margham Publications.  |
| 4.    | Cost Accounting                | T.S.Reddy and Dr.Y.Hariprasd Reddy | Margham Publications.  |

### QUESTION PAPER SETTING:

The teaching learning process and assessment are being carried out in accordance with the revised Blooms Taxonomy. The question paper should consist of 90% questions based on Lower Order Thinking (LOTs) and the remaining 10% based on Higher Order Thinking (HOTs) as detailed below.

| Revised Bloom's Taxonomy Level | Lower order thinking skills (LOTs) | Higher Order Thinking Skills (HOTs) |
|--------------------------------|------------------------------------|-------------------------------------|
|                                | R-Remember, U-Understand, AP-Apply | An- Analyse, E-Evaluate, C-Create   |
| % to be included               | 90 %                               | 10 %                                |

## MODEL QUESTION PAPER

### CEE6114– FINANCE FUNDAMENTALS

**Time : 3Hrs**

**Max.Marks:100**

PART-A

(5x2x10Marks=100Marks)

Note: Answer Ten questions by selecting two questions from each unit.

Each question carries 10 marks

| S. no | Questions                                                                                                    | Unit | Bloom's Level | Course Outcome | Program Outcomes |
|-------|--------------------------------------------------------------------------------------------------------------|------|---------------|----------------|------------------|
| I     | 1)Write the Objectives and advantages of Personal Finance.                                                   | I    | U             | E6114.1        | PO1,PO5,PO7      |
|       | 2) (i) Explain about the Different modes of Saving.<br>(ii) Explain about the Setting Alerts for commitments | I    | U             | E6114.1        | PO1,PO5,PO7      |
|       | 3) (i) Explain about the Individual Perspective.<br>(ii) Write short notes on Time Value of Money            | I    | U             | E6114.1        | PO1,PO5,PO7      |
|       | 4) (i) Explain about the Financial Discipline.<br>(ii)Differentiate Returns and Risk.                        | I    | R             | E6114.1        | PO1,PO5,PO7      |
| II    | 5) Explain about the Personal Savings.                                                                       | II   | R             | E6114.2        | PO1,PO5,PO7      |
|       | 6) (i) Explain Borrowings.<br>(ii) Explain about the Commercial Banks                                        | II   | R             | E6114.2        | PO1,PO5,PO7      |
|       | 7) Explain about the process of Venture Capital.                                                             | II   | U             | E6114.2        | PO1,PO5,PO7      |
|       | 8) Briefly Explain about the Government Grants and Scheme                                                    | II   | R             | E6114.2        | PO1,PO5,PO7      |
| III   | 9) Explain about Assets.                                                                                     | III  | U             | E6114.3        | PO1,PO5,PO7      |
|       | 10)Describe about Liabilities                                                                                | III  | U             | E6114.3        | PO1,PO5,PO7      |
|       | 11) (i) Explain about the Shareholders fund.<br>(ii)Differentiate Reserve & Provision.                       | III  | U             | E6114.3        | PO1,PO5,PO7      |
|       | 12) (i)Explain about the Depreciation<br>(ii) Explain Expenditure                                            | III  | U             | E6114.3        | PO1,PO5,PO7      |
| IV    | 13) Explain about the Budgetary Control.                                                                     | IV   | R             | E6114.4        | PO1,PO5,PO7      |
|       | 14) Explain about the Preparation of various budgets.                                                        | IV   | U             | E6114.4        | PO1,PO5,PO7      |
|       | 15) (i) Explain about the Purchase budget<br>(ii) Explain about the Production budget                        | IV   | R             | E6114.4        | PO1,PO5,PO7      |
|       | 16) (i) Explain about the Sales Budget.<br>(ii) Explain about the Cash Budget.                               | IV   | R             | E6114.4        | PO1,PO5,PO7      |

|   |                                                                                                                              |   |   |         |             |
|---|------------------------------------------------------------------------------------------------------------------------------|---|---|---------|-------------|
| V | 16) (i) Explain about the Marginal Costing.<br>(ii) Differentiate Marginal Costing & Absorption Costing                      | V | U | E6114.5 | PO1,PO5,PO7 |
|   | 17) (i) Explain about the Concepts of Variable Cost.<br>(ii) Explain about the Fixed Cost and Contribution                   | V | U | E6114.5 | PO1,PO5,PO7 |
|   | 19) (i) Explain about the PV Ratio.<br>(ii) Explain about the Break-Even Point.                                              | V | R | E6114.5 | PO1,PO5,PO7 |
|   | 20) (i) Explain about the Exploring New Markets<br>(ii) Explain about the Application of Marginal Costing in decision making | V | U | E6114.5 | PO1,PO5,PO7 |

### QUESTION PAPER SETTING

The teaching learning process and assessment are being carried out in accordance with the revised Blooms Taxonomy. The question paper should consist of 90% questions based on Lower Order Thinking (LOTs) and the remaining 10% based on Higher Order Thinking (HOTs) as detailed below.

| Revised Bloom's Taxonomy Level | Lower order thinking skills (LOTs) | Higher Order Thinking Skills (HOTs) |
|--------------------------------|------------------------------------|-------------------------------------|
|                                | R-Remember, U-Understand, AP-Apply | An- Analyse, E-Evaluate, C-Create   |
| % to be included               | 90 %                               | 10 %                                |

## CEE6115 – ADVANCED ENVIRONMENTAL ENGINEERING

| L | T | P | C |
|---|---|---|---|
| 3 | 0 | 0 | 3 |

Programme Name : CIVIL ENGINEERING  
 Course Code : CEE6115  
 Semester : VI SEMESTER  
 Course Title : ADVANCED ENVIRONMENTAL ENGINEERING  
 Course Type : THEORY

### TEACHING AND SCHEME OF EXAMINATION

No. of weeks per semester: 15 weeks

| Course                             | Instructions |                  | Examination         |                        |       |          |
|------------------------------------|--------------|------------------|---------------------|------------------------|-------|----------|
|                                    | Hours / Week | Hours / Semester | Marks               |                        |       | Duration |
|                                    |              |                  | Internal Assessment | Autonomous Examination | Total |          |
| Advanced Environmental Engineering | 3            | 45               | 40                  | 100*                   | 100   | 3 Hrs    |

\*Examinations will be conducted for 100 marks and will be converted to 60 marks

### TOPICS AND ALLOCATION OF HOURS

| Unit         | Topics                                                         | Time (Hrs) |
|--------------|----------------------------------------------------------------|------------|
| I            | Filtration, disinfection and softening of water                | 09         |
| II           | Water waste surveys, pipe appurtenances and water management   | 09         |
| III          | Secondary treatment, miscellaneous methods and sludge disposal | 09         |
| IV           | Environmental pollution and solid waste management             | 09         |
| V            | Environmental impact assessment and environmental poisoning    | 09         |
| <b>Total</b> |                                                                | <b>45</b>  |

### COURSE DESCRIPTION

Diploma holders in Civil Engineering are expected to be responsible for Water Quality assessment, Pollution and Polluting Agents, Treatment of Sludge, Waste Management etc, Apart from basics of Environmental Engineering, some of the advanced topics dealing with the Environmental Engineering are discussed in this course.

### COURSE OBJECTIVE

The objectives of the course is to enable the students to

- Know the procedure of process of filtration and disinfection of water in water supply scheme.
- Select suitable method of treatment of water from various sources.
- Know the pipe appurtenances required for water supply scheme.
- Understand the purpose of water management.
- Understand the various secondary treatment of sewage.
- Know the methods of disposal of sludge and solid wastes.

- Identify the various types of pollution and their prevention.
- Create awareness about environmental impact assessment.

## COURSE OUTCOME

| After successful completion of this course, the students should be able to |                                                                                                                                                     |
|----------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>E6115.1</b>                                                             | Explain the process of filtration, disinfection and softening of water.                                                                             |
| <b>E6115.2</b>                                                             | Describe the procedure in waste water survey, various pipe appurtenances, management and conservation of water.                                     |
| <b>E6115.3</b>                                                             | Explain the various secondary treatment technologies and miscellaneous treatment for waste water such as chlorination off tank, oxidation pond etc. |
| <b>E6115.4</b>                                                             | Identify the various types of pollution and their prevention, methods of solid waste management.                                                    |
| <b>E6115.5</b>                                                             | Create awareness about Environmental Impact Assessment.                                                                                             |

### Pre-requisites

Knowledge of Basic Environmental Engineering

### CO-POs & PSOs mapping matrix

| CO                       | PO1       | PO2       | PO3      | PO4      | PO5       | PO6      | PO7       | PSO1      | PSO2      | PSO3      |
|--------------------------|-----------|-----------|----------|----------|-----------|----------|-----------|-----------|-----------|-----------|
| <b>E6115.1</b>           | 3         | 2         | 1        | 1        | 3         | 1        | 2         | 3         | 3         | 2         |
| <b>E6115.2</b>           | 3         | 2         | 1        | 1        | 3         | 1        | 2         | 3         | 3         | 2         |
| <b>E6115.3</b>           | 3         | 2         | 1        | 1        | 3         | 1        | 2         | 3         | 3         | 2         |
| <b>E6115.4</b>           | 3         | 2         | 1        | 1        | 3         | 1        | 2         | 3         | 3         | 2         |
| <b>E6115.5</b>           | 3         | 2         | 2        | 1        | 3         | 2        | 2         | 3         | 3         | 2         |
| <b>Total</b>             | <b>15</b> | <b>10</b> | <b>6</b> | <b>5</b> | <b>15</b> | <b>6</b> | <b>10</b> | <b>15</b> | <b>15</b> | <b>10</b> |
| <b>Correlation Level</b> | <b>3</b>  | <b>2</b>  | <b>1</b> | <b>1</b> | <b>3</b>  | <b>1</b> | <b>2</b>  | <b>3</b>  | <b>3</b>  | <b>2</b>  |

Correlation level 1 – Slight (low)

Correlation level 2 – Moderate (Medium)

Correlation level 3 – Substantial (high)

### Instructional Strategy

- It is advised that teachers take steps to pique pupils' attention and boost their learning confidence.
- To help students learn and appreciate numerous concepts and principles in each area, teachers should provide examples from daily life, realistic situations, and real - world engineering and technological applications.
- The demonstration can make the subject exciting and foster in the students a scientific mindset. Student activities should be planned on all the topics.
- Throughout the course, a theory - demonstrate - practice - activity strategy may be used to ensure that learning is outcome - and employability - based.
- Do not let students work on an activity or an experiment with the expected outcome, rather allow students to be honest about whatever the results of the experiment are. If the results are different from the expectations, students should do an analysis where they could be the source of error, if any.

## Assessment Methodology

|                           | Continuous Assessment (40marks) |                          |                                         |                       | End Semester Examination (60 marks) |
|---------------------------|---------------------------------|--------------------------|-----------------------------------------|-----------------------|-------------------------------------|
|                           | CA1                             | CA2                      | CA3                                     | CA4                   |                                     |
| <b>Mode</b>               | Written test (Unit 1 & 2)       | Writtentest (Unit 3 & 4) | Quiz MCQ (Online/ Offline)              | Model Examination     | Written Examination                 |
| <b>Duration</b>           | 2Periods                        | 2Periods                 | 1Hour                                   | 3Hours                | 3Hours                              |
| <b>Exam Marks</b>         | 50                              | 50                       | 60                                      | 100                   | 100                                 |
| <b>Converted to</b>       | 10                              | 10                       | 10                                      | 10                    | 60                                  |
| <b>Marks</b>              | 40                              |                          |                                         |                       | 60                                  |
| <b>Tentative Schedule</b> | 6 <sup>th</sup> Week            | 12 <sup>th</sup> Week    | 13 <sup>th</sup> -14 <sup>th</sup> Week | 16 <sup>th</sup> Week |                                     |

### CONTINUOUS ASSESSMENT

**CA1and CA2:** Assessment written test should beconducted for 50Marks for two units. The marks scored will be converted to 10 Marks for the internal assessment.

**CA1and CA2, Assessment test should be conducted for two units as below**

- PART A :( 5X10Marks=50Marks).
- Eight questions will be asked, students should write five questions. Four questions can be asked from each unit.

**CA3:** 60 MCQ can be asked by covering the entire portion. It may be conducted by Online / Offline. The marks scored should be converted to 10 marks for the internal assessment.

**CA4:** Model examination should be conducted as per the end semester question pattern. The marks should be converted to 10marks for theinternal assessment.

#### Question Pattern:

- Answer Ten questions by selecting two questions from each unit. Each question carries 10 marks.
- Four questions will be asked from every unit. Students should write any two questions.

**Question Pattern –Model Examination and End Semester Examination Theory Exam**

PART-A

(5x2x10Marks=100Marks)

Note: Answer Ten questions by selecting two questions from each unit. Each question carries 10 marks.

**Sample:**

- I. 1
- 2
- 3
- 4
- II. 5
- 6
- 7
- 8
- III. 9
- 10
- 11
- 12
- IV. 13
- 14
- 15
- 16
- V. 17
- 18
- 19
- 20

**QUESTION PAPER SETTING**

The teaching learning process and assessment are being carried out in accordance with the revised Blooms Taxonomy. The question paper should consist of 90% questions based on Lower Order Thinking (LOTs) and the remaining 10% based on Higher Order Thinking (HOTs) as detailed below.

| Revised Bloom's<br>Taxonomy<br>Level | Lower order thinking skills<br>(LOTs) | Higher Order Thinking<br>Skills (HOTs) |
|--------------------------------------|---------------------------------------|----------------------------------------|
|                                      | R-Remember, U-Understand,<br>AP-Apply | An- Analyse, E-Evaluate,<br>C-Create   |
| % to be included                     | 90 %                                  | 10 %                                   |

**CEE6115 -ADVANCED ENVIRONMENTAL ENGINEERING**

| CEE6115                                                                             |                                                              | ADVANCED ENVIRONMENTAL ENGINEERING | L | T | P | C      |
|-------------------------------------------------------------------------------------|--------------------------------------------------------------|------------------------------------|---|---|---|--------|
| THEORY                                                                              |                                                              |                                    | 3 | 0 | 0 | 3      |
| Unit-I                                                                              | FILTRATION, DISINFECTION AND SOFTENING OF WATER              |                                    |   |   |   | 9Hrs   |
| 1.1 FILTRATION OF WATER                                                             |                                                              |                                    |   |   |   |        |
| Theory of filtration - filter sand                                                  |                                                              |                                    |   |   |   | [2Hrs] |
| Types - Slow Sand Filter - Rapid Sand Filter                                        |                                                              |                                    |   |   |   |        |
| Comparison of slow sand and rapid sand filter - Pressure Filter                     |                                                              |                                    |   |   |   |        |
| 1.2 DISINFECTION OF WATER                                                           |                                                              |                                    |   |   |   |        |
| Necessity of Disinfection                                                           |                                                              |                                    |   |   |   | [2Hrs] |
| Types of disinfection - Minor methods of Disinfection                               |                                                              |                                    |   |   |   |        |
| Chlorination - Action of chlorine - Application of chlorine - Forms of Chlorination |                                                              |                                    |   |   |   |        |
| 1.3 WATER SOFTENING                                                                 |                                                              |                                    |   |   |   | [2Hrs] |
| Water Softening – Necessity of Water Softening – Hardness—Types of Hardness         |                                                              |                                    |   |   |   |        |
| Effects of Hardness - Removal of Hardness (names only)                              |                                                              |                                    |   |   |   | [2Hrs] |
| Miscellaneous Water treatment (names only)                                          |                                                              |                                    |   |   |   |        |
| Mineral waterRequirements - Treatment Process - Reverse of Osmosis (RO)             |                                                              |                                    |   |   |   | [1Hr]  |
| Unit-II                                                                             | WATER WASTE SURVEYS, PIPE APPURTENANCES AND WATER MANAGEMENT |                                    |   |   |   | 9Hrs   |
| 2.1 WATER WASTE SURVEYS                                                             |                                                              |                                    |   |   |   | [2Hrs] |
| Wastage of water - Water waste surveys                                              |                                                              |                                    |   |   |   |        |
| Permissible wastage of water - Preventive measures                                  |                                                              |                                    |   |   |   |        |
| Water waste test - Maintenance of distribution system                               |                                                              |                                    |   |   |   |        |
| 2.2 PIPE APPURTENANCES                                                              |                                                              |                                    |   |   |   | [2Hrs] |
| Necessity - Air values - Bib cocks                                                  |                                                              |                                    |   |   |   |        |
| Fire hydrants - Reflux valves - Scour valves                                        |                                                              |                                    |   |   |   |        |
| Sluice valves - Stop cocks - water meters                                           |                                                              |                                    |   |   |   | [2Hrs] |
| 2.3 WATER MANAGEMENT                                                                |                                                              |                                    |   |   |   |        |
| Introduction of water management                                                    |                                                              |                                    |   |   |   | [2Hrs] |
| Measures for reshaping local water balance                                          |                                                              |                                    |   |   |   |        |
| Uses and resources.                                                                 |                                                              |                                    |   |   |   | [1Hr]  |

|                                                                                                                                                                                                                                                                                            |                                                                       |             |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------|-------------|
| <b>Unit-III</b>                                                                                                                                                                                                                                                                            | <b>SECONDARY TREATMENT, MISCELLANEOUS METHODS AND SLUDGE DISPOSAL</b> | <b>9Hrs</b> |
| <b>3.1 SECONDARY TREATMENT OF SEWAGE</b>                                                                                                                                                                                                                                                   |                                                                       |             |
| Filters - Types - Contact beds - Intermittent sand filters - Trickling Filters - Activated Sludge Process (ASP) - Advantages and Disadvantage of ASP                                                                                                                                       |                                                                       | [2Hrs]      |
| Comparison of ASP versus Trickling filters.                                                                                                                                                                                                                                                |                                                                       | [2Hrs]      |
| <b>3.2 MISCELLANEOUS METHODS OF SEWAGE TREATMENT</b>                                                                                                                                                                                                                                       |                                                                       |             |
| General - Cesspool - Chlorination of sewage - Imhoff tanks - Oxidation ponds - Septic tanks                                                                                                                                                                                                |                                                                       | [2Hrs]      |
| Soak pit- Dispersion Trenches, Waste from fertilizer actories                                                                                                                                                                                                                              |                                                                       |             |
| <b>3.3 SLUDGE DISPOSAL</b>                                                                                                                                                                                                                                                                 |                                                                       | [2Hrs]      |
| Methods of sludge disposal - Disposal on land - Distribution by pipe line - Drying on drying beds, Dumping into the sea - Heat - drying - Incineration - Lagooning or Ponding - Digestion followed by drying - Sludge digestion tanks                                                      |                                                                       | [1Hr]       |
| <b>Unit-IV</b>                                                                                                                                                                                                                                                                             | <b>ENVIRONMENTAL POLLUTION AND SOLID WASTE MANAGEMENT</b>             | <b>9Hrs</b> |
| <b>4.1 ENVIRONMENTAL POLLUTION</b>                                                                                                                                                                                                                                                         |                                                                       | [2Hrs]      |
| Environment - Definition - Water pollution - Sources of water pollution                                                                                                                                                                                                                    |                                                                       |             |
| Effects of water pollution - Control of water pollution                                                                                                                                                                                                                                    |                                                                       |             |
| Soil pollution - Sources of soil pollution - Effects of soil pollution - Control of soil pollution                                                                                                                                                                                         |                                                                       | [2Hrs]      |
| Noise pollution - Sources of noise pollution - Effects of noise pollution - Control of noise pollution, Air pollution - Sources of air pollution - Effects of air pollution on human beings, plants, animals, materials ,Air pollution control equipment - Control devices for particulate |                                                                       | [1Hr]       |
| Contaminants Environmental degradation - Ozone layer depletion.                                                                                                                                                                                                                            |                                                                       | [2Hrs]      |
| <b>4.2 SOLID WASTE MANAGEMENT</b>                                                                                                                                                                                                                                                          |                                                                       |             |
| Solid Waste Disposal - Necessity                                                                                                                                                                                                                                                           |                                                                       | [1Hr]       |
| Method of Solid Waste Disposal                                                                                                                                                                                                                                                             |                                                                       |             |
| Dumping, sanitary landfill, composting - Energy from waste.                                                                                                                                                                                                                                |                                                                       | [1Hr]       |

| Unit-V                                                                      | ENVIRONMENTAL IMPACT ASSESSMENT AND ENVIRONMENTAL POISONING | 9Hrs      |
|-----------------------------------------------------------------------------|-------------------------------------------------------------|-----------|
| <b>5.1 ENVIRONMENTAL IMPACT ASSESSMENT</b>                                  |                                                             |           |
| Environmental impact assessment (EIA)                                       |                                                             | [2Hrs]    |
| Methodology of EIA - Organizing the job - Performing the assessment         |                                                             |           |
| Preparation of Environmental Impact Statement(EIS) - review of EIS          |                                                             | [2Hrs]    |
| Environmental risk assessment                                               |                                                             |           |
| Limitation of EIA                                                           |                                                             | [1Hr]     |
| <b>5.2 ENVIRONMENTAL POISONING</b>                                          |                                                             | [1Hr]     |
| Cadium poisoning - Sources and Effects                                      |                                                             | [1Hr]     |
| Mercury poisoning - Sources and Effects                                     |                                                             | [1Hr]     |
| Trace metal poisoning - Definition - cation of metals - Sources and Effects |                                                             | [1Hr]     |
| <b>Total</b>                                                                |                                                             | <b>45</b> |

#### Suggested list of Students Activity:

- Prepare Models of rapid sand filtration process
- Compare various disinfection methods and identify the suitable disinfection method for the water from various sources.
- Identify the suitable appurtenances for the appropriate location in the water distribution network system.
- Demonstrate the process of Trickling Filters and Activated Sludge Process (ASP).
- Collect the details about the air pollution/noise pollution in the various industries and prepare the report.
- Visit any one solid waste disposal site and prepare the activities involved in the disposal .
- Case study about Environmental Impact Assessment for any one of the project .

#### Text Books

| S.NO | TITLE                                                     | AUTHOR                                  | PUBLISHER WITH EDITION                         |
|------|-----------------------------------------------------------|-----------------------------------------|------------------------------------------------|
| 1.   | Water Supply waste Disposal and Environmental Engineering | A.K. Chatterjee                         | 8th Edition, Khanna Publishers, 2006.          |
| 2.   | Environmental Engineering                                 | M.P. Poonia S.C. Sharma, Santhosh kumar | 2nd Edition, Khanna Publishers, 2023.          |
| 3.   | Water Supply and Sanitary Engineering                     | S.C. Rangwala                           | 29th Edition, Charotar Publishing House, 2016. |

### Web-based/Online Resources

| S.No | Website/Links                                                                                                               |
|------|-----------------------------------------------------------------------------------------------------------------------------|
| 1    | <a href="https://nptel.ac.in/courses/105107207">https://nptel.ac.in/courses/105107207</a>                                   |
| 2    | <a href="https://archive.nptel.ac.in/courses/124/107/124107160/">https://archive.nptel.ac.in/courses/124/107/124107160/</a> |

### QUESTION PAPER SETTING

The teaching learning process and assessment are being carried out in accordance with the revised Blooms Taxonomy. The question paper should consist of 90% questions based on Lower Order Thinking (LOTs) and the remaining 10% based on Higher Order Thinking (HOTs) as detailed below.

| Revised Bloom's<br>Taxonomy<br>Level | Lower order thinking skills<br>(LOTs) | Higher Order Thinking<br>Skills (HOTs) |
|--------------------------------------|---------------------------------------|----------------------------------------|
|                                      | R-Remember, U-Understand,<br>AP-Apply | An- Analyse, E-Evaluate,<br>C-Create   |
| % to be included                     | 90 %                                  | 10 %                                   |

# MODEL QUESTION PAPER

## CEE6115 - ADVANCED ENVIRONMENTAL ENGINEERING

**Time :3 Hrs**

**Max.Marks:100**

**PART-A**

**(5x2x10Marks=100Marks)**

Note: Answer Ten questions by selecting two questions from each unit. Each question carries 10 marks

| S.no | Questions                                                                                        | Unit | Bloom's Level | Course Outcome | Program Outcomes |
|------|--------------------------------------------------------------------------------------------------|------|---------------|----------------|------------------|
| I    | 1) Explain about Disinfection.                                                                   | I    | U             | E6115.1        | PO1,PO2,PO3      |
|      | 2) Explain about various forms of Chlorination.                                                  | I    | U             | E6115.1        | PO1,PO2,PO3      |
|      | 3) Compare Slow Sand and Rapid Sand Filter.                                                      | I    | U             | E6115.1        | PO1,PO2,PO3      |
|      | 4) Describe the types and effects of Hardness.                                                   | I    | U             | E6115.1        | PO1,PO2,PO3      |
| II   | 5) Explain about maintenance of Distribution system.                                             | II   | U             | E6115.2        | PO1,PO2,PO3      |
|      | 6)Write short notes on i) Reflux values (3)<br>ii) Scour values (3) and Draw simple sketches (1) | II   | R             | E6115.2        | PO1,PO2          |
|      | 7) Describe about the preventive measures for wastage of water.                                  | II   | U             | E6115.2        | PO1,PO2,PO3      |
|      | 8) Explain about the permissible wastage of water and its preventive measures..                  | II   | U             | E6115.2        | PO1,PO2,PO3      |
| III  | 9) Describe the advantages and disadvantages of Activated Sludge Disposal.                       | III  | U             | E6115.3        | PO1,PO2,PO3      |
|      | 10) Explain about sludge digestion tanks.                                                        | III  | U             | E6115.3        | PO1,PO2,PO3      |
|      | 11) Compare Activated Sludge Process and Trickling Filters.                                      | III  | U             | E6115.3        | PO1,PO2,PO3      |
|      | 12) Describe about the Trickling Filter with neat sketch.                                        | III  | U             | E6115.3        | PO1,PO2,PO3      |
| IV   | 13) Explain about the sources and effects of Noise Pollution.                                    | IV   | U             | E6115.4        | PO1,PO2,PO3      |
|      | 14) Describe about the control of air pollution.                                                 | IV   | U             | E6115.4        | PO1,PO2,PO3      |
|      | 15) Describe the processes involved in the control of water pollution.                           | IV   | U             | E6115.4        | PO1,PO2,PO3      |
|      | 16) Explain about the solid waste disposal.                                                      | IV   | U             | E6115.4        | PO1,PO2,PO3      |
| V    | 17) Explain about the Environmental Impact Assessment.                                           | V    | U             | E6115.5        | PO1,PO2,PO3      |
|      | 18) Explain about the methodology of Environmental Impact Assessment.                            | V    | U             | E6115.5        | PO1,PO2,PO3      |
|      | 19) Describe about the preparation of Environmental Impact Statement.                            | V    | U             | E6115.5        | PO1,PO2,PO3      |
|      | 20) Explain about the sources and effects of Cadmium Poisoning.                                  | V    | U             | E6115.5        | PO1,PO2,PO3      |

## CEE6116 – ADVANCED CONCRETE TECHNOLOGY

Programme Name : CIVIL ENGINEERING  
 Course Code : CEE6116  
 Semester : VI SEMESTER  
 Course Title : ADVANCED CONCRETE TECHNOLOGY  
 Course Type : THEORY

| L | T | P | C |
|---|---|---|---|
| 3 | 0 | 0 | 3 |

### TEACHING AND SCHEME OF EXAMINATION

No. of weeks per semester: 15 weeks

| Course                       | Instructions |                  | Examination         |                        |       |          |
|------------------------------|--------------|------------------|---------------------|------------------------|-------|----------|
|                              | Hours / Week | Hours / Semester | Marks               |                        |       | Duration |
|                              |              |                  | Internal Assessment | Autonomous Examination | Total |          |
| Advanced concrete Technology | 3            | 45               | 40                  | 100*                   | 100   | 3 Hrs    |

\*Examinations will be conducted for 100 marks and will be converted to 60 marks

### TOPICS AND ALLOCATION OF HOURS

| Unit         | Topics                                      | Time (Hrs) |
|--------------|---------------------------------------------|------------|
| I            | Cement chemistry                            | 09         |
| II           | Admixtures and its classifications          | 09         |
| III          | Durability, permeability and corrosion      | 09         |
| IV           | Concrete structures in special environments | 09         |
| V            | Special concrete                            | 09         |
| <b>Total</b> |                                             | <b>45</b>  |

### COURSE DESCRIPTION

Concrete is the material choice where strength, durability, impermeability, fire resistance and abrasion resistance are necessary. A deep understanding of concrete technology requires fundamental concepts, material characteristics and related laboratory experiments on concrete and its ingredients. It incorporates the latest Indian standard specifications and codes regulating concrete construction. The properties of concrete and its constituent materials and the role of various admixtures are the factors in modifying these properties to suit specific requirements. The behaviour of concrete with respect to long-term drying shrinkage, plastic shrinkage, special concrete like FRC Polymer concrete is some of the areas in order to have better understanding of the complex behaviour of concrete. In addition to this, it explores the methods to repair and rehabilitation of structures already constructed.

## COURSE OBJECTIVE

- Understanding the theoretical concept of Concrete material which includes Cement and admixtures.
- Build durability to resist cracks, weathering and chemical attack.
- Comprehend the properties of Fresh Concrete in special Environments
- Know various types of special concretes & its application.
- Understand repair materials and their applications

## COURSE OUTCOME

| After successful completion of this course, the students should be able to |                                                                                     |
|----------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| <b>E6116.1</b>                                                             | Understand the process of Hydration of cement & compounds                           |
| <b>E6116.2</b>                                                             | Apply relevant admixtures for concreting.                                           |
| <b>E6116.3</b>                                                             | Understand the knowledge of durability, impermeability and corrosion.               |
| <b>E6116.4</b>                                                             | Understand the concept of underwater construction, hot and cold weather concreting. |
| <b>E6116.5</b>                                                             | Describe the concept of various special concretes                                   |

### Pre-requisites

Knowledge of basic Science and concrete ingredients, Manufacturing, & testing of concrete.

### CO-POs & PSOs mapping matrix

| CO                       | PO1       | PO2       | PO3       | PO4      | PO5       | PO6      | PO7       | PSO1      | PSO2      | PSO3      |
|--------------------------|-----------|-----------|-----------|----------|-----------|----------|-----------|-----------|-----------|-----------|
| <b>E6116.1</b>           | 3         | 2         | 1         | 1        | 1         | 1        | 1         | 3         | 3         | 2         |
| <b>E6116.2</b>           | 3         | 3         | 2         | 1        | 2         | 1        | 2         | 3         | 3         | 2         |
| <b>E6116.3</b>           | 3         | 3         | 3         | 2        | 3         | 2        | 3         | 3         | 3         | 2         |
| <b>E6116.4</b>           | 3         | 3         | 2         | 2        | 2         | 2        | 2         | 3         | 3         | 2         |
| <b>E6116.5</b>           | 3         | 3         | 2         | 1        | 2         | 1        | 2         | 3         | 3         | 2         |
| <b>Total</b>             | <b>15</b> | <b>14</b> | <b>10</b> | <b>7</b> | <b>10</b> | <b>7</b> | <b>10</b> | <b>15</b> | <b>15</b> | <b>10</b> |
| <b>Correlation Level</b> | <b>3</b>  | <b>3</b>  | <b>2</b>  | <b>1</b> | <b>2</b>  | <b>2</b> | <b>3</b>  | <b>3</b>  | <b>3</b>  | <b>2</b>  |

Correlation level 1 – Slight (low)

Correlation level 2 – Moderate (Medium)

Correlation level 3 – Substantial (high)

### Instructional Strategy:

NOTE 1: The course content shall be delivered through lectures, PowerPoint presentations, video demonstrations and field visits

NOTE 2: The Activity criteria shall be conducted / executed by the student and to be submitted to the faculty

## Assessment Methodology

|                           | Continuous Assessment (40marks) |                           |                                         |                       | End Semester Examination (60 marks) |
|---------------------------|---------------------------------|---------------------------|-----------------------------------------|-----------------------|-------------------------------------|
|                           | CA1                             | CA2                       | CA3                                     | CA4                   |                                     |
| <b>Mode</b>               | Writtentest (Unit 1 & 2)        | Written test (Unit 3 & 4) | Quiz MCQ (Online/ Offline)              | Model Examination     | Written Examination                 |
| <b>Duration</b>           | 2Periods                        | 2Periods                  | 1Hour                                   | 3Hours                | 3Hours                              |
| <b>Exam Marks</b>         | 50                              | 50                        | 60                                      | 100                   | 100                                 |
| <b>Converted to</b>       | 10                              | 10                        | 10                                      | 10                    | 60                                  |
| <b>Marks</b>              | 40                              |                           |                                         |                       | 60                                  |
| <b>Tentative Schedule</b> | 6 <sup>th</sup> Week            | 12 <sup>th</sup> Week     | 13 <sup>th</sup> -14 <sup>th</sup> Week | 16 <sup>th</sup> Week |                                     |

### CONTINUOUS ASSESSMENT

**CA1and CA2:** Assessment written test should be conducted for 50Marks for two units. The marks scored will be converted to 10 Marks for the internal assessment.

**CA1and CA2, Assessment test should be conducted for two units as below**

- PART A:(5X 10Marks=50Marks).
- Eight questions will be asked, students should write five questions. Four questions can be asked from each unit.

**CA3:** 60 MCQ can be asked by covering the entire portion. It may be conducted by Online / Offline. The marks scored should be converted to 10 marks for the internal assessment.

**CA4:** Model examination should be conducted as per the end semester question pattern. The marks should be converted to 10marks for the internal assessment.

#### Question Pattern:

- Answer Ten questions by selecting two questions from each unit. Each question carries 10 marks.
- Four questions will be asked from every unit. Students should write any two questions.

## Question Pattern –Model Examination and End Semester Examination Theory Exam

PART-A (5x2x10Marks=100Marks)

Note: Answer Ten questions by selecting two questions from each unit. Each question carries 10 marks.

### Sample:

- I. 1
- 2
- 3
- 4
- II. 5
- 6
- 7
- 8
- III. 9
- 10
- 11
- 12
- IV. 13
- 14
- 15
- 16
- V. 17
- 18
- 19
- 20

### QUESTION PAPER SETTING

The teaching learning process and assessment are being carried out in accordance with the revised Blooms Taxonomy. The question paper should consist of 90% questions based on Lower Order Thinking (LOTs) and the remaining 10% based on Higher Order Thinking (HOTs) as detailed below.

| Revised Bloom's<br>Taxonomy<br>Level | Lower order thinking skills<br>(LOTs) | Higher Order Thinking<br>Skills (HOTs) |
|--------------------------------------|---------------------------------------|----------------------------------------|
|                                      | R-Remember, U-Understand,<br>AP-Apply | An- Analyse, E-Evaluate,<br>C-Create   |
| % to be included                     | 90 %                                  | 10 %                                   |

**CEE6116 -ADVANCED CONCRETE TECHNOLOGY**

| CEE6116                                                                                      |                                    | ADVANCED CONCRETE TECHNOLOGY | L | T | P | C     |
|----------------------------------------------------------------------------------------------|------------------------------------|------------------------------|---|---|---|-------|
| THEORY                                                                                       |                                    |                              | 3 | 0 | 0 | 3     |
| Unit-I                                                                                       | CEMENT CHEMISTRY                   |                              |   |   |   | 9Hrs  |
| Chemical composition                                                                         |                                    |                              |   |   |   | [1Hr] |
| Bogue’s Compounds                                                                            |                                    |                              |   |   |   | [1Hr] |
| Oxide composition &Compound Composition                                                      |                                    |                              |   |   |   | [1Hr] |
| Hydration of Cement-Heat of hydration                                                        |                                    |                              |   |   |   | [1Hr] |
| Heat evolution pattern & peaks                                                               |                                    |                              |   |   |   | [1Hr] |
| Calcium silicate hydrates                                                                    |                                    |                              |   |   |   | [1Hr] |
| Calcium Hydroxide-Calcium Aluminate Hydrate-Interfacial Transition zone                      |                                    |                              |   |   |   | [1Hr] |
| Water requirement for hydration                                                              |                                    |                              |   |   |   | [1Hr] |
| Composition of cement paste at different stages of hydration.                                |                                    |                              |   |   |   | [1Hr] |
| Unit-II                                                                                      | ADMIXTURES AND ITS CLASSIFICATIONS |                              |   |   |   | 9Hrs  |
| 2.1 Admixtures                                                                               |                                    |                              |   |   |   | [1Hr] |
| Definition-Purposes-classification.                                                          |                                    |                              |   |   |   |       |
| 2.2 Chemical Admixtures                                                                      |                                    |                              |   |   |   | [1Hr] |
| Plasticizers-basic Products-Action of plasticizers, Super plasticizers-classification        |                                    |                              |   |   |   |       |
| Effect of super plasticizers-compatibility of plasticizer with cement Marsh Cone Test        |                                    |                              |   |   |   | [1Hr] |
| Retarders-applications-retarding materials-retarding plasticizers, Accelerators applications |                                    |                              |   |   |   |       |
| accelerating plasticizers, air-entraining admixture-advantages-air entraining agents         |                                    |                              |   |   |   | [1Hr] |
| effect of air entrainment on properties of concrete.                                         |                                    |                              |   |   |   | [1Hr] |
| 2.3 Mineral Admixtures                                                                       |                                    |                              |   |   |   |       |
| Pozzolana materialsAdvantages-Fly ash-effect of fly ash on fresh concrete and hardened       |                                    |                              |   |   |   | [1Hr] |
| concrete, Ground granulated blast furnace slag (GGBS)                                        |                                    |                              |   |   |   | [1Hr] |
| Performance of GGBS in fresh and hardened concrete.                                          |                                    |                              |   |   |   | [1Hr] |
| Silica fumes- available forms-influence on fresh and hardened concrete.                      |                                    |                              |   |   |   | [1Hr] |

|                                                                                                                                             |                                                    |             |
|---------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------|-------------|
| <b>Unit-III</b>                                                                                                                             | <b>DURABILITY, PERMEABILITY AND CORROSION</b>      | <b>9Hrs</b> |
| <b>3.1 Durability and Permeability</b>                                                                                                      |                                                    | [1Hr]       |
| Durability-Definition and significance- Cracking                                                                                            |                                                    | [1Hr]       |
| Types and causes of cracks in concrete                                                                                                      |                                                    | [1Hr]       |
| Factors contributing to cracks in Concrete                                                                                                  |                                                    | [1Hr]       |
| Plastic shrinkage Cracks-Bleeding-Drying Shrinkage-Sulphate Attack-Freezing and Thawing                                                     |                                                    | [1Hr]       |
| Methods of controlling, Sulphate attack Carbonation-Rate of Carbonation-Alkali, silica, reaction, Permeability of cement paste and concrete |                                                    | [1Hr]       |
| Causes for higher permeability.                                                                                                             |                                                    | [1Hr]       |
| <b>3.2 Corrosion</b>                                                                                                                        |                                                    |             |
| Corrosion of reinforcement                                                                                                                  |                                                    | [1Hr]       |
| Factors influencing corrosion-Damages caused by corrosion-Preventive measures.                                                              |                                                    | [1Hr]       |
| <b>Unit-IV</b>                                                                                                                              | <b>CONCRETE STRUCTURES IN SPECIAL ENVIRONMENTS</b> | <b>9Hrs</b> |
| <b>4.1 Underwater Construction</b>                                                                                                          |                                                    | [1Hr]       |
| Methods-Tremie and grouting method                                                                                                          |                                                    | [1Hr]       |
| Precautions required during underwater concreting.                                                                                          |                                                    | [1Hr]       |
| <b>4.2 Cold Weather concreting</b>                                                                                                          |                                                    | [1Hr]       |
| Effect of cold weather on Concrete                                                                                                          |                                                    | [1Hr]       |
| Precautions to be Taken while Concreting in Cold Weather Conditions.                                                                        |                                                    | [1Hr]       |
| <b>4.3 Hot Weather Concreting</b>                                                                                                           |                                                    | [1Hr]       |
| Effect of hot weather on concrete                                                                                                           |                                                    | [1Hr]       |
| Precautions to be taken while Concreting in Hot Weather Conditions.                                                                         |                                                    | [1Hr]       |
| <b>Unit-V</b>                                                                                                                               | <b>SPECIAL CONCRETE</b>                            | <b>9Hrs</b> |
| <b>5.1 Light weight concrete</b>                                                                                                            |                                                    | [1Hr]       |
| Ingredients-Natural Aggregate-Artificial aggregate                                                                                          |                                                    | [1Hr]       |
| Factors influencing the strength and density of light weight concrete                                                                       |                                                    | [1Hr]       |
| Properties of light weight concrete                                                                                                         |                                                    | [1Hr]       |
| <b>5.2 Fibre reinforced concrete</b>                                                                                                        |                                                    |             |
| Fibers used-Factors effecting properties-                                                                                                   |                                                    | [1Hr]       |
| Volume of fibres-aspect ratio-orientation-work ability and compaction of concrete-                                                          |                                                    |             |
| Size of coarse aggregates-applications                                                                                                      |                                                    | [1Hr]       |
| <b>5.3 Polymer concrete</b>                                                                                                                 |                                                    |             |
| List of polymers, Type of polymer Concrete                                                                                                  |                                                    | [1Hr]       |
| Polymer impregnated concrete-properties and applications                                                                                    |                                                    |             |
| <b>5.4 Self-compacting concrete</b>                                                                                                         |                                                    | [1Hr]       |
| Requirements for SCC-Advantages-Tests methods (names only).                                                                                 |                                                    | [1Hr]       |
| <b>TOTAL HOURS</b>                                                                                                                          |                                                    | <b>45</b>   |

**Suggested list of Students Activity**

1. Study on Natural fibres and artificial fibres and prepare a report
2. Conduct market analysis on chemical admixtures and compare.
3. Compare the special concrete with conventional concrete and prepare report
4. Conduct Marsh cone Test to infer compatibility of super plasticizers and cement
5. List the cracks in concrete in a building and remedies

**Text Books**

| S. NO | TITLE                                     | AUTHOR                  | PUBLISHER WITH EDITION                                |
|-------|-------------------------------------------|-------------------------|-------------------------------------------------------|
| 1.    | Concrete Technology (Theory and Practice) | M.S.Shetty              | 8 <sup>th</sup> Edition, S.Chand& Company Ltd, 2018   |
| 2.    | Concrete Technology                       | A.R.Santhakumar         | 2 <sup>nd</sup> Edition, Oxford University Press,2018 |
| 3.    | Concrete Technology                       | A.M.Neville,&J.J.Brooks | 2 <sup>nd</sup> Edition, Pearson Education, 2019      |

**Web-based/Online Resources**

| S.No | Website/Links                                                                                                                                                                                 |
|------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1    | <a href="https://www.youtube.com/watch?v=SdWh05agJtg">https://www.youtube.com/watch?v=SdWh05agJtg</a>                                                                                         |
| 2    | <a href="https://www.youtube.com/watch?v=dgjZEI9PXCs">https://www.youtube.com/watch?v=dgjZEI9PXCs</a>                                                                                         |
| 3    | <a href="https://www.youtube.com/watch?v=rJSxTY6u9NU&amp;list=PLyqSpQzTE6M82k6diJ8LXu58vSMAiM-WP">https://www.youtube.com/watch?v=rJSxTY6u9NU&amp;list=PLyqSpQzTE6M82k6diJ8LXu58vSMAiM-WP</a> |

**QUESTION PAPER SETTING**

The teaching learning process and assessment are being carried out in accordance with therevised Blooms Taxonomy. The question paper should consist of 90% questions based on Lower Order Thinking (LOTs) and the remaining 10% based on Higher Order Thinking (HOTs) as detailed below.

| Revised Bloom's Taxonomy Level | Lower order thinking skills (LOTs) | Higher Order Thinking Skills (HOTs) |
|--------------------------------|------------------------------------|-------------------------------------|
|                                | R-Remember, U-Understand, AP-Apply | An- Analyse, E-Evaluate, C-Create   |
| % to be included               | 90 %                               | 10 %                                |

## MODEL QUESTION PAPER

### CEE6116– ADVANCED CONCRETE TECHNOLOGY

**Time:3 Hrs**

**Max.Marks:100**

PART-A

(5x2x10Marks=100Marks)

Note: Answer Ten questions by selecting two questions from each unit.

Each question carries 10 marks

| S. no | Questions                                                                                                    | Unit | Bloom's Level | Course Outcome | Program Outcomes             |
|-------|--------------------------------------------------------------------------------------------------------------|------|---------------|----------------|------------------------------|
| I     | 1) Explain the development of strength of compounds in cement                                                | I    | U             | E6116.1        | PO1,PO2,PO3, PO4,PO5,PO6,PO7 |
|       | 2) Explain in detail about Transition zone in concrete                                                       | I    | U             | E6116.1        | PO1,PO2,PO3 PO4,PO5,PO6,PO7  |
|       | 3) Explain about water requirements for hydration of cement                                                  | I    | U             | E6116.1        | PO1,PO2,PO3 PO4,PO5,PO6,PO7  |
|       | 4) Explain about composition of cement paste at different stages of hydration                                | I    | U             | E6116.1        | PO1,PO2,PO3 PO4,PO5,PO6,PO7  |
| II    | 5) List out the advantages of mineral admixtures with OPC cement in concrete                                 | II   | R             | E6116.2        | PO1,PO2,PO3, PO4,PO5,PO6,PO7 |
|       | 6) Distinguish between plasticizers and super plasticizers                                                   | II   | R             | E6116.2        | PO1,PO2,PO3, PO4,PO5,PO6,PO7 |
|       | 7) What are the available forms of Silica fumes- and explain their influence on fresh and hardened concrete? | II   | R             | E6116.2        | PO1,PO2,PO3, PO4,PO5,PO6,PO7 |
|       | 8) Explain Marsh cone Test on super plasticizer with cement                                                  | II   | U             | E6116.2        | PO1,PO2,PO3, PO4,PO5,PO6,PO7 |
| III   | 9) Explain the methods of controlling sulphate attack on concrete.                                           | III  | U             | E6116.3        | PO1,PO2,PO3, PO4,PO5,PO6,PO7 |
|       | 10) Describe the Damages caused by corrosion.                                                                | III  | U             | E6116.3        | PO1,PO2,PO3, PO4,PO5,PO6,PO7 |
|       | 11) Explain permeability of cement paste and concrete.                                                       | III  | U             | E6116.3        | PO1,PO2,PO3, PO4,PO5,PO6,PO7 |
|       | 12) What are the factors influencing corrosion of reinforcement?                                             | III  | R             | E6116.3        | PO1,PO2,PO3, PO4,PO5,PO6,PO7 |
| IV    | 13) What are the Precautions required during underwater concreting?                                          | IV   | R             | E6116.4        | PO1,PO2,PO3, PO4,PO5,PO6,PO7 |
|       | 14) Explain any one method of underwater placement of concrete                                               | IV   | U             | E6116.4        | PO1,PO2,PO3, PO4,PO5,PO6,PO7 |
|       | 15) What are the effects of cold weather concreting?                                                         | IV   | R             | E6116.4        | PO1,PO2,PO3, PO4,PO5,PO6,PO7 |
|       | 16) What precautions need to be taken for hot weather concreting?                                            | IV   | R             | E6116.4        | PO1,PO2,PO3, PO4,PO5,PO6,PO7 |
|       | 17) What are the factors effecting properties of FRC? Explain                                                | V    | R             | E6116.5        | PO1,PO2,PO3, PO4,PO5,PO6,PO7 |

|   |                                                                       |   |       |         |                              |
|---|-----------------------------------------------------------------------|---|-------|---------|------------------------------|
| V | 18) Explain the applications of polymer impregnated concrete          | V | U     | E6116.5 | PO1,PO2,PO3, PO4,PO5,PO6,PO7 |
|   | 19) Mention any four light weight concrete and write their properties | V | U, AN | E6116.5 | PO1,PO2,PO3, PO4,PO5,PO6,PO7 |
|   | 20) Explain the advantages of SCC                                     | V | U     | E6116.5 | PO1,PO2,PO3, PO4,PO5,PO6,PO7 |

### QUESTION PAPER SETTING

The teaching learning process and assessment are being carried out in accordance with the revised Blooms Taxonomy. The question paper should consist of 90% questions based on Lower Order Thinking (LOTs) and the remaining 10% based on Higher Order Thinking (HOTs) as detailed below.

| Revised Bloom's Taxonomy Level | Lower order thinking skills (LOTs) | Higher Order Thinking Skills (HOTs) |
|--------------------------------|------------------------------------|-------------------------------------|
|                                | R-Remember, U-Understand, AP-Apply | An- Analyse, E-Evaluate, C-Create   |
| % to be included               | 90 %                               | 10 %                                |

## CEE6117 – ADVANCED TRANSPORTATION ENGINEERING

Programme Name : CIVIL ENGINEERING  
 Course Code : CEE6117  
 Semester : VI SEMESTER  
 Course Title : ADVANCED TRANSPORTATION ENGINEERING  
 Course Type : THEORY

| L | T | P | C |
|---|---|---|---|
| 3 | 0 | 0 | 3 |

### TEACHING AND SCHEME OF EXAMINATION

No. of weeks per semester: 15 weeks

| Course                              | Instructions |                  | Examination         |                        |       |          |
|-------------------------------------|--------------|------------------|---------------------|------------------------|-------|----------|
|                                     | Hours / Week | Hours / Semester | Marks               |                        |       | Duration |
|                                     |              |                  | Internal Assessment | Autonomous Examination | Total |          |
| Advanced Transportation Engineering | 3            | 45               | 40                  | 100*                   | 100   | 3 Hrs    |

\*Examinations will be conducted for 100 marks and will be converted to 60 marks

### TOPICS AND ALLOCATION OF HOURS

| Unit         | Topics                                     | Time (Hrs) |
|--------------|--------------------------------------------|------------|
| I            | Pavement materials and construction        | 09         |
| II           | Pavement evaluation and maintenance        | 09         |
| III          | Traffic engineering                        | 09         |
| IV           | Mass transit system and road safety system | 09         |
| V            | Bridge engineering                         | 09         |
| <b>Total</b> |                                            | <b>45</b>  |

### COURSE DESCRIPTION

Advanced Transportation Engineering is a specialized field that delves into the intricate aspects of transportation systems. It aims to provide an overview about the highway with respect to planning, design, construction and maintenance as per IRC standards, specifications and methods. The key topics in this subject include Pavement Analysis and Design, Traffic Engineering, Mass transit system and bridge engineering.

### COURSE OBJECTIVE

The objective of this course is to

- Introduce the students with the practice of transportation engineering which focuses on highway, traffic and bridge engineering.
- Get Exposure to pavement evaluation in transportation engineering.
- Introduce recent advancements in the field of mass transit and road safety.
- Acquire knowledge in traffic engineering and management.

- Get adequate knowledge in various bridge structures.

## COURSE OUTCOMES

| After successful completion of this course, the students should be able to |                                                                                     |
|----------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| <b>E6117.1</b>                                                             | Understand the properties and use of various materials and construction.            |
| <b>E6117.2</b>                                                             | Attain knowledge in evaluation and maintenance of pavements.                        |
| <b>E6117.3</b>                                                             | Attain basic understanding on traffic engineering design, operation and management. |
| <b>E6117.4</b>                                                             | Understand basics of mass transit and its policies and road safety.                 |
| <b>E6117.5</b>                                                             | Learn the various types of bridges and its components used for transportation.      |

### Pre-requisites

Knowledge of Basic Highway and traffic engineering

### CO-POs & PSOs mapping matrix

| CO                       | PO1       | PO2       | PO3       | PO4       | PO5       | PO6       | PO7       | PSO1     | PSO2      | PSO3      |
|--------------------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|----------|-----------|-----------|
| <b>E6117.1</b>           | 3         | 2         | 2         | 2         | 1         | 3         | 3         | -        | 3         | 2         |
| <b>E6117.2</b>           | 3         | 2         | 3         | 2         | 1         | 3         | 2         | -        | 3         | 2         |
| <b>E6117.3</b>           | 3         | 3         | 3         | 3         | 1         | 3         | 3         | -        | 3         | 2         |
| <b>E6117.4</b>           | 3         | 2         | 2         | 2         | 1         | 3         | 3         | -        | 3         | 2         |
| <b>E6117.5</b>           | 3         | 2         | 3         | 2         | 1         | 2         | 2         | -        | 3         | 2         |
| <b>Total</b>             | <b>15</b> | <b>11</b> | <b>13</b> | <b>11</b> | <b>05</b> | <b>14</b> | <b>13</b> | <b>-</b> | <b>15</b> | <b>10</b> |
| <b>Correlation Level</b> | <b>3</b>  | <b>2</b>  | <b>2</b>  | <b>2</b>  | <b>1</b>  | <b>3</b>  | <b>3</b>  | <b>-</b> | <b>3</b>  | <b>2</b>  |

Correlation level 1 – Slight (low)

Correlation level 2 – Moderate (Medium)

Correlation level 3 – Substantial (high)

### Instructional Strategy

- It is advised that teachers take steps to pique pupils' attention and boost their learning confidence.
- To help students learn and appreciate numerous concepts and principles in each area, teachers should provide examples from daily life, realistic situations, and real-world engineering and technological applications.
- The demonstration can make the subject exciting and foster in the students a scientific mindset. Student activities should be planned on all the topics.
- Throughout the course, a theory-demonstrate-practice-activity strategy may be used to ensure that learning is outcome and employability-based.
- Do not let students work on an activity or an experiment with the expected outcome, rather allow students to be honest about whatever the results of the experiment are. If the results are different from the expectations, students should do an analysis where they could be the source of error, if any.

## Assessment Methodology

|                           | Continuous Assessment (40marks) |                           |                                         |                       | End Semester Examination (60 marks) |
|---------------------------|---------------------------------|---------------------------|-----------------------------------------|-----------------------|-------------------------------------|
|                           | CA1                             | CA2                       | CA3                                     | CA4                   |                                     |
| <b>Mode</b>               | Written test (Unit 1 & 2)       | Written test (Unit 3 & 4) | Quiz MCQ (Online/ Offline)              | Model Examination     | Written Examination                 |
| <b>Duration</b>           | 2Periods                        | 2Periods                  | 1Hour                                   | 3Hours                | 3Hours                              |
| <b>Exam Marks</b>         | 50                              | 50                        | 60                                      | 100                   | 100                                 |
| <b>converted to</b>       | 10                              | 10                        | 10                                      | 10                    | 60                                  |
| <b>Marks</b>              | 40                              |                           |                                         |                       | 60                                  |
| <b>Tentative Schedule</b> | 6 <sup>th</sup> Week            | 12 <sup>th</sup> Week     | 13 <sup>th</sup> -14 <sup>th</sup> Week | 16 <sup>th</sup> Week |                                     |

### CONTINUOUS ASSESSMENT

**CA1and CA2:** Assessment written test should be conducted for 50Marks for two units. The marks scored will be converted to 10 Marks for the internal assessment.

**CA1and CA2, Assessment test should be conducted for two units as below**

- PART A :( 5X 10Marks=50Marks).
- Eight questions will be asked, students should write five questions. Four questions can be asked from each unit.

**CA3:** 60 MCQ can be asked by covering the entire portion. It may be conducted by Online / Offline. The marks scored should be converted to 10 marks for the internal assessment.

**CA4:** Model examination should be conducted as per the end semester question pattern. The marks should be converted to 10marks for the internal assessment.

#### Question Pattern:

- Answer Ten questions by selecting two questions from each unit. Each question carries 10 marks.
- Four questions will be asked from every unit. Students should write any two questions.

## Question Pattern –Model Examination and End Semester Examination Theory Exam

PART-A

(5x2x10 Marks=100Marks)

Note: Answer Ten questions by selecting two questions from each unit. Each question carries 10 marks.

### Sample:

- I. 1
- 2
- 3
- 4
- II. 5
- 6
- 7
- 8
- III. 9
- 10
- 11
- 12
- IV. 13
- 14
- 15
- 16
- V. 17
- 18
- 19
- 20

## QUESTION PAPER SETTING

The teaching learning process and assessment are being carried out in accordance with the revised Blooms Taxonomy. The question paper should consist of 90% questions based on Lower Order Thinking (LOTs) and the remaining 10% based on Higher Order Thinking (HOTs) as detailed below.

| Revised Bloom's<br>Taxonomy<br>Level | Lower order thinking skills<br>(LOTs) | Higher Order Thinking<br>Skills (HOTs) |
|--------------------------------------|---------------------------------------|----------------------------------------|
|                                      | R-Remember, U-Understand,<br>AP-Apply | An- Analyse, E-Evaluate,<br>C-Create   |
| % to be included                     | 90 %                                  | 10 %                                   |

**CEE6117 – ADVANCED TRANSPORTATION ENGINEERING**

| CEE6117                                                                      | ADVANCED TRANSPORTATION<br>ENGINEERING     | L           | T | P | C     |
|------------------------------------------------------------------------------|--------------------------------------------|-------------|---|---|-------|
| THEORY                                                                       |                                            | 3           | 0 | 0 | 3     |
| <b>Unit-I</b>                                                                | <b>PAVEMENT MATERIALS AND CONSTRUCTION</b> | <b>9Hrs</b> |   |   |       |
| Aggregates- requirements,                                                    |                                            |             |   |   | [1Hr] |
| Properties and testing of aggregates                                         |                                            |             |   |   | [1Hr] |
| Sub grade-significance and functions                                         |                                            |             |   |   | [1Hr] |
| Evaluation of soil strength-CBR and plate load test, preparation of subgrade |                                            |             |   |   | [1Hr] |
| Bitumen and Tar                                                              |                                            |             |   |   | [1Hr] |
| Tests on bitumen: Penetration test                                           |                                            |             |   |   | [1Hr] |
| Viscosity test, Ductility test, Softening point test                         |                                            |             |   |   | [1Hr] |
| Specific gravity test, Flash and Fire point test                             |                                            |             |   |   | [1Hr] |
| Bituminous emulsions and Cutback                                             |                                            |             |   |   | [1Hr] |
| <b>Unit-II</b>                                                               | <b>PAVEMENT EVALUATION AND MAINTENANCE</b> | <b>9Hrs</b> |   |   |       |
| Pavement evaluation                                                          |                                            |             |   |   | [1Hr] |
| Causes of distress in rigid                                                  |                                            |             |   |   | [1Hr] |
| flexible pavements                                                           |                                            |             |   |   | [1Hr] |
| Evaluation based on surface Appearance:cracks, patches and pot holes,        |                                            |             |   |   | [1Hr] |
| Undulations, ravelling, roughness, skid resistance                           |                                            |             |   |   | [1Hr] |
| Structural evaluation by Deflection measurements                             |                                            |             |   |   | [1Hr] |
| Pavement Serviceability Index                                                |                                            |             |   |   | [1Hr] |
| Pavement maintenance                                                         |                                            |             |   |   | [1Hr] |
| (IRC Recommendations only).                                                  |                                            |             |   |   | [1Hr] |

|                                                                                     |                                                   |             |
|-------------------------------------------------------------------------------------|---------------------------------------------------|-------------|
| <b>Unit-III</b>                                                                     | <b>TRAFFIC ENGINEERING</b>                        | <b>9Hrs</b> |
| Conventional and modern methods of traffic survey                                   |                                                   | [1Hr]       |
| Volume,Capacity and Density                                                         |                                                   | [1Hr]       |
| Headway concepts and applications                                                   |                                                   | [1Hr]       |
| Speed and delay-origin and destination                                              |                                                   | [1Hr]       |
| Level of Services(LOS)                                                              |                                                   | [1Hr]       |
| Parking facilities(on street, off street)                                           |                                                   | [1Hr]       |
| At grade intersection(rotary, channelization, traffic signal control)               |                                                   | [1Hr]       |
| Grade separated intersection and its types                                          |                                                   | [1Hr]       |
| Traffic sign and its types-Road Arboriculture.                                      |                                                   | [1Hr]       |
| <b>Unit-IV</b>                                                                      | <b>MASS TRANSIT SYSTEM AND ROAD SAFETY SYSTEM</b> | <b>9Hrs</b> |
| Various modes of mass transit and its Role                                          |                                                   | [1Hr]       |
| Urban transport system                                                              |                                                   | [1Hr]       |
| NUTP and JNNURM                                                                     |                                                   | [1Hr]       |
| Unified Transport Authorities (UMTA and CUMTA)                                      |                                                   | [1Hr]       |
| Intelligent Transportation System (role in Traffic management and its advantages)   |                                                   | [1Hr]       |
| Applications of IoT in Transportation                                               |                                                   | [1Hr]       |
| Causes of accidents (human, vehicle, road factors)                                  |                                                   | [1Hr]       |
| Black spot-Black route                                                              |                                                   | [1Hr]       |
| Road safety audit (elements and its need). Mode of rural and urban transport system |                                                   | [1Hr]       |
| <b>Unit-V</b>                                                                       | <b>BRIDGE ENGINEERING</b>                         | <b>9Hrs</b> |
| Bridge:Definition-Components of Bridge                                              |                                                   | [1Hr]       |
| Selection of type of bridge-scour-afflux-economic span-waterway                     |                                                   | [1Hr]       |
| Factors governing the ideal site for bridge-Functions of foundation                 |                                                   | [1Hr]       |
| Types of bridge foundations-Coffer dam and its types                                |                                                   | [1Hr]       |
| Classification of bridges (based on purpose and materials)                          |                                                   | [1Hr]       |
| Abutments-piers-wing walls                                                          |                                                   | [1Hr]       |
| Continuous bridge                                                                   |                                                   | [1Hr]       |
| Cantilever bridge, Arch bridge                                                      |                                                   | [1Hr]       |
| Suspension bridge.                                                                  |                                                   | [1Hr]       |
| <b>Total</b>                                                                        |                                                   | <b>45</b>   |

#### Suggested list of Students Activity

- Presentation /Seminars by students on any recent technological developments in Highway Engineering.
- Periodic class quizzes conducted on a weekly/fortnightly based on the course.
- Prepare Models of Traffic signs, pavements, road intersections, bridges etc. Visit nearby road construction activities, traffic signals, Bridges.

**Text Books**

| S. NO | TITLE                      | AUTHOR                    | PUBLISHER WITH EDITION                                               |
|-------|----------------------------|---------------------------|----------------------------------------------------------------------|
| 1.    | Highway Engineering        | S.K.Khanna and C.E.GJusto | 10 <sup>th</sup> edition, Nem Chand and Bros Publisher,Roorkee,2017. |
| 2.    | Highway Engineering        | Rangwala                  | 11 <sup>th</sup> Edition, Charotar Publishing House Pvt. Ltd.,2017.  |
| 3.    | Transportation Engineering | L R Kadiyali,             | 1 <sup>st</sup> edition, Charotar Publishing House Pvt. Ltd.,2019.   |

**Web-based/Online Resources**

| S. No | Website/Links                                                                                                   |
|-------|-----------------------------------------------------------------------------------------------------------------|
| 1     | <a href="https://youtu.be/3oNa9Z94Hiw?si=KaE7Cu7w6SvwVdek">https://youtu.be/3oNa9Z94Hiw?si=KaE7Cu7w6SvwVdek</a> |
| 2     | <a href="https://youtu.be/5DGYmSXXStg?si=umVV7FDl6D2Ytl01">https://youtu.be/5DGYmSXXStg?si=umVV7FDl6D2Ytl01</a> |
| 3     | <a href="https://youtu.be/oju-XCy-MJU?si=43SHkPRIgr0wh4sd">https://youtu.be/oju-XCy-MJU?si=43SHkPRIgr0wh4sd</a> |
| 4     | <a href="https://youtu.be/4ej1XkAvzhc?si=uMzVhFt7rpseA9Wu">https://youtu.be/4ej1XkAvzhc?si=uMzVhFt7rpseA9Wu</a> |
| 5     | <a href="https://youtu.be/O9OR-IpX32I?si=Sn7uw3bF_o89BPKM">https://youtu.be/O9OR-IpX32I?si=Sn7uw3bF_o89BPKM</a> |
| 6     | <a href="https://youtu.be/RB2k5hSYO3U?si=7B0sA6N36OOjDh8T">https://youtu.be/RB2k5hSYO3U?si=7B0sA6N36OOjDh8T</a> |

**QUESTION PAPER SETTING**

The teaching learning process and assessment are being carried out in accordance with the revised Blooms Taxonomy. The question paper should consist of 90% questions based on Lower Order Thinking (LOTs) and the remaining 10% based on Higher Order Thinking (HOTs) as detailed below.

| Revised Bloom's Taxonomy Level | Lower order thinking skills (LOTs) | Higher Order Thinking Skills (HOTs) |
|--------------------------------|------------------------------------|-------------------------------------|
|                                | R-Remember, U-Understand, AP-Apply | An- Analyse, E-Evaluate, C-Create   |
| % to be included               | 90 %                               | 10 %                                |

# MODEL QUESTION PAPER

## CEE6117– ADVANCED TRANSPORTATIONENGINEERING

**Time : 3 Hrs**

**Max.Marks:100**

**PART-A**

(5x2x10Marks=100Marks)

Note: Answer Ten questions by selecting two questions from each unit. Each question carries 10 marks

| S. no | Questions                                                          | Unit | Bloom's Level | Course Outcome | Program Outcomes                |
|-------|--------------------------------------------------------------------|------|---------------|----------------|---------------------------------|
| I     | 1) Explain any two types of bitumen test?                          | I    | U             | E6117.1        | PO1,PO2,PO3<br>PO4,PO5,PO6,PO7  |
|       | 2) Explain about Plate Test?                                       | I    | U             | E6117.1        | PO1,PO2,PO3<br>PO4, PO5,PO6,PO7 |
|       | 3) Explain any two tests of aggregates used in road pavements?     | I    | U             | E6117.1        | PO1,PO2,PO3<br>PO4,PO5,PO6,PO7  |
|       | 4) Write short notes on Bituminous emulsions and Cutback.          | I    | R             | E6117.1        | PO1,PO2,PO3<br>PO4, PO5,PO6,PO7 |
| II    | 5) Explain about ravelling and roughness                           | II   | U             | E6117.2        | PO1,PO2,PO3<br>PO4,PO5,PO6,PO7  |
|       | 6) Write about the pavement maintenance recommended by IRC?        | II   | R             | E6117.2        | PO1,PO2,PO3<br>PO4,PO5,PO6,PO7  |
|       | 7) What are the causes of distress in rigid and flexible pavement? | II   | R             | E6117.2        | PO1,PO2,PO3<br>PO4,PO5,PO6,PO7  |
|       | 8) Explain the Structural evaluation?                              | II   | U             | E6117.2        | PO1,PO2,PO3<br>PO4,PO5,PO6,PO7  |
| III   | 9) Explain the concept of level of service (LOS)?                  | III  | U             | E6117.3        | PO1,PO2,PO3<br>PO4,PO5,PO6,PO7  |
|       | 10) Discuss briefly about speed, density and traffic flow.         | III  | U,R           | E6117.3        | PO1,PO2,PO3<br>PO4,PO5,PO6,PO7  |
|       | 11) Discuss about the various types of at grade intersection.      | III  | U,R           | E6117.3        | PO1,PO2,PO3<br>PO4,PO5,PO6,PO7  |
|       | 12) Write about the parking facilities?                            | III  | R             | E6117.3        | PO1,PO2,PO3<br>PO4,PO5,PO6,PO7  |
| IV    | 13) Discuss briefly about road safety audit.                       | IV   | U,R           | E6117.4        | PO1,PO2,PO3<br>PO4,PO5,PO6,PO7  |
|       | 14) What are the various causes of road accident?                  | IV   | R             | E6117.4        | PO1,PO2,PO3<br>PO4,PO5,PO6,PO7  |
|       | 15) Discuss about NUTP and JNNURM.                                 | IV   | U,R           | E6117.4        | PO1,PO2,PO3<br>PO4,PO5,PO6,PO7  |
|       | 16) Explain Black spot & Black route.                              | IV   | U             | E6117.4        | PO1,PO2,PO3<br>PO4,PO5,PO6,PO7  |
| V     | 17) Discuss briefly about various types of coffer dam.             | V    | U,R           | E6117.5        | PO1,PO2,PO3<br>PO4,PO5,PO6,PO7  |
|       | 18) Write about the factors governing the ideal site for bridge?   | V    | R,AN          | E6117.5        | PO1,PO2,PO3<br>PO4,PO5,PO6,PO7  |
|       | 19) Write short notes on (a) abutment (b) wing wall.               | V    | R             | E6117.5        | PO1,PO2,PO3<br>PO4,PO5,PO6,PO7  |
|       | 20) What is the classification of bridges? Explain briefly.        | V    | U             | E6117.5        | PO1,PO2,PO3<br>PO4,PO5,PO6,PO7  |

## CEE6118– ADVANCED SURVEYING

Programme Name : CIVIL ENGINEERING  
 Course Code : CEE6118  
 Semester : VI SEMESTER  
 Course Title : ADVANCED SURVEYING  
 Course Type : THEORY

| L | T | P | C |
|---|---|---|---|
| 3 | 0 | 0 | 3 |

### TEACHING AND SCHEME OF EXAMINATION

No. of weeks per semester: 15 weeks

| Course             | Instructions |                  | Examination         |                        |       |          |
|--------------------|--------------|------------------|---------------------|------------------------|-------|----------|
|                    | Hours / Week | Hours / Semester | Marks               |                        |       | Duration |
|                    |              |                  | Internal Assessment | Autonomous Examination | Total |          |
| Advanced Surveying | 3            | 45               | 40                  | 100*                   | 100   | 3 Hrs    |

\*Examinations will be conducted for 100 marks and will be converted to 60 marks

### TOPICS AND ALLOCATION OF HOURS

| Unit                 | Topics                                  | Time (Hrs) |
|----------------------|-----------------------------------------|------------|
| I                    | Engineering surveys                     | 09         |
| II                   | Modern surveying instruments            | 10         |
| III                  | Hydrographic and astronomical surveying | 08         |
| IV                   | Introduction to remote sensing          | 10         |
| V                    | Introduction to photogrammetry          | 08         |
| <b>Total Periods</b> |                                         | <b>45</b>  |

### COURSE DESCRIPTION

Advanced surveying techniques encompass a diverse array of methods and technologies employed to accurately measure, map, and analyze the Earth's surface and its features. These techniques often go beyond traditional surveying methods, incorporating cutting-edge technologies and sophisticated methodologies to achieve precise and comprehensive results. One facet of advanced surveying involves the utilization of satellite-based positioning systems such as GPS (Global Positioning System), GNSS (Global Navigation Satellite System), and GIS (Geographic Information System). These systems enable surveyors to determine precise coordinates of points on the Earth's surface, facilitating accurate mapping, navigation, and geospatial analysis. Overall, advanced surveying plays a pivotal role in various fields including urban planning, civil engineering, environmental management, disaster response, and natural resource exploration. By harnessing the power of advanced technologies and methodologies, surveyors can generate precise geospatial data essential for informed decision-making, sustainable development, and effective resource management.

## COURSE OBJECTIVE

The object of this course is to enable the student to

- Introduction to Engineering Survey Understanding the basic terms & Principles of Surveys.
- Gain Knowledge about Modern surveying Instruments.
- Students can able to Understand the Hydrographical and Astronomical Surveying
- Students can able to understand the Knowledge of Remote Sensing.
- Students can able to understand the Knowledge of Photogrammetry.

## COURSE OUTCOMES

| After successful completion of this course, the students should be able to |                                                                                           |
|----------------------------------------------------------------------------|-------------------------------------------------------------------------------------------|
| <b>E6118.1</b>                                                             | Introduction to Engineering Survey Understanding the basic terms & Principles of Surveys. |
| <b>E6118.2</b>                                                             | Gain Knowledge about Modern surveying Instruments.                                        |
| <b>E6118.3</b>                                                             | To Understand the Hydrographic and Astronomical Surveying                                 |
| <b>E6118.4</b>                                                             | To understand the Knowledge of Remote Sensing.                                            |
| <b>E6118.5</b>                                                             | To understand the Knowledge of Photogrammetry.                                            |

### Pre-requisites

Knowledge of Basic Surveying

### CO-POs & PSOs mapping matrix

| CO                       | PO1       | PO2      | PO3       | PO4      | PO5      | PO6       | PO7       | PSO1      | PSO2      | PSO3      |
|--------------------------|-----------|----------|-----------|----------|----------|-----------|-----------|-----------|-----------|-----------|
| <b>E6118.1</b>           | 3         | -        | 3         | -        | 2        | 3         | 3         | 2         | 3         | 2         |
| <b>E6118.2</b>           | 3         | -        | 2         | 2        | -        | -         | 3         | 2         | 3         | 2         |
| <b>E6118.3</b>           | 3         | 2        | 3         | -        | 2        | 3         | 2         | 2         | 3         | 2         |
| <b>E6118.4</b>           | 3         | 2        | 2         | 2        | -        | 2         | 2         | 2         | 3         | 2         |
| <b>E6118.5</b>           | 3         | -        | 3         | -        | -        | 3         | 2         | 2         | 3         | 2         |
| <b>Total</b>             | <b>15</b> | <b>4</b> | <b>13</b> | <b>4</b> | <b>4</b> | <b>11</b> | <b>12</b> | <b>10</b> | <b>15</b> | <b>10</b> |
| <b>Correlation Level</b> | <b>3</b>  | <b>1</b> | <b>2</b>  | <b>1</b> | <b>1</b> | <b>2</b>  | <b>3</b>  | <b>2</b>  | <b>3</b>  | <b>2</b>  |

Correlation level 1 – Slight (low)

Correlation level 2 – Moderate (Medium)

Correlation level 3 – Substantial (high)

### Instructional Strategy

- It is advised that teachers take steps to pique pupils' attention and boost their learning confidence.
- To help students learn and appreciate numerous concepts and principles in each area, teachers should provide examples from daily life, realistic situations, and real-world engineering and technological applications.
- The demonstration can make the subject exciting and foster in the students a scientific mindset. Student activities should be planned on all the topics.

- Throughout the course, a theory-demonstrate-practice-activity strategy may be used to ensure that learning is outcome and employability-based.
- Do not let students work on an activity or an experiment with the expected outcome, rather allow students to be honest about whatever the results of the experiment are. If the results are different from the expectations, students should do an analysis where they could be the source of error, if any.

### Assessment Methodology

|                           | Continuous Assessment(40marks) |                           |                                         |                       | End Semester Examination (60 marks) |
|---------------------------|--------------------------------|---------------------------|-----------------------------------------|-----------------------|-------------------------------------|
|                           | CA1                            | CA2                       | CA3                                     | CA4                   |                                     |
| <b>Mode</b>               | Written test (Unit 1 & 2)      | Written test (Unit 3 & 4) | Quiz MCQ (Online/ Offline)              | Model Examination     | Written Examination                 |
| <b>Duration</b>           | 2Periods                       | 2Periods                  | 1Hour                                   | 3Hours                | 3Hours                              |
| <b>Exam Marks</b>         | 50                             | 50                        | 60                                      | 100                   | 100                                 |
| <b>Converted to</b>       | 10                             | 10                        | 10                                      | 10                    | 60                                  |
| <b>Marks</b>              | 40                             |                           |                                         |                       | 60                                  |
| <b>Tentative Schedule</b> | 6 <sup>th</sup> Week           | 12 <sup>th</sup> Week     | 13 <sup>th</sup> -14 <sup>th</sup> Week | 16 <sup>th</sup> Week |                                     |

### CONTINUOUS ASSESSMENT

**CA1and CA2:** Assessment written test should be conducted for 50Marks for two units. The marks scored will be converted to 10 Marks for the internal assessment.

**CA1and CA2, Assessment test should be conducted for two units as below**

- PART A :(5x10 Marks=50Marks).
- Eight questions will be asked, students should write five questions. Four questions can be asked from each unit.

**CA3:** 60 MCQ can be asked by covering the entire portion. It may be conducted by Online / Offline. The marks scored should be converted to 10 marks for the internal assessment.

**CA4:** Model examination should be conducted as per the end semester question pattern. The marks should be converted to 10marks for the internal assessment.

#### Question Pattern:

Answer Ten questions by selecting two questions from each unit. Each question carries 10 marks.

- Four questions will be asked from every unit. Students should write any two questions.

## Question Pattern –Model Examination and End Semester Examination Theory Exam

### PART-A

(5x2x10Marks=100Marks)

Note: Answer Ten questions by selecting two questions from each unit. Each question carries 10 marks.

#### Sample:

- I. 1
- 2
- 3
- 4
- II. 5
- 6
- 7
- 8
- III. 9
- 10
- 11
- 12
- IV. 13
- 14
- 15
- 16
- V. 17
- 18
- 19
- 20

#### QUESTION PAPER SETTING

The teaching learning process and assessment are being carried out in accordance with the revised Blooms Taxonomy. The question paper should consist of 90% questions based on Lower Order Thinking (LOTs) and the remaining 10% based on Higher Order Thinking (HOTs) as detailed below.

| Revised Bloom's<br>Taxonomy<br>Level | Lower order thinking skills<br>(LOTs) | Higher Order Thinking<br>Skills (HOTs) |
|--------------------------------------|---------------------------------------|----------------------------------------|
|                                      | R-Remember, U-Understand,<br>AP-Apply | An- Analyse, E-Evaluate,<br>C-Create   |
| % to be included                     | 90 %                                  | 10 %                                   |

**CEE6118 – ADVANCED SURVEYING**

| CEE6118                                                                                                                                                                                        |                              | ADVANCED SURVEYING | L | T | P | C      |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------|--------------------|---|---|---|--------|
| THEORY                                                                                                                                                                                         |                              |                    | 3 | 0 | 0 | 3      |
| Unit-I                                                                                                                                                                                         | ENGINEERING SURVEYS          |                    |   |   |   | 9Hrs   |
| 1.1 Reconnaissance, preliminary and location surveys for engineering projects                                                                                                                  |                              |                    |   |   |   | [1Hr]  |
| Lay out - Setting out works                                                                                                                                                                    |                              |                    |   |   |   | [1Hr]  |
| Route Surveys for highways, railways and waterways                                                                                                                                             |                              |                    |   |   |   | [1Hr]  |
| 1.2 Horizontal and vertical curves                                                                                                                                                             |                              |                    |   |   |   | [1Hr]  |
| Simple curves - Setting with chain and tapes                                                                                                                                                   |                              |                    |   |   |   | [1Hr]  |
| Tangential angles by theodolite, double theodolite                                                                                                                                             |                              |                    |   |   |   | [1Hr]  |
| Setting out by offsets and angles - Vertical curves - Mine Surveying - instruments –Tunnels                                                                                                    |                              |                    |   |   |   | [1Hr]  |
| Correlation of underground and surface surveys – Shafts.                                                                                                                                       |                              |                    |   |   |   | [2Hrs] |
| Unit-II                                                                                                                                                                                        | MODERN SURVEYING INSTRUMENTS |                    |   |   |   | 10Hrs  |
| 2.1 Electronic Theodolite                                                                                                                                                                      |                              |                    |   |   |   | [1Hr]  |
| Component parts -set up- working principles –temporary adjustments                                                                                                                             |                              |                    |   |   |   | [1Hr]  |
| Total stations - uses-component parts - EDM, Electronic field book - Advantages                                                                                                                |                              |                    |   |   |   | [1Hr]  |
| Parts and accessories - working principle                                                                                                                                                      |                              |                    |   |   |   | [1Hr]  |
| Observables – Errors - COGO functions – Field procedure and applications.                                                                                                                      |                              |                    |   |   |   | [1Hr]  |
| 2.2 GPS: Advantages                                                                                                                                                                            |                              |                    |   |   |   | [1Hr]  |
| System components– receiver components and antenna                                                                                                                                             |                              |                    |   |   |   | [1Hr]  |
| Planning and data acquisition – Data processing - Errors in GPS                                                                                                                                |                              |                    |   |   |   | [1Hr]  |
| Field procedure and applications. Geographical information systems (GIS) – map definitions, map projections data entry importance, use and application of GIS in Civil Engineering.3D scanning |                              |                    |   |   |   | [1Hr]  |

|                                                                                                                                                   |                                                |              |
|---------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------|--------------|
| <b>Unit-III</b>                                                                                                                                   | <b>HYDROGRAPHIC AND ASTRONOMICAL SURVEYING</b> | <b>8Hrs</b>  |
| 3.1 Hydro graphic Surveying - Tides - MSL - Sounding methods                                                                                      |                                                | [1Hr]        |
| Location of soundings and methods                                                                                                                 |                                                | [1Hr]        |
| Three-point problem (Lehmann's Method, Bessel Method, Mechanical Method)                                                                          |                                                | [1Hr]        |
| Strength of fix - Sextants and station pointer - River surveys                                                                                    |                                                | [1Hr]        |
| Measurement of current and discharge - Celestial sphere.                                                                                          |                                                | [1Hr]        |
| 3.2 Astronomical terms and definitions                                                                                                            |                                                | [1Hr]        |
| Motion of sun and stars - Apparent altitude and corrections                                                                                       |                                                | [1Hr]        |
| Celestial co-ordinate systems - Different time systems                                                                                            |                                                | [1Hr]        |
| Use of Nautical almanac, Star constellations.                                                                                                     |                                                | [1Hr]        |
| <b>Unit-IV</b>                                                                                                                                    | <b>INTRODUCTION TO REMOTE SENSING</b>          | <b>10Hrs</b> |
| 4.1 Remote sensing - Introduction and applications in Civil Engineering                                                                           |                                                | [2Hrs]       |
| components of RS, History of Remote Sensing                                                                                                       |                                                | [1Hr]        |
| Merits and demerits of data collation between conventional and Remote sensing methods.                                                            |                                                | [2Hrs]       |
| 4.2 Electromagnetic Spectrum-Standard atmospheric profile –interaction of radiation                                                               |                                                | [2Hrs]       |
| Atmosphere – Scattering, absorption and refraction -Spectral Signature concepts                                                                   |                                                | [1Hr]        |
| Typical spectral reflectance curves for vegetation, soil and water -Classification of remote sensors                                              |                                                | [2Hrs]       |
| <b>Unit-V</b>                                                                                                                                     | <b>INTRODUCTION TO PHOTOGRAMMETRY</b>          | <b>8Hrs</b>  |
| 5.1 Principles - Stereoscopic depth perception – aerial photo-aerial camera -Scale overlaps stereoscopy – concepts – viewing and measuring system |                                                | [1Hr]        |
| Principle of floating mark                                                                                                                        |                                                | [1Hr]        |
| 5.2 Methods of parallax measurement – vertical photographs – geometry, scale                                                                      |                                                | [2Hrs]       |
| parallax Equations, Plan metric mapping                                                                                                           |                                                | [1Hr]        |
| Tilted photograph, Geometry, Coordinate system, Scale, Planimetric mapping.                                                                       |                                                | [1Hr]        |
| <b>TOTAL HOURS</b>                                                                                                                                |                                                | <b>45</b>    |

#### Suggested list of Students Activity

- Collect the information on survey instruments available in the market with specifications.
- Watch educational videos on various advanced surveying methods to understand the concepts.

#### Text Books

| S. NO | TITLE                 | AUTHOR                                          | PUBLISHER WITH EDITION                                                                     |
|-------|-----------------------|-------------------------------------------------|--------------------------------------------------------------------------------------------|
| 1.    | Surveying Vol. I & II | Dr. B. C. Punmia, Ashok K. Jain and Arun K Jain | 6 <sup>th</sup> Edition, Lakshmi Publications Pvt Ltd, New Delhi, Sixteenth Edition, 2016. |
| 2.    | Surveying Vol I & II  | K. R. Arora                                     | 12 <sup>th</sup> Edition, Standard Book house, 2013.                                       |
| 3.    | Textbook of Surveying | C.Venkatramaiah                                 | 2 <sup>nd</sup> Edition, Universities Press, 2011.                                         |

### Web-based/Online Resources

| S. No | Website/Links                                                                                         |
|-------|-------------------------------------------------------------------------------------------------------|
| 1     | <a href="https://www.youtube.com/watch?v=am3MYbQApz8">https://www.youtube.com/watch?v=am3MYbQApz8</a> |
| 2     | <a href="https://www.youtube.com/watch?v=HImugNxfDhU">https://www.youtube.com/watch?v=HImugNxfDhU</a> |
| 3     | <a href="https://www.youtube.com/watch?v=ZkZbVOdaXHs">https://www.youtube.com/watch?v=ZkZbVOdaXHs</a> |
| 4     | <a href="https://www.youtube.com/watch?v=rEzgU6Ds_5c">https://www.youtube.com/watch?v=rEzgU6Ds_5c</a> |
| 5     | <a href="https://www.youtube.com/watch?v=Cy2Oy9iJTbY">https://www.youtube.com/watch?v=Cy2Oy9iJTbY</a> |
| 6     | <a href="https://www.youtube.com/watch?v=VliVvNrV_vU">https://www.youtube.com/watch?v=VliVvNrV_vU</a> |

### QUESTION PAPER SETTING

The teaching learning process and assessment are being carried out in accordance with the revised Blooms Taxonomy. The question paper should consist of 90% questions based on Lower Order Thinking (LOTs) and the remaining 10% based on Higher Order Thinking (HOTs) as detailed below.

| Revised Bloom's Taxonomy Level | Lower order thinking skills (LOTs) | Higher Order Thinking Skills (HOTs) |
|--------------------------------|------------------------------------|-------------------------------------|
|                                | R-Remember, U-Understand, AP-Apply | An- Analyse, E-Evaluate, C-Create   |
| % to be included               | 90 %                               | 10 %                                |

## MODEL QUESTION PAPER

### CEE6118 – ADVANCED SURVEYING

**Time: 3Hrs**

**Max.Marks:100**

**PART-A**

**(5x2x10Marks=100Marks)**

Note: Answer Ten questions by selecting two questions from each unit.

Each question carries 10 marks

| S.no | Questions                                                                         | Unit | Bloom's Level | Course Outcome | Program Outcomes                |
|------|-----------------------------------------------------------------------------------|------|---------------|----------------|---------------------------------|
| I    | 1) What are the different surveys for the engineering projects (explain any one)? | I    | U             | E6118.1        | PO1,PO2,PO3<br>PO4, PO5,PO6,PO7 |
|      | 2) Explain the procedure of simple curve setting method (explain any one)         | I    | U             | E6118.1        | PO1,PO2,PO3<br>PO4, PO5,PO6,PO7 |
|      | 3) Explain route surveys for highways and railways                                | I    | U             | E6118.1        | PO1,PO2,PO3<br>PO4, PO5,PO6,PO7 |
|      | 4) Explain the different types of vertical curves                                 | I    | R             | E6118.1        | PO1,PO2,PO3<br>PO4, PO5,PO6,PO7 |
| II   | 5) Explain the EDM modern surveying instruments                                   | II   | U             | E6118.2        | PO1,PO2,PO3<br>PO4, PO5,PO6,PO7 |
|      | 6) Briefly Explain the various applications of GIS                                | II   | R             | E6118.2        | PO1,PO2,PO3<br>PO4, PO5,PO6,PO7 |
|      | 7) Explain the working principles of electronic theodolite.                       | II   | R             | E6118.2        | PO1,PO2,PO3<br>PO4, PO5,PO6,PO7 |
|      | 8) Explain advantages in GPS.                                                     | II   | U             | E6118.2        | PO1,PO2,PO3<br>PO4, PO5,PO6,PO7 |
| III  | 9) Explain about Three Point Problem.                                             | III  | U, An         | E6118.3        | PO1,PO2,PO3<br>PO4, PO5,PO6,PO7 |
|      | 10) Explain the various types sounding methods in hydrographic surveying          | III  | U, R          | E6118.3        | PO1,PO2,PO3<br>PO4, PO5,PO6,PO7 |
|      | 11) Explain about strength of fix                                                 | III  | U, R          | E6118.3        | PO1,PO2,PO3<br>PO4, PO5,PO6,PO7 |
|      | 12) Explain the Measurement of current and discharge in river surveying           | III  | R             | E6118.3        | PO1,PO2,PO3<br>PO4, PO5,PO6,PO7 |

|    |                                                                                                          |    |      |         |                                 |
|----|----------------------------------------------------------------------------------------------------------|----|------|---------|---------------------------------|
| IV | 13) What are the merits and demerits of data collection between conventional and remote sensing methods? | IV | U, R | E6118.4 | PO1,PO2,PO3<br>PO4, PO5,PO6,PO7 |
|    | 14) Write the applications of remote sensing in civil engineering.                                       | IV | R    | E6118.4 | PO1,PO2,PO3<br>PO4, PO5,PO6,PO7 |
|    | 15) Explain interaction of radiation with atmosphere.                                                    | IV | U, R | E6118.4 | PO1,PO2,PO3<br>PO4, PO5,PO6,PO7 |
|    | 16) Explain classifications of remote sensors.                                                           | IV | U    | E6118.4 | PO1,PO2,PO3<br>PO4, PO5,PO6,PO7 |
| V  | 17) Write short notes on Principle of floating mark?                                                     | V  | U, R | E6118.5 | PO1,PO2,PO3<br>PO4, PO5,PO6,PO7 |
|    | 18) Describe the Methods of parallax measurement                                                         | V  | R    | E6118.5 | PO1,PO2,PO3<br>PO4, PO5,PO6,PO7 |
|    | 19) Explain (i) aerial photo (ii) aerial camera (iii) stereoscopy                                        | V  | R    | E6118.5 | PO1,PO2,PO3<br>PO4, PO5,PO6,PO7 |
|    | 20) Explain (i) Tilted photograph (ii) Vertical photographs                                              | V  | U    | E6118.5 | PO1,PO2,PO3<br>PO4, PO5,PO6,PO7 |

### QUESTION PAPER SETTING

The teaching learning process and assessment are being carried out in accordance with the revised Blooms Taxonomy. The question paper should consist of 90% questions based on Lower Order Thinking (LOTs) and the remaining 10% based on Higher Order Thinking (HOTs) as detailed below.

| Revised Bloom's Taxonomy Level | Lower order thinking skills (LOTs) | Higher Order Thinking Skills (HOTs) |
|--------------------------------|------------------------------------|-------------------------------------|
|                                | R-Remember, U-Understand, AP-Apply | An- Analyse, E-Evaluate, C-Create   |
| % to be included               | 90 %                               | 10 %                                |

**CEE6241–ARTIFICIAL INTELLIGENCE AND MACHINE  
LANGUAGE IN CONSTRUCTION MANAGEMENT**

| L | T | P | C |
|---|---|---|---|
| 1 | 0 | 4 | 3 |

Programme Name : CIVIL ENGINEERING  
 Course Code : CEE6241  
 Semester : VI SEMESTER  
 Course Title : ARTIFICIAL INTELLIGENCE AND MACHINE LANGUAGE IN  
 CONSTRUCTION MANAGEMENT  
 Course Type : PRACTICUM

**TEACHING AND SCHEME OF EXAMINATION**

**No. of weeks per semester: 15 weeks**

| Course                                                                  | Instructions  |                     | Examination            |                           |       |          |
|-------------------------------------------------------------------------|---------------|---------------------|------------------------|---------------------------|-------|----------|
|                                                                         | Hour/<br>Week | Hours /<br>Semester | Marks                  |                           |       | Duration |
|                                                                         |               |                     | Internal<br>Assessment | Autonomous<br>Examination | Total |          |
| Artificial intelligence and machine language in construction management | 5             | 75                  | 40                     | 100*                      | 100   | 3Hrs     |

**\*Examinations will be conducted for 100 marks and will be converted to 60 marks**

**TOPICS AND ALLOCATION OF HOURS**

| Unit         | Topics                  | Time (Hrs) |
|--------------|-------------------------|------------|
| I            | Python programming      | 05         |
| II           | Machine learning        | 05         |
| III          | Artificial intelligence | 05         |
| <b>Total</b> |                         | <b>15</b>  |

**COURSE DESCRIPTION:**

This course explores the transformative impact of Artificial Intelligence (AI) and Machine Learning (ML) on construction management. It aims to equip students with the knowledge and skills needed to leverage AI and ML technologies to optimize construction processes, improve project outcomes, and enhance decision-making. Through a combination of theoretical understanding and practical application, students will learn how to implement these advanced technologies in real-world construction scenarios. The course aims to bridge the gap between advanced technology and practical construction management, preparing students to lead the future of the construction industry with cutting-edge AI and ML capabilities.

## COURSE OBJECTIVE

The objective of this course is to enable the student:

- Understand the fundamental concepts of AI and ML.
- Explore the applications of AI and ML in the construction industry.
- Analyze the benefits and challenges of integrating AI and ML in construction management.
- Develop practical skills in using AI and ML tools for construction project planning, scheduling, and risk management.
- Evaluate case studies of AI and ML implementations in construction projects.

## COURSE OUTCOMES

| After successful completion of this course, the students should be able to |                                                                                                      |
|----------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------|
| <b>E6241.1</b>                                                             | Demonstrate an understanding of AI and ML principles and their relevance to construction management. |
| <b>E6241.2</b>                                                             | Apply AI and ML techniques to solve complex problems in construction projects.                       |
| <b>E6241.3</b>                                                             | Analyze and interpret data to make informed decisions in construction management.                    |
| <b>E6241.4</b>                                                             | Develop AI-driven solutions to enhance efficiency, safety, and quality in construction.              |
| <b>E6241.5</b>                                                             | Critically assess the impact of AI and ML on the construction industry and anticipate future trends. |

### Pre-requisites

Nil

### CO-POs & PSOs mapping matrix

| CO/PO                    | PO1       | PO2       | PO3      | PO4       | PO5      | PO6      | PO7       | PSO1      | PSO2      | PSO3      |
|--------------------------|-----------|-----------|----------|-----------|----------|----------|-----------|-----------|-----------|-----------|
| <b>E6241.1</b>           | 3         | 2         | 1        | 2         | 1        | -        | 3         | 2         | 3         | 2         |
| <b>E6241.2</b>           | 3         | 2         | 1        | 2         | 1        | -        | 3         | 2         | 3         | 2         |
| <b>E6241.3</b>           | 3         | 2         | 1        | 2         | 1        | -        | 3         | 2         | 3         | 2         |
| <b>E6241.4</b>           | 3         | 2         | 1        | 2         | 1        | -        | 3         | 2         | 3         | 2         |
| <b>E6241.5</b>           | 3         | 2         | 1        | 2         | 1        | -        | 3         | 2         | 3         | 2         |
| <b>Total</b>             | <b>15</b> | <b>10</b> | <b>5</b> | <b>10</b> | <b>5</b> | <b>-</b> | <b>15</b> | <b>10</b> | <b>15</b> | <b>10</b> |
| <b>Correlation Level</b> | <b>2</b>  | <b>2</b>  | <b>1</b> | <b>2</b>  | <b>1</b> | <b>-</b> | <b>3</b>  | <b>2</b>  | <b>3</b>  | <b>2</b>  |

Correlation level 1 – Slight (low)

Correlation level 2 – Moderate (Medium)

Correlation level 3 – Substantial (high)

### Instructional Strategy

- Lecture
- Presentation
- Demonstration
- Discussion

## Assessment Methodology

|                           | Continuous Assessment (40 marks)   |                                             |                       |                       | End Semester Examination (60 marks) |
|---------------------------|------------------------------------|---------------------------------------------|-----------------------|-----------------------|-------------------------------------|
|                           | CA1                                | CA2                                         | CA3                   | CA4                   |                                     |
| <b>Mode</b>               | Practical Test                     | Practical Test                              | Written Test Theory   | Practical Test        | Practical Examination               |
| <b>Portion</b>            | Cycle I Exercises<br>50% Exercises | Cycle II Exercises<br>Another 50% Exercises | All Units             | All Exercises         | All Exercises                       |
| <b>Duration</b>           | 2 Periods                          | 2 Periods                                   | 3 hours               | 3 hours               | 3 hours                             |
| <b>Exam Marks</b>         | 60                                 | 60                                          | 100                   | 100                   | 100                                 |
| <b>Converted to</b>       | 10                                 | 10                                          | 10                    | 10                    | 60                                  |
| <b>Marks</b>              | 40                                 |                                             |                       |                       | 60                                  |
| <b>Tentative Schedule</b> | 7 <sup>th</sup> Week               | 14 <sup>th</sup> Week                       | 15 <sup>th</sup> Week | 16 <sup>th</sup> Week |                                     |

### Note:

**CA1 and CA2:** All the exercises/experiments should be completed as per the portions above and kept for the practical test. The students shall be permitted to select any one by lot for the test. The practical test should be conducted as per the scheme of evaluation as below. The marks awarded shall be converted to 10 Marks for each assessment test. Practical documents should be maintained for every exercise / experiment immediately after completion of the practice. The practical document should be submitted for the practical test. The same should be evaluated for 10 Marks for each exercise/experiment. The total marks awarded should be converted to 10 Marks for the practical test as per the scheme of evaluation as below.

### The details of the documents to be prepared as per the instruction below.

Each exercise should be completed on the day of practice. The same shall be evaluated for 10 marks on the day or next day of practice before commencement of the next exercise. This documentation can be carried out in a separate notebook or printed manual or a file with documents. Students should write the procedure and draw the sketch manually. The detailed date of the practices and its evaluations should be maintained in the course logbook. The log book and the practical documents should be submitted for the verification by the Flying Squad.

### SCHEME OF EVALUATION

| PART | DESCRIPTION                | MARKS |
|------|----------------------------|-------|
| A    | Aim and Apparatus Required | 5     |
| B    | Free Hand Sketch           | 20    |
| C    | Execution/Printout         | 20    |
| D    | Result                     | 5     |

|       |                                           |    |
|-------|-------------------------------------------|----|
| TOTAL |                                           | 50 |
| E     | Practical Documents (As per the portions) | 10 |
| TOTAL |                                           | 60 |

- **CA 3:** Written Test for complete theory portions should be conducted for 100 Marks as per the question pattern below. The marks scored will be converted to 10 Marks for internal assessment.

#### Question pattern – Written Test Theory

| Description |                                                     | Marks     |           |
|-------------|-----------------------------------------------------|-----------|-----------|
| Part – A    | 30 MCQ from the complete theory portions.           | 30X1Mark  | 30Marks   |
| Part – B    | Seven Questions to be answered out of 10 Questions. | 7X10Marks | 70Marks   |
| TOTAL       |                                                     |           | 100 Marks |

- **CA 4:** All the exercises/experiments should be completed and kept for the practical test. The students shall be permitted to select any one by lot for the test. The practical test should be conducted as per the scheme of evaluation below. After completion of all the exercises the practical test should be conducted as per End Semester Examination question pattern scheme of evaluation. The marks awarded should be converted to 10 Marks for the internal assessment.

#### SCHEME OF EVALUATION

##### Model Practical Examination and End Semester Examination - Practical Exam

| PART  | DESCRIPTION                | MARKS |
|-------|----------------------------|-------|
| A     | Aim and Apparatus Required | 10    |
| B     | Free Hand Sketch           | 20    |
| C     | Execution/Printout         | 20    |
| D     | Result                     | 10    |
| E     | Written Test               | 30    |
| F     | Viva Voce                  | 10    |
| TOTAL |                            | 100   |

**Note:** For the written test 30 MCQ shall be asked from the theory portions.

**CEE6241 –ARTIFICIAL INTELLIGENCE AND MACHINE  
LANGUAGE IN CONSTRUCTION MANAGEMENT**

| CEE6241                                                                                       |                                                                                   | ARTIFICIAL INTELLIGENCE AND<br>MACHINE LANGUAGE IN<br>CONSTRUCTION MANAGEMENT | L | T | P | C      |
|-----------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-------------------------------------------------------------------------------|---|---|---|--------|
| PRACTICUM                                                                                     |                                                                                   |                                                                               | 1 | 0 | 4 | 3      |
| Unit -I                                                                                       | PYTHON PROGRAMMING                                                                |                                                                               |   |   |   | 5Hrs   |
| Variables, Data types, Control flow statements: if, looping statements (for and while)        |                                                                                   |                                                                               |   |   |   | [1Hr]  |
| Functions Creation, manipulation, and common operations: Lists, Tuples, Dictionaries and Sets |                                                                                   |                                                                               |   |   |   | [1Hr]  |
| Fundamental Python Libraries for Data Scientists:                                             |                                                                                   |                                                                               |   |   |   | [1Hr]  |
| NumPy, ScikitLearn, Pandas, Matplotlib                                                        |                                                                                   |                                                                               |   |   |   | [1Hr]  |
| Unit -II                                                                                      | MACHINE LEARNING                                                                  |                                                                               |   |   |   | 5Hrs   |
| Introduction to Machine Learning: ML Types                                                    |                                                                                   |                                                                               |   |   |   | [1Hr]  |
| Regression: Linear Regression                                                                 |                                                                                   |                                                                               |   |   |   | [1Hr]  |
| Classification: K-Nearest Neighbour (KNN), and Decision Tree                                  |                                                                                   |                                                                               |   |   |   | [1Hr]  |
| Unsupervised algorithm K-Means algorithm                                                      |                                                                                   |                                                                               |   |   |   | [1Hr]  |
| Dimensionality Reduction – Principal Component Analysis (PCA) Algorithm                       |                                                                                   |                                                                               |   |   |   | [1Hr]  |
| Unit- III                                                                                     | ARTIFICIAL INTELLIGENCE                                                           |                                                                               |   |   |   | 5Hrs   |
| Multi-Layer Perception                                                                        |                                                                                   |                                                                               |   |   |   | [1Hr]  |
| Artificial Neural Network                                                                     |                                                                                   |                                                                               |   |   |   | [1Hr]  |
| Introduction to generative AI, Prompt Engineering                                             |                                                                                   |                                                                               |   |   |   | [1Hr]  |
| Introduction to AI in Civil Engineering                                                       |                                                                                   |                                                                               |   |   |   | [1Hr]  |
| Use of AI in Smart Construction Equipment                                                     |                                                                                   |                                                                               |   |   |   | [1Hr]  |
|                                                                                               | PRACTICAL EXERCISES                                                               |                                                                               |   |   |   |        |
| 1                                                                                             | Sample programs using conditional and looping statements                          |                                                                               |   |   |   | [5Hrs] |
| 2                                                                                             | Sample Programs for List, Array, Dictionary and Set                               |                                                                               |   |   |   | [4Hrs] |
| 3                                                                                             | Data Manipulation with Pandas; Sample programs to pre-process and visualize data. |                                                                               |   |   |   | [4Hrs] |
| 4                                                                                             | ML - Estimation of the cost of a construction project using linear regression     |                                                                               |   |   |   | [4Hrs] |
| 5                                                                                             | ML - Prediction of Labour requirement for a project using KNN                     |                                                                               |   |   |   | [4Hrs] |

|                     |                                                                                        |           |
|---------------------|----------------------------------------------------------------------------------------|-----------|
| 6                   | ML - Prediction of salaries of the employee in a construction site using decision tree | [4Hrs]    |
| 7                   | ML - Concrete strength prediction using Random Forest Regression                       | [4Hrs]    |
| 8                   | ML – Using K Means clustering to improve construction project efficiency               | [4Hrs]    |
| 9                   | ML - Perform univariate and multivariate time series forecasting                       | [4Hrs]    |
| 10                  | ML - Prediction of Material requirement for a project.                                 | [4Hrs]    |
| 11                  | ML - Estimation of time overruns in a project using ANN                                | [4Hrs]    |
| <b>TOTAL PERIOD</b> |                                                                                        | <b>75</b> |

#### **Suggested List of Students Activity:**

- Tracking worker movements and safety compliance using ML
- Weather related delays using ML algorithm.
- Minimising material cost and resource optimization in the Construction fields.
- Develop AI systems to monitor safety compliance on construction sites.
- Analyse historical data to predict risks using ML Algorithms.

#### **Text Books**

| S. NO | TITLE                                                                          | AUTHOR                                                   | PUBLISHER WITH EDITION                      |
|-------|--------------------------------------------------------------------------------|----------------------------------------------------------|---------------------------------------------|
| 1.    | Artificial Intelligence in Construction Engineering and Management,            | Limao Zhang, YuePan, Xianguo Wu, Mirosław J. Skibniewski | Springer, 2024                              |
| 2.    | Artificial intelligence and Machine Learning Techniques for Civil Engineering, | Vagelis Plevris, Afaq Ahmad, Nikos D. Lagaros            | 1st Edition, IGI Global, 17th March 2023.   |
| 3.    | Machine Learning for Beginners                                                 | Jonathan S Walker                                        | 1st edition, Jw Choices, 31st January 2023. |

#### **Web-based/Online Resources**

| S.No | Website/Links                                                                                                         |
|------|-----------------------------------------------------------------------------------------------------------------------|
| 1    | Suggested Journals :Journal of Computing in Civil Engineering (ASCE)                                                  |
| 2    | <a href="https://www.constructiondive.com/">https://www.constructiondive.com/</a> for live construction news updation |
| 3    | Learning Path: "AI and Machine Learning Foundations" from Coursera.                                                   |
| 4    | AI tools – Copilot.ai,Bard.ai,Chatgpt.ai etc.                                                                         |

#### **Equipment / Facilities required to conduct the Practical Course.**

**Computers- 30**

**Software used:**

- PyCharm
- Anaconda python
- Data set: Kaggle, GitHub, data.gov etc

## MODEL QUESTION PAPER

### CEE6241 –ARTIFICIAL INTELLIGENCE AND MACHINE LANGUAGE IN CONSTRUCTION MANAGEMENT

Time : 3Hrs

Max.Marks:100

| S. No | Name of the Experiments                                                                | CO      | PO                  |
|-------|----------------------------------------------------------------------------------------|---------|---------------------|
| 1     | Sample programs using conditional and looping statements                               | E6241.1 | PO1,PO2,PO3,PO4,PO7 |
| 2     | Sample Programs for List, Array, Dictionary and Set                                    | E6241.1 | PO1,PO2,PO3,PO4,PO7 |
| 3     | Data Manipulation with Pandas; Sample programs to pre-process and visualize data.      | E6241.1 | PO1,PO2,PO3,PO4,PO7 |
| 4     | ML - Estimation of the cost of a construction project using linear regression          | E6241.2 | PO1,PO2,PO3,PO4,PO7 |
| 5     | ML - Prediction of Labour requirement for a project using KNN                          | E6241.2 | PO1,PO2,PO3,PO4,PO7 |
| 6     | ML - Prediction of salaries of the employee in a construction site using decision tree | E6241.2 | PO1,PO2,PO3,PO4,PO7 |
| 7     | ML - Concrete strength prediction using Random Forest Regression                       | E6241.2 | PO1,PO2,PO3,PO4,PO7 |
| 8     | ML – Using K Means clustering to improve construction project efficiency               | E6241.3 | PO1,PO2,PO3,PO4,PO7 |
| 9     | ML - Perform univariate and multivariate time series forecasting                       | E6241.3 | PO1,PO2,PO3,PO4,PO7 |
| 10    | ML - Prediction of Material requirement for a project.                                 | E6241.3 | PO1,PO2,PO3,PO4,PO7 |
| 11    | ML - Estimation of time overruns in a project using ANN                                | E6241.3 | PO1,PO2,PO3,PO4,PO7 |

### QUESTION PAPER SETTING

The teaching learning process and assessment are being carried out in accordance with the revised Blooms Taxonomy. The question paper should consist of 90% questions based on Lower Order Thinking (LOTs) and the remaining 10% based on Higher Order Thinking (HOTs) as detailed below.

| Revised Bloom's Taxonomy Level | Lower order thinking skills (LOTs) | Higher Order Thinking Skills (HOTs) |
|--------------------------------|------------------------------------|-------------------------------------|
|                                | R-Remember, U-Understand, AP-Apply | An- Analyse, E-Evaluate, C-Create   |
| % to be included               | 90 %                               | 10 %                                |

## CEE6242-STRUCTURAL DETAILING FOR RCC ELEMENTS

Programme Name : CIVIL ENGINEERING  
 Course Code : CEE6242  
 Semester : VI SEMESTER  
 Course Title : STRUCTURAL DETAILING FOR RCC ELEMENTS  
 Course Type : PRACTICUM

| L | T | P | C |
|---|---|---|---|
| 1 | 0 | 4 | 3 |

### TEACHING AND SCHEME OF EXAMINATION

No. of weeks per semester: 15 weeks

| Course                                | Instructions |                  | Examination         |                        |       |          |
|---------------------------------------|--------------|------------------|---------------------|------------------------|-------|----------|
|                                       | Hours / Week | Hours / Semester | Marks               |                        |       | Duration |
|                                       |              |                  | Internal Assessment | Autonomous Examination | Total |          |
| Structural detailing for RCC elements | 5            | 75               | 40                  | 100*                   | 100   | 3Hrs     |

\*Examinations will be conducted for 100 marks and will be converted to 60 marks

### TOPICS AND ALLOCATION OF HOURS

| Unit         | Topics                                                                                                     | Time (Hrs) |
|--------------|------------------------------------------------------------------------------------------------------------|------------|
| I            | Detailing of simply supported, singly and doubly reinforced beams and cantilever beams as per IS 456- 2000 | 20         |
| II           | Detailing of one way, Two way and continuous slabs as per IS 456- 2000                                     | 30         |
| III          | Detailing of columns and footing as per IS 456- 2000                                                       | 25         |
| <b>Total</b> |                                                                                                            | <b>75</b>  |

### COURSE DESCRIPTION

This is a core Course which covers broad elements of RCC detailing. This is an important subject that deals with the detailing of RCC structural elements. Diploma holders in Civil Engineering will be required to supervise the civil works with structural drawings. They may also be required to design and detail simple structural elements, make changes in detailing and drafting procedure depending upon the availability of materials (bars of different diameters). This subject thus deals with elementary detailing principles as per IS code of practice IS: 456 - 2000 by limit state method.

### COURSE OBJECTIVE

The objectives of the course are to enable the students to

- Detailing and drafting of simple RCC elements like singly, doubly reinforced rectangular beams, and singly reinforced simply supported T-beams for flexure and shear.
- Detailing and drafting of one way/ two ways simply supported slabs.
- Design axially loaded Columns and Footings.

## COURSE OUTCOMES

| After successful completion of this course, the students should be able to |                                                                                                                                                                                         |
|----------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>E6242.1</b>                                                             | Detailing and drafting of RCC elements like singly doubly reinforced rectangular beams, and singly reinforced Cantilevers, simply supported and Continuous beams for flexure and shear. |
| <b>E6242.2</b>                                                             | Detailing and drafting of One way/ Two-way slabs.                                                                                                                                       |
| <b>E6242.3</b>                                                             | Detailing and drafting of Axially loaded Columns and Footings.                                                                                                                          |

### Pre-requisites

Design of R.C.C Structures

### CO-POs & PSOs mapping matrix

| CO/PO                    | PO1      | PO2      | PO3      | PO4      | PO5      | PO6      | PO7      | PSO1     | PSO2     | PSO3     |
|--------------------------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|
| <b>E6242.1</b>           | 3        | 3        | 2        | -        | 2        | -        | 3        | -        | 3        | 2        |
| <b>E6242.2</b>           | 3        | 3        | 2        | -        | 2        | -        | 3        | -        | 3        | 2        |
| <b>E6242.3</b>           | 3        | 3        | 2        | -        | 2        | -        | 3        | -        | 3        | 2        |
| <b>Total</b>             | <b>9</b> | <b>9</b> | <b>6</b> | <b>-</b> | <b>6</b> | <b>-</b> | <b>9</b> | <b>-</b> | <b>9</b> | <b>6</b> |
| <b>Correlation Level</b> | <b>3</b> | <b>3</b> | <b>2</b> | <b>-</b> | <b>2</b> | <b>-</b> | <b>3</b> | <b>-</b> | <b>3</b> | <b>2</b> |

Correlation level 1 – Slight (low)

Correlation level 2 – Moderate (Medium)

Correlation level 3 – Substantial (high)

### Instructional Strategy

- This Course is introduced so that diploma holder in Civil Engineering may appreciate the concepts and principles of RCC structural elements of buildings and are able to apply the knowledge gained through the subjects of mechanics of materials and mechanics of structures. The detailing of simple structural elements like beams, slabs, column and footings will be demonstrate to the students to expose them in the field.
- Teacher should give simple exercises involving the applications of various concepts and principles being taught in the subject.
- Efforts should be made to prepare tutorial sheets on various topics and students should be encouraged /guided to solve the tutorial problems independently and visit to local construction site to understand the behavior and uses of structural elements.
- Teacher may conduct weekly small quiz sessions to know the students' level of understanding.

## Assessment methodology

|                           | Continuous Assessment (40 marks)   |                                             |                       |                       | End Semester Examination (60 marks) |
|---------------------------|------------------------------------|---------------------------------------------|-----------------------|-----------------------|-------------------------------------|
|                           | CA1                                | CA2                                         | CA3                   | CA4                   |                                     |
| <b>Mode</b>               | Practical Test                     | Practical Test                              | Written Test Theory   | Practical Test        | Practical Examination               |
| <b>Portion</b>            | Cycle I Exercises<br>50% Exercises | Cycle II Exercises<br>Another 50% Exercises | All Units             | All Exercises         | All Exercises                       |
| <b>Duration</b>           | 2 Periods                          | 2 Periods                                   | 3 hours               | 3 hours               | 3 hours                             |
| <b>Exam Marks</b>         | 60                                 | 60                                          | 100                   | 100                   | 100                                 |
| <b>Converted to</b>       | 10                                 | 10                                          | 10                    | 10                    | 60                                  |
| <b>Marks</b>              | 40                                 |                                             |                       |                       | 60                                  |
| <b>Tentative Schedule</b> | 7 <sup>th</sup> Week               | 14 <sup>th</sup> Week                       | 15 <sup>th</sup> Week | 16 <sup>th</sup> Week |                                     |

### Note:

**CA1 and CA2:** All the exercises/experiments should be completed as per the portions above and kept for the practical test. The students shall be permitted to select any one by lot for the test. The practical test should be conducted as per the scheme of evaluation as below. The marks awarded shall be converted to 10 Marks for each assessment test. Practical documents should be maintained for every exercise / experiment immediately after completion of the practice. The practical document should be submitted for the practical test. The same should be evaluated for 10 Marks for each exercise/experiment. The total marks awarded should be converted to 10 Marks for the practical test as per the scheme of evaluation as below.

### The details of the documents to be prepared as per the instruction below.

Each exercise should be completed on the day of practice. The same shall be evaluated for 10 marks on the day or next day of practice before commencement of the next exercise. This documentation can be carried out in a separate notebook or printed manual or a file with documents. Students should write the procedure and draw the sketch manually. The detailed date of the practices and its evaluations should be maintained in the course logbook. The log book and the practical documents should be submitted for the verification by the Flying Squad.

### SCHEME OF EVALUATION

| PART | DESCRIPTION                | MARKS |
|------|----------------------------|-------|
| A    | Aim and Apparatus Required | 5     |
| B    | Free Hand Sketch           | 20    |
| C    | Execution/Printout         | 20    |

|       |                                           |    |
|-------|-------------------------------------------|----|
| D     | Result                                    | 5  |
| TOTAL |                                           | 50 |
| E     | Practical Documents (As per the portions) | 10 |
|       |                                           | 60 |

- **CA 3:** Written Test for complete theory portions should be conducted for 100 Marks as per the question pattern below. The marks scored will be converted to 10 Marks for internal assessment.

#### Question pattern – Written Test Theory

| Description |                                                     | Marks     |           |
|-------------|-----------------------------------------------------|-----------|-----------|
| Part – A    | 30 MCQ from the complete theory portions.           | 30X1Mark  | 30Marks   |
| Part – B    | Seven Questions to be answered out of 10 Questions. | 7X10Marks | 70Marks   |
| TOTAL       |                                                     |           | 100 Marks |

- **CA 4:** All the exercises/experiments should be completed and kept for the practical test. The students shall be permitted to select any one by lot for the test. The practical test should be conducted as per the scheme of evaluation below. After completion of all the exercises the practical test should be conducted as per End Semester Examination question pattern scheme of evaluation. The marks awarded should be converted to 10 Marks for the internal assessment.

#### SCHEME OF EVALUATION

##### Model Practical Examination and End Semester Examination - Practical Exam

| PART  | DESCRIPTION                | MARKS |
|-------|----------------------------|-------|
| A     | Aim and Apparatus Required | 10    |
| B     | Free Hand Sketch           | 20    |
| C     | Execution/Printout         | 20    |
| D     | Result                     | 10    |
| E     | Written Test               | 30    |
| F     | Viva Voce                  | 10    |
| TOTAL |                            | 100   |

Note: For the written test 30 MCQ shall be asked from the theory portions.

**CEE6242–STRUCTURAL DETAILING FOR RCC ELEMENTS**

| CEE6242                                                                                                                             |                                                                                                            | STRUCTURAL DETAILING FOR RCC |  | L | T | P | C      |
|-------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------|------------------------------|--|---|---|---|--------|
| PRACTICUM                                                                                                                           |                                                                                                            | ELEMENTS                     |  | 1 | 0 | 4 | 3      |
| Unit-I                                                                                                                              | DETAILING OF SIMPLY SUPPORTED, SINGLY AND DOUBLY REINFORCED BEAMS AND CANTILEVER BEAMS AS PER IS 456- 2000 |                              |  |   |   |   | 20Hrs  |
| Concept of Reinforced Cement Concrete (RCC)                                                                                         |                                                                                                            |                              |  |   |   |   | [1Hr]  |
| Types of Reinforcement Materials-Suitability of steel as reinforcing material                                                       |                                                                                                            |                              |  |   |   |   | [1Hr]  |
| Properties of mild steel, HYSD steel and TMT bars-Loading on structures as per IS:875                                               |                                                                                                            |                              |  |   |   |   | [1Hr]  |
| Development of stress in reinforcement-Curtailment of reinforcements                                                                |                                                                                                            |                              |  |   |   |   | [1Hr]  |
| Detailing and drafting Concept of simply supported singlyand doubly reinforced beams and cantilever beams as per IS456 -2000        |                                                                                                            |                              |  |   |   |   | [1Hr]  |
| Practical exercises:                                                                                                                |                                                                                                            |                              |  |   |   |   |        |
| 1. Detailing and Drafting of Singly Reinforced simply supported beam as per code provisions.                                        |                                                                                                            |                              |  |   |   |   | [5Hrs] |
| 2. Detailing and Drafting Doubly Reinforced simply supported beam as per code provisions                                            |                                                                                                            |                              |  |   |   |   | [5Hrs] |
| 3. Detailing and drafting of cantilever beam as per code provisions.                                                                |                                                                                                            |                              |  |   |   |   | [5Hrs] |
| Unit-II                                                                                                                             | DETAILING OF ONE WAY, TWO WAY AND CONTINUOUS SLABS AS PER IS 456- 2000                                     |                              |  |   |   |   | 30Hrs  |
| Requirements governing slab reinforcements                                                                                          |                                                                                                            |                              |  |   |   |   | [1Hr]  |
| Detailing of slabs as per IS 456 – 2000                                                                                             |                                                                                                            |                              |  |   |   |   | [1Hr]  |
| Detailing and drafting of one-way, two-way slab                                                                                     |                                                                                                            |                              |  |   |   |   | [1Hr]  |
| (Corners are not held down and corners held down)                                                                                   |                                                                                                            |                              |  |   |   |   | [1Hr]  |
| Tension and Torsion reinforcement requirements.                                                                                     |                                                                                                            |                              |  |   |   |   | [1Hr]  |
| Practical exercises:                                                                                                                |                                                                                                            |                              |  |   |   |   |        |
| 4. Detailing and drafting of one-way slab as per code provisions.                                                                   |                                                                                                            |                              |  |   |   |   | [5Hrs] |
| 5. Detailing and drafting of two-way slab as per code provisions- Corners are not held down (All the Four edges discontinuous case) |                                                                                                            |                              |  |   |   |   | [5Hrs] |
| 6. Detailing and drafting of two-way slab as per code provisions corners held down (All the Four edges discontinuous case)          |                                                                                                            |                              |  |   |   |   | [5Hrs] |
| 7. Detailing and drafting of one-way Continuous slab as per code provisions.                                                        |                                                                                                            |                              |  |   |   |   | [5Hrs] |
| 8. Detailing and drafting of two-way Continuous slab as per code provisions                                                         |                                                                                                            |                              |  |   |   |   | [5Hrs] |

| Unit-III                                                                           | DETAILING OF COLUMNS AND FOOTING AS PER IS 456- 2000 | 25Hrs     |
|------------------------------------------------------------------------------------|------------------------------------------------------|-----------|
| Requirements governing longitudinal                                                |                                                      | [1Hr]     |
| Transverse reinforcement of column as per IS 456                                   |                                                      | [1Hr]     |
| Arrangement of transverse and longitudinal reinforcement as per IS 456             |                                                      | [1Hr]     |
| Detailing and drafting of axially loaded short columns for reinforcement           |                                                      | [1Hr]     |
| Distributed equally on two/four sides and footing as per IS code.                  |                                                      | [1Hr]     |
| <b>Practical Exercises:</b>                                                        |                                                      |           |
| 9. Detailing and drafting of square column as per code provisions.                 |                                                      | [5Hrs]    |
| 10. Detailing and drafting of rectangular column as per code provisions.           |                                                      | [5Hrs]    |
| 11. Detailing and drafting of isolated square footing as per code provisions.      |                                                      | [5Hrs]    |
| 12. Detailing and drafting of isolated rectangular footing as per code provisions. |                                                      | [5Hrs]    |
| <b>TOTAL</b>                                                                       |                                                      | <b>75</b> |

**EQUIPMENTS REQUIRED: (Batch strength: 30 students)**

| S. No | LIST OF EQUIPMENTS | QUANTITY REQUIRED |
|-------|--------------------|-------------------|
| 1.    | Computers          | 30 Nos.           |
| 2.    | Laser printer      | 2 Nos.            |
| 3.    | CAD software       | 30 sers           |

**Suggested List of Students Activities**

- Visits to nearby construction site and study about
- Foundation and Footings
- Column reinforcements
- Grade beam and lintel level beam reinforcement arrangements
- Reinforcement details for beams and slabs
- Study the bar bending details of structural drawings.
- Learning the reinforcement arrangements given in SP- 34 (Hand book on concrete reinforcement and detailing)

**Text Books**

| S. NO | TITLE                                     | AUTHOR         | PUBLISHER WITH EDITION                                            |
|-------|-------------------------------------------|----------------|-------------------------------------------------------------------|
| 1.    | Limit state Design of Reinforced Concrete | B.C.Punmia     | Revised edition Lakshmi publications, Delhi, 2016                 |
| 2.    | Limit state Design of Reinforced Concrete | P.C.Varghese   | 2 <sup>nd</sup> edition PHI Learning Pvt. Ltd, 2008               |
| 3.    | Design of RCC and structural elements     | S.S.Bhavikatti | 1 <sup>st</sup> edition, New age International Publications, 2016 |

### Web-based/Online Resources

| S. No | Website/Links                                                                                                                                         |
|-------|-------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1     | <a href="https://nptel.ac.in/">https://nptel.ac.in/</a>                                                                                               |
| 2     | <a href="https://ndl.iitkgp.ac.in">https://ndl.iitkgp.ac.in</a>                                                                                       |
| 3     | Limit state method: <a href="https://youtu.be/jhVh4qNa_x8?si=YNSfiPtXo1DDZANC">https://youtu.be/jhVh4qNa_x8?si=YNSfiPtXo1DDZANC</a>                   |
| 4     | Analysis of singly reinforced beams: <a href="https://youtu.be/o4-EAjGhzSw?si=Ild2GPM_ZcvIqx3e">https://youtu.be/o4-EAjGhzSw?si=Ild2GPM_ZcvIqx3e</a>  |
| 5     | Design of flanged beams in flexure<br>: <a href="https://youtube/BOtUb1yk8sI?si=RSfF6k9F_SHnZium">https://youtube/BOtUb1yk8sI?si=RSfF6k9F_SHnZium</a> |
| 6     | Design of slabs: <a href="https://youtu.be/TQLehidE6Hc?si=eTEtZDufiXFmvp9-">https://youtu.be/TQLehidE6Hc?si=eTEtZDufiXFmvp9-</a>                      |
| 7     | Design of columns : <a href="https://youtu.be/n-D56dTiyik?si=SGY0E46YRd1LZucG">https://youtu.be/n-D56dTiyik?si=SGY0E46YRd1LZucG</a>                   |

**MODEL QUESTION PAPER****CEE6242–STRUCTURAL DETAILING FOR RCC ELEMENTS****Time :3 Hrs****Max.Marks:100**

| <b>S. No</b> | <b>Name of the Experiments</b>                                                                                                    | <b>CO</b> | <b>PO</b>                   |
|--------------|-----------------------------------------------------------------------------------------------------------------------------------|-----------|-----------------------------|
| 1            | Detailing and Drafting of Singly Reinforced simply supported beam as per code provisions.                                         | E6242:1   | PO1,PO2,PO3,PO4,PO5,PO6,PO7 |
| 2            | Detailing and Drafting Doubly Reinforced simply supported beam as per code provisions                                             | E6242:1   | PO1,PO2,PO3,PO4,PO5,PO6,PO7 |
| 3            | Detailing and Drafting of cantilever beam as per code provisions.                                                                 | E6242:1   | PO1,PO2,PO3,PO4,PO5,PO6,PO7 |
| 4            | Detailing and drafting of one-way slab as per code provisions.                                                                    | E6242:2   | PO1,PO2,PO3,PO4,PO5,PO6,PO7 |
| 5            | Detailing and drafting of two-way slab as per code provisions- Corners are not held down (All the Four edges discontinuous case ) | E6242:2   | PO1,PO2,PO3,PO4,PO5,PO6,PO7 |
| 6            | Detailing and drafting of two-way slab as per code provisions corners held down (All the Four edges discontinuous case )          | E6242:2   | PO1,PO2,PO3,PO4,PO5,PO6,PO7 |
| 7            | Detailing and drafting of one-way Continuous slab as per code provisions.                                                         | E6242:2   | PO1,PO2,PO3,PO4,PO5,PO6,PO7 |
| 8            | Detailing and drafting of two-way Continuous slab as per code provisions                                                          | E6242:2   | PO1,PO2,PO3,PO4,PO5,PO6,PO7 |
| 9            | Detailing and drafting of square column as per code provisions.                                                                   | E6242:3   | PO1,PO2,PO3,PO4,PO5,PO6,PO7 |
| 10           | Detailing and drafting of rectangular column as per code provisions                                                               | E6242:3   | PO1,PO2,PO3,PO4,PO5,PO6,PO7 |
| 11           | Detailing and drafting of isolated square footing as per code provisions.                                                         | E6242:3   | PO1,PO2,PO3,PO4,PO5,PO6,PO7 |
| 12           | Detailing and drafting of isolated rectangular footing as per code provisions                                                     | E6242:3   | PO1,PO2,PO3,PO4,PO5,PO6,PO7 |

## CEE6243- DESIGN AND DRAWING OF STEEL ELEMENTS

Programme Name : CIVIL ENGINEERING  
 Course Code : CEE6243  
 Semester : VI SEMESTER  
 Course Title : DESIGN AND DRAWING OF STEEL ELEMENTS  
 Course Type : PRACTICUM

| L | T | P | C |
|---|---|---|---|
| 1 | 0 | 4 | 3 |

### TEACHING AND SCHEME OF EXAMINATION

No. of weeks per semester: 15 weeks

| Course                               | Instructions |                  | Examination         |                        |       |          |
|--------------------------------------|--------------|------------------|---------------------|------------------------|-------|----------|
|                                      | Hours / Week | Hours / Semester | Marks               |                        |       | Duration |
|                                      |              |                  | Internal Assessment | Autonomous Examination | Total |          |
| Design and drawing of steel elements | 5            | 75               | 40                  | 100*                   | 100   | 3Hrs     |

\*Examinations will be conducted for 100 marks and will be converted to 60 marks

### TOPICS AND ALLOCATION OF HOURS

| Unit         | Topics                                         | Time (Hrs) |
|--------------|------------------------------------------------|------------|
| I            | Simple connection-bolted and welded connection | 15         |
| II           | Tension members                                | 15         |
| III          | Compression members                            | 15         |
| IV           | Beams                                          | 15         |
| V            | Roof truss                                     | 15         |
| <b>Total</b> |                                                | <b>75</b>  |

### COURSE DESCRIPTION:

A steel structure, a metal structure is made of structural steel components connected to each other to carry loads and provide rigidity. The subject deals with the basic concepts and principles, their application in drafting and detailing tension members, compression members and connectionsConstruction.

### COURSE OBJECTIVE:

The objectives of the course is to enable the students to

- Express bout steel and its importance
- Know the importance of steel in construction.
- Know the use of steel code and steel tables
- Know the importance of steel code for the design
- Know the various types of steel
- Know the types of connections
- Apply the knowledge of connections
- Know the types of connections

- Assess the drafting and detailing of tension members
- Assess the drafting and detailing of compression members
- Assess the drafting and detailing of connections

## COURSE OUTCOMES

| After successful completion of this course, the students should be able to |                                                                                                  |
|----------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------|
| <b>E6243.1</b>                                                             | To understand the application of IS code of practice for the design of steel structural elements |
| <b>E6243.2</b>                                                             | To understand the detailing and drafting of Compression members.                                 |
| <b>E6243.3</b>                                                             | To understand the detailing and drafting of Tension members.                                     |
| <b>E6243.4</b>                                                             | To understand the detailing and drafting of Beams.                                               |
| <b>E6243.5</b>                                                             | To understand the detailing and drafting of welded and bolted connections                        |

### Pre-requisites

Properties of Steel, Types and Shapes Steel Elements.

### CO-POs & PSOs mapping matrix

| CO/PO                    | PO1       | PO2       | PO3      | PO4       | PO5      | PO6       | PO7       | PSO1      | PSO2      | PSO3      |
|--------------------------|-----------|-----------|----------|-----------|----------|-----------|-----------|-----------|-----------|-----------|
| <b>E6243.1</b>           | 3         | 2         | 1        | 2         | 1        | 2         | 2         | 2         | 3         | 2         |
| <b>E6243.2</b>           | 3         | 2         | 1        | 2         | 1        | 2         | 2         | 2         | 3         | 2         |
| <b>E6243.3</b>           | 3         | 2         | 1        | 2         | 1        | 2         | 2         | 2         | 3         | 2         |
| <b>E6243.4</b>           | 3         | 2         | 1        | 2         | 1        | 2         | 2         | 2         | 3         | 2         |
| <b>E6243.5</b>           | 3         | 2         | 1        | 2         | 1        | 2         | 2         | 2         | 3         | 2         |
| <b>Total</b>             | <b>15</b> | <b>10</b> | <b>5</b> | <b>10</b> | <b>5</b> | <b>10</b> | <b>10</b> | <b>10</b> | <b>15</b> | <b>10</b> |
| <b>Correlation Level</b> | <b>2</b>  | <b>2</b>  | <b>1</b> | <b>2</b>  | <b>1</b> | <b>2</b>  | <b>3</b>  | <b>2</b>  | <b>3</b>  | <b>2</b>  |

Correlation level 1 – Slight (low)

Correlation level 2 – Moderate (Medium)

Correlation level 3 – Substantial (high)

### Instructional Strategy:

- To help the students to learn and appreciate the concepts in drafting and detailing the members and connections.
- Theory- demonstrates- practice – activity may be used to ensure that learning is outcome- and employability based.
- Visits to different construction activities have to be planned on all the topics.

**Assessment Methodology:**

|                           | Continuous Assessment (40 marks)   |                                             |                       |                       | End Semester Examination (60 marks) |
|---------------------------|------------------------------------|---------------------------------------------|-----------------------|-----------------------|-------------------------------------|
|                           | CA1                                | CA2                                         | CA3                   | CA4                   |                                     |
| <b>Mode</b>               | Practical Test                     | Practical Test                              | Written Test Theory   | Practical Test        | Practical Examination               |
| <b>Portion</b>            | Cycle I Exercises<br>50% Exercises | Cycle II Exercises<br>Another 50% Exercises | All Units             | All Exercises         | All Exercises                       |
| <b>Duration</b>           | 2 Periods                          | 2 Periods                                   | 3 hours               | 3 hours               | 3 hours                             |
| <b>Exam Marks</b>         | 60                                 | 60                                          | 100                   | 100                   | 100                                 |
| <b>Converted to</b>       | 10                                 | 10                                          | 10                    | 10                    | 60                                  |
| <b>Marks</b>              | 40                                 |                                             |                       |                       | 60                                  |
| <b>Tentative Schedule</b> | 7 <sup>th</sup> Week               | 14 <sup>th</sup> Week                       | 15 <sup>th</sup> Week | 16 <sup>th</sup> Week |                                     |

**Note:**

**CA1 and CA2:** All the exercises/experiments should be completed as per the portions above and kept for the practical test. The students shall be permitted to select any one by lot for the test. The practical test should be conducted as per the scheme of evaluation as below. The marks awarded shall be converted to 10 Marks for each assessment test. Practical documents should be maintained for every exercise / experiment immediately after completion of the practice. The practical document should be submitted for the practical test. The same should be evaluated for 10 Marks for each exercise/experiment. The total marks awarded should be converted to 10 Marks for the practical test as per the scheme of evaluation as below.

**The details of the documents to be prepared as per the instruction below.**

Each exercise should be completed on the day of practice. The same shall be evaluated for 10 marks on the day or next day of practice before commencement of the next exercise. This documentation can be carried out in a separate notebook or printed manual or a file with documents. Students should write the procedure and draw the sketch manually. The detailed date of the practices and its evaluations should be maintained in the course logbook. The log book and the practical documents should be submitted for the verification by the Flying Squad.

**SCHEME OF EVALUATION**

| PART | DESCRIPTION                | MARKS |
|------|----------------------------|-------|
| A    | Aim and Apparatus Required | 5     |
| B    | Free Hand Sketch           | 20    |
| C    | Execution/Printout         | 20    |
| D    | Result                     | 5     |

|       |                                           |    |
|-------|-------------------------------------------|----|
| TOTAL |                                           | 50 |
| E     | Practical Documents (As per the portions) | 10 |
|       |                                           | 60 |

- **CA 3:** Written Test for complete theory portions should be conducted for 100 Marks as per the question pattern below. The marks scored will be converted to 10 Marks for internal assessment.

**Question pattern – Written Test Theory**

| Description |                                                     | Marks     |           |
|-------------|-----------------------------------------------------|-----------|-----------|
| Part – A    | 30 MCQ from the complete theory portions.           | 30X1Mark  | 30Marks   |
| Part – B    | Seven Questions to be answered out of 10 Questions. | 7X10Marks | 70Marks   |
| TOTAL       |                                                     |           | 100 Marks |

- **CA 4:** All the exercises/experiments should be completed and kept for the practical test. The students shall be permitted to select any one by lot for the test. The practical test should be conducted as per the scheme of evaluation below. After completion of all the exercises the practical test should be conducted as per End Semester Examination question pattern scheme of evaluation. The marks awarded should be converted to 10 Marks for the internal assessment.

**SCHEME OF EVALUATION**

**Model Practical Examination and End Semester Examination - Practical Exam**

| PART  | DESCRIPTION                | MARKS |
|-------|----------------------------|-------|
| A     | Aim and Apparatus Required | 10    |
| B     | Free Hand Sketch           | 20    |
| C     | Execution/Printout         | 20    |
| D     | Result                     | 10    |
| E     | Written Test               | 30    |
| F     | Viva Voce                  | 10    |
| TOTAL |                            | 100   |

Note: For the written test 30 MCQ shall be asked from the theory portions.

**CEE6243– DESIGN AND DRAWING OF STEEL ELEMENTS**

| CEE6243                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | DESIGN AND DRAWING OF STEEL<br>ELEMENTS               | L            | T | P | C                               |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------|--------------|---|---|---------------------------------|
| PRACTICUM                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                       | 1            | 0 | 4 | 3                               |
| <b>Unit-I</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | <b>SIMPLE CONNECTION-BOLTED AND WELDED CONNECTION</b> | <b>15Hrs</b> |   |   |                                 |
| Introduction -Bolted connection-types of bolts<br>Types of bolted joints-lap and butt joint-main plate, cover plate, packing plate, tack bolts<br>Patterns of bolted joints-chain, Staggered, diamond-IS 800 2007<br>Specifications for bolted joints, Diameter of bolts, pitch, Gauge, edge distance<br>Ends distance, Welded connection-Types of weld-fillet weld, butt weld or groove, plug weld, slot weld, Spot weld-IS 800 2007 Specifications for welded joint-size, effective throat thickness, Effective length, overlap-intermittent weld. |                                                       |              |   |   | [1Hr]<br><br>[1Hr]<br><br>[1Hr] |
| <b>Practical exercises:</b><br>1. Detailing and drafting of double cover butt joint with packing plate and bolt arranged in diamond pattern.<br>2. Detailing and drafting of end connection of ISA tie member with gusset plate by fillet weld.<br>3. Detailing and drafting of end connection of Channel tie member with gusset plate by slot weld and plug weld.                                                                                                                                                                                   |                                                       |              |   |   | [4Hrs]<br>[4Hrs]<br>[4Hrs]      |
| <b>Unit- II</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | <b>TENSION MEMBERS</b>                                | <b>15Hrs</b> |   |   |                                 |
| Tension members-types of tension members<br>Net sectional area, Types of failure-yielding failure rupture<br>Failure and block shear failure-Lug angle-Splice.                                                                                                                                                                                                                                                                                                                                                                                       |                                                       |              |   |   | [1Hr]<br>[1Hr]<br>[1Hr]         |
| <b>Practical exercises:</b><br>4. Draw the block shear failure of angle tie member connected to gusset plate by Single bolted connection & Double bolted connection.<br>5. Detailing and drafting of Channel tension member connected to gusset plate using lug angle by bolted connection.<br>6. Detailing and drafting of tension member consisting of two angles placed back-to-back connected to gusset plate using lug angle by bolted connection.                                                                                              |                                                       |              |   |   | [4Hrs]<br>[4Hrs]<br>[4Hrs]      |

|                                                                                                       |                            |              |
|-------------------------------------------------------------------------------------------------------|----------------------------|--------------|
| <b>Unit-III</b>                                                                                       | <b>COMPRESSION MEMBERS</b> | <b>15Hrs</b> |
| Introduction-Compression members- effective length-slenderness ratio                                  |                            | [1Hr]        |
| Design of simple compression member                                                                   |                            | [1Hr]        |
| Built-up column-Lacing-Batten-IS 800 2007 provision for built-up column-Splice.                       |                            | [1Hr]        |
| <b>Practical exercises:</b>                                                                           |                            |              |
| 7. Detailing and drafting of built-up column of two channels face-to-face connected by single lacing  |                            | [4Hrs]       |
| 8. Detailing and drafting of built-up column of two channels back-to-back connected by double lacing. |                            | [4Hrs]       |
| 9. Detailing and drafting of built-up column of two channels face-to-face connected by battens.       |                            | [4Hrs]       |
| <b>Unit-IV</b>                                                                                        | <b>BEAMS</b>               | <b>15Hrs</b> |
| Beams-Laterally supported and laterally unsupported beams                                             |                            | [1Hr]        |
| Design of simple steel beam                                                                           |                            | [1Hr]        |
| Plate girder                                                                                          |                            | [1Hr]        |
| <b>Practical exercises:</b>                                                                           |                            |              |
| 10. Detailing and drafting of laterally unsupported beam.                                             |                            | [4Hrs]       |
| 11. Detailing and drafting of laterally supported beam.                                               |                            | [4Hrs]       |
| 12. Detailing and drafting of Plate girder                                                            |                            | [4Hrs]       |
| <b>Unit-V</b>                                                                                         | <b>ROOF TRUSS</b>          | <b>15Hrs</b> |
| Truss-Components of truss                                                                             |                            | [1Hr]        |
| Types of truss-Pratt truss, Warren truss, Fink truss, King post truss,                                |                            | [1Hr]        |
| Queen post truss, How truss, North light roof truss                                                   |                            | [1Hr]        |
| <b>Practical exercises:</b>                                                                           |                            |              |
| 13. Detailing and drafting of Pratt truss                                                             |                            | [4Hrs]       |
| 14. Detailing and drafting of Fink truss                                                              |                            | [4Hrs]       |
| 15. Detailing and drafting of North light roof truss                                                  |                            | [2Hrs]       |
| 16. Detailing and drafting of king and queen post truss.                                              |                            | [2Hrs]       |
| <b>Total</b>                                                                                          |                            | <b>75</b>    |

**Suggested List of Students Activity:**

- Seminar on the different types of steel, joints and application.
- Periodic quizzes based on the topic.
- Industrial visit to know about the real- world application.

**Text Books**

| S. NO | TITLE                      | AUTHOR                                  | PUBLISHER WITH EDITION                                                          |
|-------|----------------------------|-----------------------------------------|---------------------------------------------------------------------------------|
| 1.    | Design of Steel Structures | Duggal S.K                              | 3 <sup>rd</sup> edition, Tata McGraw Hill, Publishing Co. Ltd., New Delhi, 2019 |
| 2.    | Design of Steel Structures | Bhavikatti S.S                          | 5 <sup>th</sup> edition, Ik International Publishing House, New Delhi, 2017.    |
| 3.    | Structural Steel Design    | Jack C. McCormac and Stephen F Csernak, | 5 <sup>th</sup> edition Pearson Education Limited, 2011                         |

### Web-based/Online Resources

| S. No | Website/Links                                                                                                                                                 |
|-------|---------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1     | Nptel design of steel structures: <a href="https://archive.nptel.ac.in/courses/105/105/105105162/">https://archive.nptel.ac.in/courses/105/105/105105162/</a> |
| 2     | <a href="http://ecoursesonline.iasri.res.in/course/view.php?id=64">http://ecoursesonline.iasri.res.in/course/view.php?id=64</a>                               |

### EQUIPMENTS REQUIRED

| S. No | LIST OF EQUIPMENTS | QUANTITY REQUIRED |
|-------|--------------------|-------------------|
| 1.    | Computers          | 30 Nos.           |
| 2.    | Laser printer      | 2 Nos.            |
| 3.    | CAD software       | 30 Users          |

**MODEL QUESTION PAPER****CEE6243– DESIGN AND DRAWING OF STEEL ELEMENTS****Time: 3Hrs****Max.Marks:100**

| <b>S. No</b> | <b>Name of the Experiments</b>                                                                                                                        | <b>CO</b> | <b>PO</b>                   |
|--------------|-------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|-----------------------------|
| 1            | Detailing and drafting of double cover butt joint with packing plate and bolt arranged in diamond pattern.                                            | E6243.1   | PO1,PO2,PO3,PO4,PO5,PO6,PO7 |
| 2            | Detailing and drafting of end connection of ISA tie member with gusset plate by fillet weld.                                                          | E6243.1   | PO1,PO2,PO3,PO4,PO5,PO6,PO7 |
| 3            | Detailing and drafting of end connection of Channel tie member with gusset plate by slot weld and plug weld.                                          | E6243.1   | PO1,PO2,PO3,PO4,PO5,PO6,PO7 |
| 4            | Draw the block shear failure of angle tie member connected to gusset plate by Single bolted connection.<br>Double bolted connection.                  | E6243.2   | PO1,PO2,PO3,PO4,PO5,PO6,PO7 |
| 5            | Detailing and drafting of Channel tension member connected to gusset plate using lug angle by bolted connection.                                      | E6243.2   | PO1,PO2,PO3,PO4,PO5,PO6,PO7 |
| 6            | Detailing and drafting of tension member consisting of two angles placed back-to-back connected to gusset plate using lug angle by bolted connection. | E6243.2   | PO1,PO2,PO3,PO4,PO5,PO6,PO7 |
| 7            | Detailing and drafting of built-up column of two channels face-to-face connected by single lacing                                                     | E6243.3   | PO1,PO2,PO3,PO4,PO5,PO6,PO7 |
| 8            | Detailing and drafting of built-up column of two channels back-to-back connected by double lacing.                                                    | E6243.3   | PO1,PO2,PO3,PO4,PO5,PO6,PO7 |
| 9            | Detailing and drafting of built-up column of two channels face-to-face connected by battens.                                                          | E6243.3   | PO1,PO2,PO3,PO4,PO5,PO6,PO7 |
| 10           | Detailing and drafting of laterally unsupported beam.                                                                                                 | E6243.4   | PO1,PO2,PO3,PO4,PO5,PO6,PO7 |
| 11           | Detailing and drafting of laterally supported beam.                                                                                                   | E6243.4   | PO1,PO2,PO3,PO4,PO5,PO6,PO7 |
| 12           | Detailing and drafting of Plate girder.                                                                                                               | E6243.4   | PO1,PO2,PO3,PO4,PO5,PO6,PO7 |
| 13           | Detailing and drafting of Pratt truss                                                                                                                 | E6243.5   | PO1,PO2,PO3,PO4,PO5,PO6,PO7 |
| 14           | Detailing and drafting of Fink truss                                                                                                                  | E6243.5   | PO1,PO2,PO3,PO4,PO5,PO6,PO7 |
| 15           | Detailing and drafting of North light roof truss                                                                                                      | E6243.5   | PO1,PO2,PO3,PO4,PO5,PO6,PO7 |

**CEE6351-INTERNSHIP**

Programme Name : CIVIL ENGINEERING  
 Course Code : CEE6351  
 Semester : VI SEMESTER  
 Course Title : INTERNSHIP  
 Course Type : PROJECT

|             |    |
|-------------|----|
| 520 Periods | C  |
|             | 12 |

**TEACHING AND SCHEME OF EXAMINATIONS****No. of weeks per semester: 15 weeks**

| Course     | Instructions |                  | Examination         |                        |       |          |
|------------|--------------|------------------|---------------------|------------------------|-------|----------|
|            | Hours / Week | Hours / Semester | Marks               |                        |       | Duration |
|            |              |                  | Internal Assessment | Autonomous Examination | Total |          |
| Internship |              | 520 Periods      | 40                  | 60*                    | 100   | 3 Hrs    |

**\*Examinations will be conducted for 100 marks and will be converted to 60 marks**

**COURSE DESCRIPTION**

Internships in educational institutions are designed to provide students with practical experience in their field of study and to bridge the gap between academic knowledge and professional practice.

**COURSE OBJECTIVES**

After completing Internship, Interns will be able to,

- Apply the theoretical knowledge and skill during performance of the tasks assigned in internship.
- Demonstrate soft skills such as time management, positive attitude and communication skills during performance of the tasks assigned in internship.
- Document the Use case on the assigned Task.
- Enable interns to apply theoretical knowledge gained in the classroom to real-world practical applications.
- Provide hands-on experience in the industrial practices.
- Develop essential skills such as communication, organization, teamwork, and problem-solving.
- Enhance specific skills related to the intern's area of focus.
- Offer a realistic understanding of the daily operations and responsibilities.
- Provide opportunities to work under the guidance of experienced supervisors and administrators.
- Allow interns to explore different career paths.
- Help interns make informed decisions about their future career goals based on first hand experience.
- Facilitate the establishment of professional relationships with supervisor, administrators, and other professionals in the field.
- Provide access to a network of contacts that can be beneficial for future job opportunities and professional growth.

- Foster personal growth by challenging interns to step out of their comfort zones and take on new responsibilities.
- Build confidence and self-efficacy through successful completion of internship tasks and projects.
- Give insight into the policies, regulations, and administrative practices.
- Allow interns to observe and understand the implementation of standards and policies in practice.
- Provide opportunities for constructive feedback from supervisors and mentors, aiding in the intern's professional development.
- Enable self-assessment and reflection on strengths, areas for improvement, and career aspirations.
- Encourage sensitivity to the needs and backgrounds of different groups, promoting inclusive and equitable industrial practices.

### COURSE OUTCOMES

|                                                                            |                                                                                              |
|----------------------------------------------------------------------------|----------------------------------------------------------------------------------------------|
| After successful completion of this course, the students should be able to |                                                                                              |
| <b>E6351.1</b>                                                             | Demonstrate improved skills.                                                                 |
| <b>E6351.2</b>                                                             | Exhibit increased professional behavior.                                                     |
| <b>E6351.3</b>                                                             | Apply theoretical knowledge and principles in real-world practices.                          |
| <b>E6351.4</b>                                                             | Develop and utilize assessment tools to evaluate the learning and practices.                 |
| <b>E6351.5</b>                                                             | Engage in reflective practice to continually improve their learning and professional growth. |

### Pre-requisites

Nil

### CO/PO & PSO Mapping Matrix:

| CO/PO & PSO              | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PSO1 | PSO2 | PSO3 |
|--------------------------|-----|-----|-----|-----|-----|-----|-----|------|------|------|
| <b>E6351.1</b>           | 3   | 3   | 3   | 3   | 3   | 3   | 3   | 3    | 3    | 3    |
| <b>E6351.2</b>           | 3   | 3   | 3   | 3   | 3   | 3   | 3   | 3    | 3    | 3    |
| <b>E6351.3</b>           | 3   | 3   | 3   | 3   | 3   | 3   | 3   | 3    | 3    | 3    |
| <b>E6351.4</b>           | 3   | 3   | 3   | 3   | 3   | 3   | 3   | 3    | 3    | 3    |
| <b>E6351.5</b>           | 3   | 3   | 3   | 3   | 3   | 3   | 3   | 3    | 3    | 3    |
| <b>Total</b>             | 15  | 15  | 15  | 15  | 15  | 15  | 15  | 15   | 15   | 15   |
| <b>Correlation Level</b> | 3   | 3   | 3   | 3   | 3   | 3   | 3   | 3    | 3    | 3    |

Legend: 3-High Correlation, 2-Medium Correlation, 1-Low Correlation

### Facilitating the Interns by an Internship Provider.

- Orient intern in the new workplace. Give interns an overview of the organization,
- Explain the intern's duties and introduce him or her to co-workers.
- Develop an internship job description with clear deliverables and timeline.
- Allow the interns in meetings and provide information, resources, and opportunities for professional development. The interns have never done this kind of work before, they want to know that their work is measuring up to organizational expectations, hence provide professional guidance and mentoring to the intern.

- Daily progress report of Intern is to be evaluated by industry supervisor. Examine what the intern has produced and make suggestions. Weekly supervision meetings can help to monitor the intern's work.

#### **Duties Responsibilities of the Faculty Mentor**

- To facilitate the placement of students for the internship
- To liaison between the college and the internship provider
- To assist the Industrial Training Supervisor during assessment

#### **Instructions to the Interns**

- Students shall report to the internship provider on the 1st day as per the internship schedule.
- Intern is expected to learn about the organization, its structure, product range, market performance, working philosophy etc.
- The interns shall work on live projects assigned by the internship provider.
- The Intern shall record all the activities in the daily log book and get the signature of the concerned training supervisor.
- Intern shall have 100% attendance during internship programme. In case of unavoidable circumstances students may avail leave with prior permission from the concerned training supervisor of the respective internship provider. However, the maximum leave permitted during internship shall be as per company norms where they are working and intern shall report the leave sanctioned details to their college faculty mentor.
- The interns shall abide all the Rules and Regulations of internship provider
- Intern shall follow all the safety Regulations of internship provider.
- On completion of the internship, the intern shall report to the college and submit the internship certificate mentioning duration of internship, evaluation of interns by internship provider, Student's Diary and Comprehensive Training Report.

#### **Attendance Certification**

Every month students have to get their attendance certified by the industrial supervisor in the prescribed form supplied to them. Students have also to put their signature on the form and submit it to the institution supervisor. Regularity in attendance and submission of report will be duly considered while awarding the Internal Assessment mark.

#### **Training Reports**

The students have to prepare two types of reports: Weekly reports in the form of a diary to be submitted to the concerned staff in-charge of the institution. This will be reviewed while awarding Internal

#### **Industrial Training Diary**

Students are required to maintain the record of day-to-day work done. Such a record is called Industrial training Diary. Students have to write this report regularly. All days for the week should be accounted for clearly giving attendance particulars (Presence, absence, Leave, Holidays etc.). The concern of the Industrial supervisor is to periodically check these progress reports.

#### **Comprehensive Training Report**

In addition to the diary, students are required to submit a comprehensive report on training with details of the organisation where the training was undergone after attestation by the supervisors. The comprehensive report should incorporate study of plant/product/process/construction along with intensive in-depth study on any one of the topics such as processes, methods, tooling, construction and equipment, highlighting aspects of quality, productivity and system. The comprehensive report should be completed in the last week of

Industrial training. Any data, drawings etc. should be incorporated with the consent of the Organisation.

### **Scheme of Evaluation**

#### **Internal Assessment**

Students should be assessed for 50 Marks by industry supervisor and polytechnic faculty mentor during 3rd Month and 5th Month. The total marks (50 + 50) scored shall be converted to 40 marks for the Internal Assessment.

| Sl.No.       | Description                                                                              | Marks     |
|--------------|------------------------------------------------------------------------------------------|-----------|
| A            | Punctuality and regularity. (Attendance)                                                 | 10        |
| B            | Level/proficiency of practical skills acquired. Initiative in learning / working at site | 10        |
| C            | Ability to solve practical problems. Sense of responsibility                             | 10        |
| D            | Self expression / communication skills, Interpersonal skills/Human Relation              | 10        |
| E            | Report and Presentation.                                                                 | 10        |
| <b>Total</b> |                                                                                          | <b>50</b> |

### **AUTONOMOUS EXAMINATION**

#### **End Semester Examination - Project Exam**

Students should be assessed for 100 Marks both by the internal examiner and external examiner appointed by the Chairperson Autonomous of Examinations after the completion of internship period (June - May). The marks scored will be converted to 60 marks for the End Semester Examination.

| S. No.       | Description                                                                                        | Marks      |
|--------------|----------------------------------------------------------------------------------------------------|------------|
| A            | Daily Activity Report.                                                                             | 20         |
| B            | Comprehensive report on Internship, Relevant Internship Certificate from the concerned department. | 30         |
| C            | Presentation by the student at the end of the Internship.                                          | 30         |
| D            | Viva Voce                                                                                          | 20         |
| <b>Total</b> |                                                                                                    | <b>100</b> |

## CEE6353-FELLOWSHIP

Programme Name : CIVIL ENGINEERING  
 Course Code : CEE6353  
 Semester : VI SEMESTER  
 Course Title : FELLOWSHIP  
 Course Type : PROJECT

|             |    |
|-------------|----|
| 520 Periods | C  |
|             | 12 |

### TEACHING AND SCHEME OF EXAMINATION

**No. of weeks per semester: 15 weeks**

| Course     | Instructions |                  | Examination         |                        |       |          |
|------------|--------------|------------------|---------------------|------------------------|-------|----------|
|            |              |                  | Marks               |                        |       | Duration |
|            | Hours / Week | Hours / Semester | Internal Assessment | Autonomous Examination | Total |          |
| Fellowship |              | 520              | 40                  | 60*                    | 100   | 3 Hrs    |

**\*Examinations will be conducted for 100 marks and will be converted to 60 marks**

### COURSE DESCRIPTION

The Fellowship in the Diploma in engineering program is designed to provide a spring engineers with a comprehensive educational experience that combines theoretical knowledge with practical skills. This fellowship aims to cultivate a new generation of proficient and innovative engineers who are equipped to meet the challenges of a rapidly evolving technological and scope.

Participants in this fellowship will benefit from a robust curriculum that covers core engineering principles, advanced technical training, and hands-on projects. The program emphasizes interdisciplinary learning, encouraging fellows to explore various branches of engineering, from mechanical and civil to electrical, electronics & communication and computer engineering. This approach ensures that graduates possess a versatile skill set, ready to adapt to diverse career opportunities in the engineering sector.

In addition to academics, the fellowship offers numerous opportunities for professional development. Fellows will engage with industry experts through seminars, workshops, and internships, gaining valuable insights into real-world applications of their studies. Collaborative projects and research initiatives foster a culture of innovation, critical thinking, and problem-solving, essential attributes for any successful engineer.

By offering this fellowship, participants become part of a vibrant community of learners and professionals dedicated to advancing the field of engineering. The program is committed to supporting the growth and development of each fellow, providing them with the tools and resources needed to excel both academically and professionally. The Fellowship in the Diploma in Engineering is more than just an educational endeavour; it is a transformative journey that equips aspiring engineers with the knowledge, skills, and experiences necessary to make significant contributions to society and the engineering profession.

## COURSE OBJECTIVES

The objective of this course is to enable the student,

- Provide fellows with a solid foundation in core engineering principles and advanced technical knowledge across various engineering disciplines. Equip fellows with hands-on experience through laboratory work, projects, and internships, ensuring they can apply theoretical knowledge to real-world scenarios.
- Promote interdisciplinary understanding by encouraging exploration and integration of different engineering fields, fostering versatility and adaptability in fellows.
- Encourage innovation and creativity through research projects and collaborative initiatives, enabling fellows to develop new solutions to engineering challenges.
- Facilitate professional growth through workshops, seminars, and interactions with industry experts, preparing fellows for successful careers in engineering.
- Develop critical thinking and problem-solving skills, essential for tackling complex engineering problems and making informed decisions.
- Strengthen connections between academia and industry by providing opportunities for internships, industry visits, and guest lectures from professionals.
- Foster leadership qualities and teamwork skills through group projects and collaborative activities, preparing fellows for leadership roles in their future careers.
- Instill a sense of ethical responsibility and awareness of the social impact of engineering practices, encouraging fellows to contribute positively to society.
- Promote a culture of lifelong learning, encouraging fellows to continually update their knowledge and skills in response to technological advancements and industry trends.
- Prepare fellows to work in a global engineering environment by exposing them to international best practices, standards, and cross-cultural experiences.

## COURSE OUTCOMES

| After successful completion of this course, the students should be able to |                                                                                                                                                                                                                   |
|----------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>E6353.1</b>                                                             | Demonstrate a strong understanding of core engineering principles and possess the technical skills necessary to design, analyze, and implement engineering solutions across various disciplines.                  |
| <b>E6353.2</b>                                                             | Apply theoretical knowledge to practical scenarios, effectively solving engineering problems through hands-on projects, laboratory work, and internships.                                                         |
| <b>E6353.3</b>                                                             | Exhibit the ability to conduct research, develop innovative solutions, and contribute to advancements in engineering through critical thinking and creative approaches to complex challenges.                     |
| <b>E6353.4</b>                                                             | Understand and adhere to professional and ethical standards in engineering practice, demonstrating responsibility, integrity, and a commitment to sustainable and socially responsible engineering.               |
| <b>E6353.5</b>                                                             | Enhance strong communication skills, both written and verbal, and be capable of working effectively in teams, demonstrating leadership and collaborative abilities in diverse and multidisciplinary environments. |

Pre-requisites

Nil

### CO/PO & PSO Mapping Matrix

| CO/PO & PSO              | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PSO1 | PSO2 | PSO3 |
|--------------------------|-----|-----|-----|-----|-----|-----|-----|------|------|------|
| E6353.1                  | 3   | 3   | 3   | 3   | 3   | 3   | 3   | 3    | 3    | 3    |
| E6353.2                  | 3   | 3   | 3   | 3   | 3   | 3   | 3   | 3    | 3    | 3    |
| E6353.3                  | 3   | 3   | 3   | 3   | 3   | 3   | 3   | 3    | 3    | 3    |
| E6353.4                  | 3   | 3   | 3   | 3   | 3   | 3   | 3   | 3    | 3    | 3    |
| E6353.5                  | 3   | 3   | 3   | 3   | 3   | 3   | 3   | 3    | 3    | 3    |
| <b>Total</b>             | 15  | 15  | 15  | 15  | 15  | 15  | 15  | 15   | 15   | 15   |
| <b>Correlation Level</b> | 3   | 3   | 3   | 3   | 3   | 3   | 3   | 3    | 3    | 3    |

Legend: 3-High Correlation, 2-Medium Correlation, 1-Low Correlation

### Important points to consider selecting the fellowship project.

Selecting the right fellowship project is crucial for maximizing the educational and professional benefits of a Diploma in engineering program.

**Relevance to Future Plans:** Choose a project that aligns with your long-term career aspirations and interests. This alignment will ensure that the skills and knowledge you gain will be directly applicable to your desired career path.

**Industry Relevance:** Consider the current and future relevance of the project within the industry. opt for projects that address contemporary challenges or emerging trends in engineering.

**Access to Facilities:** Ensure that the necessary facilities, equipment, and materials are available to successfully complete the project. Lack of resources can hinder the progress and quality of your work.

**Mentorship and Guidance:** Select a project that offers strong mentorship and support from experienced faculty members or industry professionals. Effective guidance is crucial for navigating complex problems and achieving project objectives.

**Project Scope:** Assess the scope of the project to ensure it is neither too broad nor too narrow. A well-defined project scope helps in setting clear objectives and achievable milestones.

**Feasibility:** Evaluate the feasibility of completing the project within the given timeframe and with the available resources. Consider potential challenges and ensure you have a realistic plan to address them.

**Technical Skills:** Choose a project that allows you to develop and enhance important technical skills relevant to your field of study. Practical experience in using specific tools, technologies, or methodologies can be highly beneficial.

**Soft Skills:** Consider projects that also offer opportunities to develop soft skills such as teamwork, communication, problem-solving, and project management.

**Innovative Thinking:** Select a project that encourages creativity and innovative problem-solving. Projects that push the boundaries of traditional engineering approaches can be particularly rewarding.

**Societal Impact:** Consider the potential impact of your project on society or the engineering community. Projects that address significant challenges or contribute to social good can be highly fulfilling and make a meaningful difference.

### **Guidelines to select Fellowship**

- Ensure the program is accredited by a recognized accrediting body and has a strong reputation for quality education in engineering.
- Ensure it covers core engineering principles that align with your interests and career goals.
- Investigate the qualifications and experience of the faculty mentor. Look for programs with faculty who have strong academic backgrounds, industry experience, and active involvement in research.
- Check if the program provides adequate hands-on training opportunities, such as laboratory work, workshops, and access to modern engineering facilities and equipment.
- Assess the program's connections with industry. Strong partnerships with companies can lead to valuable internship opportunities, industry projects, and exposure to real-world engineering challenges.
- Explore the availability of research opportunities. Participation in research projects can enhance your learning experience and open doors to innovative career paths.
- Look for programs that offer professional development resources, such as workshops, seminars, and networking events with industry professionals and alumni.
- Ensure the program provides robust support services, including academic advising, career counselling, mentorship programs, and assistance with job placement after graduation.
- Consider the cost of the program and available financial aid options, such as scholarships, grants, and fellowships. Evaluate the return on investment in terms of career prospects and potential earnings.
- Research the success of the program's alumni. High employment rates and successful careers of past graduates can indicate the program's effectiveness in preparing students for the engineering field.

### **Duties Responsibilities of the Faculty Mentor**

- Each student should have a faculty mentor for the Institute.
- Get the approval from the Chairperson Autonomous of Examinations with the recommendations of the HOD/Principal for the topics.
- Provide comprehensive academic advising to help fellows select appropriate specializations, and research projects that align with their interests and career goals.
- Guide fellows through their research projects, offering expertise and feedback to ensure rigorous methodology, innovative approaches, and meaningful contributions to the field.
- Assist fellows in developing technical and professional skills through hands-on projects, laboratory work, and practical applications of theoretical knowledge.
- Offer career advice and support, helping fellows explore potential career paths, prepare for job searches, and connect with industry professionals and opportunities.
- Provide personal mentorship, fostering a supportive relationship that encourages growth, resilience, and a positive academic experience.
- Facilitate connections between fellows and industry professionals, alumni, and other relevant networks to enhance their professional opportunities and industry exposure.
- Ensure fellows have access to necessary resources, including research materials, lab equipment, software, and academic literature.
- Regularly monitor and evaluate the progress of fellows, providing constructive feedback and guidance to help them stay on track and achieve their goals.

- Instill and uphold high ethical and professional standards, encouraging fellows to practice integrity and responsibility in their work.
- Assist with administrative tasks related to the fellowship program, such as preparing progress reports, writing recommendation letters, and facilitating grant applications.
- Organize and participate in workshops, seminars, and other educational events that enhance the learning experience and professional development of fellows.
- Address any issues or conflicts that arise, providing mediation and support to ensure a positive and productive academic environment.

#### **Instructions to the Fellowship Scholar**

- Regularly meet with your faculty mentor for guidance on academic progress, research projects, and career planning. Be proactive in seeking advice and support from your mentor.
- Develop strong organizational skills. Use planners, calendars, and task management tools to keep track of assignments, project deadlines, and study schedules. Prioritize tasks to manage your time efficiently.
- Take advantage of opportunities to participate in research projects and hands-on activities. These experiences are crucial for applying your theoretical knowledge and gaining practical skills.
- Focus on improving essential professional skills such as communication, teamwork, problem-solving, and leadership. Participate in workshops and seminars that enhance these competencies.
- Actively seek networking opportunities through industry events, seminars, and meetings. Establish connections with peers, alumni, and professionals in your field to build a strong professional network.
- Seek internships, co-op programs, or part-time jobs related to your field of study. Real-world experience is invaluable for understanding industry practices and enhancing your employability.
- Uphold high ethical standards in all your academic and professional activities. Practice integrity, honesty, and responsibility. Adhere to the ethical guidelines and standards set by your institution and the engineering profession.
- Adopt a mindset of lifelong learning. Stay updated with the latest developments and trends in engineering by reading industry journals, attending conferences, and taking additional courses.

#### **Documents to be submitted by the student to offer fellowship.**

- **Completed Application Form:** This is typically the standard form provided by the institution or fellowship program that includes personal information, educational background, and other relevant details.
- **Detailed CV/Resume:** A comprehensive document outlining your educational background, knowledge experience, and interest in research experience, publications, presentations, awards, and other relevant achievements if any.
- **Personal Statement:** A document explaining your motivation for applying to the fellowship, your career goals, how the fellowship aligns with those goals, and what you intend to achieve through the program.
- **Recommendation Letters:** Letters from faculty mentor, employer, or professionals who can attest to your academic abilities, professional skills, and suitability for the fellowship.

- **Proposal/Description:** A detailed proposal or description of the fellowship project or study you plan to undertake during the fellowship. This should include objectives, methodology, expected outcomes, and significance of the project.
- **Enrollment verification:** Documentation verifying your current acceptance status in the academic institution or industry where the fellowship will be conducted.
- **Funding Information:** Details about any other sources of funding or financial aid you are receiving, if applicable. Some fellowships may also require a budget proposal for the intended use of the fellowship funds.
- **Samples of Work:** Copies of the relevant work that demonstrates your capabilities and accomplishments in your field.
- **Endorsement Letter:** A letter from your current academic institution endorsing your application for the fellowship, if required.
- **Ethical Approval Documents:** If your research involves human subjects or animals, you may need to submit proof of ethical approval from the relevant ethics committee.
- **Additional Documents:** Any other documents requested by the fellowship program required by the institution.
- **Attendance Certification**  
Every month students have to get their attendance certified by the supervisor in the prescribed form supplied to them. Students have also to put their signature on the form and submit it to the faculty mentor. Regularity in attendance and submission of report will be duly considered while awarding the Internal Assessment mark.

#### **Rubrics or Fellowship. Review I & II.**

| <b>S. No</b> | <b>Topics</b>                   | <b>Description</b>                                                                                                                                                                            |
|--------------|---------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1            | Alignment with Objectives       | Assess how well the project aligns with the stated objectives and requirements.<br>Determine if the student has addressed the key aspects outlined in the project guidelines.                 |
| 2            | Depth of Research               | Evaluate the depth and thoroughness of the literature review. Assess the student's ability to identify and address gaps in existing research.                                                 |
| 3            | Clarity of Objectives           | Check if the student has clearly defined and articulated the objectives of the project.<br>Ensure that the objectives are specific, measurable, achievable, relevant, and time-bound (SMART). |
| 4            | Methodology and Data Collection | Evaluate the appropriateness and justification of the research methodology.<br>Assess the methods used for data collection and their relevance to the research questions.                     |
| 5            | Analysis and Interpretation     | Examine the quality of data analysis techniques used.<br>Assess the student's ability to interpret results and draw meaningful conclusions.                                                   |
| 6            | Project Management              | Evaluate the project management aspects, including adherence to timelines and milestones.<br>Assess the student's ability to plan and execute the project effectively.                        |
| 7            | Documentation and               | Check the quality of documentation, including code, experimental details,                                                                                                                     |

|    |                            |                                                                                                                                                                                        |
|----|----------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|    | Reporting                  | and any other relevant materials.<br>Evaluate the clarity, structure, and coherence of the final report.                                                                               |
| 8  | Originality and Creativity | Assess the level of originality and creativity demonstrated in the project.<br>Determine if the student has brought a unique perspective or solution to the research problem.          |
| 9  | Critical Thinking          | Evaluate the student's critical thinking skills in analyzing information and forming conclusions.<br>Assess the ability to evaluate alternative solutions and make informed decisions. |
| 10 | Problem-Solving Skills     | Evaluate the student's ability to identify and solve problems encountered during the project.<br>Assess adaptability and resilience in the face of challenges.                         |

#### **INTERNAL MARKS- 40Marks**

As per the rubrics each topic should be considered for the Review I and Review II. Equalweightage should be given for all the topics. It should be assessed by a faculty mentor and the industrial professional or research guide. Review 1 shall be conducted after 8th week and Review 2 shall be conducted after 14th week in the semester. Average marks scored in there views shall be considered for the internal assessment of 40 Marks.

#### Scheme of Evaluation

| PART         | DESCRIPTION                | MARKS     |
|--------------|----------------------------|-----------|
| A            | Assessmentaspertherubrics. | 30        |
| B            | Attendance                 | 10        |
| <b>Total</b> |                            | <b>40</b> |

#### **AUTONOMOUS EXAMINATION**

#### **END SEMESTER EXAMINATION- Project Exam**

Students should be assessed for 100 Marks both by the internal examiner and external examiner appointed by the Chairperson Autonomous of Examinations after the completion of fellowship. The marks scored will be converted to 60 marks for the End Semester Examination.

| Sl. No.      | Description                                  | Marks      |
|--------------|----------------------------------------------|------------|
| A            | Daily Activity Report.                       | 20         |
| B            | Comprehensive report of the Fellowship Work. | 30         |
| C            | Presentation by the student.                 | 30         |
| D            | Viva Voce                                    | 20         |
| <b>Total</b> |                                              | <b>100</b> |

**CEE6374-IN-HOUSEPROJECT**

540 Periods

C

12

Programme Name : CIVIL ENGINEERING  
 Course Code : CEE6374  
 Semester : VI SEMESTER  
 Course Title : IN-HOUSEPROJECT  
 Course Type : PROJECT

**TEACHING AND SCHEME OF EXAMINATION****No. of weeks per semester: 15 weeks**

| Course           | Instructions |                  | Examination         |                        |       |          |
|------------------|--------------|------------------|---------------------|------------------------|-------|----------|
|                  | Hours / Week | Hours / Semester | Marks               |                        |       | Duration |
|                  |              |                  | Internal Assessment | Autonomous Examination | Total |          |
| In-house Project |              | 540 Periods      | 40                  | 60*                    | 100   | 3 Hrs    |

**\*Examinations will be conducted for 100 marks and will be converted to 60 marks**

**COURSE DESCRIPTION**

- Every student must do one major project in the Final year of their program. Students can do their major project in Industry or R&D Lab or in-house or a combination of any two for the partial fulfillment for the award of Diploma in Engineering.
- For the project works, the Department will constitute a three-member faculty committee to monitor the progress of the project and conduct reviews regularly.
- If the projects are done in-house, the students must obtain the bonafide certificate for project work from the Project supervisor and Head of the Department, at the end of the semester. Students who have not obtained the bonafide certificate are not permitted to appear for the Project Viva Voce examination.
- For the projects carried out in Industry, the students must submit a separate certificate from Industry apart from the regular bonafide certificate mentioned above. For Industry related projects there must be one internal faculty advisor / Supervisor from Industry (External), this is in addition to the regular faculty supervision.
- The final examination for project work will be evaluated based on the final report submitted by the project group of **not exceeding four students**, and the viva voce by an external examiner.

**OBJECTIVES:**

Academic project work plays a crucial role in the education of Diploma in engineering students, as it helps them apply theoretical knowledge to practical situations and prepares them for real-world engineering challenges.

**Integration of Knowledge:** Consolidate and integrate theoretical knowledge acquired in coursework to solve practical engineering problems.

**Skill Development:** Enhance technical skills related to the specific field of engineering through hands-on experience and application.

**Problem-Solving Abilities:** Develop critical thinking and problem-solving abilities by addressing complex engineering issues within a defined scope.

**Project Management:** Gain experience in project planning, execution, and management, including setting objectives, timelines, and resource allocation.

**Teamwork and Collaboration:** Foster teamwork and collaboration by working in multidisciplinary teams to achieve project goals and objectives.

**Research Skills:** Acquire research skills by conducting literature reviews, gathering relevant data, and applying research methodologies to investigate engineering problems.

**Innovation and Creativity:** Encourage innovation and creativity in proposing and developing engineering solutions that may be novel or improve upon existing methods.

**Communication Skills:** Improve communication skills, both oral and written, by presenting project findings, writing technical reports, and effectively conveying ideas to stakeholders.

**Ethical Considerations:** Consider ethical implications related to engineering practices, including safety, environmental impact, and societal concerns.

**Professional Development:** Prepare for future professional roles by demonstrating professionalism, initiative, and responsibility throughout the project lifecycle.

#### **COURSE OUTCOMES**

|                                                                            |                                                                                                                                                                                       |
|----------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| After successful completion of this course, the students should be able to |                                                                                                                                                                                       |
| <b>E6374.1</b>                                                             | Demonstrate the ability to apply theoretical concepts and principles learned in coursework to solve practical engineering problems encountered during the project.                    |
| <b>E6374.2</b>                                                             | Develop and enhance technical skills specific to the field of engineering relevant to the project, such as design, analysis, simulation, construction, testing, and implementation.   |
| <b>E6374.3</b>                                                             | Apply critical thinking and problem-solving skills to identify, analyze, and propose solutions to engineering challenges encountered throughout the project lifecycle.                |
| <b>E6374.4</b>                                                             | Acquire project management skills by effectively planning, organizing, and executing project tasks within defined timelines and resource constraints.                                 |
| <b>E6374.5</b>                                                             | Improve communication skills through the preparation and delivery of project reports, presentations, and documentation that effectively convey technical information to stakeholders. |

#### **Pre-requisites**

Nil

#### **CO/PO & PSO Mapping Matrix:**

| <b>CO/PO &amp; PSO</b>   | <b>PO1</b> | <b>PO2</b> | <b>PO3</b> | <b>PO4</b> | <b>PO5</b> | <b>PO6</b> | <b>PO7</b> | <b>PSO1</b> | <b>PSO2</b> | <b>PSO3</b> |
|--------------------------|------------|------------|------------|------------|------------|------------|------------|-------------|-------------|-------------|
| <b>E6374.1</b>           | 3          | 3          | 3          | 3          | 3          | 3          | 3          | 3           | 3           | 3           |
| <b>E6374.2</b>           | 3          | 3          | 3          | 3          | 3          | 3          | 3          | 3           | 3           | 3           |
| <b>E6374.3</b>           | 3          | 3          | 3          | 3          | 3          | 3          | 3          | 3           | 3           | 3           |
| <b>E6374.4</b>           | 3          | 3          | 3          | 3          | 3          | 3          | 3          | 3           | 3           | 3           |
| <b>E6374.5</b>           | 3          | 3          | 3          | 3          | 3          | 3          | 3          | 3           | 3           | 3           |
| <b>Total</b>             | <b>15</b>  | <b>15</b>  | <b>15</b>  | <b>15</b>  | <b>15</b>  | <b>15</b>  | <b>15</b>  | <b>15</b>   | <b>15</b>   | <b>15</b>   |
| <b>Correlation Level</b> | <b>3</b>   | <b>3</b>   | <b>3</b>   | <b>3</b>   | <b>3</b>   | <b>3</b>   | <b>3</b>   | <b>3</b>    | <b>3</b>    | <b>3</b>    |

Legend: 3-High Correlation, 2-Medium Correlation, 1-Low Correlation

**Important points to consider to select the In-house project.**

- Selecting a project work in Diploma Engineering is a significant decision that can greatly influence your learning experience and future career prospects.
- Choose a project that aligns with your career aspirations and interests within the field of engineering. Consider how the project can contribute to your professional development and future opportunities.
- Ensure the project aligns with your coursework and specialization within the Diploma program. It should complement and build upon the knowledge and skills you have acquired in your studies.
- Evaluate the scope of the project to ensure it is manageable within the given timeframe, resources, and constraints. Avoid projects that are overly ambitious or impractical to complete effectively.
- Assess the availability of resources needed to conduct the project, such as equipment, materials, laboratory facilities, and access to relevant software or tools. Lack of resources can hinder project progress.
- Select a project that genuinely interests and motivates you. A project that captures your curiosity and passion will keep you engaged and committed throughout the project duration.
- Consider the availability and expertise of faculty advisors or industry mentors who can provide guidance and support throughout the project. Effective mentorship is crucial for success.
- Clearly define the learning objectives and expected outcomes of the project. Ensure that the project will help you achieve specific learning goals related to technical skills, problem-solving, and professional development.
- Look for opportunities to propose innovative solutions or explore new methodologies within your project. Projects that encourage creativity can set you apart and enhance your learning experience.
- Consider ethical implications related to the project, such as safety protocols, environmental impact, and compliance with ethical guidelines in research and engineering practices.
- Evaluate whether the project offers opportunities for collaboration with peers, experts from other disciplines, or industry partners. Interdisciplinary projects can broaden your perspective and enhance your teamwork skills.
- Consider the potential impact of your project on society or the engineering community. Projects that address significant challenges or contribute to social good can be highly fulfilling and make a meaningful difference.
- By carefully considering these points, Diploma Engineering students can make informed decisions when selecting project work that not only enhances their academic learning but also prepares them for successful careers in engineering.

**Duties Responsibilities of the internal faculty advisor.**

- Each group should have an internal faculty advisor assigned by the HOD/Principal.
- The in-house project should be approved by the project monitoring committee constituted by the Chairperson Autonomous of Examinations.

- The in-house project should be selected in the fifth semester itself. Each in-house project shall have a maximum of four students in the project group.
- Provide comprehensive academic advising to help in the selection of appropriate in-house project that align with their interests and career goals.
- Offer expertise and feedback to ensure rigorous methodology, innovative approaches, and meaningful contributions to the field.
- Assist in developing technical and professional skills through hands-on projects, laboratory work, and practical applications of theoretical knowledge.
- Provide personal mentorship, fostering a supportive relationship that encourages growth, resilience, and a positive academic experience.
- Facilitate connections between students and industry professionals, alumni, and other relevant networks to enhance their professional opportunities and industry exposure.
- Ensure students have access to necessary resources, including research materials, lab equipment, software, and academic literature.
- Regularly monitor and evaluate the progress of the in-house project, providing constructive feedback and guidance to help them stay on track and achieve their goals.
- Install and uphold high ethical and professional standards, encouraging students to practice integrity and responsibility in their work.
- Assist in preparing progress reports, writing recommendation letters, and facilitating grant applications.
- Organize and participate in workshops, seminars, and other educational events that enhance the learning experience and professional development.
- Address any issues or conflicts that arise, providing mediation and support to ensure a positive and productive academic environment.

#### **Instructions to the students**

- Regularly meet with your internal faculty advisor for guidance on academic progress, research projects, and career planning. Be proactive in seeking advice and support from your faculty advisor.
- Use planners, calendars, and task management tools to keep track of assignments, project deadlines, and study schedules. Prioritize tasks to manage your time efficiently.
- Take advantage of opportunities to participate in in-house projects and hands-on activities. These experiences are crucial for applying your theoretical knowledge and gaining practical skills.
- Focus on improving essential professional skills such as communication, teamwork, problem-solving, and leadership. Participate in workshops and seminars that enhance these competencies.
- Actively seek networking opportunities through industry events, seminars, and meetings. Establish connections with peers, alumni, and professionals in your field to build a strong professional network.
- Seek internships, co-op programs, or part-time jobs related to your field of study. Real-world experience is invaluable for understanding industry practices and enhancing your employability.
- Uphold high ethical standards in all your academic and professional activities. Practice integrity, honesty, and responsibility. Adhere to the ethical guidelines and standards set by your institution and the engineering profession.

- Adopt a mindset of lifelong learning. Stay updated with the latest developments and trends in engineering by reading industry journals, attending conferences, and taking additional courses.

**Documents to be submitted by the student for an in-house project.**

Submit a printed report of your in-house project work along with the fabrication model / analysis report for the End Semester Examination.

Rubrics for In-House Project Work

| S.No. | Topics                          | Description                                                                                                                                  |
|-------|---------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------|
| 1     | Objectives                      | Clearly defined and specific objectives out lined. Objectives align with the project's scope and purpose.                                    |
| 2     | LiteratureReview                | Thorough review of relevant literature.<br>Identification of gaps and justification for the project's contribution.                          |
| 3     | Research Design and Methodology | Clear explanation of the research design.<br>Appropriateness and justification of chosen research methods.                                   |
| 4     | Project Management              | Adherence to project timeline and milestones.<br>Effective organization and planning evident in the project execution.                       |
| 5     | Documentation                   | Comprehensive documentation of project details.<br>Clarity and completeness in recording methods, results, and challenges.                   |
| 6     | Presentation Skills             | Clear and articulate communication of project findings.<br>Effective use of visuals, if applicable.                                          |
| 7     | Analysis and Interpretation     | In-depth analysis of data.<br>Clear interpretation of results in the context of research questions.                                          |
| 8     | Problem-Solving                 | Demonstrated ability to identify and address challenges encountered during the project.<br>Innovative solutions considered where applicable. |
| 9     | Professionalism and Compliance  | Adherence to ethical standards in research. Compliance with project guidelines and requirements.                                             |
| 10    | Quality of Work                 | Overall quality and contribution of the project to the field.<br>Demonstrated effort to produce high-quality work.                           |

## SCHEME OF EVALUATION

The mark allocation for Internal and End Semester Viva-voce are as below.

| Internal Marks -(40Marks)*              |                                           |                                           |
|-----------------------------------------|-------------------------------------------|-------------------------------------------|
| Review1<br>(10Marks)                    | Review2<br>(15Marks)                      | Review3<br>(15marks)                      |
| Committee:5 Marks.<br>Supervisor:5Marks | Committee:7.5Marks<br>Supervisor:7.5Marks | Committee:7.5Marks<br>Supervisor:7.5Marks |

Note:\*The rubrics should be followed for the evaluation of the internal marks during reviews.

## AUTONOMOUS EXAMINATION

### END SEMESTER EXAMINATION - Project Exam

The performance of each student in the project group would be evaluated in a viva voce examination conducted by a committee consisting of an external examiner and the project supervisor and an internal examiner.

| End Semester (100) <sup>#</sup>           |                                           |                                           |                                             |
|-------------------------------------------|-------------------------------------------|-------------------------------------------|---------------------------------------------|
| Record(20Marks)                           | Presentation<br>(20 Marks)                | Viva Voce<br>(20 Marks)                   | Model / Analysis<br>Report<br>(40 Marks)    |
| External:10<br>Internal:5<br>Supervisor:5 | External:10<br>Internal:5<br>Supervisor:5 | External:10<br>Internal:5<br>Supervisor:5 | External:20<br>Internal:10<br>Supervisor:10 |

<sup>#</sup> **The marks scored will be converted to 60 Marks.**

Students who are unable to complete the project work at the end of the semester can apply for an extension to the Head of the Department, with the recommendation from the project guide for a period of a maximum of two months. For those students who extend the project work for two months, Viva Voce will be carried out and results will be declared separately. If the project report is not submitted even beyond the extended time, then students are not eligible to appear for Project Viva Voce Examination.