PERIYAR CENTENARY POLYTECHNIC COLLEGE

PERIYAR NAGAR VALLAM–613403 –THANJAVUR

(AUTONOMOUS INSTITUTION)

NBA Accredited – (ECE, EEE, MECH, CT - upto 2026)

DIPLOMA IN COMPUTER ENGINEERING

SYLLABUS

CTE/23/00

SEMESTER SYSTEM

E- SCHEME

PERIYAR CENTENARY POLYTECHNIC COLLEGE

Periyar Nagar, Vallam – 613 403, Thanjavur

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

Department of Computer Engineering

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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.

PROGRAMME OUTCOMES (POs)

1. **Basic and Discipline specific knowledge**: Apply knowledge of basic mathematics, science and engineering fundamentals and engineering specialization to solve the engineering problems.
2. **Problem analysis**: Identify and analyse well-defined engineering problems using codified standard methods.
3. **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.
4. **Engineering Tools, Experimentation and Testing**: Apply modern engineering tools and appropriate technique to conduct standard tests and measurements.
5. **Engineering practices for society, sustainability and environment**: Apply appropriate technology in context of society, sustainability, environment and ethical practices.
6. **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.
7. **Life-long learning**: Ability to analyse individual needs and engage in updating in the context of technological changes.

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 through outcomes. 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 students 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 in cognitive domain are as 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 part 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.

DEPARTMENT OF COMPUTER ENGINEERING

VISION

Develop highly competent diploma Computer Engineers to manage the global challenges with latest technologies to suit the need of the industry and society.

MISSION

M1: To provide quality education and training with updated curriculum.

M2: To create innovative teaching learning environment with motivation for self learning for problem solving through ICT infrastructure.

M3: To strengthens soft skills of students especially of rural students through co-curricular and extracurricular activities.

M4: To Mould the students as professional diploma engineers with moral, ethical and social values and encourage them to become entrepreneurs, also encourage them for lifelong learning.

PROGRAM EDUCATIONAL OBJECTIVES (PEOs)

PEO1 : Our Diploma graduates will have the ability to apply knowledge of computer engineering to pursue variety of career / higher educations.

PEO2 : Our Diploma graduates will be able to design solutions that are technically sound, economical viable by following the ethical value

PEO3 : Our Diploma graduates will be effective to work in new technologies by constantly upgrading their skills and attitude towards lifelong learning.

PROGRAM SPECIFIC OUTCOMES(PSOs)

PSO1: Analyze and develop essential proficiency skills in the areas related to engineering science, communicating the earned knowledge, algorithms and analysis, system software and networking and to apply the knowledge based skill to solve real time problems.

PSO2: Apply programming skills for the software development using modern computer languages, tools and platforms.

PSO3: Utilize the knowledge in the computer hardware, network, multimedia and product development.

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 is 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".

Dentition 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.

Theory (L) - 15 periods	**1 credit**
Tutorial (T) - 15 periods	**1 credit**
Practical (P) – 30 periods	**1 credit**
Internship (I) - 30 periods	**1 credit**
Project (J) - 30 periods	**1 credit**

* 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.

Category	**Credit Range**
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
Integrated Learning Experiences	
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 *(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, proofs of-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 (10 Marks)	**Review 2 (15 Marks)**	**Review 3 (15 marks)**	**Record (20 Marks)**	**Presentation (20 Marks)**	**Viva Voce (20 Marks)**
Committee: 5 Supervisor: 5	Committee: 7.5 Supervisor: 7.5	Committee: 7.5 Supervisor: 7.5	External: 10 Internal: 5 Supervisor: 5	External: 10 Internal: 5 Supervisor: 5	External: 10 Internal: 5 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) (ii) Minimum Marks to be secured in end semester exam is 35 out of 100,

(iii) (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:

Letter Grade	Grade Points	Marks
0 (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-Appearance)	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 Ci is the number of Credits assigned to the course
GPi 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.

DEPARTMENT OF COMPUTER ENGINEERING

Credit Distribution

Semester	No of Courses	Periods	Credits
Semester I	9	640	20
Semester II	9	625	20
Semester III	8	640	20
Semester IV	7	640	22
Semester V	8	625	20
Semester VI	3	660	18
Total Credits			**120**

DEPARTMENT OF COMPUTER ENGINEERING
ANNEXURE - I
E – SCHEME
(Implemented from the Academic Year 2023 – 2024 (onwards)
CURRICULUM OUTLINE

THIRD SEMESTER

S. No.	Course Category	Course Type	Code	Course Title	L-T-P	Period	Credit	End Exam
1	Program Core	Theory	CTE3110	Digital Logic Design	3-0-0	45	3	Theory
2	Program Core	Practicum	CTE3230	RDBMS	3-0-2	75	4	Theory
3	Program Core	Practical/Lab	CTE3320	Digital Logic Design Lab	0-0-4	60	2	Practical
4	Program Core	Practicum	CTE3440	C Programming	1-0-4	75	3	Practical
5	Program Core	Practicum	CTE3540	Web Designing	1-0-4	75	3	Practical
6	Program Core	Practicum	CTE3640	Operating Systems	1-0-2	45	2	Practical
7	Open Elective	Advanced Skill Certification	CTE3760	Advanced Skills Certification - 3	1-0-3	60	2	NA
8	Humanities & Social Science	Integrated Learning Experience	GLE3880	Growth Lab	0-0-2	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	-	15	0	-
11	Audit Course	Integrated Learning Experience	ACE3883	Shop floor Immersion	-	8	0	-
12	Audit Course	Integrated Learning Experience	ACE3884	Student-Led Initiative	-	23	0	-
13	Audit Course	Integrated Learning Experience	ACE3885	Emerging Technology Seminars	-	8	0	-
14	Audit Course	Integrated Learning Experience	ACE3886	Health & Wellness	-	30	1	-
				Test & Revisions		**60**		
				Library		**15**		
				TOTAL		**640**	**20**	

FORTH SEMESTER

S. No.	Course Category	Course Type	Code	Course Title	L-T-P	Period	Credit	End Exam
1	Program Core	Theory	CTE4110	Computer Networks and Security	3-0-0	45	3	Theory
2	Program Core	Practicum	CTE4230	Data Structures Using Python	3-0-2	75	4	Theory
3	Program Core	Practicum	CTE4340	Java Programming	2-0-4	90	4	Practical
4	Program Core	Practicum	CTE4440	Python Programming	1-0-4	75	3	Practical
5	Program Core	Practicum	CTE4540	E-Publishing Tools	1-0-4	75	3	Practical
6	Program Core	Project	CTE4640	Scripting Languages	0-0-6	90	3	Practical
7	Open Elective	Advanced Skill Certification	CTE4760	Advanced Skills Certification - 4	1-0-3	60	2	NA
8	Audit Course	Integrated Learning Experience	ACE4882	I&E/ Club Activity/ Community Initiatives		15	0	
9	Audit Course	Integrated Learning Experience	ACE4883	Shop floor Immersion	-	08	0	-
10	Audit Course	Integrated Learning Experience	ACE4884	Student-Led Initiative	-	16	0	-
11	Audit Course	Integrated Learning Experience	ACE 4885	Emerging Technology Seminars	-	08	0	-
12	Audit Course	Integrated Learning Experience	ACE4886	Health & Wellness	-	15	0	-
13	Audit Course	Integrated Learning Experience	ACE4887	Special Interest Groups (Placement Training)	-	08	0	-
					Test and Revisions	45		
					Library	15		
	TOTAL					**640**	**22**	

FIFTH SEMESTER

S. No.	Course Category	Course Type	Code	Course Title	L-T-P	Period	Credit	End Exam
1	Program Core	Practicum	CTE5130	Cloud Computing	2-0-2	60	3	Theory
2	Program Elective	Theory		Elective-1	3-0-0	45	3	Theory
3	Program Core	Practical/Lab	CTE5320	Internet of Things & Digital Twins	0-0-4	60	2	Practical
4	Program Core	Practicum	CTE5440	Computer Hardware and Networking	1-0-4	75	3	Practical
5	Program Elective	Practicum		Elective-2	1-0-4	75	3	Practical
6	Humanities & Social Science	Practicum	CTE5654	Innovation and Startup	1-0-2	45	2	Project
7	Project / Internship	Project/Internship	CTE5773	Industrial Training * [Summer Vacation - 90 Hours]		-	2	Project
8	Open Elective	Advanced Skill Certification	CTE5860	Advanced Skills Certification - 5	1-0-3	60	2	NA
9	Audit Course	Integrated Learning Experience	ACE4882	I&E/ Club Activity/ Community Initiatives		15	0	
10	Audit Course	Integrated Learning Experience	ACE4883	Shop floor Immersion	-	8	0	-
11	Audit Course	Integrated Learning Experience	ACE4884	Student-Led Initiative	-	24	0	-
12	Audit Course	Integrated Learning Experience	ACE4885	Emerging Technology Seminars	-	8	0	-
13	Audit Course	Integrated Learning Experience	ACE4886	Health & Wellness	-	30	0	-
14	Audit Course	Integrated Learning Experience	ACE4887	Special Interest Groups	-	30	0	-
				Test and Revisions		**75**		
				Library		**15**		
				TOTAL		**625**	**20**	

SIXTH SEMESTER

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

FIFTH SEMSTER (Elective I)								
S. No	Course Category	Course Type	Course Code	Course Title	L-T-P	Period	Credit	End Exam
1	Program Elective	Theory	CTE 5211	Machine Learning	3-0-0	45	3	Theory
2	Program Elective	Theory	CTE 5212	Data Warehousing and Data Mining	3-0-0	45	3	Theory
3	Program Elective	Theory	CTE 5213	Ethical Hacking	3-0-0	45	3	Theory
4	Program Elective	Theory	CTE 5214	Agile Product Development	3-0-0	45	3	Theory
5	Program Elective	Theory	CTE 5215	Artificial Intelligence	3-0-0	45	3	Theory

FIFTH SEMSTER (Elective II)								
S. No	Course Category	Course Type	Course Code	Course Title	L-T-P	Period	Credit	End Exam
1	Program Elective	Practicum	CTE 5541	Data Analytics	1-0-4	75	3	Practical
2	Program Elective	Practicum	CTE 5542	Mobile Computing	1-0-4	75	3	Practical
3	Program Elective	Practicum	CTE 5543	Component Based Technologies	1-0-4	75	3	Practical
4	Program Elective	Practicum	CTE 5544	Multimedia Systems	1-0-4	75	3	Practical
5	Program Elective	Practicum	CTE 5545	Full Stack Developer	1-0-4	75	3	Practical
6	Program Elective	Practicum	CTE 5546	Robotic Process Automation	1-0-4	75	3	Practical

ELECTIVE-III (Pathway)								
S. No.	Course Category	Course Type	Course Code	Course Title	L-T-P	Period	Credit	End Exam
1	Elective | Higher Education	Theory	CTE 6111	Advanced Engineering Mathematics	3-0-0	45	3	Theory
2	Elective | Entrepreneurship	Theory	CTE 6112	Entrepreneurship	3-0-0	45	3	Theory
3	Elective | Technocrats	Theory	CTE 6113	Project Management	3-0-0	45	3	Theory
4	Elective | Technocrats	Theory	CTE 6114	Finance Fundamentals	3-0-0	45	3	Theory
5	Elective | Technologists	Theory	CTE 6115	5G Technology	3-0-0	45	3	Theory
6	Elective | Technologists	Theory	CTE 6116	DevOps	3-0-0	45	3	Theory

ELECTIVE-IV (Specialization)								
S. No.	Course Category	Course Type	Code	Course Title	L-T-P	Period (Hrs.)	Credit	End Exam
1	Elective	Practicum	CTE 6241	Data Science	1-0-4	75	3	Practical
2	Elective	Practicum	CTE 6242	Cloud Platform	1-0-4	75	3	Practical
3	Elective	Practicum	CTE 6243	Data Visualization	1-0-4	75	3	Practical
4	Elective	Practicum	CTE 6244	Advance DBMS	1-0-4	75	3	Practical
5	Elective	Practicum	CTE 6245	Mobile Application Development	1-0-4	75	3	Practical
6	Elective	Practicum	CTE 6246	UI & UX Design	1-0-4	75	3	Practical

Project/Internship

S. No.	Course Category	Course Type	Code	Course Title	L-T-P	Period (Hrs.)	Credit	End Exam
1	Project / Internship	Project / Internship	CTE 6351	Internship	-	540	12	Project
2	Project / Internship	Project / Internship	CTE 6353	Fellowship	-	540	12	Project
3	Project / Internship	Project / Internship	CTE 6374	In-house Project	-	540	12	Project

ANNEXURE – II

SCHEME OF EXAMINATIONS

Computer Engineering (Full Time)

THIRD 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	CTE3110	Digital Logic Design	40	60	100	40	3	Theory
2	CTE3230	RDBMS	40	60	100	40	3	Theory
3	CTE3320	Digital Logic Design Lab	40	60	100	40	3	Practical
4	CTE3440	C Programming	40	60	100	40	3	Practical
5	CTE3540	Web Designing	40	60	100	40	3	Practical
6	CTE3640	Operating Systems	40	60	100	40	3	Practical
7	CTE3760	Advanced Skills Certification - 3						NA
8	GLE3880	Growth Lab						NA
9	ACE3881	Induction Program II						**
10	ACE3882	I&E/ Club Activity/ Community Initiatives						**
11	ACE3883	Shop floor Immersion						**
12	ACE3884	Student-Led Initiative						**
13	ACE3885	Emerging Technology Seminars						**
14	ACE3886	Health & Wellness						**
	TOTAL		**240**	**360**	**600**	**-**	**-**	**-**

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

ANNEXURE – II

SCHEME OF EXAMINATIONS

Computer 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	CTE4110	Computer Networks and Security	40	60	100	40	3	Theory
2	CTE4230	Data Structures Using Python	40	60	100	40	3	Theory
3	CTE4340	Java Programming	40	60	100	40	3	Practical
4	CTE4440	Python Programming	40	60	100	40	3	Practical
5	CTE4540	E-Publishing Tools	40	60	100	40	3	Practical
6	CTE4640	Scripting Languages	40	60	100	40	3	Practical
7	CTE4760	Advanced Skills Certification - 4						NA
8	ACE4882	I&E/ Club Activity/ Community Initiatives						**
9	ACE4883	Shop floor Immersion						**
10	ACE4884	Student-Led Initiative						**
11	ACE 4885	Emerging Technology Seminars						**
12	ACE4886	Health & Wellness						**
13	ACE4887	Special Interest Groups (Placement Training)						**
	TOTAL		**240**	**360**	**600**			

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

ANNEXURE – II

SCHEME OF EXAMINATIONS

Computer 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	CTE 5130	Cloud Computing	40	60	100	40	4	Theory
	Elective – 1							
2	CTE 5211	Machine Learning	40	60	100	40	3	Theory
	CTE 5212	Data Warehousing and Data Mining						
	CTE 5213	Ethical Hacking						
	CTE 5214	Agile Product Development						
	CTE 5215	Artificial Intelligence						
3	CTE 5320	Internet of Things & Digital Twins	40	60	100	40	4	Practical
4	CTE 5440	Computer Hardware and Networking	40	60	100	40	5	Practical
5	**Elective – 2**		40	60	100	40	5	Practical
	CTE 5541	Data Analytics						
	CTE 5542	Mobile Computing						
	CTE 5543	Component Based Technologies						
	CTE 5544	Multimedia Systems						
	CTE 5545	Full Stack Developer						
	CTE 5546	Robotic Process Automation						
6	CTE 5654	Innovation and Startup	40	60	100	40	3	Project
7	CTE 5773	Industrial Training * [Summer Vacation - 90 Hours]						Project
8	CTE 5860	Advanced Skills Certification - 5						
9	ACE 4882	I&E/ Club Activity/ Community Initiatives						
10	ACE 4883	Shop floor Immersion						
11	ACE 4884	Student-Led Initiative						
12	ACE 4885	Emerging Technology Seminars						
13	ACE 4886	Health & Wellness						
14	ACE 4887	Special Interest Groups						
	TOTAL		**200**	**300**	**500**			

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

ANNEXURE – II

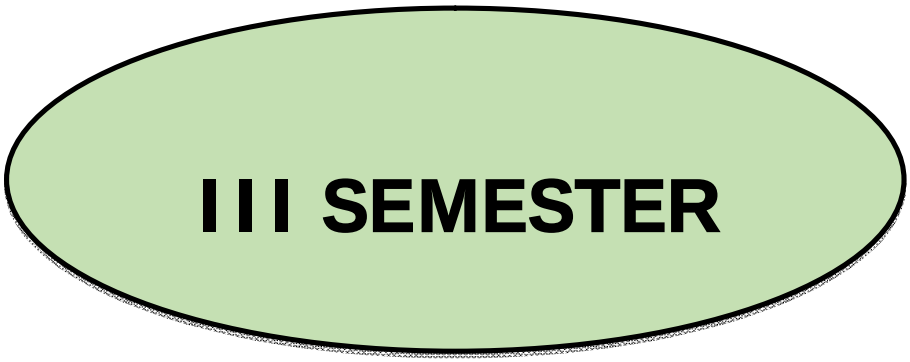
SCHEME OF EXAMINATIONS

Computer Engineering (Full Time)

SIXTH 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-3 (Pathway)**		40	60	100	40	3	Theory
	CTE 6111	Advanced Engineering Mathematics						
	CTE 6112	Entrepreneurship						
	CTE 6113	Project Management						
	CTE 6114	Finance Fundamentals						
	CTE 6115	5G Technology						
	CTE 6116	DevOps						
2	**Elective-4 (Specialization)**		40	60	100	40	5	Practical
	CTE 6241	Data Science						
	CTE 6242	Cloud Platform						
	CTE 6243	Data Visualization						
	CTE 6244	Advance DBMS						
	CTE 6245	Mobile Application Development						
	CTE 6246	UI & UX Design						
3.	CTE 6351	Internship	40	60	100	40	-	Project
	CTE 6353	Fellowship						
	CTE 6374	In-house Project						
	TOTAL		**120**	**180**	**300**			

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


III SEMESTER

CTE3110 – DIGITAL LOGIC DESIGN

Programme Name : COMPUTER ENGINEERING
Course Code : CTE3110
Semester : III SEMESTER
Course Title : DIGITAL LOGIC DESIGN
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			
			Marks			Duration
	Hours / Week	Hours / Semester	Internal Assessment	Autonomous Examination	Total	
DIGITAL LOGIC DESIGN	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	Foundations of Digital Logic	9
II	Combinational Logic Design	9
III	Sequential Logic Design	9
IV	Digital Interfacing, ADC and DAC	9
V	Memories, Programmable Logic Devices	9
TOTAL		45

COURSE DESCRIPTION

This subject introduces students to the fundamental concepts and techniques for designing and analyzing digital circuits, laying the groundwork for understanding and creating digital technologies.

COURSE OBJECTIVES

The objective of this course is to enable the student to

- Provide comprehensive understanding of digital systems and their fundamentals components, applications.
- Simplify and optimize digital logic circuits while gaining practical insights into its applications through Boolean algebra.

- Learn how to design sequential logic circuits using various components and techniques.
- Learn how to design sensor interface and their role in digital systems.
- Understand the principles and operation of various Analog-to-Digital Converters (ADC) and Digital-to-Analog Converters (DAC).
- Gain knowledge of different types of memory and their characteristics.
- Understand Programmable Logic Devices (PLDs) and their applications in digital system design.
- Analyze the societal impact of Digital Integrated Circuits (ICs) and their role in various industries and technologies.

This initial course offers students a gateway into the realm of digital electronics.

COURSE OUTCOMES

After successful completion of this course, the students should be able to	
E3110.1	Understanding digital systems fundamentals comprehensively.
E3110.2	Explore Boolean algebra fundamentals and practical applications.
E3110.3	Utilize sequential logic principles to create designs.
E3110.4	Design digital sensor interfaces and ADC/DAC converters
E3110.5	Analyse memory and PLDs.

Pre-requisites Nil

CO-POs & PSOs Mapping matrix

CO/PO & PSO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PSO1**	**PSO2**	**PSO3**
E3110.1	3	2	2	3	3	2	3	3	3	2
E3110.2	3	2	2	3	3	2	3	3	3	2
E3110.3	3	2	2	3	3	2	3	3	3	2
E3110.4	3	2	2	3	3	2	3	3	3	2
E3110.5	3	2	2	3	3	2	3	3	3	2
Total	**15**	**10**	**10**	**15**	**15**	**10**	**15**	**15**	**15**	**10**
Correlation level	**3**	**2**	**2**	**3**	**3**	**2**	**3**	**3**	**3**	**2**

Correlation level 1 – Slight (low)
Correlation level 2 – Moderate (Medium)
Correlation level 3 – Substantial (high)

Instructional Strategy:

- **Real-world Applications**: Integrate real-world examples and applications of digital logic design, such as binary arithmetic in computer architecture, digital communication systems, and control systems. Showing practical applications helps students understand the relevance of the course.
- **Interactive Lectures:** Conduct interactive lectures with demonstrations, multimedia presentations, and interactive whiteboards to illustrate abstract concepts effectively. Encourage student participation through discussions, questions, and problem-solving exercises.
- **Case Studies:** Present case studies of real-world digital systems, highlighting design challenges, solutions, and outcomes.
- **Use of Visual Aids:** Utilize visual aids such as diagrams, charts, and animations to clarify complex concepts like Boolean algebra, logic gates, and sequential logic circuits. Visual representations help reinforce learning and improve comprehension.
- **Flipped Classroom Approach:** Implement a flipped classroom model where students review lecture materials and resources independently before class and use class time for hands-on activities, problem-solving, and discussions. This approach encourages active learning.
- **Formative Assessment:** Use formative assessment techniques such as quizzes, concept mapping, and in-class exercises to gauge student understanding and provide timely feedback. Adjust teaching strategies based on assessment results to address areas of difficulty.
- **Self-directed Learning Resources:** Provide self-directed learning resources such as textbooks, online tutorials, and supplementary materials to accommodate diverse learning styles and allow students to explore topics at their own pace.

Assessment Methodology

	Continuous Assessment (40 marks)				**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	2 Periods	2 Periods	1 Hour	3 Hours	3 Hours
Exam Marks	50	50	60	100	100
Converted to	10	10	10	10	60
Marks	40				60
Tentative Schedule	6^{th} Week	12^{th} Week	13^{th}-14^{th} Week	16^{th} week	

Note:

CA1 and CA2: Assessment written test should be conducted for 50 Marks for two units. The marks scored will be converted to 10 Marks for the internal assessment.

CA1 and CA2, Assessment test should be conducted for two units as below

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

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 10 marks 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 (5 X 2 X 10 Marks=100 Marks)

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 ThinkingSkills (HOTs)**
	R-Remember, **U**-Understand, **AP**-Apply	**An**- Analyse, **E**-Evaluate, **C**-Create
% to be included	90 %	10 %

CTE3110 – DIGITAL LOGIC DESIGN

CTE3110	DIGITAL LOGIC DESIGN	L	T	P	C
THEORY		3	0	0	3

Unit I	FOUNDATIONS OF DIGITAL LOGIC	[9 Hrs]
Introduction: digital systems and their importance,		[1Hr]
Number systems: binary,		[1Hr]
octal, hexadecimal number		[1Hr]
binary arithmetic: 1's and 2's complements arithmetic,		[1Hr]
binary conversion,		[1Hr]
binary code standards: ASCII, BCD.		[1Hr]
Logic Gates: AND, OR, NOT, NAND,		[1Hr]
NOR and Ex-OR operations and logic diagram,		[1Hr]
realization of gates using universal gates		[1Hr]

Unit II	COMBINATIONAL LOGIC DESIGN	[9 Hrs]
Basic concepts of Boolean algebra: Laws, theorems,		[1Hr]
De-Morgan's theorem,		[1Hr]
Standard representation of logic functions		[1Hr]
K-map representation (upto 3 variable)		[1Hr]
simplification of logic functions using K-map. Applications: Adders, Subtractors,		[1Hr]
digital comparator,		[1Hr]
Multiplexer(MUX)/ data selector,		[1Hr]
De-Multiplexer(D-MUX)/decoder,		[1Hr]
priority encoder.		[1Hr]

Unit III	SEQUENTIAL LOGIC DESIGN	[9 Hrs]
Flip Flops: SR – JK and D type flip flop,		[1Hr]
concept of Edge Triggering,		[1Hr]
applications of flip flops.		[1Hr]
Registers: shift registers,		[1Hr]
serial to parallel converter,		[1Hr]
parallel to serial converter.		[1Hr]
Counters: Asynchronous up counters,		[1Hr]
Synchronous down counters,		[1Hr]
Decade counter.		[1Hr]

Unit IV	DIGITAL INTERFACING, ADC AND DAC	[9 Hrs]
Digital Interfacing: Introduction,		[1Hr]
sensors and their types,		[1Hr]
TTL and CMOS interface - switch, LED, relay,		[1Hr]
Motor and solenoid		[1Hr]
A/D converters:		[1Hr]
successive approximation A/D converter,		[1Hr]
dual slope A/D converter		[1Hr]
D/A converters: weighted resistor/converter,		[1Hr]
R-2RLadder D/A converter. Design Automation		[1Hr]
Unit V	**MEMORIES, PROGRAMMABLE LOGIC DEVICES**	**[9 Hrs]**
Memory: Definition- i) memory read ii) memory write iii) access time		[1Hr]
iv) memory capacity v) address lines vi) word		[1Hr]
length, Different types of ROM & RAM, Memory		[1Hr]
accessing processing, hierarchy and management		[1Hr]
difference between Flash ROM and NVRAM		[1Hr]
operation of pendrive		[1Hr]
SD card and solid state hard disk .		[1Hr]
PLDs: Difference between fixed logic and programmable logic		[1Hr]
PLA architecture		[1Hr]
TOTAL HOURS		**45 Hrs**

Suggested List of Students Activity

The following student activities or similar activities can be assigned

1. Collect the information about the different types of display devices used in digital circuits and carry out a seminar.
2. Prepare a note on E-waste and disposal of PCBs and ICs, carry out a seminar.
3. Organize a series of problem-solving sessions where students work on Boolean algebra problems and logic circuit design tasks. Evaluate students basedon their ability to manipulate Boolean expressions, simplify logic circuits, and design practical solutions. Assess their problem-solving skills, logical reasoning, and the correctness of their solutions.
4. Provide industrial sensor datasheets or specifications for commonly used sensors in manufacturing processes (e.g., temperature sensors, pressure sensors, proximity sensors).
5. Ask students to design and implement digital sensor interfaces or ADC/DAC circuits to interface with these sensors and provide digital or analog measurements.
6. Provide specifications or requirements for industrial control tasks, such as sequence control, timing control, or data processing tasks. Ask students to design, simulate, and implement the sequential logic circuits using PLC programming software or microcontroller platforms commonly used in industrial automation.
7. Assign a group project where diploma students analyse the memory technologies, programmable logic devices (PLDs), and their societal impact in industrial applications. Focus on memory technologies commonly used in industrial control systems (e.g., EEPROM, flash memory) and PLDs used for logic control and customization in industrial automation.

Execution Note:

- Maximum of 3 students in each batch for student activity.
- Above activities may be distributed among different batches; Any one activity among 1 to 5 or any similar activities per batch may be assigned by the teacher based on interest of the students.

Text books for Reference:

S.NO	TITLE	AUTHOR	PUBLISHER WITH EDITION
1.	Digital logic and Computer design	M. M. Mano	Pearson Education India, 2016.
2.	Digital Design Principles and Practices	Wakerly, John	5/E, Pearson Education 2018
3.	Digital Design and Computer Architecture	Sarah Harris and David Harris	ARM Edition, ,2015
4.	Fundamentals of Digital Circuits	A. Kumar	Prentice Hall India, 2016.

Web-based/Online Resources:

S.NO	WEBSITES/LINKS
1.	https://nptel.ac.in/
2.	https://www.nptelvideos.com/course.php?id=5
3.	http://www.vlab.co.in

MODEL QUESTION PAPER

CTE3110 – DIGITAL LOGIC DESIGN

Time : [3 Hrs]. **Max. Marks : 100**

PART-A (5 X 2 X 10 Marks = 100 Marks)

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.	Convert this decimal number 784.2 to its equivalent binary number, octal number and hexadecimal number?	I	U	E3110.1	PO1,PO2,PO5,PO7
	2.	Explain ASCII codes and NAND gate and EX-OR gate.	I	R	E3110.1	PO1,PO2,PO5,PO7
	3.	Draw the symbols and truth tables of AND, OR , NOT, EX-OR and NAND gates.	I	R	E3110.1	PO1,PO2,PO5,PO7
	4.	Convert an Hexadecimal number of A25 to its equivalent decimal number.	I	E	E3110.1	PO1,PO2,PO5,PO7
II	5.	State the following laws of Boolean Algebra. (a) Commutative law (b) Associative law (c) Distributive law	II	R	E3110.2	PO1,PO2,PO5,PO7
	6.	Explain about two variable K - Map.	II	R	E3110.2	PO1,PO2,PO5,PO7
	7.	Explain about the logical diagram of a multiplexer and demultiplexer with diagram	II	U	E3110.2	PO1,PO2,PO5,PO7
	8.	Draw and Explain encoder and decoder circuits.	II	R	E3110.2	PO1,PO2,PO5,PO7
III	9.	Explain about the operation of a JK flip flop with logic diagram.	III	R	E3110.3	PO1,PO2,PO5,PO7
	10.	Explain about the applications of shift register	III	U	E3110.3	PO1,PO2,PO5,PO7
	11.	With the logic diagram explain the operation of parallel in–serial out shift register	III	R	E3110.3	PO1,PO2,PO5,PO7
	12.	Draw and explain the operation of Edge triggered JK flip flop	III	U	E3110.3	PO1,PO2,PO5,PO7
IV	13.	Explain about the Digital Interfacing	IV	U	E3110.4	PO1,PO2,PO5,PO7
	14.	Explain about the A/D converters	IV	R	E3110.4	PO1,PO2,PO5,PO7
	15.	Explain about the D/A converters	IV	U	E3110.4	PO1,PO2,PO5,PO7
	16.	Explain about TTL and CMOS interface	IV	U	E3110.4	PO1,PO2,PO5,PO7
V	17.	Difference between fixed logic and programmable logic	V	R	E3110.5	PO1,PO2,PO5,PO7
	18.	Brief y explain the Memory Concepts.	V	R	E3110.5	PO1,PO2,PO5,PO7
	19.	Difference between Flash ROM and NVRAM	V	An	E3110.5	PO1,PO2,PO5,PO7
	20.	Briefly explain PLA architecture	V	U	E3110.5	PO1,PO2,PO5,PO7

QUESTION PAPER SETTING

The teaching learning process and assessment are being carried out in accordance withthe revised Blooms Taxonomy. The question paper should consist of 90% questionsbased 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 ThinkingSkills (HOTs)**
	R-Remember, **U**-Understand, **AP**-Apply	**An**- Analyse, **E**-Evaluate, **C**-Create
% to be included	90 %	10 %

CTE3230 - RDBMS

Programme Name : COMPUTER ENGINEERING
Course Code : CTE3230
Semester : III SEMESTER
Course Title : RDBMS
Course Type : PRACTICUM

L	T	P	C
3	0	2	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	
RDBMS	5	75	40	100*	100	3 Hrs

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

Unit	Topics	Time (Hrs)
I	Relational Data Model & Mysql Administration	15
II	Interactive Mysql	15
III	Flow Control in Mysql	15
IV	Mysql Performance Tuning	15
V	Stored Program Concepts & Development	15
TOTAL		**75**

COURSE DESCRIPTION

All modern database management systems like SQL, MS SQL Server, IBM DB2, ORACLE, My-SQL, and Microsoft Access are based on RDBMS. It is called RelationalDatabase Management System (RDBMS) because it is based on the relational model introduced by E.F. CODD. A relational database is the most commonly used database. Due to a collection of an organized set of tables, data can be accessed easily in RDBMS.

COURSE OBJECTIVES

The objective of this course is to enable the student to

- To know the fundamentals of DBMS.
- To share of data and speedy forming of new applications, restrict repetition or redundancy of data.
- To avoid data inconsistencies providing better integrity.
- To familiarize all the possible operations of data in the database.
- To familiarize programming skills for all the operations in database.

COURSE OUTCOMES

After successful completion of this course, the students should be able to	
E3230.1	Describe fundamentals of DBMS, installation and working with admin.
E3230.2	Apply SQL commands to create, insert, retrieve, update, delete data from the Relational databases.
E3230.3	Describe MySQL programming constructs, control statements and subprograms.
E3230.4	Describe how to Tune MySQL performance.
E3230.5	Apply cursors, triggers and Exception handling concepts

Pre-requisites : Nil

CO-POs & PSOs Mapping matrix:

CO/POs & PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
E3230.1	3	2	2	3	3	2	3	3	3	2
E3230.2	3	2	2	3	3	2	3	3	3	2
E3230.3	3	2	2	3	3	2	3	3	3	2
E3230.4	3	2	2	3	3	2	3	3	3	2
E3230.5	3	2	2	3	3	2	3	3	3	2
Total	**15**	**10**	**10**	**15**	**15**	**10**	**15**	**15**	**15**	**10**
Correlation level	**3**	**2**	**2**	**3**	**3**	**2**	**3**	**3**	**3**	**2**

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 engineering 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.
- Encourage Critical Analysis: Foster an environment where students can honestly assess experiment outcomes and analyze potential sources of error in case of discrepancies.

Assessment Methodology

	Continuous Assessment (40 marks)				End Semester Examination (60 marks)
	CA1	CA2	CA3	CA4	
Mode	Written Test Theory (Unit 1& 2)	Written Test Theory (Unit 3 & 4)	Practical Test (All Exercises)	Written Test (Complete Theory Portions)	Written Examination (Complete Theory Portions)
Duration	2 Periods	2 Periods	3 hours	3 hours	3 hours
Exam Marks	50	50	100	100	100
Converted to	10	10	10	10	60
Marks	40				60
Tentative Schedule	6^{th} Week	12^{th} Week	15^{th} Week	16^{th} 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.
  - PART-A (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 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.

- The exercise should be completed on the day of practice. The same shall be evaluated for 10 marks on the day or the next day of practice before commencement of next exercise. The detailed date of the practices and its evaluations should be maintained in the log book and should be submitted for the verification.

SCHEME OF EVALUATION - Practical Test

Sl.No.	Description	Marks
A	Aim (05) ,Program (30)	35
B	Execution	20
C	Output	10
D	Practical document (All Practicals)	30
E	Viva Voce	05
Total		**100**

- **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: Model Examination and End Semester Examination- Theory Exam

- 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.

PART - A (5 X 2 X 10 Marks=100 Marks)

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 %

CTE3230- RDBMS

CTE3230	RDBMS	L	T	P	C
PRACTICUM		3	0	2	4

Unit I	**RELATIONAL DATA MODEL & MYSQL ADMINISTRATION**	[15 Hrs]
Relational Data Model -Introduction to database concepts		[1Hr]
CODD's Rules – Components of DBMS		[1Hr]
Table Structure		[1Hr]
Keys : types of Keys – Data Constraints and types of Constraints-		[1Hr]
difference between SQL and MySQL		[1Hr]
MySQL Installation Install ,configure and test		[1Hr]
MySQL server on Microsoft Windows Working with MySQL Admin Creating		[1Hr]
selecting and describing database		[1Hr]
show command – backing up databases.		[1Hr]
Ex No:1 Install, configure and connect to MySQL server and MySQL workbench in Windows.		[3 Hrs]
Ex No:2 Write a query to create a database, show and backing up databases.		[3 Hrs]
Unit II	**INTERACTIVE MYSQL**	[15 Hrs]
Introduction to MYSQL		
MySQL data types – Data Definition Commands		[2 Hrs]
Data Manipulation Commands – Data Retrieval Commands.		[1Hr]
MySQL operators and Expressions		
Types of operators – Arithmetic		[2Hrs]
Comparison and Logical Operators		[1Hr]
Pattern Matching- Import and Export Data.		[1Hr]
Built – in Functions.		
Single Row functions – Aggregate functions – conversion functions.		[2Hrs]
Ex No 3: Create a database named 'college' and create a table for student and employee with the fields as you like.		[3 Hrs]
Ex No 4: create a table 'student' with marks field for 10 students. Apply built in functions to do calculations.		[3 Hrs]
Unit III	**FLOW CONTROL IN MYSQL**	[15 Hrs]

Flow Control IF(), IF NULL(),CASE ,LOOP	[1Hr]
LEAVE ,ITERATE , REPEAT, WHILE.	[1Hr]
Querying the table	
Selecting rows using where, order by	[2 Hrs]
group by and Having clauses-Sub-queries	[1Hr]
correlated sub-queries.	[1Hr]
Views	
Introduction – Advantages of views – creating	[2Hrs]
updating and deleting views.	[1Hr]
Ex No 5: create a table 'bank' and apply flow control statements to do some transactions.	[3 Hrs]
Ex No 6: create a table ' library' with proper fields and create another table 'library1' and insert rows from library using views	[3 Hrs]
Unit IV **MYSQL PERORMANCE TUNING**	[15 Hrs]
Indexes and Sequences- Index	[1Hr]
Types simple and compound	[1Hr]
Sequences : creating , altering and dropping sequences	[1Hr]
Joins & Unions Joins- definition-types of joins	[1Hr]
natural join, inner join, self join, outer join.	[1Hr]
Union types : union , Union All, Union Distinct- order by and limit handling	
User and transaction management	
Creating – deleting – renaming users grant and revoke commands – transaction	[2 Hrs]
command : commit , rollback and save points.	[1Hr]
Database Design, ER Diagram and Unified Modeling Language.	[1Hr]
Ex No 7: Create a table named 'student' with sequences	[3Hrs]
Ex No 8: Create any two tables with common column name and perform join and union	[3Hrs]
UNIT V **STORED PROGRAM CONCEPTS & DEVELOPMENT**	[15 Hrs]
MySQL Procedures & Functions	
Creating –executing and deleting stored procedures	[2Hrs]
creating – executing and deleting stored functions -advantages.	[1Hr]
MySQL Trigger & Cursor	
Use of trigger	[2Hrs]
creating	[1Hr]
trigger	[1Hr]
types of triggers Cursor:	[1Hr]
creation and deletion.	[1Hr]
Ex No 9 : Create a stored procedure to get employee details from employee table.	[3 Hrs]
Ex No 10: Create a program for trigger and cursor.	[3 Hrs]
TOTAL HOURS	**75 Hrs**

Suggested List of Students Activity

- Presentation/Seminars by students on any recent technological developments based on the course.
- Periodic class/online quizzes conducted based on the course.
- Blended learning activities to explore the recent trends and developments in the field.

Text books for Reference:

S.NO	TITLE	AUTHOR	PUBLISHER WITH EDITION
1.	Querying MySQL: Makeyour MySQL database analytics accessible with SQL operations, data extraction, and custom queries	Adam Aspin	1st Edition, BPB Publication ,2022
2.	MySQL: The Complete Reference (Osborne Complete Reference Series)	Vikram Vaswani	1st edition, McGraw Hill Education,2017
3.	MySQL Pocket Reference	George Reese	2nd Edition, O'Reilly Media 2007
4.	High Performance MySQL: Optimization, Backups, Replication	BaronSchwartz, Peter Zaitsev, et al.	Third Edition, O'Reilly Media,2012

Web-based/Online Resources:

S.NO	WEBSITES
1.	https://www.w3schools.com/mysql/
2.	https://www.mysqltutorial.org/
3.	https://www.javatpoint.com/mysql-tutorial
4.	https://www.guru99.com/mysql-tutorial.html

Equipment / Facilities required to conduct the Practical Portion

Hardware Requirement

S.NO	HARDWARE
1.	Desktop Computers / Laptop
2.	Printer

Software Requirement

S.NO	SOFTWARE
1.	Windows / Linux Operating System
2.	https://dev.mysql.com/downloads/installer/

CTE3230– RDBMS

MODEL QUESTION PAPER

Time : 3 Hrs **Max. Marks : 100**

PART-A(5 X 2 X 10 Marks = 100 Marks)

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.	Define Keys and explain types of Keys	I	U	E3230.1	PO1,PO2,PO5,PO7
	2.	Explain CODD's Rules	I	U	E3230.1	PO1,PO2,PO5,PO7
	3.	Explain in detail working with MYSQL admin with examples	I	R	E3230.1	PO1,PO2,PO5,PO7
	4.	Difference between SQL and YSQL	I	An	E3230.1	PO1,PO2,PO5,PO7
II	5.	Explain Data Definition commands	II	R	E3230.2	PO1,PO2,PO5,PO7
	6.	Explain MYSQL Data types	II	R	E3230.2	PO1,PO2,PO5,PO7
	7.	Explain MYSQL operations &	II	U	E3230.2	PO1,PO2,PO5,PO7
	8.	Explain Pattern Matching and Import and Export of data	II	R	E3230.2	PO1,PO2,PO5,PO7
III	9.	Explain Flow Control	III	R	E3230.3	PO1,PO2,PO5,PO7
	10.	Explain about the Querying the table	III	U	E3230.3	PO1,PO2,PO5,PO7
	11.	Define view and explain the advantages	III	R	E3230.3	PO1,PO2,PO5,PO7
	12.	Briefly explain the group by and having clauses	III	R	E3230.3	PO1,PO2,PO5,PO7
IV	13.	Define index and explain the index types	IV	R	E3230.4	PO1,PO2,PO5,PO7
	14.	Explain about the joins & union	IV	R	E3230.4	PO1,PO2,PO5,PO7
	15.	Explain about the User and transaction management	IV	R	E3230.4	PO1,PO2,PO5,PO7
	16.	Explain about Types of union	IV	U	E3230.4	PO1,PO2,PO5,PO7
V	17.	Describe the MySQL Trigger & Cursor	V	AP	E3230.5	PO1,PO2,PO5,PO7
	18.	Briefly explain MySQL Procedures & Functions	V	U	E3230.5	PO1,PO2,PO5,PO7
	19.	Explain executing and deleting stored functions -advantages	V	U	E3230.5	PO1,PO2,PO5,PO7
	20.	Define Keys and explain types of Keys	V	U	E3230.5	PO1,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 %

CTE3320–DIGITAL LOGIC DESIGN LAB

Programme Name : COMPUTER ENGINEERING
Course Code : CTE3320
Semester : III SEMESTER
Course Title : DIGITAL LOGIC DESIGN LAB
Course Type : PRACTICAL

L	T	P	C
0	0	4	2

TEACHING AND SCHEME OF EXAMINATION:

Number of Weeks/ Semester: 15 Weeks

Course	Instructions		Examination			
	Hours / Week	Hours / Semester	Marks			Duration
			Internal Assessment	Autonomous Examination	Total	
DIGITAL LOGIC DESIGN LAB	4	60	40	100*	100	3 Hrs

***Examinations will be conducted for 100 marks and it will be**

COURSE DESCRIPTION

This course emphasizes practical application alongside theoretical knowledge, covering digital logic devices and circuits, hands-on experiments, understanding IC specifications, and application through simulation exercises and mini-projects, fostering critical thinking and problem-solving abilities.

COURSE OBJECTIVES

The objective of this course is to

- To familiarize students with digital logic devices and circuits about logic gates
- To enable students to understand the concepts on decoder and encoder.
- To provide hands-on experience about the flip flops
- To introduce students to understand about counters.
- To develop students' skills in designing and troubleshooting digital circuits through simulation and practical experimentation.

COURSE OUTCOMES

After successful completion of this course, the students should be able to	
E3320.1	Test the truth tables of logic gates. Build combinational logic circuits and validate their truth tables
E3320.2	Construct sequential logic circuits and verify their truth tables.
E3320.3	Construct and verify the truth tables of multiplexer/demuliplexer
E3320.4	Construct and verify the truth tables of decoder/encoder
E3320.5	Simulate digital logic circuits using any tool.

Pre-requisites

- Students should have knowledge of basic logic gate operations, Boolean algebra, and digital circuit design principles.

CO- POs & PSOs MAPPING MATRIX

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
E3320.1	3	2	2	3	3	2	3	3	3	3
E3320.2	3	2	2	3	3	2	3	3	3	3
E3320.3	3	2	2	3	3	2	3	3	3	3
E3320.4	3	2	2	3	3	2	3	3	3	3
E3320.5	3	2	2	3	3	2	3	3	3	3
Total	**15**	**10**	**10**	**15**	**15**	**10**	**15**	**15**	**15**	**15**
Correlation level	**3**	**2**	**2**	**3**	**3**	**2**	**3**	**3**	**3**	**3**

Correlation level 1 – Slight (low)

Correlation level 2 – Moderate (Medium)

Correlation level 3 – Substantial (high)

Instructional strategy:

- It is advised that teachers make the learning experience more engaging by introducing innovative and interesting ways of teaching. The teachers need to expose the students to material in multiple modes help them learn it faster and retain it longer.
- **Use of Visual Aids:** Utilize visual aids such as diagrams, charts, and animations to clarify complex concepts like Boolean algebra, logic gates, and sequential logic circuits. Visual representations help reinforce learning and improve comprehension.
- **Hands-on Labs and Simulations:** Provide hands-on experience with logic gates, flipflops, and other digital components through laboratory sessions. Additionally, utilize digital logic simulation software to allow students to design and simulate circuits, providing a practical understanding of concepts
- **Group Projects:** Assign group projects that require students to design and implement digital circuits to solve specific problems or tasks. This encourages teamwork, enhances problem-solving skills, and reinforces learning through practical application.
- **Guest Lectures and Industry Visits:** Invite guest speakers from industry or academia to share insights into digital logic design applications, emerging technologies, and career opportunities. Organize visits to relevant industries or laboratories to expose students to real- world digital design practices.

Assessment Methodology:

	Continuous Assessment (40 marks)				End Semester Examination (60 marks)
	CA1	**CA2**	**CA3**	**CA4**	
Mode	Practical Test	Practical Test	Practical Document	Practical Test	Practical Examination
Portion	Part A Exercises	Part B Exercises	All Exercises	All Exercises	All Exercises
Duration	2 Periods	2 Periods	Regularly	3 Hours	3 Hours
Exam Marks	50	50	Each Practical10 Marks	100	100
Converted to	10	10	10	10	60
InternalMarks	40				60
Tentative Schedule	7th Week	14th Week	15th Week	16th 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 & Circuit diagram	35
B	Execution and Result	15
TOTAL		**50**

- **CA 3:** Practical document should be maintained for every exercise / experiment immediately after completion of the practice. The same should be evaluated for 10Marks. 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 the next day of practice before commencementof next exercise. The detailed date of the practices and its evaluations should be maintained in the log book and should be submitted for the verification.
- **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 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
1	Aim (05), Circuit diagram for the experiment from Part-A (30)	35
2	Aim (05), Circuit diagram for the experiment from Part-B (30)	35
3	Execution of any one experiment from Part-A OR Part-B	25
4	Viva Voce	05
TOTAL		**100**

CTE3320 – DIGITAL LOGIC DESIGN LAB

Practical

CTE3320	NAME OF THE EXPERIMENT	L	T	P	C
PRACTICAL		0	0	4	2
EX.NO	**PART -A**				30 Hrs
1.	Verify the truth tables of any 3 Logic Gates.				[6 Hrs]
2.	Construct and verify the truth tables of full adder				[6 Hrs]
3.	Construct and verify the truth tables of full subtractor.				[6 Hrs]
4.	Construct and validate the truth table of demultiplexer				[6 Hrs]
5.	Construct and validate the truth table of decoder.				[6 Hrs]
PART-B					30 Hrs
6 .	Construct and verify the truth tables of 2 bit magnitude comparator.				[5 Hrs]
7.	Construct and verify the truth tables of JK flip flop				[5 Hrs]
8.	Construct and verify the performance of decade counter.				[5 Hrs]
9.	Design 4 bit asynchronous up counter using any simulation tool.				[5 Hrs]
10.	Design 4 bit shift register (Serial in Parallel Out) using any simulation tool.				[5 Hrs]
11	Construct the circuit and draw the VI characteristics of LED.				[5 Hrs]
TOTAL HOURS					**60**

Suggested List of Students Activity

Proposed List of Student Activities for Digital Logic Design:

- Research and present on the evolution of digital display technologies, including LED, LCD, OLED, and e-paper displays. Discuss their working principles, advantages, and applications in digital circuits.
- Investigate and compare the specifications, availability, and costs of two different Analog-to-Digital Converter (ADC) and Digital-to-Analog Converter (DAC) ICs. Analyze their features and suitability for various applications.
- Develop a block diagram approach for constructing a digital clock, frequency counter, or digital voltmeter using digital logic circuits. Estimate the cost of components required for the project and discuss potential challenges and solutions.
- Explore the environmental impact of electronic waste (E-waste) and the proper disposal methods for printed circuit boards (PCBs) and integrated circuits (ICs). Conduct a seminar to raise awareness about E-waste management practices.
- Design and simulate the functionality of a simple logic circuit using a modern software tool such as Logisim, Proteus, or LTspice.

Execution Guidelines:

- Limit each batch to a maximum of three students per activity.
- Assign activity No. 5 (logic circuit simulation) as mandatory for all batches.
- Assign any one activity from Nos. 1 to 5 or propose similar activities based on student interest and teacher discretion.

Text books for Reference:

S.NO	TITLE	AUTHOR	PUBLISHER WITH EDITION
1.	Modern Digital Electronics	R. P. Jain	McGraw Hill Education, 2009.
2.	Fundamentals of Digital Circuits	A. Kumar	Prentice Hall India, 2016.
3.	Digital Design and Computer Architecture	Sarah Harris and David Harris	ARM Edition, 2015.

Web-based/Online Resources:

S.No.	WEBSITES/LINK
1.	https://nptel.ac.in/
2.	http://www.vlab.co.in

Equipment / Facilities required to conduct the Practical Course

Software Requirement:

S.No.	SOFTWARE
1.	Pspice software : https://www.pspice.com/
2.	LogiSim software : https://logisim.software.informer.com/2.7/
3.	Xcircuit Software : http://opencircuitdesign.com/xcircuit/
4.	Scilab : https://cloud.scilab.in/
5.	Proprietor Software : Pspice, Multisim (available student version).
6.	Ltspice (available freely version).

Hardware Requirement:

S.No.	HARDWARE
1.	Digital Trainer Kit.
2.	Logic Gates: Basic logic gate ICs like 7400 (Quad 2-input NAND), 7402 (Quad 2-input NOR), and 7486 (Quad 2-input XOR).
3.	Multiplexer/ Demultiplexer , Decoder and Encoder
4.	Flip flop IC
5.	2-bit magnitude comparator
6.	Power Supply (0-30V)
7.	5V DC Motor
8.	Resistors, capacitors, diodes, LEDs.
9.	Breadboard, power supply, wires, and other necessary components for circuit construction and testing.

CTE3320 – DIGITAL LOGIC DESIGN LAB

MODEL QUESTION PAPER

Duration: 3 hrs. **Max. Marks: 100**

S.NO	NAME OF THE EXPERIMENTS	CO	PO
	PART - A		
1	Verify the truth tables of any 3 Logic Gates.	E3320.1	PO1, PO2, PO3, PO4, PO5, PO6,PO7
2	Construct and verify the truth tables of full adder	E3320.1	PO1, PO2, PO3, PO4, PO5, PO6,PO7
3	Construct and verify the truth tables of full subtractor.	E3320.1	PO1, PO2, PO3, PO4, PO5, PO6,PO7
4	Construct and validate the truth table of demultiplexer	E3320.2	PO1, PO2, PO3, PO4, PO5, PO6,PO7
5	Construct and validate the truth table of decoder	E3320.2	PO1, PO2, PO3, PO4, PO5, PO6,PO7
	PART – B		
6	Construct and verify the truth table of decoder	E3320.3	PO1, PO2, PO3, PO4, PO5, PO6,PO7
7	Construct and verify the truth tables of JK flip flop	E3320.4	PO1, PO2, PO3, PO4, PO5, PO6,PO7
8	Construct and verify the performance of decadecounter.	E3320.4	PO1, PO2, PO3, PO4, PO5, PO6,PO7
9	Design 4 bit asynchronous up counter using anysimulation tool.	E3320.5	PO1, PO2, PO3, PO4, PO5, PO6,PO7
10	Design 4 bit shift register (SeriaI in Parallel Out)using any simulation tool.	E3320.5	PO1, PO2, PO3, PO4, PO5, PO6,PO7
11	Construct the circuit and draw the VI characteristics of LED.	E3320.5	PO1, PO2, PO3, PO4, PO5, PO6,PO7

CTE3440 – C PROGRAMMING

Programme Name : COMPUTER ENGINEERING
Course Code : CTE3440
Semester : III SEMESTER
Course Title : C PROGRAMMING
Course Type : PRACTICUM

L	T	P	C
1	0	4	3

TEACHING AND SCHEME OF EXAMINATION

No. of weeks per semester: 15weeks

Course	Instructions		Examination			
			Marks			Duration
	Hours / Week	Hours / Semester	Internal Assessment	Autonomous Examination	Total	
C PROGRAMMING	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 to C	15
II	Control structures and looping	15
III	Arrays and functions	15
IV	Strings and pointers	15
V	Structures and file management	15
TOTAL HOURS		**75**

COURSE DESCRIPTION

In this course, students will learn the C programming language and its fundamental concepts. Also, they gain the knowledge to write simple C programs and undertake future courses that assume some background in computer programming. This course introduces programming principles using the C language. Students will learn C tokens, variables, data types, control structures, functions, arrays, pointers, structures and file concepts. Through hands-on students will develop proficiency in writing structured and efficient C programs to solve a variety of computational problems.

COURSE OBJECTIVES

The objective of this course is to enable the student to

- To learn problem solving skills.
- To gain knowledge of arrays and strings.

- To understand the concept of functions and their role in modular programming.
- To comprehend the basics of structures and its importance in application development.
- To recognize the importance of files and its related operations.

COURSE OUTCOMES:

After successful completion of this course, the students should be able to	
E3440.1	Demonstrate knowledge on C Programming concepts.
E3440.2	Develop simple programs in C using basic constructs.
E3440.3	Design modular C programs with reusable functions to improve code readability and maintainability.
E3440.4	Develop applications using structures and unions.
E3440.5	Apply programming skills to solve numerical problems and real-time problems.

Pre-requisites : Nil

CO- POs & PSOs MAPPING MATRIX:

CO/ PO & PSO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PSO1**	**PSO2**	**PSO3**
E3440.1	3	3	3	3	2	2	3	2	3	2
E3440.2	3	3	3	3	2	2	3	2	3	2
E3440.3	3	3	3	3	2	2	3	2	3	2
E3440.4	3	3	3	3	2	2	3	2	3	2
E3440.5	3	3	3	3	2	2	3	2	3	2
Total	**15**	**15**	**15**	**15**	**10**	**10**	**15**	**10**	**15**	**10**
Correlation level	**3**	**3**	**3**	**3**	**2**	**2**	**3**	**2**	**3**	**2**

Correlation level 1 – Slight (low)
Correlation level 2 – Moderate (Medium)
Correlation level 3 – Substantial (high)

Instructional Strategy:

1. Engage and Motivate: Instructors should actively engage students to boost their learning confidence.
2. Real-World Relevance: Incorporate relatable, real-life examples and engineering applications to help students understand and appreciate course concepts.
3. Interactive Learning: Utilize demonstrations and plan interactive student activities for an engaging learning experience.
4. Application-Based Learning: Employ a theory-demonstrate-practice-activity strategy throughout the course to ensure outcome-driven learning and employability.
5. Encourage Critical Analysis: Foster an environment where students can honestly assess experiment outcomes and analyze potential sources of error in case of discrepancies

Assessment Methodology:

	Continuous Assessment (40 marks)				End Semester Examination (60 marks)
	CA1	**CA2**	**CA3**	**CA4**	
Mode	Practical Test	Practical Test	Written Test Theory	Practical Test	Practical Examination
Portion	PART-A Exercises	PART-B Exercises	All Units	All Exercises	All Exercises
Duration	2 Periods	2 Periods	3 hours	3 hours	3 hours
Exam Marks	60	60	100	100	100
Converted to	10	10	10	10	60
Marks	40				60
Tentative Schedule	7th Week	14th Week	15th Week	16th 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.

The exercise should be completed on the day of practice. The same shall be evaluated for 10 marks on the day or the next day of practice before commencement of next exercise. The detailed date of the practices and its evaluations should be maintained in the log book and should be submitted for the verification.

SCHEME OF EVALUATION

PART	DESCRIPTION	MARKS
A	Aim (05) , Program (30)	35
B	Execution and Output	15
TOTAL		50
C	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	Answer any ten questions out of twelve. Each carries three marks.	10 x 3	30
Part – B	Answer any seven questions out of ten. Each carries ten marks	7 x 10	70
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 (05) , Program from Part – A (30)	35
B	Aim (05) , Program from Part – B (30)	35
C	Executing any one program (Part A or Part –B)	15
D	Output	10
E	Viva Voce	05
TOTAL		**100**

CTE3440 – C PROGRAMMING

CTE3440	C PROGRAMMING	L	T	P	C
PRACTICUM		1	0	4	3
Unit I	**INTRODUCTION TO C**	**[15 Hrs]**			
Overview of C: Basic Structure of C program, Compiling and Executing a C program. C Basics: Constants, Variable, Operators and Datatypes -Character Set -C Tokens - Keywords and Identifiers – Declaration and Use of Variables. Managing Input and Output Operations: Formatted and Unformatted Input and Output statements.		[1Hr] [1Hr] [1Hr]			
Ex No 1: Write a C program to calculate the simple interest and compound interest. **Ex No 2**: Write a C program to find the area of a circle and a rectangle (use preprocessing directory for defining pi value).		[6 Hrs] [6 Hrs]			
Unit II	**CONTROL STRUCTURES AND LOOPING**	**[15 Hrs]**			
Decision Making and Branching: Simple if Statement - if-else Statement Nested if-else Statements - else if ladder – Switch case statement. Looping: While Statement – do..while statement – for loop statement-break and continue statement- goto statement.		[1Hr] [1Hr] [1Hr]			
Ex No 3: Write a C program to find the largest of three numbers. **Ex No 4:** Write a C program to generate all prime numbers from 1 to N.		[6 Hrs] [6 Hrs]			
Unit III	**ARRAYS AND FUNCTIONS**	**[15 Hrs]**			
Arrays: One-dimensional Arrays- Declaration of One-dimensional Arrays - Initialization of One-dimensional Arrays Two-dimensional Arrays- Declaration of Two-dimensional Arrays - Initialization and accessing Two-dimensional Arrays. User-Defined Functions: Need for Functions -Elements of User Defined Functions – Functions Types – Call by Value-Call by Reference-Passing Arrays to Functions-Recursion		[1Hr] [1Hr] [1Hr]			
Ex No 5: Write a C program to demonstrate matrix addition and transpose operations. **Ex No 6:** Write a C program to find factorial of a given number using recursion.		[6 Hrs] [6 Hrs]			
Unit IV	**STRINGS AND POINTERS**	**[15 Hrs]**			
Strings: Declaring and Initializing String Variables –String Built-in Functions. Pointer: Declaring, Initialization and Accessing a pointer Variable-Pointer Expressions Pointer Arithmetic – Pointer to Pointer - Pointer to an Array.		[1Hr] [1Hr] [1Hr]			
Ex No 7: Write a C program to find the length and reverse a string using pointers. **Ex No 8**: Write a C program for implementing linear search using pointer to an array.		[6 Hrs] [6 Hrs]			
Unit V	**STRUCTURES AND FILE MANAGEMENT**	**[15 Hrs]**			
Structures and Union: Introduction -Defining a Structure -Declaring Structure Variables Accessing Structure Members – structure initialization -Array of Structures-Union. File Management in C: Introduction – File Types- Defining File Modes -Opening and Closing a File – File Operations.		[1Hr] [1Hr] [1Hr]			

Ex No 9: Write a C program to collect and print students details like name, marks, etc. and then calculate total and average mark using structure. **Ex No 10:** Write a C program to count the number of characters, words and lines in a file. **Ex No 11:** Write a c Program to swap to varaiable's using (i)Third variable and (ii)Without using a third variable.	[4 Hrs] [4 Hrs] [4 Hrs]
Total Hours	**75 Hrs**

Suggested List of Students Activity

- Presentation/Seminars by students on any recent technological developments based on the course Programming assignments
- Periodic class/online quizzes conducted based on the course.
- Blended learning activities to explore the recent trends and developments in the field.

Text books for Reference:

S.NO	TITLE	AUTHOR	PUBLISHER WITH EDITION
1.	Programming in C	Reema Thareja	Oxford University Press, Second Edition, 2015.
2.	Fundamentals of Computing and Programming in C	Pradip Dey, Manas Ghosh	First Edition, Oxford University Press, 2009.
3.	Programming in ANSI C	E.Balaguruswamy	Tata McGraw-Hill, Third Edition Edition, 2012.

Web-based/Online Resources

S.NO	WEBSITES/LINKS
1.	https://www.w3schools.com/c/
2.	https://www.programiz.com/c-programming
3.	https://www.tutorialspoint.com/cprogramming/index.htm
4.	https://egyankosh.ac.in/
5.	https://archive.nptel.ac.in/courses/106/104/106104128/

Equipment / Facilities required to conduct the Practical Portion

Software Requirement:

S.NO.	SOFTWARE
1.	Windows / Linux Operating System
2.	Code Blocks / Turbo C

Hardware Requirement:

S.NO.	HARDWARE
1.	Desktop / Laptop
2.	Printer

CTE3440 – C PROGRAMMING

MODEL QUESTION PAPER

Duration: 3 hrs. **Max. Marks: 100**

S. NO	NAME OF THE EXPERIMENTS	CO	PO
	PART - A		
1	Write a C program to calculate the simple interest and compound interest	E3440.1	PO1, PO2, PO3, PO4, PO5, PO6,PO7
2	Write a C program to find the area of a circle and a rectangle (use preprocessing directory for defining pi value).	E3440.1	PO1, PO2, PO3, PO4, PO5, PO6,PO7
3	Write a C program to find the largest of three numbers.	E3440.2	PO1, PO2, PO3, PO4, PO5, PO6,PO7
4	Write a C program to generate all prime numbers from 1 to N.	E3440.2	PO1, PO2, PO3, PO4, PO5, PO6,PO7
5	Write a C program to demonstrate matrix addition and transpose operations	E3440.3	PO1, PO2, PO3, PO4, PO5, PO6,PO7
	PART - B		
6	Write a C program to find factorial of a given number using recursion.	E3440.3	PO1, PO2, PO3, PO4, PO5, PO6,PO7
7	Write a C program to find the length and reverse a string using pointers.	E3440.4	PO1, PO2, PO3, PO4, PO5, PO6,PO7
8	Write a C program for implementing linear search using pointer to an array.	E3440.4	PO1, PO2, PO3, PO4, PO5, PO6,PO7
9	Write a C program to collect and print students details like name, marks, etc. and then calculate total and average mark using structure.	E3440.5	PO1, PO2, PO3, PO4, PO5, PO6,PO7
10	Write a C program to count the number of characters, words and lines in a file.	E3440.5	PO1, PO2, PO3, PO4, PO5, PO6,PO7
11	Write a c Program to swap to variable's using Third variable and Without using a third variable	E3440.5	PO1, PO2, PO3, PO4, PO5, PO6,PO7

CTE3540 – WEB DESIGNING

Programme Name : COMPUTER ENGINEERING
Course Code : CTE3540
Semester : III SEMESTER
Course Title : WEB DESIGNING
Course Type : PRACTICUM

L	T	P	C
1	0	4	3

TEACHING AND SCHEME OF EXAMINATION

No. of weeks per semester: 15weeks

Course	Instructions		Examination			
			Marks			Duration
	Hours / Week	Hours / Semester	Internal Assessment	Autonomous Examination	Total	
WEB DESIGNING	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	HTML & HTML Tags	15
II	HTML & CSS	22
III	JavaScript	16
IV	JavaScript Advanced	22
TOTAL HOURS		**75**

COURSE DESCRIPTION

This course provides an introductory overview of the principles and practices of web design. Students will learn the fundamentals of creating visually appealing and user-friendly websites. Through a combination of theory and hands-on projects, students will explore various aspects of web design through basic coding languages such as HTML, CSS and client-side scripting language like JavaScript.

COURSE OBJECTIVES

1. Learn the syntax, structure, and basic elements of HTML, including tags, attributes, and semantic markup.
2. Gain proficiency in creating and organizing content using HTML elements such as headings, paragraphs, lists, and links and media elements.
3. Explore CSS syntax, selectors, properties, and values for styling HTML elements.
4. Learn how to apply CSS styling to text, backgrounds, borders, and other page elements.
5. Understand the role and importance of client-side scripting in web development.
6. Gain proficiency in JavaScript syntax, data types, and operators.
7. Learn how to manipulate the Document Object Model (DOM) using JavaScript.
8. Explore various techniques for handling user interactions and events on webpages.
9. Learn how to validate form inputs and handle form submissions using JavaScript.

COURSE OUTCOMES

After successful completion of this course, the students should be able to	
E3540.1	Develop well-structured web pages using HTML.
E3540.2	Develop web pages using HTML links and media elements.
E3540.3	Apply CSS to effectively style and format HTML elements to create visually appealing web pages.
E3540.4	Write and deploy Javascript code to solve practical web design problems
E3540.5	Utilize JavaScript to add interactivity and dynamic behavior to web pages including event handling, DOM manipulation, and form validation.

Pre-requisites : Knowledge of web browsers, websites, and basic internet terminologies.

CO/PO & PSO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
E3540.1	2	3	3	2	1	1	2	3	3	2
E3540.2	2	3	3	3	1	1	2	3	3	2
E3540.3	2	3	3	2	1	1	2	3	3	2
E3540.4	2	3	3	3	1	1	2	3	3	2
E3540.5	2	3	3	3	1	1	2	3	3	2
Total	10	15	15	13	5	5	10	15	15	10
Correlation level	2	3	3	3	1	1	2	3	3	2

Correlation level 1 – Slight (low)

Correlation level 2 – Moderate (Medium)

Correlation level 3 – Substantial (high)

Instructional Strategy

- It is advised to assign practical projects that allow students to apply concepts learned in class. Projects could include designing and coding websites from scratch, creating prototypes, or redesigning existing websites to improve usability and aesthetics.
- Conduct of interactive demos to help students learn specific techniques and tools. Provide step-by-step guidance and encourage questions and participation.
- Real-world examples of websites to understand design principles, usability issues, and best practices and discuss how different design choices impact user experience and business goals.

Assessment Methodology:

	Continuous Assessment (40 marks)				End Semester Examination (60 marks)
	CA1	**CA2**	**CA3**	**CA4**	
Mode	Practical Test	Practical Test	Written Test Theory	Practical Test	Practical Examination
Portion	Part A Exercises	Part B Exercises	All Units	All Exercises	All Exercises
Duration	2 Periods	2 Periods	3 hours	3 hours	3 hours
Exam Marks	60	60	100	100	100
Converted to	10	10	10	10	60
Marks	40				60
Tentative Schedule	7th Week	14th Week	15th Week	16th 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.

The exercise should be completed on the day of practice. The same shall be evaluated for 10 marks on the day or the next day of practice before commencement of next exercise. The detailed date of the practices and its evaluations should be maintained in the log book and should be submitted for the verification.

SCHEME OF EVALUATION

PART	DESCRIPTION	
A	Aim (05) , Program (30)	35
B	Execution and Output	15
TOTAL		**50**
C	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	Answer any ten questions out of twelve. Each carries three marks.	10 x 3	30
Part – B	Answer any seven questions out of ten. Each carries ten marks	7 x 10	70
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 (05) ,Program from Part – A (30)	35
B	Aim (05) ,Program from Part – B (30)	35
C	Executing any one program (Part A or Part –B)	15
D	Output	10
E	Viva Voce	05
TOTAL		**100**

CTE3540 – WEB DESIGNING

CTE3540	WEB DESIGNING	L	T	P	C
PRACTICUM		1	0	4	3

Unit I	HTML & HTML Tags	[15 Hrs]
Introduction to HTML: HTML editors-HTML5- HTML Elements & Attributes. HTML Tags -Page Formatting Tags: DOC TYPE Tag- html tag- head, title, body, meta, script, style tags Text Formatting Tags: Heading Tags- Paragraph Tags- Horizontal rules- Line breaks-Superscript- Subscript- Underline- Italic- Bold- Emphasis- del tags HTML List Tags: Unordered List- Ordered List-Definition List .HTML Link Tags & attributes- HTML Table Tags: table, th, tr, td, colspan, rowspan		[1Hr] [1Hr] [1Hr]
1.Write a HTML code to display welcome text using different text formatting tags.(Use h1-h6, bold, italic, underline, strikethrough, div,p,pre tags) **(HTML Basic tags)**		[6Hrs]
2. Design a HTML page to list the computer languages where each language is a link. Prepare separate HTML documents for each language and call them in the appropriate link. **(Lists and Links)**		[6Hrs]
Unit II	**HTML & CSS**	**[22 Hrs]**
HTML Document Layout Tags: header, footer, main, section tags HTML Media Tags- Images- <img> tags & attributes, Image Mapping using <map> and <area> tags - background images- Other media tags- <audio>, <video>, <iframe>, <embed>,<svg>, <canvas> CSS- Introduction- Need for CSS- Syntax- Selector- Declaration, Property, value- Types of CSS selector: Class, id, pseudo-class, attribute, universal selector- Types of style sheets: Internal - External- Inline- Color values. CSS background properties- Border properties- margin properties- padding properties- height, width properties- CSS Text properties- CSS Fonts properties		[2Hrs] [1 Hr] [1Hr]
3. Write a HTML program to display the image of a computer as a link to the web page describing the components of computers. **(Images and link tags)**		[6Hrs]
4. Develop a web page using CSS to create a time table for the class using different border style. **(Table tags and internal style sheets)**		[6Hrs]
5. Design a webpage of your college with attractive background color, text-color, font-face, an image by using external CSS formatting .**(External Style sheets)**		[6Hrs]

Unit III	JAVASCRIPT	[16 Hrs]
Scripting Languages: Client Side Scripting- Server Side Scripting- Need for javascript - structure of javascript Variables- Datatypes- String- Number- Boolean- Undefined- Null JavaScript Objects: Array- String- Date- Math- Number- Boolean- User Defined Objects. Operators: Arithmetic - Assignment - Comparison - String - Logical - Bitwise - Ternary -Type Conditional Statements: if, if-else, else-if, switch. Loop statements- for, while, do-while-break- continue statements. JavaScript functions: definition- parameters-function call- function invocation		[1Hr] [1Hr] [1Hr] [1Hr]
6. Write a JavaScript program to create a clock in 24 hours format using Date Object. (Do not include AM/PM) (**JavaScript Objects and Functions**)		[6Hrs]
7. Write a JavaScript program to control (play, pause, stop) the audio/video in a web page. **(JavaScript User defined Objects and Media Tags)**		[6Hrs]
Unit IV	**JAVASCRIPT ADVANCED**	**[22 Hrs]**
Forms: Form tag- action, method, target, auto complete attributes, input tag, type attribute values- text, radio, checkbox, button, submit, password, other attributes for input tag -id, name, value , size, required. Special tags in forms –text area tag, select tag, button tag, label tag. Message Boxes: Dialog Box- Alert Box- Confirm Box- Prompt Box JavaScript Document Object Model: Methods of Document object- Java script Events- Event Handlers- Mouse events- Keyboard Events- Form Events- Window Events JavaScript Form Validation- Email validation		[1Hr] [1Hr] [1Hr] [1Hr]
8. Write a JavaScript program to change the color of a web page to the color typed by the user in the text box. **(DOM)**		[6Hrs]
9.Write a JavaScript program to develop a simple calculator (with basic arithmetic operations like add, subtract, multiply, divide, equal to) by getting two` numbers in two text boxes, buttons for operations and display the result in the third text box. **(Event Handling)**		[6Hrs]
10. Create a form with text fields such as username, mail id, password, retype password, gender (radio), languages known (check box), Describe yourself (text area), submit button and perform form validation such as username must not be less than 8 characters, mail id should contain @ symbol, password and retype password must be the same. **(Forms & Form validation)** 11. Create a site containing banner advertisement at the top of the page. the ads are changed every 10 or 15 seconds.		[6Hrs]
TOTAL HOURS		**75 Hrs**

Suggested List of Students Activity

- Quizzes/ Seminars/ Presentations to students to evaluate their learning concepts.
- Mini Project based learning to work on a website project incorporating HTML, CSS, and JavaScript as an extension to real life applications.
- Conduct code reviews to provide feedback on HTML, CSS, and JavaScript code and to debug and troubleshoot it.

Text books for Reference:

S.NO	TITLE	AUTHOR	PUBLISHER WITH EDITION
1.	Web Development and Design Foundations with HTML5	Terry Felke-Morris	9th Edition, Pearson, 2018.
2.	Mastering HTML, CSS & JavaScript WebPublishing	Laura Lemay, Rafe Colburn	First Edition, BPB Publications, 2016.
3.	Java Script: The Complete Reference	Thomas Powell, FritzSchneider	3rd Edition, McGraw Hill Education (India), 2017.

Web-based/Online Resources

S.NO	WEBSITES/LINKS
1.	https://www.w3schools.com
2.	https://javascript.info/
3.	https://www.javatpoint.com/javascript-tutorial
4.	https://www.freecodecamp.org/news/html-css-and-javascript-explained-for-beginners/
5.	https://nptel.ac.in/courses/106105084

Equipment / Facilities required to conduct the Practical Course

Software Requirement:

S.No.	Software
1.	Notepad / Notepad++ / Dreamweaver
2.	Any Browser.

Hardware Requirement:

S.No.	Hardware
1.	Desktop Computers / Laptop
2.	Laser Printer

CTE3540 – WEB DESIGNING

MODEL QUESTION PAPER

Duration: 3 hrs. **Max. Marks: 100**

S.NO	NAME OF THE EXPERIMENTS	CO	PO
	PART A		
1	Write a HTML code to display welcome text using different text formatting tags.(Use h1-h[6 Hrs], bold, italic,underline, strike through, div, p, pre tags) (HTML Basic tags)	E3540.1	PO1, PO2, PO3,PO4, PO5, PO6,PO7
2	Design a HTML page to list the computer languages where each language is a link. Prepare separate HTML documents for each language and call them inthe appropriate link.	E3540.1	PO1, PO2, PO3,PO4, PO5, PO6,PO7
3	Write a HTML program to display the image of acomputer as a link to the web page describing thecomponents of computers.	E3540.2	PO1, PO2, PO3,PO4, PO5, PO6,PO7
4	Develop a web page using CSS to create a timetablefor the class using different border style.	E3540.2	PO1, PO2, PO3,PO4, PO5, PO6,PO7
5	Conduct Load Test on DC Series Motor and Draw thePerformance Curve	E3540.2	PO1, PO2, PO3, PO4, PO5, PO6,PO7
	PART B		
6	Write a JavaScript program to create a clock in 24 hours format using Date Object.	E3540.3	PO1, PO2, PO3,PO4, PO5, PO6,PO7
7	Write a JavaScript program to control (play, pause,stop) the audio/video in a web page	E3540.3	PO1, PO2, PO3,PO4, PO5, PO6,PO7
8	Write a JavaScript program to change the color of aweb page to the color typed by the user in the text box.	E3540.4	PO1, PO2, PO3,PO4, PO5, PO6,PO7
9	Write a JavaScript program to develop a simple calculator (with basic arithmetic operations like add, subtract, multiply, divide, equal to) by getting two` numbers in two text boxes, buttons for operations anddisplay the result in the third text box.	E3540.4	PO1, PO2, PO3,PO4, PO5, PO6,PO7
10	Create a form with text fields such as username, mail id, password, retype password, gender (radio), languages known (check box), Describe yourself (text area), submit button and perform form validation such as username must not be less than 8 characters, mail id should contain @ symbol, password and retype password must be the same.	E3540.5	PO1, PO2, PO3,PO4, PO5, PO6,PO7
11	create a site containing banner advertisement at the top of the page. the ads are changed every 10 or 15 seconds.	E3540.5	PO1, PO2, PO3,PO4, PO5, PO6,PO7

CTE3640 – OPERATING SYSTEMS

Programme Name : COMPUTER ENGINEERING
Course Code : CTE3640
Semester : III SEMESTER
Course Title : OPERATING SYSTEMS
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	
OPERATING SYSTEMS	3	45	40	100*	100	3 Hrs

*** Examinations will be conducted for 100 marks and will beconverted to 60 marks**

TOPICS AND ALLOCATION OF HOURS

Part	Topics	Time (Hrs)
A	Introduction of OS	23
B	Shell Scripts	22
Total Hours		**45**

COURSE DESCRIPTION

Students have to be conversant with computer, its terminology and functioning. The heart of a computer is based around its Operating System. An operating system acts asan interface between the user of a computer and the computer hardware. The processor deals with request coming from all directions asynchronously. The operating system has to deal with the problems of contention, resource management and both program and user data management, and provide a useful no-wait user interface. The course provides clear vision, understanding and working of Operating Systems.

COURSE OBJECTIVES

On completion of the following units of syllabus contents, the students must be able to

- To understand the purpose, goals, functions and evolution of operating Systems. Login and logoff Procedures
- To know how to use of General purpose and communication commands
- To study the use of Search patterns, simple filters and advanced filters
- To know the details of process status
- To understand shell scripts, define the elements of the shell script and write shell script for various problems.

COURSE OUTCOMES

After successful completion of this course, the students should be able to	
E3640.1	Understand functional architecture of an operating system.
E3640.2	Distinguish CPU scheduling algorithms.
E3640.3	Analyze process coordination.
E3640.4	Classify File System and directory implementations.
E3640.5	Resource Management

Pre-requisites : Nil

CO-POs & PSOs Mapping matrix

CO/PO & PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
E3640.1	2	3	2	3	2	2	3	3	3	3
E3640.2	2	3	2	3	2	2	3	3	3	3
E3640.3	2	3	2	3	2	2	3	3	3	3
E3640.4	2	3	2	3	2	2	3	3	3	3
E3640.5	2	3	2	3	2	2	3	3	3	3
E3640 Total	**10**	**15**	**10**	**15**	**10**	**10**	**15**	**15**	**15**	**15**
Correlation level	**2**	**3**	**2**	**3**	**2**	**2**	**3**	**3**	**3**	**3**

Correlation level 1 – Slight (low)

Correlation level 2 – Moderate (Medium)

Correlation level 3 – Substantial (high)

Instructional Strategy:

1. Engage and Motivate: Instructors should actively engage students to boost their learning confidence.
2. Real-World Relevance: Incorporate relatable, real-life examples and engineering applications to help students understand and appreciate course concepts
3. Interactive Learning: Utilize demonstrations and plan interactive student activities for an engaging learning experience.
4. Application-Based Learning: Employ a theory-demonstrate-practice-activity strategy throughout the course to ensure outcome-driven learning and employability.
5. Encourage Critical Analysis: Foster an environment where students can honestly assess experiment outcomes and analyze potential sources of error in case of discrepancies

Assessment Methodology

	Continuous Assessment (40 marks)				End Semester Examination (60 marks)
	CA1	**CA2**	**CA3**	**CA4**	
Mode	Practical Test	Practical Test	Written Test Theory	Practical Test	Practical Examination
Portion	PART A Exercises	PART B Exercises	All Units	All Exercises	All Exercises
Duration	2 Periods	2 Periods	3 hours	3 hours	3 hours
Exam Marks	60	60	100	100	100
Converted to	10	10	10	10	60
Marks	40				60
Tentative Schedule	7th Week	14th Week	15th Week	16th 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.

The exercise should be completed on the day of practice. The same shall be evaluated for 10 marks on the day or the next day of practice before commencement of next exercise. The detailed date of the practices and its evaluations should be maintained in the log book and should be submitted for the verification.

SCHEME OF EVALUATION

PART	DESCRIPTION	MARKS
A	Aim (05) , Program (30)	35
B	Execution and Output	15
TOTAL		**50**
C	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	Answer any ten questions out of twelve. Each carries three marks.	10 x 3	30
Part – B	Answer any seven questions out of ten. Each carries ten marks	7 x 10	70
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
1	Aim (05) ,Program from Part – A (30)	35
2	Aim (05) ,Program from Part – B (30)	35
3	Executing any one program (Part A or Part –B)	15
4	Output	10
5	Viva Voce	05
TOTAL		**100**

CTE3640 – OPERATING SYSTEMS

CTE3640	OPERATING SYSTEMS	L	T	P	C
PRACTICUM		1	0	2	2

PART A	INTRODUCTION TO OS	[23 Hrs]
Introduction to operating system: Basics of Operating system- types of operating system- operating system services – operating system structures		[1Hr]
Process Management – Process scheduling Process synchronization, critical section, Deadlocks.		[1Hr]
Memory Management : swapping, Contiguous memory allocation, paging		[1Hr]
Virtual Memory , Page Replacement Algorithms.		[1Hr]
Basics of Linux OS: Entering and Exiting from a Linux System		[1Hr]
User Accounts – Different shells		[1Hr]
Learn the syntax and usage of Directory Management Commands – Check the process status process management commands – search patterns		[1Hr]
Ex No:1 Write a syntax and execute the directory management commands : ls, cd, pwd,mkdir, rmdir		[3 Hrs]
Ex No:2 Write a syntax and execute the file management commands such as cat, chmod, cp,mv, rm, more		[4 Hrs]
Ex No:3 Write a syntax and execute the general purpose commands : wc, cal, date, who, tty,ln		[4 Hrs]
Ex No:4 Using the simple filters verify pr, head, tail, cut, paste, nl, sort grep, egrep, fgrep,write and wall		[4 Hrs]
PART B	**SHELL SCRIPTS**	**[22 Hrs]**
File operations (New, Open, Close, Save, Save and Exit, Print)		[1Hr]
Text Editing operations (inserting ,deleting ,finding, replacing, copying and moving)		[1 Hr]
Use of shell scripts		[1 Hr]
Numerical operations – Looping – Swapping techniques		[1 Hr]
String operations- using command line arguments – filters-date function		[1 Hr]
Relational Operations - Logical Operations – Boolean Operations		[1 Hr]
Basic Arithmetic operations – case statement – search directory or file .		[1 Hr]
Ex No 5: Write a shell script that accepts a numerical value N and find sum .		[3 Hrs]
Ex No 6: Write a shell script to find factorial of the given number .		[3 Hrs]
Ex No 7: Write a shell script to perform arithmetic calculator using case statement.		[3 Hrs]
Ex No 8: Write a shell script using command line arguments and reports on whether it is a directory, file or something else.		[3 Hrs]
Ex No 9: Check the details of process name, PID, status using PS Command. Process managementcommands:&, nohup, kill, nice.		[3 Hrs]
TOTAL HOURS		**45 Hrs**

Suggested List of Students Activity

- Presentation/Seminars by students on any recent technological developments based on the course.
- Periodic class/online quizzes conducted based on the course.
- Blended learning activities to explore the recent trends and developments in the field.

Text books for Reference:

S.NO	TITLE	AUTHOR	PUBLISHER WITH EDITION
1.	Operating System Principles	Abraham Silberchatz, Peter B. Galvin,Greg Gagne	9 th Edition John& Sons,2018 Wiley
2.	Operating Systems Internal Design Principle	William Stallings	9 th Edition Pearson Education /PHI,2018
3.	Modern Operating Systems	Andrew Tanenbaum	3rd Edition, Pearson/PHI,2014.

Web-based/Online Resources

S.NO	WEBSITE/ LINKS
1.	https://nptel.ac.in/courses/106/105/106105214/
2.	https://ocw.mit.edu/courses/6-828-operating-system-engineering-fall2012/pages/lecture-notes-and-readings/
3.	https://www.geeksforgeeks.org/what-is-an-operating-system/
4.	https://www.w3schools.in/operating-system/intro

Equipment / Facilities required to conduct the Practical Portion

Software Requirement:

S.NO.	SOFTWARE
1.	Linux Operating System

Hardware Requirement:

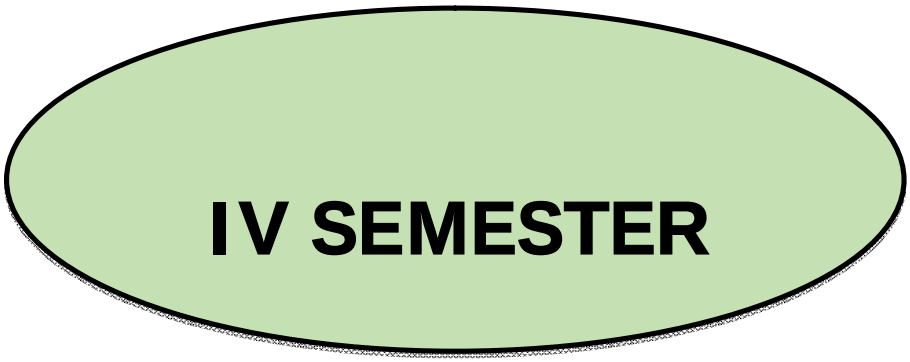
S.NO.	HARDWARE
1.	Desktop Computers / Laptop
2.	Laser Printer

CTE3640 – OPERATING SYSTEMS

MODEL QUESTION PAPER

Duration: 3 hrs. **Max. Marks: 100**

S.No	Name of the Experiments	CO	PO
	PART A		
1	Write a syntax and execute the directory management commands : ls, cd, pwd, mkdir, rmdir	E3640.1	PO1, PO2, PO3,PO4, PO5, PO6,PO7
2	Write a syntax and execute the file management commands such as cat, chmod, cp, mv, rm, more	E3640.1	PO1, PO2, PO3,PO4, PO5, PO6,PO7
3	Write a syntax and execute the general purpose commands : wc, cal, date, who, tty, ln	E3640.2	PO1, PO2, PO3, PO5, PO6,PO7
4	Using the simple filters verify pr, head, tail, cut,paste, nl, sort grep, egrep, fgrep, write and wall	E3640.2	PO1, PO2, PO3,PO4, PO5, PO6,PO7
	PART B		
5	Write a shell script that accepts a numerical value Nand find sum .	E3640.3	PO1, PO2, PO3,PO4, PO5, PO6,PO7
6	Write a shell script to find factorial of the givennumber .	E3640.3	PO1, PO2, PO3,PO4, PO5, PO6,PO7
7	Write a shell script to perform arithmetic calculatorusing case statement.	E3640.4	PO1, PO2, PO3,PO4, PO5, PO6, PO7
8	Write a shell script using command line argumentsand reports on whether it is a directory, file or something else.	E3640.5	PO1, PO2, PO3,PO4, PO5, PO6,PO7
9	check the details of process name, PID, status using PS Command. Process managementcommands:&, nohup, kill, nice.	E3640.5	PO1, PO2, PO3,PO4, PO5, PO6,PO7


IV SEMESTER

CTE4110 – COMPUTER NETWORKS AND SECURITY

Programme Name : COMPUTER ENGINEERING
Course Code : CTE4110
Semester : IV SEMESTER
Course Title : COMPUTER NETWORKS AND SECURITY
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	
COMPUTER NETWORKS AND SECURITY	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	Data communication	9
II	OSI model and 802.X protocols	9
III	Network, transport and application layer protocols	9
IV	Network security	10
V	Network security applications	8
TOTAL HOURS		**45**

COURSE DESCRIPTION

The course aims to groom the students to gain concepts, knowledge and skills required to work on Computer Networking and Security industry. Course curriculum has been designed to give overview and use cases of Data Communication, Layered Networks, Inter-networking technology/protocols and Computer Security is covered and this will help to prepare the students to keep pace with computer networking and security industry trends.

COURSE OBJECTIVES

The objective of this course is to enable the student to

- Understand the concept of data communication.
- To know the functions and protocols of each layer of OSI and TCP/IP protocol suite.

- To visualize the end-to-end flow of information.
- Understand the main principles of computer and network security.
- Know different networking devices and their practical usages.
- Know the IP addressing and its mechanisms.
- Identify the attacks and threats.
- Study about Cryptography and different Cryptography Algorithms.

COURSE OUTCOMES

After successful completion of this course, the students should be able to	
E4110.1	Remember the fundamentals of Computer Networks.
E4110.2	Identify core networking and infrastructure components, and the services
E4110.3	Examine the different networking applications
E4110.4	Understand fundamental properties of computer security, such as Authentication,Authorization, and Data confidentiality and Integrity.
CTE4110.5	Identify the concept of the internet and security issues.

Pre-requisites Nil

CO-POs & PSOs Mapping matrix

CO/PO & PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
E4110.1	3	3	3	2	2	2	3	3	3	3
E4110.2	3	3	3	2	2	2	3	3	3	3
E4110.3	3	3	3	2	2	2	3	3	3	3
E4110.4	3	3	3	2	2	2	3	3	3	3
E4110.5	3	3	3	2	2	2	3	3	3	3
Total	**15**	**15**	**15**	**10**	**10**	**10**	**15**	**15**	**15**	**15**
Correlation level	**3**	**3**	**3**	**2**	**2**	**2**	**3**	**3**	**3**	**3**

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 engineering 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-activitystrategy 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.
- Encourage Critical Analysis: Foster an environment where students can honestly assess experiment outcomes and analyze potential sources of error in case of discrepancies.

Assessment Methodology

	Continuous Assessment (40 marks)				**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	2 Periods	2 Periods	1 Hour	3 Hours	3 Hours
Exam Marks	50	50	60	100	100
Converted to	10	10	10	10	60
Marks	40				60
Tentative Schedule	6th Week	12th Week	13th-14th Week	16th week	

Note:

- **CA1 and CA2:** Assessment written test should be conducted for 50 Marks for two units. The marks scored will be converted to 10 Marks for the internal assessment.

  CA1 and 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. Each unit four questions can be asked.

- **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 10 marks 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 ExaminationTheory Exam

PART - A (5 X 2 X 10 Marks=100 Marks)

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 ThinkingSkills (HOTs)**
	R-Remember, **U**-Understand, **AP**-Apply	**An**- Analyse, **E**-Evaluate, **C**-Create
% to be included	90 %	10 %

CTE4110 – COMPUTER NETWORKS AND SECURITY

CTE4110	COMPUTER NETWORKS AND SECURITY	L	T	P	C
THEORY		3	0	0	3

Unit I	DATA COMMUNICATION	[9 Hrs]
Data Communication: Components of a data communication		[1Hr]
Data flow: Simplex - Half duplex - Full duplex .		[1Hr]
Types of Connections: Point to Point		[1Hr]
Multipoint; Topologies: Star, Bus, Ring, Mesh, Hybrid		[1Hr]
Advantages and Disadvantages of each topology.		[1Hr]
Types of Networks: Need of Computer Networks – LAN – MAN – WAN		[1Hr]
Internet- Intranet – Internet Service Providers (ISP)		[1Hr]
Client-server – Peer to Peer – Wi-Fi – Bluetooth.		[1Hr]
Network Devices: Switches – Bridges – Routers – Gateways.		[1Hr]

Unit II	OSI MODEL AND 802.X PROTOCOLS	[9 Hrs]
Network Models: OSI Model – Layered Architecture		[1Hr]
Function of Layers		[1Hr]
TCP/IP Protocol Suite		[1Hr]
802.X Protocols: Concepts and PDU format of CSMA/CD(802.3) Token ring (802.5)		[2Hrs]
Ethernet – Types of Ethernet (Fast Ethernet, gigabit Ethernet		[2Hrs]
High speed Ethernet 10GE to 800GE)		[1Hr]
Comparison between 802.3 and 802.5.- Cyber Security Architecture		[1Hr]

Unit III	NETWORK, TRANSPORT AND APPLICATION LAYER PROTOCOLS	[9 Hrs]
Network Layer Protocol: IP		[1Hr]
Interior Gateway Protocols: ARP, RARP (concepts only)		[1Hr]
IP Addressing: Dotted Decimal Notation – Subnetting and Supernetting –		[2Hrs]
Ipv4 – Ipv6 Overview of TCP/IP		[1Hr]
Transport Layer Protocols: Stop and wait protocol-		[1Hr]
Connection Oriented and Connectionless Service		[1Hr]
Sockets – TCP and UDP		[1Hr]
Application Layer Protocols: FTP – HTTP – Telnet		[1Hr]

Unit IV	NETWORK SECURITY	[10 Hrs]
Network Security: Definition – Need of Network Security –		[2 Hrs]
Principles of Security		[1Hr]
Attacks – Types of Attacks – Criminal Attacks – Legal Attacks		[1Hr]
Passive and Active Attacks – Software Supply Chain Attacks		[1Hr]
Cryptography: Definition – Symmetric Encryption Principles –		[2 Hrs]
Symmetric Block Encryption Algorithms		[1Hr]
DES - Digest Function – Public key cryptography principles		[1Hr]
RSA– Digital Signature (concepts only)		[1Hr]
Unit V	**NETWORK SECURITY APPLICATION**	**[8 Hrs]**
Hackers Techniques: Historical hacking techniques and Open sharing –		[1Hr]
Bad Passwords-Advanced techniques – Viruses –		[1Hr]
Worms – Trojan Horses – SPAM Security Mechanisms:		[1Hr]
Introduction – Types of Firewalls –		[1Hr]
Packet Filters Application Gateways – Limitation of Firewalls		[1Hr]
Intrusion: Intruders – Intruder detection –		[1Hr]
Classification of Intruder		[1Hr]
Detection Systems – Honeypots		[1Hr]
TOTAL HOURS		**45 Hrs**

Suggested List of Students Activity

- Presentation/Seminars by students on any recent technological developments based on the course.
- Periodic class Assessments conducted based on the course.
- Blended learning activities to explore the recent trends and developments in the field.

Text Books for Reference: :

S.No	TITLE	AUTHOR	PUBLISHER WITH EDITION
1.	Data communication and Networking	Behrouz A. Forouzan	Fourth Edition, Tata McGraw-Hill, 2007.
2.	Computer Networks	Andrew S. Tanenbaum	Fifth Edition, Pearson Prentice Hall Edition, 2011.
3.	Data and Computer Communications	William Stallings	Eighth Edition, Pearson Education, 2011.

Web-based/Online Resources

S.NO	WEBSITES
1.	https://www.pynetlabs.com/network-devices-and-its-various-types/
2.	https://learn.microsoft.com/enus/dotnet/fundamentals/networking/sockets/socket-services
3.	https://portswigger.net/research/top-10-web-hacking-techniques-of-2021

MODEL QUESTION PAPER

CTE4110 – COMPUTER NETWORKS AND SECURITY

Time : [3 Hrs]. **Max. Marks : 100**

PART-A (5 X 2 X 10 Marks = 100 Marks)

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 Data Communication and its Components.	I	U	E4110.1	PO1,PO2,PO5,PO7
	2.	Briefly explain the types of Networks.	I	R	E4110.1	PO1,PO2,PO5,PO7
	3.	Explain about the Network Devices.	I	R	E4110.1	PO1,PO2,PO5,PO7
	4.	What are the Advantages and Disadvantages of each Topology.	I	U	E4110.1	PO1,PO2,PO5,PO7
II	5.	Difference between 802.3 and 802.5.	II	R	E4110.2	PO1,PO2,PO5,PO7
	6.	Describe the concepts of 802.X protocols	II	R	E4110.2	PO1,PO2,PO5,PO7
	7.	Explain the types of Ethernet.	II	U	E4110.2	PO1,PO2,PO5,PO7
	8.	Explain the about the Network models.	II	R	E4110.2	PO1,PO2,PO5,PO7
III	9.	Explain the concepts of Network Layer Protocol.	III	R	E4110.3	PO1,PO2,PO5,PO7
	10.	Explain about the applications Layer Protocols.	III	E	E4110.3	PO1,PO2,PO5,PO7
	11.	Briefly explain the overview of TCP/IP.	III	R	E4110.3	PO1,PO2,PO5,PO7
	12.	Draw and explain the operation of Edge triggered JK flip flop.	III	U	E4110.3	PO1,PO2,PO5,PO7
IV	13.	Write the needs and principles of Network Security.	IV	U	E4110.4	PO1,PO2,PO5,PO7
	14.	Explain about the types of Attacks.	IV	R	E4110.4	PO1,PO2,PO5,PO7
	15.	Describe the cryptography.	IV	U	E4110.4	PO1,PO2,PO5,PO7
	16.	Briefly explain the DES and RSA.	IV	U	E4110.4	PO1,PO2,PO5,PO7
V	17.	Describe the Security Mechanisms and its types.	V	R	E4110.5	PO1,PO2,PO5,PO7
	18.	Explain the Advanced techniques in Network security Applications.	V	R	E4110.5	PO1,PO2,PO5,PO7
	19.	Explain about the Intrusion and its Classification.	V	An	E4110.5	PO1,PO2,PO5,PO7
	20.	Briefly explain the Hackers Techniques.	V	U	E4110.5	PO1,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 ThinkingSkills (HOTs)**
	R-Remember, **U**-Understand, **AP**-Apply	**An**- Analyse, **E**-Evaluate, **C**-Create
% to be included	90 %	10 %

CTE4230 - DATA STRUCTURS USING PYTHON

Programme Name : COMPUTER ENGINEERING
Course Code : CTE4230
Semester : IV SEMESTER
Course Title : DATA STRUCTURES USING PYTHON
Course Type : PRACTICUM

L	T	P	C
3	0	2	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	
DATA STRUCTURES USING PYTHON	5	75	40	100*	100	3 Hrs

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

Unit	Topics	Time (Hrs)
I	Introduction to data structures	11
II	Linear data structures - linked lists	12
III	Linear data structures – stack & queue	18
IV	Non-Linear data structures – Trees	13
V	Sequential storage representation – sorting & searching	21
TOTAL HOURS		**75**

COURSE DESCRIPTION

Data structure is a subject of primary importance in Information and Communication Technology. Knowledge of data structures is essential for implementation of efficient algorithms and program development. Learning data structures with Python offer flexibility and ease of programming with many built in data structures and libraries.

COURSE OBJECTIVES

The objective of this course is to enable the student to

- Provide the knowledge of various types of data structures
- Familiarize with the representation of data structures
- Use various data structures in organizing data
- Reinforce theoretical concepts by writing relevant programs
- Gain knowledge in practical applications of data structures

.

COURSE OUTCOMES

After successful completion of this course, the students should be able to	
E4230.1	Understand the fundamental data structures
E4230.2	Understand the concepts of linked lists.
E4230.3	Apply the operations of stack and queue
E4230.4	Illustrate tree structure and apply trees traversal techniques
E4230.5	Implement various sorting and searching techniques

Pre-requisites :

Knowledge in C and python Programming

CO-POs & PSOs Mapping matrix:

CO/POs & PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
E4230.1	3	3	2	3	3	2	3	3	3	3
E4230.2	3	3	2	3	3	2	3	3	3	3
E4230.3	3	3	2	3	3	2	3	3	3	3
E4230.4	3	3	2	3	3	2	3	3	3	3
E4230.5	3	3	2	3	3	2	3	3	3	3
Total	**15**	**15**	**10**	**15**	**15**	**10**	**15**	**15**	**15**	**15**
Correlation level	**3**	**3**	**2**	**3**	**3**	**2**	**3**	**3**	**3**	**3**

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 engineering 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.
- Encourage Critical Analysis: Foster an environment where students can honestly assess experiment outcomes and analyze potential sources of error in case of discrepancies.

Assessment Methodology

	Continuous Assessment (40 marks)				End Semester Examination (60 marks)
	CA1	**CA2**	**CA3**	**CA4**	
Mode	Written Test Theory (Unit 1& 2)	Written Test Theory (Unit 3 & 4)	Practical Test (All Exercises)	Written Test (Complete Theory Portions)	Written Examination (Complete Theory Portions)
Duration	2 Periods	2 Periods	3 hours	3 hours	3 hours
Exam Marks	50	50	100	100	100
Converted to	10	10	10	10	60
Marks	40				60
Tentative Schedule	6th Week	12th Week	15th Week	16th 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. PART-A (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 by lot for the test. The practical test should be conducted as per the scheme of evaluationas 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.

The exercise should be completed on the day of practice. The same shall be evaluated for 10 marks on the day or the next day of practice before commencement of next exercise. The detailed date of the practices and its evaluations should be maintained in the log book and should be submitted for the verification.

SCHEME OF EVALUATION - Practical Test

Sl.No.	Description	Marks
A	Aim (05) ,Program (30)	35
B	Execution	20
C	Output	10
D	Practical document (All Practicals)	30
E	Viva Voce	05
Total		**100**

- **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: Model Examination and End Semester Examination-Theory Exam

- 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.

PART - A (5 X 2 X 10 Marks=100 Marks)

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 %

CTE4230- DATA STRUCTURES USING PYTHON

CTE4230 PRACTICUM	DATA STRUCTURES USING PYTHON	L	T	P	C
		3	0	2	4

Unit I	INTRODUCTION TO DATA STRUCTURES	[11 Hrs]
Data structures – Introduction, classification of data structures : primitive and non-primitive		[1Hr]
data structures with python examples		[1Hr]
Linear and nonlinear data structures with python examples.		[1Hr]
Operations on data structures.		[1Hr]
Abstract data types - Introduction, abstractions, Abstract data types, example of		[1Hr]
abstract data type (student, date)		[1Hr]
Defining the ADT, Using the ADT, Implementing the ADT.		[1Hr]
Algorithm Analysis – space complexity, time complexity		[1Hr]
Asymptomatic notations: Big-O notation- Algorithm Optimization		[1Hr]
Ex No:1 Write a program to implement any one python data structure with the following operations A) Create B) Add elements C) Access elements D) Remove elements		[2 Hrs]

Unit II	LINEAR DATA STRUCTURES - LINKED LISTS	[12 Hrs]
Linked List - Terminology: node, address, information,		[1Hr]
null pointer, empty list		[1Hr]
Types – singly linked lists: creating nodes,		[1Hr]
traversing the nodes, searching for a node		[1Hr]
Prepending nodes, removing nodes –		[1Hr]
doubly linked list & circular linked list – organization		[1Hr]
Operations: traversal, searching, adding nodes,		[1Hr]
Removing nodes (concepts only, no implementations)		[1Hr]
Ex No 2: Write a python program to implement a singly linked list a. Create a singly linked list b. Add element to singly linked list **c.** Remove element from singly linked list		[4 Hrs]

Unit III	LINEAR DATA STRUCTURES – STACK & QUEUE	[18 Hrs]
Stacks- Overview of stack		[1Hr]
Implementation of stack using python		[1Hr]
list: push, pop, display.		[1Hr]
Stack applications: balanced delimiters,		[1Hr]
Evaluating postfix expressions.		[1Hr]
Recursion - Properties of recursion		[1Hr]
Recursive functions: Factorials, Recursive call tree.		[1Hr]
Queues- Overview of queue		[1Hr]
Implementing the queue and its operations using python list		[1Hr]
Applications of queues - Circular queue and Priority queue (concepts only)		[1Hr]

Ex No 3: Write a python program to implement stack		[4 Hrs]
Ex No 4: Write a python program to implement queue		[4 Hrs]
Unit IV	**NON-LINEAR DATA STRUCTURES - TREES**	**[13 Hrs]**
Tree - Terminology: node, edge, parent, children,		[1Hr]
Path Level of a node, depth of a node, height of a tree		[1Hr]
Binary tree: full binary tree, complete binary tree		[1Hr]
Linear representation of binary tree –		[1Hr]
binary tree traversals: in-order Pre-order, post order.		[2Hrs]
Binary Search Tree –		[1Hr]
Introduction, Creation of a Binary Search tree without duplicate node		[2 Hrs]
Applications.		
Ex No 5: Write the python program for pre-order traversal of a binary tree		[4Hrs]
UNIT V	**SEQUENTIAL STORAGE REPRESENTATION- SORTING & SEARCHING**	**[21 Hrs]**
Sorting- Introduction to different sorting techniques		[2 Hrs]
Bubble sort,		[1Hr]
Insertion sort,		[1Hr]
Quick sort and Merge Sort.		[2 Hrs]
Searching- Introduction to different searching techniques Linear search		[2 Hrs]
and Binary search.		[1Hr]
Ex No 6 : Write a python program to implement bubble sort		[4 Hrs]
Ex No 7: Write a python program to implement linear search		[4 Hrs]
Ex No 8: Write a python program to implement binary search		[4 Hrs]
TOTAL HOURS		**75 Hrs**

Suggested List of Students Activity

- Presentation/Seminars by students on any recent technological developments based on the course.
- Periodic class quizzes on a weekly / fortnightly based on the course.
- Blended learning activities to explore the recent trends and developments in the field.

Text book for Reference:

S.NO	TITLE	AUTHOR	PUBLISHER WITH EDITION
1.	Data Structures and Algorithms using Python	Rance .Necaise,	John Wiley, 2011
2.	Python Data Structures and Algorithms	Benjamin Baka	Packt Publishing Ltd., 2017
3.	Data Structures and Algorithms in Python	Roberto Tamassia, Michael H. Goldwasser, Michael T. Goodrich	1st Edition, Wiley, 2013

Web-based/Online Resources:

S.NO	WEBSITES
1.	https://www.pynetlabs.com/network-devices-and-its-various-types/
2.	https://learn.microsoft.com/enus/dotnet/fundamentals/networking/sockets/socket-services
3.	https://portswigger.net/research/top-10-web-hacking-techniques-of-2021

Equipment / Facilities required to conduct the Practical Portion
Hardware Requirement

S.NO	HARDWARE
1.	Desktop Computers / Laptop
2.	Printer

Software Requirement

S.NO	SOFTWARE
1.	Windows / Linux Operating System
2.	Python IDLE / Spyder.

CTE4230– DATA STRUCTURES USING PYTHON

MODEL QUESTION PAPER

Time : 3 Hrs **Max. Marks : 100**

PART-A(5X2X10 Marks=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 Primitive Data Structures	I	U	E4230.1	PO1,PO2,PO5,PO7
	2.	Explain Operations on data structures	I	R	E4230.1	PO1,PO2,PO5,PO7
	3.	Explain Non-Primitive Data Structures	I	R	E4230.1	PO1,PO2,PO5,PO7
	4.	Defining the ADT, Using the ADT, Implementing the ADT.	I	An	E4230.1	PO1,PO2,PO5,PO7
II	5.	Explain the Terminology	II	R	E4230.2	PO1,PO2,PO5,PO7
	6.	Describe the singly linked lists	II	R	E4230.2	PO1,PO2,PO5,PO7
	7.	Explain about the operations	II	U	E4230.2	PO1,PO2,PO5,PO7
	8.	Explain - linked lists	II	R	E4230.2	PO1,PO2,PO5,PO7
III	9.	Explain about the Overview of stack	III	R	E4230.3	PO1,PO2,PO5,PO7
	10.	Briefly Explain about the Stack applications	III	U	E4230.3	PO1,PO2,PO5,PO7
	11.	Recursive functions explain it	III	R	E4230.3	PO1,PO2,PO5,PO7
	12.	Describe of the Queues	III	C	E4230.3	PO1,PO2,PO5,PO7
IV	13.	Explain Tree - Terminology	IV	R	E4230.4	PO1,PO2,PO5,PO7
	14.	Explain about the binary tree traversals	IV	R	E4230.4	PO1,PO2,PO5,PO7
	15.	Explain about the Binary Search Tree	IV	E	E4230.4	PO1,PO2,PO5,PO7
	16.	Explain about Binary tree	IV	U	E4230.4	PO1,PO2,PO5,PO7
V	17.	Introduction to different sorting	V	R	E4230.5	PO1,PO2,PO5,PO7
	18.	Briefly explain Sorting	V	U	E4230.5	PO1,PO2,PO5,PO7
	19.	Explain Linear search and Binary search.	V	U	E4230.5	PO1,PO2,PO5,PO7
	20.	Briefly explain about Searching	V	U	E4230.5	PO1,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 %

CTE4340 – JAVA PROGRAMMING

Programme Name : COMPUTER ENGINEERING
Course Code : CTE4340
Semester : IV SEMESTER
Course Title : JAVA PROGRAMMING
Course Type : PRACTICUM

L	T	P	C
2	0	4	4

TEACHING AND SCHEME OF EXAMINATION

No. of weeks per semester: 15weeks

Course	Instructions		Examination			
			Marks			Duration
	Hours / Week	Hours / Semester	Internal Assessment	Autonomous Examination	Total	
JAVA PROGRAMMING	6	90	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 Java	18
II	Control structures, array and string	18
III	Class and Objects	18
IV	Inheritance and interface	18
V	Exception handling and swing	18
TOTAL HOURS		**90**

COURSE DESCRIPTION

This course is a class-based, object-oriented programming language. It is intended to let application developers write once, and run anywhere (WORA), meaning that compiled Java code can run on all platforms that support Java without the need for recompilation. Java is widely used for developing applications for desktop, web, and mobile devices. Java is known for its simplicity, robustness, and security features, making it a popular choice for enterprise level applications. Students will learn Java tokens, variables, data types, control structures, functions, arrays, strings, object - oriented programming concepts and swing components. Through hands-on students will

develop proficiency in writing structured and efficient Java programs to solve a variety of computational problems.

COURSE OBJECTIVES

On completion of the following units of syllabus contents, the students must be able to

- To understand the concepts of Object Oriented Programming.
- To learn about the control structures, class with attributes and methods used in Java.
- To gain knowledge of arrays and strings.
- To understand the concept of exception handling mechanism.
- To comprehend the basics of swing components and its importance in application development.

COURSE OUTCOMES:

After successful completion of this course, the students should be able to	
E4340.1	Demonstrate knowledge on Java Programming fundamentals.
E4340.2	Develop programs in Java using control structures, array and string.
E4340.3	Demonstrate use of object - oriented programming concepts in Java.
E4340.4	Apply programming skills to solve overriding problems using interface.
E4340.5	Develop applications using swing components.

Pre-requisites : Nil

CO- POs & PSOs MAPPING MATRIX:

CO/ PO & PSO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PSO1**	**PSO2**	**PSO3**
E4340.1	3	3	3	3	2	2	3	3	3	3
E4340.2	3	3	3	3	2	2	3	3	3	3
E4340.3	3	3	3	3	2	2	3	3	3	3
E4340.4	3	3	3	3	2	2	3	3	3	3
E4340.5	3	3	3	3	2	2	3	3	3	3
Total	**15**	**15**	**15**	**15**	**10**	**10**	**15**	**15**	**15**	**15**
Correlation level	**3**	**3**	**3**	**3**	**2**	**2**	**3**	**3**	**3**	**3**

Correlation level 1 – Slight (low)

Correlation level 2 – Moderate (Medium)

Correlation level 3 – Substantial (high)

Instructional Strategy:

1. Engage and Motivate: Instructors should actively engage students to boost their learning confidence.

2. Real-World Relevance: Incorporate relatable, real-life examples and engineering applications to help students understand and appreciate course concepts.
3. Interactive Learning: Utilize demonstrations and plan interactive student activities for an engaging learning experience.
4. Application-Based Learning: Employ a theory-demonstrate-practice-activity strategy throughout the course to ensure outcome-driven learning and employability.
5. Encourage Critical Analysis: Foster an environment where students can honestly assess experiment outcomes and analyze potential sources of error in case of discrepancies.

Assessment Methodology:

	Continuous Assessment (40 marks)				**End Semester Examination (60 marks)**
	CA1	**CA2**	**CA3**	**CA4**	
Mode	Practical Test	Practical Test	Written Test Theory	Practical Test	Practical Examination
Portion	PART-A Exercises	PART-B Exercises	All Units	All Exercises	All Exercises
Duration	2 Periods	2 Periods	3 hours	3 hours	3 hours
Exam Marks	60	60	100	100	100
Converted to	10	10	10	10	60
Marks	40				60
Tentative Schedule	7th Week	14th Week	15th Week	16th 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.

The exercise should be completed on the day of practice. The same shall be evaluated for 10 marks on the day or the next day of practice before commencement of next exercise. The detailed date of the practices and its evaluations should be maintained in the log book and should be submitted for the verification.

SCHEME OF EVALUATION

PART	DESCRIPTION	MARKS
A	Aim (05) , Program (30)	35
B	Execution and Output	15
TOTAL		50
C	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	Answer any ten questions out of twelve. Each carries three marks.	10 x 3	30
Part – B	Answer any seven questions out of ten. Each carries ten marks	7 x 10	70
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 (05) , Program from Part – A (30)	35
B	Aim (05) , Program from Part – B (30)	35
C	Executing any one program (Part A or Part – B)	15
D	Output	10
E	Viva Voce	05
TOTAL		**100**

CTE4340 – JAVA PROGRAMMING

CTE4340	JAVA PROGRAMMING	L	T	P	C
PRACTICUM		2	0	4	4

Unit I	**INTRODUCTION TO JAVA**	**[18 Hrs]**
Introduction to OOPS: Paradigms of Programming Languages		[1Hr]
Basic concepts of Object-Oriented Programming Benefits of OOPs		[1Hr]
Java features – Java Environment JDK – API.		[1Hr]
Creating and Executing a Java program – Java Tokens-Java Virtual Machine (JVM) –		[1Hr]
Command Line Arguments - Constants – Variables - Data types -Scope of variables		[1Hr]
Type casting – Operators.		[1Hr]
Ex No 1: Write a java program to read the temperature in Celsius and convert into Fahrenheit.		[4Hrs]
Ex No 2: Write a program to read 2 integers and find the largest number using conditional operator.		[4Hrs]
Ex No 3: Write a Java program to implement command line arguments.		[4Hrs]
Unit II	**CONTROL STRUCTURES, ARRAY AND STRING**	**[18 Hrs]**
Control structures: Decision making statements		[1Hr]
looping statements branching statement		[1Hr]
Arrays: One Dimensional Array		[1Hr]
Multi dimensional Array		[1Hr]
String: String Array –		[1Hr]
String Methods.		[1Hr]
Ex No 4: Write a Java program to find the sum and average of your tenth standard marks.		[6 Hrs]
Ex No 5: Write a Java Program to sort 10 student names in alphabetical order using bubble sort.		[6 Hrs]
Unit III	**CLASS AND OBJECTS**	**[18 Hrs]**
Class and objects: Defining a class – Methods		[1Hr]
Creating objects – Accessing class members –		[1Hr]
Constructors-Method overloading –		[1Hr]
Static members –		[1Hr]
Nesting of Methods –		[1Hr]
Final methods.		[1Hr]
Ex No 6: Write a Java program to collect student details using constructors.		[6 Hrs]
Ex No 7: Write a Java program to calculate area of rectangle, triangle and square using Method overloading.		[6 Hrs]
Unit IV	**INHERITANCE AND INTERFACE**	**[18 Hrs]**
Inheritance: Defining Inheritance –		[1Hr]
Types of Inheritances		[1Hr]
Overriding Methods –		[1Hr]
Final Variables and Methods –		[1Hr]
Abstract Class-		[1Hr]

Interfaces: Defining Interface –Types of Interface.		[1Hr]
Ex No 8: Write a Java program to create a class called Shape with methods called get Perimeter() and get Area(). Create a subclass called Circle that overrides the get Perimeter() and get Area() methods to calculate the area and perimeter of a circle. **Ex No 9**: Write a Java program to create an interface Shape with the get Area() method. Create three classes Rectangle, Circle, and Triangle that implement the Shape interface. Implement the get Area() method for each of the three classes.		[6 Hrs] [6 Hrs]
Unit V	**EXCEPTION HANDLING AND SWING**	**[18 Hrs]**
Exception Handling: Basics of Exception Handling – try blocks – throwing an exception catching an exception – finally statement. Swing Components and Event Handlers: – Event Handlers – Event Listeners –Input Events.		[1Hr] [1Hr] [1Hr] [1Hr] [1Hr] [1Hr]
Ex No 10: Write a Java program to create a panel with three buttons, labeled Red, Blue and Yellow, so that clicking each button results in the background color changing to theappropriate color. **Ex No 11:** Write a program to demonstrate Mouse events.		[6Hrs] [6Hrs]
TOTAL HOURS		**90 Hrs**

Suggested List of Students Activity

- Presentation/Seminars by students on any recent technological developments based on the course
- Programming assignments
- Periodic class/online quizzes conducted based on the course.
- Blended learning activities to explore the recent trends and developments in the field.

Text books for Reference:

S.NO	TITLE	AUTHOR	PUBLISHER WITH EDITION
1.	Programming with Java	E. Balagurusamy	5th Edition, TataMc-Graw Hill.
2.	Java Programming for Core and advanced learners	Sagayaraj, Denis, Karthick and Gajalakshmi	Universities Press (INDIA) Private Limited, 2018.
3.	The complete reference Java	Herbert Schildt	TataMc-Graw Hill, 7thEdition.

Web-based/Online Resources

S.NO	WEBSITES/LINKS
1.	NPTEL & MOOC courses titled Java: https://nptel.ac.in/courses/106105191/

Equipment / Facilities required to conduct the Practical Portion

SOFTWARE REQUIREMENTS

S.NO.	SOFTWARE
1.	Windows Operating System
2.	Net Beans 8.0.2 / 8.2 with JDK.

HARDWARE REQUIREMENTS

S.NO.	HARDWARE
1.	Desktop / Laptop
2.	Printer

CTE4340 – JAVA PROGRAMMING

MODEL QUESTION PAPER

Duration: 3 hrs. **Max. Marks: 100**

S. NO	NAME OF THE EXPERIMENTS	CO	PO
	PART - A		
1	Write a Java program to read the temperature in Celsius and convert into Fahrenheit.	E4340.1	PO1, PO2, PO3, PO4, PO5, PO6,PO7
2	Write a Java program to read 2 integers and find the largest number using conditional operator	E4340.1	PO1, PO2, PO3, PO4, PO5, PO6,PO7
3	Write a Java program to implement command line arguments.	E4340.2	PO1, PO2, PO3, PO4, PO5, PO6,PO7
4	Write a Java program to find the sum and average of your tenth standard marks.	E4340.2	PO1, PO2, PO3, PO4, PO5, PO6,PO7
5	Write a Java Program to sort 10 student names in alphabetical order using bubble sort.	E4340.3	PO1, PO2, PO3, PO4, PO5, PO6,PO7
	PART - B		
6	Write a Java program to collect student details using constructors	E4340.3	PO1, PO2, PO3, PO4, PO5, PO6,PO7
7	Write a Java program to calculate area of rectangle, triangle and square using method overloading.	E4340.4	PO1, PO2, PO3, PO4, PO5, PO6,PO7
8	Write a Java program to create a class called Shape with methods called getPerimeter() and getArea(). Create a subclass called Circle that overrides the getPerimeter() and getArea() methods to calculate the area and perimeter of a circle.	E4340.4	PO1, PO2, PO3, PO4, PO5, PO6,PO7
9	Write a Java program to create an interface Shape with the getArea() method. Create three classes Rectangle, Circle, and Triangle that implement the Shape interface. Implement the getArea() method for each of the three classes.	E4340.5	PO1, PO2, PO3, PO4, PO5, PO6,PO7
10	Write a Java program to create a panel with three buttons, labeled Red, Blue and Yellow, so that clicking each button results in the background color changing to the appropriate color.	E4340.5	PO1, PO2, PO3, PO4, PO5, PO6,PO7
11	Write a program to demonstrate Mouse Events.	E4340.5	PO1, PO2, PO3, PO4, PO5, PO6,PO7

CTE4440 – PYTHON PROGRAMMING

Programme Name : COMPUTER ENGINEERING
Course Code : CTE4440
Semester : IV SEMESTER
Course Title : PYTHON PROGRAMMING
Course Type : PRACTICUM

L	T	P	C
1	0	4	3

TEACHING AND SCHEME OF EXAMINATION

No. of weeks per semester: 15weeks

Course	Instructions		Examination			
			Marks			Duration
	Hours / Week	Hours / Semester	Internal Assessment	Autonomous Examination	Total	
PYTHON PROGRAMMING	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	Introduction to python	16
II	String, list, tuple, dictionary	20
III	NumPy	20
IV	File handling	19
TOTAL HOURS		**75**

COURSE DESCRIPTION

Being able to implement the basic logical statements in python and explore python's various data structures and packages which are much useful in the fields of data science, artificial intelligence.

COURSE OBJECTIVES

The objectives of this course is to enable the students to

1. To read and write simple python programs.
2. To define strings in python and operations on string.
3. Represent compound data using python lists, tuples, dictionaries.
4. To define and access multi-dimensional arrays using NumPy.
5. To do input/output with files in python.

COURSE OUTCOMES

After successful completion of this course, the students should be able to	
E4440.1	Demonstrate the installation process of python IDE and modules.
E4440.2	Implement the decision making and looping statements in python.
E4440.3	Define regular expression for the pattern and verify for the validity.
E4440.4	Create and access string, list, tuple, dictionary and NumPy array.
E4440.5	Read and write text and csv file using python.

Pre-requisites : Nil

CO/PO & PSO Mapping:

CO/PO & PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
E4440.1	3	3	3	3	2	2	3	2	3	3
E4440.2	3	3	3	3	2	2	3	2	3	3
E4440.3	3	3	3	3	2	2	3	2	3	3
E4440.4	3	3	3	3	2	2	3	2	3	3
E4440.5	3	3	3	3	2	2	3	2	3	3
Total	**15**	**15**	**15**	**15**	**10**	**10**	**15**	**10**	**15**	**15**
Correlation level	**3**	**3**	**3**	**3**	**2**	**2**	**3**	**2**	**3**	**3**

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 engineering 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.
- Encourage Critical Analysis: Foster an environment where students can honestly assess experiment outcomes and analyze potential sources of error in case of discrepancies.

Assessment Methodology:

	Continuous Assessment (40 marks)				End Semester Examination (60 marks)
	CA1	**CA2**	**CA3**	**CA4**	
Mode	Practical Test	Practical Test	Written Test Theory	Practical Test	Practical Examination
Portion	PART A Exercises	PART B Exercises	All Units	All Exercises	All Exercises
Duration	2 Periods	2 Periods	3 Hours	3 Hours	3 Hours
Exam Marks	60	60	100	100	100
Converted to	10	10	10	10	60
Marks	40				60
Tentative Schedule	7th Week	14th Week	15th Week	16th 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.

  The exercise should be completed on the day of practice. The same shall be evaluated for 10 marks on the day or the next day of practice before commencement of next exercise. The detailed date of the practices and its evaluations should be maintained in the log book and should be submitted for the verification.

SCHEME OF EVALUATION

PART	DESCRIPTION	MARKS
A	Aim (05) , Program (30)	35
B	Execution and Output	15
TOTAL		**50**
C	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	Answer any ten questions out of twelve. Each carries three marks.	10 x 3	30
Part – B	Answer any seven questions out of ten. Each carries ten marks	7 x 10	70
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 (05) ,Program from Part – A (30)	35
B	Aim (05) ,Program from Part – B (30)	35
C	Executing any one program (Part A or Part –B)	15
D	Output	10
E	Viva Voce	05
TOTAL		**100**

CTE4440 – PYTHON PROGRAMMING

CTE4440	PYTHON PROGRAMMING	L	T	P	C
PRACTICUM		1	0	4	3

Unit I	INTRODUCTION TO PYTHON	[16 Hrs]
Installing and running Python in interpreter and Interactive mode Basic Datatypes in Python: int, float, string. Storing Values in Variables Basic functions in Python: input (), print (), str (), int (), float (). Decision Making – Simple if, if…else and if … elif statement; Control Statement: while, break, continue, for loop, range ().		[1Hr] [1Hr] [1Hr] [1Hr]
Ex No 1: Write a python program to read three numbers and print the greatest of three numbers **Ex No 2:** Write a python program to find the sum of N number using range () function in for loop		[6Hrs] [6Hrs]
Unit II	**STRING, LIST, TUPLE, DICTIONARY**	**[20 Hrs]**
Sequence Data types. Operations on sequence data types: Indexing and slicing, concatenation, and replication, in and not in operators to access elements. List: Creation, mutable property, In build methods of List: index (), append (), insert (), sort (),reverse (). Tuple: immutable property, converting types using tuple (), list (). Dictionary Data type: Creation, keys (), values () and items () methods.		[1Hr] [1Hr] [1Hr] [1Hr]
Ex No 3: Write a python program to demonstrate the string slicing, concatenation, replicationand len() method. **Ex No 4:** Write a python program to create a tuple and convert into a list and print the list insorted order. **Ex No 5:** Write a python program to create a dictionary and check whether a key or value exist in the dictionary.		[5Hrs] [5Hrs] [6Hrs]

Unit III	NumPy	[20 Hrs]
Install and import NumPy module, Creation of one dimensional		[1Hr]
2D-dimensional NumPy array using array (), Slicing, indexing,		[1Hr]
NumPy methods: shape (), reshape (), concatenate (), where ().		[1Hr]
Arithmetic operations in NumPy, Aggregation functions in NumPy.		[1Hr]
Ex No 6: Write a python program to create one dimensional array and convert into a 2D-dimensional array using reshape (), print the first two columns alone using slicing.		[5Hrs]
Ex No 7: Write a python program to create two-dimensional array and search for an Element using where () function.		[5Hrs]
Ex No 8: Write a python program to create a 2D-dimensional array and demonstrate aggregation functions sum (), min () and max () in the row and column wise.		[6Hrs]
Unit IV	**FILE HANDLING**	**[19 Hrs]**
Text file handling: file opening mode, reading from a file: read(), readline(),		[1Hr]
readlines() and writing into a file: write(), writeline().		[1Hr]
Pandas package: install and import pandas, read and write a csv file, pandas methods: head(), describe().		[1Hr]
Ex No 9: Write a python program to read a text file and write the content in another file.		[6 Hrs]
Ex No 10: Write a python program to read a csv file using pandas and print the content.		[5 Hrs]
Ex No 11: Write a Python Program to add 'ing' at the end of a given string if the string has 3 ormore characters. If the given string is already ends with 'ing' then add 'ly' instead. If the string has less than 3 characters, leave it unchanged.		[5 Hrs]
TOTAL HOURS		**75 Hrs**

Suggested List of Students Activity

- Presentation/Seminars by students on any recent technological developments based on the course.
- Periodic class/online quizzes conducted based on the course.
- Blended learning activities to explore the recent trends and developments in the field.

Text books for Reference:

S.NO	TITLE	AUTHOR	PUBLISHER WITH EDITION
1.	Automate the Boring Stuff with Python	AI Sweigart	Second Edition, No Starch Press,2019.
2.	Python Data Science Handbook, Essential tool for working with data	Jake Vanderplas	First Edition, O'Reilly Media, Inc, 2017.
3.	Python for Data Analysis: Data Wrangling with Pandas, NumPy and Ipython	Wes McKinney	Wes McKinney, Second Edition, O'REILLY, 2017.

Equipment / Facilities required to conduct the Practical Course

Software Requirement:

S.No.	Software
1.	Windows / Linux Operating System
2.	Python IDLE /Spyder.

Hardware Requirement:

S.No.	Hardware
1.	Desktop Computers / Laptop
2.	Printer

CTE4440- PYTHON PROGRAMMING

MODEL QUESTION PAPER

Duration: 3 hrs. **Max. Marks: 100**

S. NO	NAME OF THE EXPERIMENTS	CO	PO
	PART - A		
1	Write a python program to read three numbers and print the greatest of three numbers.	E4440.1	PO1, PO2, PO3, PO4, PO5, PO6,PO7
2	Write a python program to find the sum of N number using range () function in for loop	E4440.1	PO1, PO2, PO3, PO4, PO5, PO6,PO7
3	Write a python program to demonstrate the string slicing, concatenation, replication and len() method.	E4440.2	PO1, PO2, PO3, PO4, PO5, PO6,PO7
4	Write a python program to create a tuple and convert into a list and print the list in sorted order.	E4440.2	PO1, PO2, PO3, PO4, PO5, PO6,PO7
5	Write a python program to create a dictionary and check whether a key or value exist in the dictionary	E4440.3	PO1, PO2, PO3, PO4, PO5, PO6,PO7
	PART – B		
6	Write a python program to create one dimensional array and convert into a 2Ddimensional array using reshape (), print the first two columns alone using slicing.	E4440.3	PO1, PO2, PO3, PO4, PO5, PO6,PO7
7	Write a python program to create two-dimensional array and search for an element using where () function.	E4440.4	PO1, PO2, PO3, PO4, PO5, PO6,PO7
8	Write a python program to create a 2D-dimensional array and demonstrate aggregation functions sum (), min () and max () in the row and column wise.	E4440.4	PO1, PO2, PO3, PO4, PO5, PO6,PO7
9	Write a python program to read a text file and write the content in another file.	E4440.5	PO1, PO2, PO3, PO4, PO5, PO6,PO7
10	Write a python program to read a csv file using pandas and print the content.	E4440.5	PO1, PO2, PO3, PO4, PO5, PO6,PO7
11	Write a Python Program to add ‘ing’ at the end of a given string if the string has 3 or more characters. If the given string is already ends with ‘ing’ then add ‘ly’ instead. If the string has less than 3 characters, leave it unchanged.	E4440.5	PO1, PO2, PO3, PO4, PO5, PO6,PO7

CTE4540–E-PUBLISHING TOOLS

Programme Name : COMPUTER ENGINEERING
Course Code : CTE4540
Semester : IV SEMESTER
Course Title : E-PUBLISHING TOOLS
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			
			Marks			Duration
	Hours/ Week	Hours / Semester	Internal Assessment	Autonomous Examination	Total	
E-PUBLISHING TOOLS	5	75	40	100*	100	3 Hrs

*** Examinations will be conducted for 100 marks and will beconverted to 60 marks**

TOPICS AND ALLOCATION OF HOURS

Part	Topics	Time(Hrs)
I	E-publishing & vector drawing applications	24
II	Page layout applications	10
III	Bitmapped image applications	28
IV	Online graphic design (canva controls)	13
TOTAL HOURS		**75**

COURSE DESCRIPTION

This course provides an introductory exploration of e-publishing tools and technologies for creating and distributing digital publications. Students will learn about various e-publishing formats, tools used to create e-books, digital magazines, interactive documents and more. Through hands-on projects and practical exercises, students will gain proficiency in using popular e-publishing software and tools to design, format, and publish digital content for different devices and platforms.

COURSE OBJECTIVES

The objectives of this course is to

- Learn all tools and options in Text editing software.
- Create Vector drawings using CorelDraw.
- Learn all tools and options in Bitmapped image editing software.
- Learn to use Layer masks, filters and blending modes in Adobe Photoshop.
- Learn to use online publishing software like Canva, Figma.
- Learn to use character styles, paragraph styles, text effects, frames in any page layout software like Adobe Indesign or any other equivalent open source software.

COURSE OUTCOMES

After successful completion of this course, the students should be able to	
E4540.1	Create designs like Business Cards, Notebook wrapper and logo.
E4540.2	Create passport size photo by removing background.
E4540.3	Design a new image by blending two images using layer masking and filters.
E4540.4	Prepare new designs for brochures, calendar and invitations.
E4540.5	Learn online graphic design platform to design presentations, social media graphics, posters, flyers, infographics.

Pre-requisites : Basic knowledge about computer and multimedia elements

CO-POs & PSOs Mapping matrix

CO/PO & PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
E4540.1	2	3	2	3	2	2	3	3	3	3
E4540.2	2	3	2	3	2	2	3	3	3	3
E4540.3	2	3	2	3	2	2	3	3	3	3
E4540.4	2	3	2	3	2	2	3	3	3	3
E4540.5	2	3	2	3	2	2	3	3	3	3
CTE3640 Total	**10**	**15**	**10**	**15**	**10**	**10**	**15**	**15**	**15**	**15**
Correlation level	**2**	**3**	**2**	**3**	**2**	**2**	**3**	**3**	**3**	**3**

Correlation level 1 – Slight (low)
Correlation level 2 – Moderate (Medium)
Correlation level 3 – Substantial (high)

Instructional Strategy:

- It is advised to assign assign hands-on projects to students create digital publications using e- publishing tools such as Adobe Photoshop, CorelDraw, Adobe PageMaker etc. Projects could include designing and formatting interactive documents.
- Conduct of interactive demos to help students learn specific techniques and tools. Providestep-by-step guidance and encourage questions and participation.
- Analysis of real-world examples of successful digital publications and their design,formatting, and distribution strategies.

Assessment Methodology

	Continuous Assessment (40 marks)				End Semester Examination (60 marks)
	CA1	**CA2**	**CA3**	**CA4**	
Mode	Practical Test	Practical Test	Written TestTheory	Practical Test	Practical Examination
Portion	PART A Exercises	PART B Exercises	All Units	All Exercises	All Exercises
Duration	2 Periods	2 Periods	3 Hours	3 Hours	3 Hours
Exam Marks	60	60	100	100	100
Converted to	10	10	10	10	60
Marks	40				60
Tentative Schedule	7th Week	14th Week	15th Week	16th 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.

  The exercise should be completed on the day of practice. The same shall be evaluated for 10 marks on the day or the next day of practice before commencement of next exercise. The detailed date of the practices and its evaluations should be maintained in the log book and should be submitted for the verification.

SCHEME OF EVALUATION

PART	DESCRIPTION	MARKS
A	Aim (05) , Program (30)	35
B	Execution and Output	15
	TOTAL	50
C	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	Answer any ten questions out of twelve. Each carries three marks.	10 x 3	30
Part – B	Answer any seven questions out of ten. Each carries ten marks	7 x 10	70
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
1	Aim (05) , Program from Part – A (30)	35
2	Aim (05) , Program from Part – B (30)	35
3	Executing any one program (Part A or Part –B)	15
4	Output	10
5	Viva Voce	05
TOTAL		**100**

CTE4540–E-PUBLISHING TOOLS

CTE4540	E-PUBLISHING TOOLS	L	T	P	C
PRACTICUM		1	0	4	3

Unit I	E-PUBLISHING & VECTOR DRAWING APPLICATIONS	[24 Hrs]

Introduction to E-Publishing- Evolution -Categories of E-Publishing Tools	[1Hr]
Text Editors- Word Processors- Vector Drawing Applications- Page Layout Applications	[1Hr]
Bitmapped image Applications	[1Hr]
Installing vector drawing application - Starting and Opening Drawings - Previewing - Viewing Modes - Saving and Closing Drawings - Workspace - Lines, Shapes, and Outlines	[1Hr]
Working with Objects, Symbols, and Layers- Colour, Fills, and Transparencies- Exploring Special Effects- Working with Text- Templates and Styles- Pages and Layout.	[1Hr]
	[1Hr]
Ex No 1: Create a business card with a logo using various text styles, rectangle tool, and ellipse tool.	[6Hrs]
Ex No 2: Design a notebook wrapper using fountain filling and pattern filling tools.	[6Hrs]
Ex No 3: Transform one object into another object using a blend tool. (Students can be allowed to use any other open source vector drawing software)	[6Hrs]

Unit II	PAGE LAYOUT APPLICATIONS	[10 Hrs]

Getting started with Scribus- Opening, closing and navigating- Text Tools- Shape Tools-	[1Hr]
Image Frame Tools- Color Management Tools- Master Pages- Layers Alignment and Distribution Tools- PDF Export Options.	[1Hr]
Ex No 4: Design an invitation for your college convocation using text tools Shape Tools Image tables in the page layout software. (Students can be allowed to use any other open source page layout software)	[8Hrs]

Unit III	BITMAPPED IMAGE APPLICATIONS	[28 Hrs]

Installing Image editing application- Opening, moving, editing, saving images Essential	[1Hr]
Keyboards Shortcuts- Workspace- panels- Selection tools	[1Hr]
Crop and slice tools- Color selection and measuring tools- Text tools	[1Hr]
Navigation tools-Retouching tools- Painting tools- Drawing tools Customizing Toolbars- Layers - Layer Mask- Blending modes- Filters.	[1Hr]
Ex No 5: Create a design by using various selection tools, cutting and pasting the images.	[6Hrs]
Ex No 6: Create a passport size photo by removing the background of a photo and change it to blue color.	[6Hrs]
Ex No 7: Change the image looks by applying various filters and blending modes. (any one among Pencil sketch, Water Color, Blurred Background)	[6Hrs]
Ex No 8: Create a design with the use of a layer mask using two images as background and foreground.(Students can be allowed to use any other open source image editing software)	[6Hrs]

Unit IV	ONLINE GRAPHIC DESIGN (CANVA CONTROLS)	[13Hrs]
Introduction to Canva- Templates- Backgrounds- Working with text- Font Styles Elements- images, icons, or graphs- Shapes- Audio- Video- Animation Applying Filters and Effects- Save- Download and share.		[1Hr] [1Hr] [1Hr]
Ex No 9: Design a multipage document like a tri-fold brochure using various elements for the college workshop. **Ex No 10:** Prepare a stylish calendar sheet by using tables and its formatting tools. (Students can be allowed to use any other open source online graphic design software) **Ex No 11:** Create E- invitation for the Conference Meet.		[3Hrs] [4Hrs] [3Hrs]
TOTAL HOURS		**75 Hrs**

Suggested List of Students Activity

- Presentation/Seminars by students on any recent technological developments based on the course
- 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.

Text books for Reference:

S.No	TITLE	AUTHOR	PUBLISHER WITH EDITION
1.	CorelDraw X7: The Official Guide	Gary David Bouton	12th Edition, O'Reilly Media, 2017.
2.	Adobe photoshop classroom in a book	Conrad Chavez, Andrew Faulkner	1st Edition, Pearson,2018.
3.	Design with Canva: A complete guide on how to use Canva	Latheefah Raji	1st edition, Independent Publisher, 2021.

Web-based/Online Resources

S.NO	WEBSITE/ LINKS
1.	https://www.psdstack.com/resources/photoshop-tutorials/
2.	https://www.vandelaydesign.com/free-CorelDraw-tutorial
3.	https://www.canva.com/designschool/tutorials/
4.	https://www.youtube.com/watch?v=uCcPDSE6vLw
5.	https://www.scribd.com/doc/13080717/CorelDraw-Course-Manua
6.	Getting Started with Adobe Photoshop (photoshopessentials.com)
7.	https://www.CorelDraw.com/en/learn/tutorials/
8.	https://www.CorelDraw.com/en/learn/webinars/

Equipment / Facilities required to conduct the Practical Portion

Software Requirement:

S.NO.	SOFTWARE
1.	Any Open Source Software
2	GIMP
3	Scribus
4	Inkscape
5	Adobe Photoshop
6	CorelDraw

Hardware Requirement:

S.NO.	HARDWARE
1.	Desktop Computers with Internet Connectivity
2.	Laser Printer
3	Scanner

CTE4540–E-PUBLISHING TOOLS

MODEL QUESTION PAPER

Duration: 3 hrs. **Max. Marks: 100**

S. NO	NAME OF THE EXPERIMENTS	CO	PO
	PART - A		
1	Create a business card with a logo using varioustext styles, rectangle tool, and ellipse tool.	E4540.1	PO1, PO2, PO3, PO4, PO5, PO6,PO7
2	Design a notebook wrapper using fountain fillingand pattern filling tools.	E4540.1	PO1, PO2, PO3, PO4, PO5, PO6,PO7
3	Transform one object into another object using a blend tool.	E4540.2	PO1, PO2, PO3, PO4, PO5, PO6,PO7
4	Design an invitation for your college convocation using text tools Shape Tools Image tables in the page layout software.	E4540.2	PO1, PO2, PO3, PO4, PO5, PO6,PO7
5	Create a design by using various selection tools, cutting and pasting the images.	E4540.3	PO1, PO2, PO3, PO4, PO5, PO6,PO7
	PART – B		
6	Create a passport size photo by removing thebackground of a photo and change it to blue color	E4540.3	PO1, PO2, PO3, PO4, PO5, PO6,PO7
7	Change the image looks by applying various filtersand blending modes.	E4540.4	PO1, PO2, PO3, PO4, PO5, PO6,PO7
8	Create a design with the use of a layer mask usingtwo images as background and foreground	E4540.4	PO1, PO2, PO3, PO4, PO5, PO6,PO7
9	Design a multipage document like a tri-foldbrochure using various elements for the college workshop.	E4540.5	PO1, PO2, PO3, PO4, PO5, PO6,PO7
10	Prepare a stylish calendar sheet by using tables andits formatting tools.	E4540.5	PO1, PO2, PO3, PO4, PO5, PO6,PO7
11	Create E- invitation for the Conference Meet.	E4540.5	PO1, PO2, PO3, PO4, PO5, PO6,PO7

CTE4640–SCRIPTING LANGUAGES

Programme Name : COMPUTER ENGINEERING
Course Code : CTE4640
Semester : IV SEMESTER
Course Title : SCRIPTING LANGUAGES
Course Type : PROJECT

L	T	P	C
0	0	6	2

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	
SCRIPTING LANGUAGES	6	90	40	100*	100	3 Hrs

*** Examinations will be conducted for 100 marks and will beconverted to 60 marks**

TOPICS AND ALLOCATION OF HOURS

Part	Topics	Time(Hrs)
I	PHP Introduction	8
II	PHP Programming And Mysql PHP	8
III	Ajax And Jquery	8
IV	Web Applications Frameworks	8
Project Development & Report Preparation		58
TOTAL HOURS		**90**

COURSE DESCRIPTION

The main objective of the course is to introduce the students with the advanced Web-based software development using JavaScript, PHP, and MySQL. The subject will impart knowledge to design visually appealing, dynamic, device-independent, and interactive web based applications with client-side and server-side scripting. Additionally, this course aims at developing innovative skills in the students where by they apply the knowledge and skills gained through the course by undertaking a project. The individual students have different skills, attitudes, and strengths. At the end of this course, the students will learn how to work with the team and how to prepare the report.

COURSE OBJECTIVES

- To learn to utilize the PHP statements for Application Development.
- To learn to develop web applications using PHP and MysQL.

- To design the interactive and dynamic web applications using AJAX, JQUERY andNode.js
- To learn to work in teams and to utilize the knowledge gained into an application suitablefor a real practical working environment
- Learn and understand the gap between the technological knowledge acquired and the actual industrial need and to compensate it by acquiring additional knowledge as required**.**

COURSE OUTCOMES

After successful completion of this course, the students should be able to	
E4640.1	Write PHP script to store, access and display the data in the MySQL Database.
E4640.2	Design the dynamic web pages using AJAX, JQUERY and Node.js
E4640.3	Develop device-independent Web application using Bootstrap
E4640.4	Identify, discuss and justify the technical aspects of the chosen project with a Comprehensive and systematic approach with the team.
E4640.5	Communicate and report effectively project related activities and findings and reproduce, improve and refine the acquired result.

Pre-requisites : Web Designing Course

CO-POs & PSOs Mapping matrix

CO/PO & PSO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PSO1**	**PSO2**	**PSO3**
E4640.1	3	3	3	3	2	2	3	3	3	3
E4640.2	3	3	3	3	2	2	3	3	3	3
E4640.3	3	3	3	3	2	2	3	3	3	3
E4640.4	3	3	3	3	2	2	3	3	3	3
E4640.5	3	3	3	3	2	2	3	3	3	3
CTE4640 Total	**15**	**15**	**15**	**15**	**10**	**10**	**15**	**15**	**15**	**15**
Correlation level	**3**	**3**	**3**	**3**	**2**	**2**	**3**	**3**	**3**	**3**

Correlation level 1 – Slight (low)

Correlation level 2 – Moderate (Medium)

Correlation level 3 – Substantial (high)

Instructional Strategy:

- Real-World Relevance: Incorporate relatable, real-life examples and engineering applications to help students understand and appreciate course concepts.
- Interactive Learning: Utilize demonstrations and plan interactive student activities for an engaging learning experience.
- Simulation and Real-World Practice: Conduct demonstrations and hands-on activities in with built in Models

- Encourage Critical Analysis and Thinking: Foster an environment where students can think over the real world problem and find the solution for the same also they can honestly assess experiment outcomes and analyze potential sources of error in case of discrepancies.
- Cooperative & Team-Based Learning: Foster the environment where in the students can work in the team, discuss among the team to find the solution for the real-world problem.

Guidelines for Project Team Formulation

Batch Size: Maximum 6 students per batch

Assessment Methodology:

	Continuous Assessment (40 marks)				**End Semester Examination (60 marks)**
	CA1	**CA2**	**CA3**	**CA4**	
Mode	Practical Test	Practical Test	Review 1	Review 2	Practical Examination
Portion	PART A Exercises	PART B Exercises	Project	Project	Project
Duration	2 Periods	2 Periods	2 Periods	2 Periods	3 hours
Exam Marks	60	60	50	50	100
Converted to	10	10	10	10	60
Marks	40				60
Tentative Schedule	7th Week	10th Week	11th Week	15th 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.

  The exercise should be completed on the day of practice. The same shall be evaluated for 10 marks on the day or the next day of practice before commencement of next exercise. The detailed date of the practices and its evaluations should be maintained in the log book and should be submitted for the verification.

SCHEME OF EVALUATION

PART	DESCRIPTION	MARKS
A	Aim (05) , Program (30)	35
B	Execution and Output	15
	TOTAL	50
C	Practical Documents (As per the portions)	10
TOTAL		**60**

CA 3 and CA 4: Two reviews should be conducted, each for 50 Marks. The marks awarded should be converted to 10 Marks for the internal assessment.

The sum of both the review marks is considered for CA3. Proper records should be maintained for the two Project Reviews. Each review is evaluated as per the following guidelines:

DETAILS OF MARK ALLOCATION	MAX. MARKS
Presentation	20
Implementation	20
Viva Voce	10
Total	**50**

END SEMESTER PRACTICAL EXAMINATION:

SCHEME OF VALUATION		
S. NO	**ALLOCATION**	**MARKS**
1	Implementation / Demo	50
2	Report	30
3	Viva Voce	20
4	**Total**	**100**

CTE4640–SCRIPTING LANGUAGES

CTE4640	SCRIPTING LANGUAGES	L	T	P	C
PROJECT		0	0	6	2

Unit I	**PHP INTRODUCTION**	**[8 Hrs]**
Theory: Introduction to Server Side Scripting – PHP: PHP Structure and Syntax - Integrating HTML with PHP – if Statements - if and else – switch case - for loop – for each loop- Strings – Arrays - HTML Form Elements Processing in PHP - Passing Variables between Pages.		[1Hr] [1Hr] [1Hr] [1Hr]
PRACTICE EXPERIMENTS		
Ex No 1: Write PHP code to implement any five string and array functions. **Ex No 2:** Design the HTML form to collect student bio data and SSLC Mark, Process the collected data inthe PHP and Find Total and Average for Mark.		[2 Hrs] [2 Hrs]
Unit II	**PHP PROGRAMMING AND MYSQL PHP**	**[8 Hrs]**
Theory: Sessions and Cookies-Page redirection- Connecting to the MySQL Server – Insert, Edit, Update, Delete and Querying the Database from PHP		[1Hr] [1Hr]
PRACTICE EXPERIMENTS		
Ex No 3: Develop the simple application which display result of the student by getting register number as user input(assume student marks are already available in the database) **Ex No 4:** Develop the simple login page, which validates the username, and password (assume username, password and student_ name are stored in the database). If username and password are correct, the page should redirect to Welcome.php file and display the student_ name in that page. If username or password is incorrect page should remain in login page itself.		[3 Hrs] [3 Hrs]
Unit III	**AJAX AND JQUERY**	**[8 Hrs]**
Theory: Introduction to AJAX -The XML Http Request Object –JSON – Introduction to jQuery –jQuery Events –jQuery Effects - AJAX and JQuery.		[1Hr] [1Hr]
PRACTICE EXPERIMENTS		
Ex No 5: Write the code to disable right-click option in the webpage using the jQuery **Ex No 6:** Develop the simple application which display details of the college by getting college code as input using AJAX without reloading the page (assume college details like code, name, courses_ offered,address, hostel facility, etc., are already available in the database)		[3 Hrs] [3 Hrs]
Unit IV	**WEB APPLICATIONS FRAMEWORKS**	**[8 Hrs]**
Theory : Bootstrap 5.0: Cards – Nav Bar-Form elements- Node.js : Introduction – NPM-Node JS Modules-upload files- Send an Email – Events-Node.js and Mysql-introduction to Django		[1Hr] [1Hr]

PRACTICE EXPERIMENTS	
Ex No 7: Develop the Node.js code to upload the file to server.	[2Hrs]
Ex No 8: Develop the Node.js code to send an email.	[2Hrs]
Ex No 9: Write a PHP program to keep track of the number of visitors visiting the web page and to display this count of visitors.	[2 Hrs]
PROJECT DEVELOPMENT & REPORT PREPARATION	**58 Hrs**
TOTAL HOURS	**90 Hrs**

Suggested List of Project (Not limited to this list):

S.No	PROJECT TITLE
1	College Management Software
2	Livestock Management software
3	Online Student Attendance and Bio data Management Software
4	Online Employee Management Software
5	Online Event Management Software
6	Online Transport Management Software
7	Online Library Management Software
8	Online Blood Bank
9	Online Shopping / Billing Software
10	Online Book / Music Store

Suggested List of Students Activity

- Presentation/Seminars by students on any recent technological developments in Web development.
- online quizzes
- Project Development

Text Books for Reference: :

S.No	TITLE	AUTHOR	PUBLISHER WITH EDITION
1.	Java Script: The Complete Reference	Thomas Powell, Fritz Schneider	Third Edition, Tata McGras-Hill, July 2017.
2.	Beginning PHP6, Apache, MySQL, WebDevelopment	Timothy Boronczyk, Elizabeth Naramore, Jason Gerner, Yann LeScouarnec, Jeremy Stolz, Michael K. Glass	John Wiley & Sons Ltd,2009
3.	Mastering Node.js	SandroPasquali, Kevin Faaborg	Second Edition, Packt Publishing, 2017.

Equipment / Facilities required to conduct the Practical Portion

Software Requirement:

S.NO.	SOFTWARE
1.	Apache / Httpd / Wamp/ Xamp Webserver
2	MySQL
3	Any Web browser

Hardware Requirement:

S.NO.	HARDWARE
1.	Desktop / laptop Computers

V SEMESTER

CTE5130 – CLOUD COMPUTING

Programme Name : COMPUTER ENGINEERING
Course Code : CTE5130
Semester : V SEMESTER
Course Title : CLOUD COMPUTING
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			
			Marks			Duration
	Hours/ Week	Hours / Semester	Internal Assessment	Autonomous Examination	Total	
CLOUD COMPUTING	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	Cloud Computing	12
II	Virtualization	12
III	Web Services And Cloud Service Providers	12
IV	Security in the Cloud	12
V	Cloud Computing Applications	12
TOTAL HOURS		**60**

COURSE DESCRIPTION

This course will introduce the emerging technology cloud computing. The advantages of cloud services and cloud applications will give the students the much needed exposure to the current trend.

COURSE OBJECTIVES

The objective of this course is to

- Introduce the concept of virtualization.
- Outline the concepts of cloud computing.
- Summarize the different types of web services and cloud service providers.
- Elaborate the security issues in cloud.
- Present the cloud applications.

COURSE OUTCOMES

After successful completion of this course, the students should be able to	
E5130.1	Understand the concept of virtualization.
E5130.2	Differentiate various cloud services.
E5130.3	Explore the different cloud service providers.
E5130.4	Understand the security issues with cloud and security policies.
E5130.5	Comprehend the various cloud applications.

Pre-requisites

- The student should have taken up Computer Networks and Security.
- The student should have the basic Knowledge about network protocols.

CO-POs & PSOs Mapping matrix

CO/PO & PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
E5130.1	3	2	2	3	3	2	3	3	3	2
E5130.2	3	2	2	3	3	2	3	3	3	2
E5130.3	3	2	2	3	3	2	3	3	3	2
E5130.4	3	2	2	3	3	2	3	3	3	2
E5130.5	3	2	2	3	3	2	3	3	3	2
Total	**15**	**10**	**10**	**15**	**15**	**10**	**15**	**15**	**15**	**10**
Correlation level	**3**	**2**	**2**	**3**	**3**	**2**	**3**	**3**	**3**	**2**

Correlation level 1 – Slight (low)
Correlation level 2 – Moderate (Medium)
Correlation level 3 – Substantial (high)

Instructional Strategy:

- The teacher can use experiential learning as an instructional strategy both in and outside the classroom.
- It may be necessary for the teacher to pre-teach the skills and processes necessary to achieve the intended learning outcomes.
- The teacher needs to encourage students to share their thoughts so that the entire class can benefit from individual insights.
- Teachers can encourage divergent thinking by asking students to transform a teacher guided image into several others of their own creation.

Assessment Methodology

	Continuous Assessment (40 marks)				End Semester Examination (60 marks)
	CA1	**CA2**	**CA3**	**CA4**	
Mode	Written Test Theory (Unit 1& 2)	Written Test Theory (Unit 3 & 4)	Practical Test (All Exercises)	Written Test (Complete Theory Portions)	Written Examination (Complete Theory Portions)
Duration	2 Periods	2 Periods	3 hours	3 hours	3 hours
Exam Marks	50	50	100	100	100
Converted to	10	10	10	10	60
Marks	40				60
Tentative Schedule	6th Week	12th Week	15th Week	16th 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.

  - PART-A (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 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.

- The exercise should be completed on the day of practice. The same shall be evaluated for 10 marks on the day or the next day of practice before commencement of next exercise. The detailed date of the practices and its evaluations should be maintained in the log book and should be submitted for the verification.

SCHEME OF EVALUATION - Practical Test

Sl.No.	Description	Marks
A	Aim (05) ,Program (30)	35
B	Execution	20
C	Output	10
D	Practical document (All Practicals)	30
E	Viva Voce	05
Total		**100**

- **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: Model Examination and End Semester Examination-Theory Exam

- 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.

PART - A (5 X 2 X 10 Marks=100 Marks)

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

Sample :

I.	1
	2
	3
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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 %

CTE5130 – CLOUD COMPUTING

CTE5130	CLOUD COMPUTING	L	T	P	C
PRACTICUM		2	0	2	3

Unit I	CLOUD COMPUTING	[12 Hrs]
Characteristics of Cloud - Benefits – limitations		[1Hr]
Cloud Deployment Models		[1Hr]
Cloud service models - Infrastructure as a service (IaaS), Platform as a Service(PaaS),		[1Hr]
Software as a Service (SaaS), Anything as a Service (XaaS)		[1Hr]
SPI Vs. Traditional IT Models, Cloud Data Centers.		[1Hr]
Fuzzy Logic and Neural Networks.		[1Hr]
Ex No:1 Create a professional portfolio using Google Slides.		[3 Hrs]
Ex No:2 Use Google Drive as Storage as a Service to Store, Organize, Share and Collaborate.		[3 Hrs]
Unit II	**VIRTUALIZATION**	**[12 Hrs]**
Virtualization,		[1Hr]
Hypervisors, Types of hypervisors.		[1Hr]
Virtualization techniques		[1Hr]
Para virtualization - full virtualization,		[1Hr]
Hardware assisted virtualization		[1Hr]
Hybrid virtualization.		[1Hr]
Ex No 3: Install Virtual box/VMware Workstation with different flavours of linux or windows OS on top of existing OS.		[3 Hrs]
Ex No 4: Setting up a Java development Virtual Machine with Virtual Box.		[3 Hrs]
Unit III	**WEB SERVICES AND CLOUD SERVICE PROVIDERS**	**[12 Hrs]**
Web Services and its types,		[1Hr]
Google compute engine,		[1Hr]
Google App Engine,		[1Hr]
Amazon – Amazon Elastic Compute Cloud		[1Hr]
Amazon Simple DB		[1Hr]
Amazon Simple Storage Service (S3) - Amazon Cloud Front		[1Hr]
Ex No 5: Install a PaaS Engine (Google App Engine / AWS / Azure or any one PaaS Engine) and create simple web applications using python/java.		[6 Hrs]
Unit IV	**SECURITY IN THE CLOUD**	**[12 Hrs]**

Storage Location and Tenancy Cloud Security Challenges CSA Reference Model Security Policies and Implementation Virtualization Security Management.	[1Hr] [2 Hrs] [2 Hrs] [1Hr]
Ex No 6: Protect Google Sheets and Range with various access permissions	[6 Hrs]
UNIT V CLOUD COMPUTING APPLICATIONS	**[12 Hrs]**
Adobe Creative Cloud Firefly design models Git Hub repository basics LinkedIn Benefits Zoho Work Drive Features Storage Concept of Google Big table..	[1Hr] [1Hr] [1Hr] [1Hr] [2Hrs]
Ex No 7 : Setup a GitHub account and develop a simple python application. **Ex No 8:** Create a column family with an age-based garbage-collection policy in Google Bigtable.	[3 Hrs] [3 Hrs]
TOTAL HOURS	**60 Hrs**

Suggested List of Students Activity:

- Presentation/Seminars by students on any recent technological developments based on the course.
- Micro project that shall be an extension of any practical lab exercise to real-worldapplication

Text books for Reference:

S.NO	TITLE	AUTHOR	PUBLISHER WITH EDITION
1.	Mastering Cloud Computing	Rajkumar Buyya, Christian Vecchiola, S.Thamarai Selvi	First Edition, Tata Mcgraw Hill, 2013
2.	Cloud Application Architectures: Buliding Applications and Infrastructure in the cloud.	George Reese	First Edition, O'Reilly 2009
3.	Cloud Computing	Ashish Bhatnagar, Shailza Sharma	First Edition, S.K. Kataria & Sons, 2019

Web-based/Online Resources:

S.NO	WEBSITES/LINKS
1.	https://www.virtualbox.org/
2.	https://colab.research.google.com/
3.	https://cloud.google.com/appengine/
4.	http://www.seanmcilvenna.com/2018/03/26/setting-up-a-java-development-vm with-virtualbox/
5.	https://cloud.google.com/bigtable/docs/samples/bigtable-create-family-gc-max-age
6.	https://www.accenture.com/gb-en/case-studies/about/cloud-security
7.	https://www.zoho.com/workdrive/features.html

MODEL QUESTION PAPER

CTE5130– CLOUD COMPUTING

Time : [3 Hrs]. **Max. Marks : 100**

PART-A (5 X 2 X 10 Marks = 100 Marks)

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 Cloud Deployment Models in detail.	I	U	E5130.1	PO1,PO2,PO5,PO7
	2.	Explain about Cloud service models in detail.	I	R	E5130.1	PO1,PO2,PO5,PO7
	3.	Detail about SPI Vs. Traditional IT Models in detail.	I	R	E5130.1	PO1,PO2,PO5,PO7
	4.	Explain about Cloud Data Centers in detail.	I	R	E5130.1	PO1,PO2,PO5,PO7
II	5.	Explain about Virtualization in detail.	II	R	E5130.2	PO1,PO2,PO5,PO7
	6.	Explain about Hypervisors, Types of hypervisors in detail.	II	R	E5130.2	PO1,PO2,PO5,PO7
	7.	Explain about Virtualization techniques in detail.	II	U	E5130.2	PO1,PO2,PO5,PO7
	8.	Explain about hardware assisted virtualization in detail.	II	R	E5130.2	PO1,PO2,PO5,PO7
III	9.	Explain about Web Services and its types in detail.	III	R	E5130.3	PO1,PO2,PO5,PO7
	10.	Explain about Google App Engine in detail.	III	U	E5130.3	PO1,PO2,PO5,PO7
	11.	Explain about Google compute engine in detail.	III	R	E5130.3	PO1,PO2,PO5,PO7
	12.	Detail about Amazon Simple Storage Service (S3)indetail.	III	U	E5130.3	PO1,PO2,PO5,PO7
IV	13.	Explain about Storage Location and Tenancy indetail.	IV	U	E5130.4	PO1,PO2,PO5,PO7
	14.	Explain about CSA Reference Model	IV	R	E5130.4	PO1,PO2,PO5,PO7
	15.	Explain about Security Policies and Implementation in detail.	IV	U	E5130.4	PO1,PO2,PO5,PO7
	16.	Explain about Virtualization Security Management in detail.	IV	U	E5130.4	PO1,PO2,PO5,PO7
V	17.	Explain about Zoho Work Drive Features in detail.	V	C	E5130.5	PO1,PO2,PO5,PO7
	18.	Explain about Git Hub repository basics in detail.	V	R	E5130.5	PO1,PO2,PO5,PO7
	19.	Explain about Storage Concept of Google Big table indetail.	V	An	E5130.5	PO1,PO2,PO5,PO7
	20.	Explain about Zoho Work Drive Features in detail.	V	U	E3110.5	PO1,PO2,PO5,PO7

QUESTION PAPER SETTING

The teaching learning process and assessment are being carried out in accordance withthe revised Blooms Taxonomy. The question paper should consist of 90% questionsbased 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 ThinkingSkills (HOTs)**
	R-Remember, **U**-Understand, **AP**-Apply	**An**- Analyse, **E**-Evaluate, **C**-Create
% to be included	90 %	10 %

CTE5211 – MACHINE LEARNING

Programme Name : COMPUTER ENGINEERING
Course Code : CTE5211
Semester : V SEMESTER
Course Title : MACHINE LEARNING
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			
			Marks			Duration
	Hours/ Week	Hours / Semester	Internal Assessment	Autonomous Examination	Total	
MACHINE LEARNING	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 Machine Learning	9
II	Predictive Modelling	9
III	Supervised Learning Techniques	9
IV	Unsupervised Learning Techniques	9
V	Advanced Concepts, Trends and Applications	9
TOTAL HOURS		**45**

COURSE DESCRIPTION

With the increased availability of data from varied sources there has been increasing attention paid to the various data driven disciplines such as analytics and machine learning. Therefore, this course provides an introduction to the field of machine learning, covering fundamental concepts, algorithms, and applications. It provides a set of techniques that can automatically detect patterns in data which can then be utilized for predictions and for developing models.

COURSE OBJECTIVES

The objective of this course is to

- To learn the basic concepts of machine learning.
- To gain knowledge on supervised learning concepts and their applications.
- To understand unsupervised learning models and their applications.
- To evaluate the algorithms based on corresponding metrics identified.
- To learn other learning aspects such as reinforcement learning and other technologies

COURSE OUTCOMES

After successful completion of this course, the students should be able to	
E5211.1	Explain the basic concepts of machine learning algorithms.
E5211.2	Evaluate and compare various machine learning models.
E5211.3	Design and Develop various supervised learning models.
E5211.4	Design and Develop various unsupervised learning algorithms.
E5211.5	Apply machine learning techniques to solve real-time problems.

Pre-requisites Nil

CO-POs & PSOs Mapping matrix

CO/PO & PSO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PSO1**	**PSO2**	**PSO3**
E5211.1	3	3	3	3	2	2	3	3	3	3
E5211.2	3	3	3	3	2	2	3	3	3	3
E5211.3	3	3	3	3	2	2	3	3	3	3
E5211.4	3	3	3	3	2	2	3	3	3	3
E5211.5	3	3	3	3	2	2	3	3	3	3
Total	**15**	**15**	**15**	**15**	**10**	**10**	**15**	**15**	**15**	**15**
Correlation level	**3**	**3**	**3**	**3**	**2**	**2**	**3**	**3**	**3**	**3**

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 engineering 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.
- **Encourage Critical Analysis**: Foster an environment where students can honestly assess experiment outcomes and analyse potential sources of error in case of discrepancies.

Assessment Methodology

	Continuous Assessment (40 marks)				**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	2 Periods	2 Periods	1 Hour	3 Hours	3 Hours
Exam Marks	50	50	60	100	100
Converted to	10	10	10	10	60
Marks	40				60
Tentative Schedule	6 th Week	12th Week	13th-14th Week	16th week	

Note:

CA1 and CA2: Assessment written test should be conducted for 50 Marks 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 10 Marks=50 Marks).
- Eight questions will be asked, students should write five questions. Each unit 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 10 marks 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 (5 X 2 X 10 Marks=100 Marks)

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 ThinkingSkills (HOTs)**
	R-Remember, **U**-Understand, **AP**-Apply	**An**- Analyse, **E**-Evaluate, **C**-Create
% to be included	90 %	10 %

CTE5211– MACHINE LEARNING

CTE5211	MACHINE LEARNING	L	T	P	C
THEORY		3	0	0	3

Unit I	INTRODUCTION TO MACHINE LEARNING	[9 Hrs]
Fundamentals of Machine Learning (ML): Definition and Scope		[1Hr]
Basic Steps in Knowledge Discovery Process - Types- Applications.		[1Hr]
Data Descriptive Analysis: Mean- Median- Mode		[1Hr]
Standard Deviation-Percentile Data.		[1Hr]
Workflow of Machine Learning Application Development: Data Cleaning, Data Integration,		[1Hr]
Data Reduction, Data Transformation,		[1Hr]
Algorithms and Visualizing Results.		[1Hr]

Unit II	PREDICTIVE MODELLING	[9 Hrs]
Predictive Modelling: Basic Concepts- Needs- Types		[1Hr]
Regression: Linear Regression		[1Hr]
Logistic Regression		[1Hr]
Evaluation Metrics for Regression		[1Hr]
Frequent Pattern Mining: Needs-Associations Rules		[1Hr]
Mining-Algorithms: Apriori Algorithm		[2 Hrs]
Pattern Evaluation Measures		[2 Hrs]

Unit III	SUPERVISED LEARNING TECHNIQUES	[9 Hrs]
Classification: Basic Concepts- Needs-		[1Hr]
Types – Features		[1Hr]
Labels, Training Data, Testing Data, and models		[1Hr]
Algorithms: Decision Tree Induction		[1Hr]
Naive Bayes classifier		[1Hr]
K-Nearest Neighbors'(KNN)		[1Hr]
Model Evaluation Metrics.		[1Hr]
Ensemble Approaches: Voting Classifiers		[1Hr]
Bagging and Boosting Sampling Techniques.		[1Hr]

Unit IV	UNSUPERVISED LEARNING TECHNIQUES	[9 Hrs]
Clustering: Basic Concepts- Needs- Types		[1Hr]
Types of Data-		[1Hr]
Data similarity and Dissimilarity Measures		[1Hr]
Partitioning Method: K-Means Algorithms		[1Hr]
Hierarchical Method: Agglomerative		[1Hr]
Divisive Algorithm.		[2Hrs]
Cluster Analysis: Metrics for Evaluating Clusters.		[2Hrs]
Unit V	**ADVANCED CONCEPTS, TRENDS AND APPLICATIONS**	**[9 Hrs]**
Text Mining		[1Hr]
Web Mining		[1Hr]
Time series Analysis.		[1Hr]
Case Studies: Market Basket Analysis		[1Hr]
Recommendation System		[1Hr]
Email Spam and Malware Filtering		[1Hr]
Online Fraud Detection		[1Hr]
Weather Forecasting-		[1Hr]
Challenges and Issues in Machine Learning- Tools for Machine Learning		[1Hr]
TOTAL HOURS		**45 Hrs**

Suggested List of Students Activity:

- Presentation/Seminars by students on any recent technological developments based on the course.
- Project based Learning in emerging application areas like finance, healthcare etc.
- Periodic class/online quizzes conducted based on the course.
- Blended learning activities to explore the recent trends and developments in the field.
- Assignments on different types of learnings
- Tutorials on solving problems using machine learning.
- Flipped classroom activities to explore application areas

Text books for Reference:

S.NO	TITLE	AUTHOR	PUBLISHER WITH EDITION
1.	Introduction to Machine Learning	Ethem Alpaydin	Fourth Edition, MIT Press, 2020.
2.	Data Mining: Concepts and Techniques	Jiawei Han, Micheline Kamber, Jian Pei	Morgan,3rd Edition, Kaufmann Publishers, 2011.
3.	Python Machine Learning	Sebastain Raschka,Vahid Mirjalili	3rd Edition, Packt publishing 2019.

Web-based/Online Resources:

S.NO	WEBSITES/LINKS
1.	https://www.javatpoint.com/machine-learning
2.	https://www.kaggle.com/learn/intro-to-machine-learning
3.	https://nptel.ac.in/courses/106106139
4.	https://nptel.ac.in/courses/106106236
5.	https://egyankosh.ac.in/

MODEL QUESTION PAPER

CTE5211 – MACHINE LEARNING

Time : [3 Hrs]. **Max. Marks : 100**

PART-A (5 X 2 X 10 Marks = 100 Marks)

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 Data Descriptive Analysis in details.	I	U	E5211.1	PO1,PO2,PO5,PO7
	2.	Explain about Workflow of Machine LearningApplication Development in details.	I	R	E5211.1	PO1,PO2,PO5,PO7
	3.	Explain about machine learning ,types & application indetails.	I	R	E5211.1	PO1,PO2,PO5,PO7
	4.	Explain about Algorithms and Visualizing Resultsin details.	I	E	E5211.1	PO1,PO2,PO5,PO7
II	5.	Explain about Predictive Modeling in details.	II	R	E5211.2	PO1,PO2,PO5,PO7
	6.	Explain about Regression in details.	II	R	E5211.2	PO1,PO2,PO5,PO7
	7.	Explain about Frequent Pattern Mining in details.	II	U	E5211.2	PO1,PO2,PO5,PO7
	8.	Explain about Mining-Algorithms in details.	II	C	E5211.2	PO1,PO2,PO5,PO7
III	9.	Explain about Naive Bayes classifier in details.	III	R	E5211.3	PO1,PO2,PO5,PO7
	10.	Explain about K-Nearest Neighbors'(KNN) in details.	III	U	E5211.3	PO1,PO2,PO5,PO7
	11.	Explain about Model Evaluation Metrics in details.	III	R	E5211.3	PO1,PO2,PO5,PO7
	12.	Explain about Ensemble Approaches: Voting.	III	U	E5211.3	PO1,PO2,PO5,PO7
IV	13.	Explain about Clustering in details.	IV	U	E5211.4	PO1,PO2,PO5,PO7
	14.	Explain about Partitioning Method: K-MeansAlgorithms in details.	IV	R	E5211.4	PO1,PO2,PO5,PO7
	15.	Explain about Hierarchical Methods Agglomerative in details.	IV	U	E5211.4	PO1,PO2,PO5,PO7
	16.	Explain about Cluster Analysis: Metrics for Evaluating Clusters in details.	IV	U	E5211.4	PO1,PO2,PO5,PO7
V	17.	Explain about Text Mining and Web Mining in details.	V	R	E5211.5	PO1,PO2,PO5,PO7
	18.	Explain about Time series Analysis in details.	V	R	E5211.5	PO1,PO2,PO5,PO7

	19.	Explain about Email Spam and Malware Filtering in details.	V	An	E5211.5	PO1,PO2,PO5,PO7
	20.	Explain about Online Fraud Detection in details.	V	U	E5211.5	PO1,PO2,PO5,PO7

QUESTION PAPER SETTING

The teaching learning process and assessment are being carried out in accordance withthe revised Blooms Taxonomy. The question paper should consist of 90% questionsbased 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 ThinkingSkills (HOTs)**
	R-Remember, **U**-Understand, **AP**-Apply	**An**- Analyse, **E**-Evaluate, **C**-Create
% to be included	90 %	10 %

CTE5212 – DATA WAREHOUSING AND DATA MINING

Programme Name : COMPUTER ENGINEERING
Course Code : CTE5212
Semester : V SEMESTER
Course Title : DATA WAREHOUSING AND DATA MINING
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			
			Marks			Duration
	Hours / Week	Hours / Semester	Internal Assessment	Autonomous Examination	Total	
MACHINE LEARNING	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 Data Ware Housing	8
II	Data Warehousing Techniques And Tools	9
III	Introduction to Data Mining	10
IV	Classification Techniques	10
V	Clustering Techniques	8
TOTAL HOURS		**45**

COURSE DESCRIPTION

This course covers key aspects of data management and analysis. It starts with Data Warehousing, covering architecture, Dimensional Modeling, and ETL processes, along with tools and technologies. Then, students explore Data Warehousing Techniques, focusing on lifecycle management, metadata, and cloud-based analysis. The course then moves to Data Mining, covering fundamental concepts, preprocessing, classification, and advanced techniques like Support Vector Machines and Neural Networks. Real-world Applications and Case Studies demonstrate Data Mining's use in retail, healthcare, CRM, and fraud detection.

COURSE OBJECTIVES

The objective of this course is to enable the student to

- Learn Data Warehousing fundamentals.
- Acquaint themselves with various Data Warehousing tools and technologies.
- Understand the Data Warehousing lifecycle, emphasizing quality, metadata Management, and cloud analysis.
- Explore core Data Mining concepts, preprocessing, and classification/clustering methods.
- Master advanced Data Mining techniques.
- Analyze real-world Data Mining applications in different sectors.

COURSE OUTCOMES

After successful completion of this course, the students should be able to	
E5212.1	Understand Data Warehousing principles, architecture, and ETL processes, including Dimensional Modeling.
E5212.2	Utilize tools and technologies proficiently for Data Warehousing.
E5212.3	Develop skills in core Data Mining concepts.
E5212.4	Master advanced Data Mining techniques like Support Vector Machines, Neural Networks, Text Mining, and DBSCAN for in-depth analysis.
E5212.5	Apply Data Warehousing and Data Mining in real-world scenarios.

Pre-requisites Nil

CO-POs & PSOs Mapping matrix

CO/PO & PSO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PSO1**	**PSO2**	**PSO3**
E5212.1	3	3	3	3	2	2	3	3	3	3
E5212.2	3	3	3	3	2	2	3	3	3	3
E5212.3	3	3	3	3	2	2	3	3	3	3
E5212.4	3	3	3	3	2	2	3	3	3	3
E5212.5	3	3	3	3	2	2	3	3	3	3
Total	**15**	**15**	**15**	**15**	**10**	**10**	**15**	**15**	**15**	**15**
Correlation level	**3**	**3**	**3**	**3**	**2**	**2**	**3**	**3**	**3**	**3**

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 engineering 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.
- **Encourage Critical Analysis:** Foster an environment where students can honestly assess experiment outcomes and analyze potential sources of error in case of discrepancies.

Assessment Methodology

	Continuous Assessment (40 marks)				**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	2 Periods	2 Periods	1 Hour	3 Hours	3 Hours
Exam Marks	50	50	60	100	100
Converted to	10	10	10	10	60
Marks	40				60
Tentative Schedule	6th Week	12th Week	13th-14th Week	16th week	

Note:

CA1 and CA2: Assessment written test should be conducted for 50 Marks for two units. The marks scored will be converted to 10 Marks for the internal assessment.

CA1 and CA2, Assessment test should be conducted for two units as below

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

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 10 marks 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 (5 X 2 X 10 Marks=100 Marks)

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 ThinkingSkills (HOTs)**
	R-Remember, **U**-Understand, **AP**-Apply	**An**- Analyse, **E**-Evaluate, **C**-Create
% to be included	90 %	10 %

CTE5212– DATA WAREHOUSING AND DATA MINING

CTE5212	DATA WAREHOUSING AND DATA MINING	L	T	P	C
THEORY		3	0	0	3

Unit I	INTRODUCTION TO DATA WARE HOUSING	[8 Hrs]
Introduction to Data Warehousing: Concepts and Architecture		[1Hr]
Data Warehouse Design: Dimensional Modeling,		[1Hr]
Fact, and Dimension Tables		[2 Hrs]
ETL Processes: Data Extraction, Transformation and Loading		[2 Hrs]
Data Warehouse Implementation: Tools and Technologies		[2 Hrs]
Unit II	**DATA WAREHOUSING TECHNIQUES AND TOOLS**	**[9 Hrs]**
Data Warehouse Lifecycle: Planning,		[2 Hrs]
Design, Implementation, and Maintenance		[2 Hrs]
Data Quality and Metadata Management		[2 Hrs]
OLAP and Multidimensional Data Analysis		[1Hr]
Data Warehousing in Cloud Environments		[2 Hrs]
Unit III	**INTRODUCTION TO DATA MINING**	**[10Hrs]**
Fundamentals of Data Mining: Concepts,		[2 Hrs]
Tasks, and Challenges		[2 Hrs]
Data Preprocessing: Data Cleaning,		[2 Hrs]
Integration, Transformation, and Reduction Classification Techniques: Decision Trees,		[1Hr]
Naive Bayes, and k-Nearest Neighbors		[1Hr]
Clustering Techniques: K-means, Hierarchical Clustering		[1Hr]
Association Rule Mining and Frequent Pattern Analysis		[1Hr]
Unit IV	**CLASSIFICATION TECHNIQUES**	**[10 Hrs]**
Introduction to Classification: supervised learning and classification		[2 Hrs]
Decision Trees: ID3, C4.5,and CART algorithms,		[2 Hrs]
handling overfitting and pruning techniques		[1Hr]
Naive Bayes Classifier: Principles of Bayesian classification,		[1Hr]
Naive Bayes algorithm for text classification		[2Hrs]
k-Nearest Neighbors (KNN): KNN algorithm,		[1Hr]
Distance metrics and parameter selection		[1Hr]
Unit IV	**CLUSTERING TECHNIQUES**	**[8 Hrs]**

Introduction to Clustering, Basics concepts of clustering Partitioning Methods: K-Means clustering Hierarchical clustering: Agglomerative and Divisive Hierarchical clustering Methods Comparison between partitioning and Hierarchical clustering approaches	[2 Hrs] [2 Hrs] [2 Hrs] [1Hr] [1Hr]
TOTAL HOURS	**45 Hrs**

Suggested List of Students Activity:

- Presentation/Seminars by students on any recent technological developments based on the course.
- Periodic class/online quizzes conducted based on the course.
- Blended learning activities to explore the recent trends and developments in the field.

Text books for Reference:

S.NO	TITLE	AUTHOR	PUBLISHER WITH EDITION
1.	Data Warehousing Concepts, Techniques,Products and Applications	C.S.R.Prabhu	Third Edition, PHILearning, 2008
2.	Data Warehouses andOLAP Concepts, Architectures, and Solutions	Robert Wrembel	1st Edition IRM Press, 2007
3.	Data Mining Concepts,Models, Methods, and Algorithms	Mehmed Kantardzic	2nd Edition, Wiley, 2011

Web-based/Online Resources:

S.NO	WEBSITES/LINKS
1.	https://www.geeksforgeeks.org/data-mining
2.	https://www.javatpoint.com/data-mining-cluster-analysis
3.	https://www.tutorialspoint.com/dwh/dwh_schemas.htm

MODEL QUESTION PAPER

CTE5212 – DATA WAREHOUSING AND DATA MINING

Time : [3 Hrs]. **Max. Marks : 100**

PART-A (5 X 2 X 10 Marks = 100 Marks)

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 Data Warehousing in details.	I	U	E5212.1	PO1,PO2,PO5,PO7
	2.	Explain about Data Warehouse Design in details.	I	R	E5212.1	PO1,PO2,PO5,PO7
	3.	Explain about Data Warehousing Architecture in details.	I	R	E5212.1	PO1,PO2,PO5,PO7
	4.	Explain about ETL Processes in details.	I	E	E5212.1	PO1,PO2,PO5,PO7
II	5.	Explain about Data Warehouse Lifecycle in details.	II	R	E5212.2	PO1,PO2,PO5,PO7
	6.	Explain about Data Quality and Metadata Managementin details.	II	R	E5212.2	PO1,PO2,PO5,PO7
	7.	Explain about Data Warehousing in Cloud Environmentsin details.	II	U	E5212.2	PO1,PO2,PO5,PO7
	8.	Explain about OLAP and Multidimensional Data indetails.	II	R	E5212.2	PO1,PO2,PO5,PO7
III	9.	Explain about Naive Bayes in details.	III	R	E5212.3	PO1,PO2,PO5,PO7
	10.	Explain about Data Preproces sing in details.	III	U	E5212.3	PO1,PO2,PO5,PO7
	11.	Explain about k-Nearest Neighbors in details.	III	C	E5212.3	PO1,PO2,PO5,PO7
	12.	Explain about K-means, Hierarchical Clustering in details.	III	U	E5212.3	PO1,PO2,PO5,PO7
IV	13.	Explain about Decision Trees in details.	IV	U	E5212.4	PO1,PO2,PO5,PO7
	14.	Explain about Principles of Bayesian classification indetails.	IV	R	E5212.4	PO1,PO2,PO5,PO7
	15.	Explain about Naive Bayes algorithm for text	IV	U	E5212.4	PO1,PO2,PO5,PO7
	16.	Explain about KNN algorithm in details.	IV	U	E5212.4	PO1,PO2,PO5,PO7
V	17.	Explain about concepts of clustering in details.	V	R	E5212.5	PO1,PO2,PO5,PO7
	18.	Explain about K-Means clustering in details.	V	R	E5212.5	PO1,PO2,PO5,PO7
	19.	Explain about hierarchical clustering in details.	V	An	E5212.5	PO1,PO2,PO5,PO7
	20.	Explain about Data Warehousing in details.	V	U	E5212.5	PO1,PO2,PO5,PO7

QUESTION PAPER SETTING

The teaching learning process and assessment are being carried out in accordance withthe 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 ThinkingSkills (HOTs)
	R-Remember, **U**-Understand, **AP**-Apply	**An**- Analyse, **E**-Evaluate, **C**-Create
% to be included	90 %	10 %

CTE5213 – ETHICAL HACKING

Programme Name : COMPUTER ENGINEERING
Course Code : CTE5213
Semester : V SEMESTER
Course Title : ETHICAL HACKING
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	
ETHICAL HACKING	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 Ethical Hacking	9
II	Reconnaissance & Foot Printing	9
III	Scanning & Sniffing	7
IV	Enumeration, Vulnerabiliy Analysis & Malwares	10
V	Social Engineering & Web Application Security	10
TOTAL HOURS		**45**

COURSE DESCRIPTION

This course designed to provide individuals with the knowledge and skills required to understand, identify, and mitigate security vulnerabilities and threats in computer systems, networks, and applications. This course introduces the concepts of Ethical Hacking and gives the learner the opportunity to learn about different tools and techniques in Ethical hacking and security and to identify and analyze the stages an ethical hacker requires to take in order to compromise a target system as well as will apply preventive, corrective and protective measures to safeguard the system.

COURSE OBJECTIVES

- Learn the fundamentals of ethical hacking principles, methodologies, and terminology, distinguishing between ethical and malicious hacking practices.
- Learn to identify and assess vulnerabilities and weaknesses in computer systems, networks, and applications through various reconnaissance techniques.
- Explore various hacking tools and techniques used by ethical hackers.
- Learn network scanning and penetration testing to identify security flaws and assess the effectiveness of defense mechanisms.
- Understand key information security concepts and their relevance to ethical hacking.
- Explore common attack vectors and learn how to defend against them.
- Learn how to secure systems and networks by implementing intrusion detection and prevention systems, firewalls, and encryption.

COURSE OUTCOMES

After successful completion of this course, the students should be able to	
E5213.1	Gain a solid understanding of network basics and basic principles of information security
E5213.2	Be familiarized with various types of cyber attacks, such as malware, social engineering, and denial-of-service (DoS), as well as common vulnerabilities like SQL injection and cross-site scripting (XSS).
E5213.3	Identify and assess vulnerabilities in computer systems, networks and applications through reconnaissance techniques, vulnerability scanning, and analysis.
E5213.4	Develop practical skills in exploiting security weaknesses within legal and ethical boundaries
E5213.5	Develop practical skills in using a variety of tools and techniques employed by ethical hackers.

Pre-requisites: Basic Knowledge of Computers and networking fundamentals

CO-POs & PSOs Mapping matrix

CO/PO & PSO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PSO1**	**PSO2**	**PSO3**
E5213.1	3	3	3	3	2	2	3	3	3	3
E5213.2	3	3	3	3	2	2	3	3	3	3
E5213.3	3	3	3	3	2	2	3	3	3	3
E5213.4	3	3	3	3	2	2	3	3	3	3
E5213.5	3	3	3	3	2	2	3	3	3	3
Total	**15**	**15**	**15**	**15**	**10**	**10**	**15**	**15**	**15**	**15**
Correlation level	**3**	**3**	**3**	**3**	**2**	**2**	**3**	**3**	**3**	**3**

Correlation level 1 – Slight (low)
Correlation level 2 – Moderate (Medium)
Correlation level 3 – Substantial (high)

Instructional Strategy:

- Provide students with hands-on experience in simulated environments where they can practice hacking techniques ethically.
- Integrate case studies and real-life scenarios to illustrate ethical dilemmas, ethical hacking methodologies, and the consequences of unethical behavior.
- Implement regular quizzes, and practical exercises to evaluate students' understanding of ethical hacking concepts, tools and techniques.
- Throughout the course, a theory-demonstrate-practice-activity strategy may be used to ensure that learning is outcome and employability-based.

Assessment Methodology

	Continuous Assessment (40 marks)				**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	2 Periods	2 Periods	1 Hour	3 Hours	3 Hours
Exam Marks	50	50	60	100	100
Converted to	10	10	10	10	60
Marks	40				60
Tentative Schedule	6th Week	12th Week	13th-14th Week	16th week	

Note:

- **CA1 and CA2:** Assessment written test should be conducted for 50 Marks for two units. The marks scored will be converted to 10 Marks for the internal assessment.

CA1 and CA2, Assessment test should be conducted for two units as below

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

- **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 10 marks 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 ExaminationTheory Exam

PART - A (5 X 2 X 10 Marks=100 Marks)

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 withthe revised Blooms Taxonomy. The question paper should consist of 90% questionsbased 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 ThinkingSkills (HOTs)**
	R-Remember, **U**-Understand, **AP**-Apply	**An**- Analyse, **E**-Evaluate, **C**-Create
% to be included	90 %	10 %

CTE5213– ETHICAL HACKING

CTE5213	ETHICAL HACKING	L	T	P	C
THEORY		3	0	0	3

Unit I	INTRODUCTION TO ETHICAL HACKING	[9 Hrs]
Introduction to ethical hacking: Types of hacking-		[1Hr]
advantages, disadvantages and purpose of hacking-		[1Hr]
Types of hackers		[1Hr]
Difference between ethical and non-ethical hacking		[1Hr]
Ethical Hacking Terminologies-		[1Hr]
Tools and Skills		[1Hr]
Phases of hacking-Laws of the Land		[1Hr]
Information Security Overview- CIA triad (Confidentiality, Integrity, Availability)		[1Hr]
The Indian IT Act 2000 and Amendments to the Indian IT Act (2008).		[1Hr]

Unit II	RECONNAISSANCE & FOOT PRINTING	[9 Hrs]
Reconnaissance: Active Reconnaissance- Passive Reconnaissance		[1Hr]
Foot printing: Domain Name Information		[1Hr]
Finding IP Address-		[1Hr]
Finding Hosting Company		[1Hr]
IP Address Ranges		[1Hr]
History of the Website.		[1Hr]
Fingerprinting: Banner Grabbing application fingerprinting		[1Hr]
web application scanning, and DNS fingerprinting.		[1Hr]
DNS Enumeration.		[1Hr]

Unit III	SCANNING & SNIFFING	[7 Hrs]
Scanning: port scanning- Ping Sweep-Scanning Networks		[1Hr]
Network discovery Vulnerability		[1Hr]
Scanning Sniffing: Introduction- Wire trapping and its types		[1Hr]
packet sniffing-ARP spoofing		[1Hr]
DNS spoofing and MAC flooding		[1Hr]
active and passive sniffing, wi-fi sniffing- session hijacking		[1Hr]
Man-In The Middle attack, sniffing counter measures, sniffing detection techniques		[1Hr]

Unit IV	ENUMERATION, VULNERABILIY ANALYSIS & MALWARES	[10Hrs]
Enumeration- System enumeration		[1Hr]
User enumeration- Service enumeration		[1Hr]
Vulnerability Analysis- Vulnerability assessment		[1Hr]

Common vulnerabilities and exposures (CVE)- Risk assessment.		[1Hr]
TCP/IP Hijacking- EMAIL Hijacking -Password Hacking		[1Hr]
Dictionary Attack-Hybrid Dictionary Attack-Brute-Force Attack-Rainbow		[1Hr]
Tables- System Hacking- Password cracking		[1Hr]
Privilege escalation- Maintaining access.		[1Hr]
Malware Threats: Types of malware (Types of viruses, worms, trojans, etc.)		[1Hr]
Anti-malware tools and techniques.		[1Hr]
Unit V	**SOCIAL ENGINEERING & WEB APPLICATION SECURITY**	**[10 Hrs]**
Social Engineering: Types of social engineering attacks,		[2 Hrs]
Prevention and awareness Denial of Service (DoS) and		[1Hr]
Distributed Denial of Service (DDoS)		[1Hr]
Attacks DoS and DDoS concepts		[1Hr]
DoS and DDoS attack techniques Mitigation strategies Web		[1Hr]
Application Security Common web vulnerabilities		[1Hr]
SQL injection- XSS, CSRF Introduction to Pen Testing: need for pen testing, types and		[1Hr]
techniques of pen testing, phases of pen testing.		[2Hrs]
TOTAL HOURS		**45 Hrs**

Suggested List of Students Activity:

- Virtual environments can be set up to practice hacking techniques in a controlled environment and students can be assigned real-world scenarios where they need to perform penetration tests on simulated corporate networks, web applications, or wireless networks.
- Students can be provided with vulnerable systems to exploit. Reverse engineering techniques can be taught to students by providing them with malware samples or binary executables to analyze

Text books for Reference:

S.NO	TITLE	AUTHOR	PUBLISHER WITH EDITION
1.	The Basics of Hacking and Penetration Testing: Ethical Hacking and Penetration Testing Made easy	Patrick Engebretson	2nd Edition, Syngress, 2013.
2.	Computer Security Principles and Practice	William Stallings, Lawrie Brown	Fourth Edition,Pearson Education, 2017.
3.	Grey Hat Hacking: The Ethical Hacker's Handbook	Allen Harper, Shon Harris, JonathanNess, Chris Eagle, Gideon Lenkey, and Terron Williams	3rd Edition, The McGraw-Hill Companies,2 011.

Web-based/Online Resources:

S.NO	WEBSITES/LINKS
1.	https://www.udemy.com/topic/ethical-hacking/free/
2.	https://nielit.gov.in/gorakhpur/sites/default/files/Gorakhpur/B01_Ethical_Hacking_2 20125.pdf
3.	https://archive.nptel.ac.in/courses/106/105/106105217/
4.	https://mu.ac.in/wp-content/uploads/2023/08/TYBSC-CS-Ethical-hacking.pdf
5.	https://aaplesarkar.maharashtra.gov.in/file/AapleSarkarCyberSecurityAwareness Guide.pd

MODEL QUESTION PAPER

CTE5213 – ETHICAL HACKING

Time : [3 Hrs]. **Max. Marks : 100**

PART-A (5 X 2 X 10 Marks = 100 Marks)

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 ethical hacking in details.	I	U	E5213.1	PO1,PO2,PO5,PO7
	2.	Difference between ethical and non-ethical hackingin details.	I	R	E5213.1	PO1,PO2,PO5,PO7
	3.	Explain about Ethical Hacking Terminologies in details.	I	R	E5213.1	PO1,PO2,PO5,PO7
	4.	Explain about CIA triad in details.	I	E	E5213.1	PO1,PO2,PO5,PO7
II	5.	Explain about Foot printing in details.	II	R	E5213.2	PO1,PO2,PO5,PO7
	6.	Explain about Reconnaissance in details.	II	R	E5213.2	PO1,PO2,PO5,PO7
	7.	Explain about web application scanning in details.	II	U	E5213.2	PO1,PO2,PO5,PO7
	8.	Explain about DNS fingerprinting in details.	II	R	E5213.2	PO1,PO2,PO5,PO7
III	9.	Explain about Scanning in details.	III	R	E5213.3	PO1,PO2,PO5,PO7
	10.	Explain about Wire trapping and its types in details.	III	E	E5213.3	PO1,PO2,PO5,PO7
	11.	Explain wi-fi sniffing- session hijacking in details.	III	R	E5213.3	PO1,PO2,PO5,PO7
	12.	Explain about sniffing detection techniques in details.	III	U	E5213.3	PO1,PO2,PO5,PO7
IV	13.	Explain about Enumeration in details.	IV	U	E5213.4	PO1,PO2,PO5,PO7
	14.	Explain about Malware Threats in details.	IV	R	E5213.4	PO1,PO2,PO5,PO7
	15.	Explain about Vulnerability Analysis in details.	IV	U	E5213.4	PO1,PO2,PO5,PO7
	16.	Explain about Anti-malware tools and techniques in details.	IV	U	E5213.4	PO1,PO2,PO5,PO7
V	17.	Explain about Social Engineering in details.	V	R	E5213.5	PO1,PO2,PO5,PO7
	18.	Explain about Web Application Security in details.	V	R	E5213.5	PO1,PO2,PO5,PO7
	19.	Explain about DoS and DDoS attack techniques in details.	V	An	E5213.5	PO1,PO2,PO5,PO7
	20.	Explain about Pen Testing in details.	V	U	E5213.5	PO1,PO2,PO5,PO7

QUESTION PAPER SETTING

The teaching learning process and assessment are being carried out in accordance withthe 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 ThinkingSkills (HOTs)**
	R-Remember, **U**-Understand, **AP**-Apply	**An**- Analyse, **E**-Evaluate, **C**-Create
% to be included	90 %	10 %

CTE5214 – AGILE PRODUCT DEVELOPMENT

Programme Name : COMPUTER ENGINEERING
Course Code : CTE5214
Semester : V SEMESTER
Course Title : AGILE PRODUCT 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			
			Marks			Duration
	Hours/ Week	Hours / Semester	Internal Assessment	Autonomous Examination	Total	
AGILE PRODUCT 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	Introduction To Software Engineering	9
II	Agile Methodology	9
III	Agile Processes	9
IV	Agility in Knowledge Management	9
V	Agility in Requirements Engineering & Quality Assurance	9
TOTAL HOURS		**45**

COURSE DESCRIPTION

Agile Product Development is a model in Software Engineering, which deals with reliability and quality assurance of the software under development. It provides framework for development of quality software product. The course covers important aspects of product development such as software lifecycle, requirement analysis and documentation, characteristics of good design, design techniques, testing, software implementation, maintenance etc. This course also provides the students with a theoretical understanding of agile software development practices and how small teams can apply them to create high-quality software.

COURSE OBJECTIVES

The student should be made to

- Define Software Engineering and to understand the phases in a software project.
- Understand different software development models.
- Understand the benefits and pitfalls of working in an agile team.
- Understand agile development and testing.
- To learn how the agility is incorporated in requirement engineering and quality assurance.

COURSE OUTCOMES

After successful completion of this course, the students should be able to	
E5214.1	Explain different software development models
E5214.2	Interpret the concept of agile software engineering and its advantages in software development.
E5214.3	Analyze the core practices behind the given agile methodologies.
E5214.4	Interpret how agility is incorporated in Knowledge Management
E5214.5	Explain and Make use of various tools available to agile teams to facilitate the project and to perform quality assurance in agile team

Pre-requisites: Nil

CO-POs & PSOs Mapping matrix

CO/PO & PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
E5214.1	3	3	3	3	2	2	3	3	3	3
E5214.2	3	3	3	3	2	2	3	3	3	3
E5214.3	3	3	3	3	2	2	3	3	3	3
E5214.4	3	3	3	3	2	2	3	3	3	3
E5214.5	3	3	3	3	2	2	3	3	3	3
Total	**15**	**15**	**15**	**15**	**10**	**10**	**15**	**15**	**15**	**15**
Correlation level	**3**	**3**	**3**	**3**	**2**	**2**	**3**	**3**	**3**	**3**

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 engineering 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.
- **Encourage Critical Analysis:** Foster an environment where students can honestly assess experiment outcomes and analyze potential sources of error in case of discrepancies.

Assessment Methodology

	Continuous Assessment (40 marks)				**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	2 Periods	2 Periods	1 Hour	3 Hours	3 Hours
Exam Marks	50	50	60	100	100
Converted to	10	10	10	10	60
Marks	40				60
Tentative Schedule	6th Week	12th Week	13th-14th Week	16th week	

Note:

- **CA1 and CA2:** Assessment written test should be conducted for 50 Marks for two units. The marks scored will be converted to 10 Marks for the internal assessment.

  CA1 and CA2, Assessment test should be conducted for two units as below
  - PART-A:(5X 10 Marks=50 Marks).
  - Eight questions will be asked, students should write five questions. Each unit four questions can be asked.
- **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 10 marks 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 (5 X 2 X 10 Marks=100 Marks)

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 withthe revised Blooms Taxonomy. The question paper should consist of 90% questionsbased 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 ThinkingSkills (HOTs)**
	R-Remember, **U**-Understand, **AP**-Apply	**An**- Analyse, **E**-Evaluate, **C**-Create
% to be included	90 %	10 %

CTE5214– AGILE PRODUCT DEVELOPMENT

CTE5214	AGILE PRODUCT DEVELOPMENT	L	T	P	C
THEORY		3	0	0	3

Unit I	INTRODUCTION TO SOFTWARE ENGINEERING	[9 Hrs]
Basics of Software Engineering : Need for Software		[1Hr]
Engineering –Definition –		[1Hr]
Software Characteristics –		[1Hr]
Program versus Software Products-		[1Hr]
Software Development Life Cycle Models:		[1Hr]
Introduction –Waterfall Model –		[1Hr]
Prototyping model –		[1Hr]
Spiral Model –		[1Hr]
Iterative Enhancement model –Agile model.		[1Hr]

Unit II	AGILE METHODOLOGY	[9 Hrs]
Agile Software Development –		[1Hr]
Traditional Model vs. Agile Model – Classification of		[1Hr]
Agile Methods – Agile Manifesto and Principles –		[1Hr]
Agile Project Management –		[1Hr]
Agile Team Interactions –		[1Hr]
Ethics in Agile Teams – Agile Documentations –		[1Hr]
Agile Drivers,		[1Hr]
Capabilities and Values.		[1Hr]
		[1Hr]

Unit III	AGILE PROCESSES	[9Hrs]
Lean Production – SCRUM-		[2Hrs]
Crystal –Feature Driven Development-		[2Hrs]
Adaptive Software Development –		[1Hr]
Extreme Programming: Method		[1Hr]
Overview – Lifecycle –		[1Hr]
Work Products,		[1Hr]
Roles and Practices		[1Hr]

Unit IV	AGILITY IN KNOWLEDGE MANAGEMENT	[9Hrs]

Agile Information Systems –	[1Hr]
Agile Decision Making –	[1Hr]
Earl_S Schools of KM –	[1Hr]
Institutional Knowledge Evolution Cycle:	[1Hr]
Development, Acquisition,	[1Hr]
Refinement, Distribution,	[1Hr]
Deployment, Leveraging –	[1Hr]
KM in Software Engineering –	[1Hr]
Story Card Maturity Model (SMM).	[1Hr]
Unit IV **AGILITY IN REQUIREMENTS ENGINEERING & QUALITY ASSURANCE**	**[9 Hrs]**
Impact of Agile Processes in Requirements	[2 Hrs]
Engineering(RE)–Overview of RE Using Agile –	[1Hr]
Managing Unstable Requirements –	[1Hr]
Requirements Elicitation —	[1Hr]
Requirements Management in Agile Environment-	[1Hr]
Agile Requirements Prioritization.–	[1Hr]
Agile Metrics –-	[1Hr]
Agility in Quality Assurance.	[1Hr]
TOTAL HOURS	**45 Hrs**

Suggested List of Students Activity:

- Presentation/Seminars by students on any recent technological developments in Software Development.
- Blended learning activities to explore the recent trends and developments in the field.
- Role play and case studies

Text books for Reference:

S.NO	TITLE	AUTHOR	PUBLISHER WITH EDITION
1.	Software Engineering –A Practitioner's Approach	Roger S. Pressman	Seventh Edition, McGraw Hill International Edition, 2010
2.	Agile Development, with Scrum	Ken Schawber, Mike Beedle	International Edition, Pearson.
3.	Agile Software Development, Principles, Patterns and Practices,	Robert C. Martin	First International Edition, Prentice Hall,2014

Web-based/Online Resources:

S.NO	WEBSITES/LINKS
1.	https://clearbridgemobile.com/complete-guideagile-software-development/
2.	https://agileken.com/agilefundamentals-ebook/
3.	https://www.edx.org/course/agile-software-development
4.	https://dl.ebooksworld.ir/motoman/Pearson.Agile.Software.Development.Principles Patterns.and.Practices.www.EBooks World.ir.pdf
5.	https://www.coursera.org/learn/agile-software-development

MODEL QUESTION PAPER

CTE5214 – AGILE PRODUCT DEVELOPMENT

Time : [3 Hrs]. **Max. Marks : 100**

PART-A (5 X 2 X 10 Marks = 100 Marks)

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

S.No		Questions	Unit	Bloom's	Course	Program
I	1.	Explain about the Need and Characterists for SoftwareEngineering.	I	U	E5214.1	PO1,PO2,PO5,PO7
	2.	Explain Waterfall Model and Agile model.	I	R	E5214.1	PO1,PO2,PO5,PO7
	3.	Describe the Software Development Life Cycle	I	R	E5214.1	PO1,PO2,PO5,PO7
	4.	What do you mean by Iterative Enhancement model	I	E	E5214.1	PO1,PO2,PO5,PO7
II	5.	Explain about the Agile Project Management.	II	R	E5214.2	PO1,PO2,PO5,PO7
	6.	Explain about the Ethics in Agile Teams	II	R	E5214.2	PO1,PO2,PO5,PO7
	7.	Briefly explain about the Agile Drivers, Capabilities andValues.	II	U	E5214.2	PO1,PO2,PO5,PO7
	8.	Write the classification of Agile Methods	II	R	E5214.2	PO1,PO2,PO5,PO7
III	9.	Explain about the Lean Production	III	R	E5214.3	PO1,PO2,PO5,PO7
	10.	What are the Feature Driven Development	III	U	E5214.3	PO1,PO2,PO5,PO7
	11.	Describe about the SCRUM- Crystal	III	R	E5214.3	PO1,PO2,PO5,PO7
	12.	Briefly explain about the Extreme Programming with its methods, roles, work products and practices.	III	C	E5214.3	PO1,PO2,PO5,PO7
IV	13.	Describe the process for Agile Decision Making.	IV	U	E5214.4	PO1,PO2,PO5,PO7
	14.	Briefly Explain about the Institutional KnowledgeEvolution Cycle.	IV	R	E5214.4	PO1,PO2,PO5,PO7
	15.	Explain about the KM in Software	IV	U	E5214.4	PO1,PO2,PO5,PO7
	16.	Explain about (SMM).	IV	U	E5214.4	PO1,PO2,PO5,PO7
V	17.	What are the Impact of Agile Processes in RequirementsEngineering(RE)	V	R	E5214.5	PO1,PO2,PO5,PO7
	18.	Explain about the Requirements Management in AgileEnvironment	V	R	E5214.5	PO1,PO2,PO5,PO7

	19.	Briefly explain Agility in Quality Assurance	V	An	E5214.5	PO1,PO2,PO5,PO7
	20.	How to Managing Unstable Requirements	V	U	E5214.5	PO1,PO2,PO5,PO7

QUESTION PAPER SETTING

The teaching learning process and assessment are being carried out in accordance withthe revised Blooms Taxonomy. The question paper should consist of 90% questionsbased 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 ThinkingSkills (HOTs)**
	R-Remember, **U**-Understand, **AP**-Apply	**An**- Analyse, **E**-Evaluate, **C**-Create
% to be included	90 %	10 %

CTE5215– ARTIFICIAL INTELLIGENCE

Programme Name : COMPUTER ENGINEERING
Course Code : CTE5215
Semester : V SEMESTER
Course Title : ARTIFICIAL INTELLIGENCE
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			
			Marks			Duration
	Hours/ Week	Hours / Semester	Internal Assessment	Autonomous Examination	Total	
ARTIFICIAL INTELLIGENCE	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 Artificial Intelligence	9
II	Problem Solving Using Search Techniques	9
III	Knowledge Representation and Optimization Techniques	9
IV	Game Playing and Constraint Satisfaction Problems	9
V	Intelligent Agents	9
TOTAL HOURS		**45**

COURSE DESCRIPTION

Artificial Intelligence has grown to be very popular in today's world. The amount of data that is generated, by both humans and machines, far outpaces humans' ability to absorb, interpret, and make complex decisions based on that data. Artificial intelligence forms the basis for all computer learning and is the future of all complex decision making. Computers are extremely efficient at calculating these combinations and permutations to arrive at the best decision. Artificial intelligence and its logical evolution of machine learning are the foundational future of business decision making.

COURSE OBJECTIVES

On completion of the syllabus contents, the students must be able to

- Describe and use the basic concepts of intelligent agents.
- Design a knowledge-based system.
- Develop general-purpose problem-solving agents, logical reasoning agents, and agents that reason under uncertainty.
- Identify systems with Artificial Intelligence.
- Choose appropriate algorithms for solving given AI problems.
- Design and implement logical reasoning agents.
- Design and implement agents that can reason under uncertainty.
- Apply Artificial Intelligence techniques for problem solving.

COURSE OUTCOMES

After successful completion of this course, the students should be able to	
E5215.1	Remember the basic concepts of Artificial intelligence.
E5215.2	Solve basic AI based problems.
E5215.3	Define the concept of Artificial Intelligence.
E5215.4	Apply AI techniques to real-world problems to develop intelligent Systems.
E5215.5	Select appropriately from a range of techniques when implementing Intelligent systems.

Pre-requisites: Nil

CO-POs & PSOs Mapping matrix

CO/PO & PSO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PSO1**	**PSO2**	**PSO3**
E5214.1	3	3	3	3	2	2	3	3	3	3
E5214.2	3	3	3	3	2	2	3	3	3	3
E5214.3	3	3	3	3	2	2	3	3	3	3
E5214.4	3	3	3	3	2	2	3	3	3	3
E5214.5	3	3	3	3	2	2	3	3	3	3
Total	**15**	**15**	**15**	**15**	**10**	**10**	**15**	**15**	**15**	**15**
Correlation level	**3**	**3**	**3**	**3**	**2**	**2**	**3**	**3**	**3**	**3**

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 engineering 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.
- **Encourage Critical Analysis:** Foster an environment where students can honestly assess experiment outcomes and analyze potential sources of error in case of discrepancies.

Assessment Methodology

	Continuous Assessment (40 marks)				**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	2 Periods	2 Periods	1 Hour	3 Hours	3 Hours
Exam Marks	50	50	60	100	100
Converted to	10	10	10	10	60
Marks	40				60
Tentative Schedule	6th Week	12th Week	13th-14th Week	16th week	

Note:

- **CA1 and CA2:** Assessment written test should be conducted for 50 Marks for two units. The marks scored will be converted to 10 Marks for the internal assessment.

  CA1 and 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. Each unit four questions can be asked.

- **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 10 marks 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 (5 X 2 X 10 Marks=100 Marks)

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 withthe revised Blooms Taxonomy. The question paper should consist of 90% questionsbased 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 ThinkingSkills (HOTs)**
	R-Remember, **U**-Understand, **AP**-Apply	**An**- Analyse, **E**-Evaluate, **C**-Create
% to be included	90 %	10 %

CTE5215– ARTIFICIAL INTELLIGENCE

CTE5215	ARTIFICIAL INTELLIGENCE	L	T	P	C
THEORY		3	0	0	3

Unit I	INTRODUCTION TO ARTIFICIAL INTELLIGENCE	[9 Hrs]
Introduction to AI – Definition - Goals of AI		[1Hr]
Applications of AI - History of AI		[1Hr]
Types of AI -Components of AI		[1Hr]
Human vs Machine Intelligence –		[1Hr]
Agents - Rationality –		[1Hr]
Structure of Agents		[1Hr]
Problem Solving Agent		[1Hr]
Types of Agents –		[1Hr]
Environments-Nature of Environments		[1Hr]

Unit II	PROBLEM SOLVING USING SEARCH TEHNIQUES	[9 Hrs]
Search Algorithms: Evaluating Search Strategies		[2 Hrs]
Breadth-first search		[1Hr]
Uniform cost search		[1Hr]
Depth first search		[1Hr]
Bidirectional Search.		[1Hr]
Heuristic Search Strategies: Best First Search		[1Hr]
Heuristic Search		[1Hr]
A* Search		[1Hr]

Unit III	KNOWLEDGE REPRESENTATION AND OPTIMIZATION TECHNIQUES	[9Hrs]
Knowledge Representation: Knowledge-Based Agents,		[2Hrs]
Logic Propositional Logic: A Very Simple Logic,		[2Hrs]
Ontological Engineering		[1Hr]
Categories and Objects, Events,		[1Hr]
Mental Events and Mental Objects		[1Hr]
Reasoning Systems for Categories **Optimization Algorithms:** Hill Climbing		[1Hr]
Local Beam Search and Genetic Algorithm		[1Hr]

Unit IV	GAME PLAYING AND CONSTRAINT SATISFACTION PROBLEMS	[9Hrs]

Game Theory: The Mini-Max search	[2Hrs]
Alpha-Beta Search-	[1Hr]
Introduction to CSPs Constraint Networks	[1Hr]
Binary and Non-Binary Constraints	[1Hr]
Constraint Propagation –	[1Hr]
Backtracking Search for CSP	[1Hr]
Local Search for CSP–	[1Hr]
Structure of CSP.	[1Hr]
Unit IV **INTELLIGENT AGENTS**	**[9 Hrs]**
Knowledge-Based Agents –	[2 Hrs]
Propositional Logic	[1Hr]
Propositional Theorem Proving –	[1Hr]
Propositional Model Checking	[1Hr]
Agents Based on Propositional Logic.	[1Hr]
Architecture for Intelligent Agents	[1Hr]
Agent communication—	[1Hr]
Argumentation among Agents.	[1Hr]
TOTAL HOURS	**45 Hrs**

Suggested List of Students Activity:

- Presentation/Seminars by students on any recent technological developments based on the course.
- Periodic class Assessments conducted based on the course.
- Blended learning activities to explore the recent trends and developments in the field.

Text books for Reference:

S.NO	TITLE	AUTHOR	PUBLISHER WITH EDITION
1.	Artificial intelligence, A modern Approach	Stuart Russel, Peter Norvig	2nd edition , Prentice Hall, 2007
2.	Artificial Intelligence	Rich, Kevin Knight, Shiv Shankar B Nair	3rd Edition, , TMH, 2009
3.	Introduction toArtificial Intelligenceand Expert Systems	Patterson	1st Edition, , Pearson India, 2015

Web-based/Online Resources:

S.NO	WEBSITES/LINKS
1.	https://www.ibm.com/blog/the-benefits-of-ai-in-healthcare/
2.	https://en.wikipedia.org/wiki/Reinforcement_learning
3.	https://www.javatpoint.com/computer-vision

MODEL QUESTION PAPER

CTE5215– ARTIFICIAL INTELLIGENCE

Time : [3 Hrs]. **Max. Marks : 100**

PART-A (5 X 2 X 10 Marks = 100 Marks)

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 the introduction to artificial intelligence	I	U	E5215.1	PO1,PO2,PO5,PO7
	2.	What are the types of AI	I	R	E5215.1	PO1,PO2,PO5,PO7
	3.	Describe about the Agents	I	R	E5215.1	PO1,PO2,PO5,PO7
	4.	What are the components of AI	I	E	E5215.1	PO1,PO2,PO5,PO7
II	5.	Describe about the problem solving using search	II	R	E5215.2	PO1,PO2,PO5,PO7
	6.	Explain about the Ethics in Agile Teams	II	R	E5215.2	PO1,PO2,PO5,PO7
	7.	Briefly explain about the Search Algorithms	II	U	E5215.2	PO1,PO2,PO5,PO7
	8.	Write the Heuristic Search Strategies	II	R	E5215.2	PO1,PO2,PO5,PO7
III	9.	Explain about the knowledge representation andoptimization techniques	III	R	E5215.3	PO1,PO2,PO5,PO7
	10.	What do you mean by Optimization Algorithms	III	U	E5215.3	PO1,PO2,PO5,PO7
	11.	Describe about the Propositional Logic	III	R	E5215.3	PO1,PO2,PO5,PO7
	12.	Briefly explain about the Extreme Programming with its methods, roles, work products and practices.	III	C	E5215.3	PO1,PO2,PO5,PO7
IV	13.	Describe the game playing and constraint satisfaction problems	IV	U	E5215.4	PO1,PO2,PO5,PO7
	14.	Briefly Explain about the Binary and Non-BinaryConstraints	IV	R	E5215.4	PO1,PO2,PO5,PO7
	15.	Explain about the Structure of CSP.	IV	U	E5215.4	PO1,PO2,PO5,PO7
	16.	Describe the Game Theory	IV	U	E5215.4	PO1,PO2,PO5,PO7
V	17.	What do you mean by intelligent agents	V	R	E5215.5	PO1,PO2,PO5,PO7
	18.	Proving Propositional Theorem	V	R	E5215.5	PO1,PO2,PO5,PO7
	19.	Write the Agents Based on Propositional Logic	V	An	E5215.5	PO1,PO2,PO5,PO7
	20.	Explain about the Agent communication	V	U	E5215.5	PO1,PO2,PO5,PO7

QUESTION PAPER SETTING

The teaching learning process and assessment are being carried out in accordance withthe revised Blooms Taxonomy. The question paper should consist of 90% questionsbased 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 ThinkingSkills (HOTs)**
	R-Remember, **U**-Understand, **AP**-Apply	**An**- Analyse, **E**-Evaluate, **C**-Create
% to be included	90 %	10 %

CTE5320– INTERNET OF THINGS AND DIGITAL TWINS

Programme Name : COMPUTER ENGINEERING
Course Code : CTE5320
Semester : V SEMESTER
Course Title : INTERNET OF THINGS AND DIGITAL TWINS
Course Type : PRACTICAL

L	T	P	C
0	0	4	2

TEACHING AND SCHEME OF EXAMINATION:

Number of Weeks/ Semester: 15 Weeks

Course	Instructions		Examination			
	Hours / Week	Hours / Semester	Marks			Duration
			Internal Assessment	Autonomous Examination	Total	
INTERNET OF THINGS AND DIGITAL TWINS	4	60	40	100*	100	3 Hrs

***Examinations will be conducted for 100 marks and it will be**

TOPICS AND ALLOCATION OF HOURS

Unit	Topics	Time (Hrs)
Part-A	Introduction to Internet of Things	30
Part-B	Cloud and Digital Twins	30
Total Hours		**60**

COURSE DESCRIPTION

This course will give a hands-on experience to the students in designing and developing Internet of Things applications and models.

COURSE OBJECTIVES

The objective of this course is to

1. Enable the students to understand the basic concepts of Internet of Things.
3. Summarize the functionalities of sensors and actuators.
3. Facilitate the students to design simple IoT concepts.
4. Illustrate the usage of cloud in IoT applications.
5. Introduce digital-twin technology to the students.

COURSE OUTCOMES

After successful completion of this course, the students should be able to	
E5320.1	Interface sensors with micro controllers.
E5320.2	Design Internet of Things models using sensors and actuators.
E5320.3	Setup a cloud interface to visualize the data.
E5320.4	Understand the concept of digital twin technology.
E5320.5	Develop digital twin models using the software.

Pre-requisites: The student should have taken up Computer Networks.

CO- POs & PSOs Mapping Matrix

CO/PO & PSOs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
E5320.1	3	3	2	3	3	2	3	3	3	3
E5320.2	3	2	2	3	3	2	3	3	3	3
E5320.3	3	3	2	3	3	2	3	3	3	3
E5320.4	3	2	2	3	3	2	3	3	3	3
E5320.5	3	2	2	3	3	2	3	3	3	3
Total	**15**	**12**	**10**	**15**	**15**	**10**	**15**	**15**	**15**	**15**
Correlation level	**3**	**3**	**2**	**3**	**3**	**2**	**3**	**3**	**3**	**3**

Correlation level 1 – Slight (low)
Correlation level 2 – Moderate (Medium)
Correlation level 3 – Substantial (high)

Instructional strategy:

- It is advised that teachers make the learning experience more engaging by introducing innovative and interesting ways of teaching.
- The teachers need to expose the students to material in multiple modes help them learn it faster and retain it longer.
- The teacher can focus the pupils' attention on the relevant facts and introduce scientific principles and concepts with the help of demonstration.

Assessment Methodology:

	Continuous Assessment (40 marks)				End Semester Examination (60 marks)
	CA1	**CA2**	**CA3**	**CA4**	
Mode	Practical Test	Practical Test	Practical Document	Practical Test	Practical Examination
Portion	Part A Exercises	Part B Exercises	All Exercises	All Exercises	All Exercises
Duration	2 Periods	2 Periods	Regularly	3 Hours	3 Hours
ExamMarks	50	50	Each Practical10 Marks	100	100
Converted to	10	10	10	10	60
InternalMarks	40				60
Tentative Schedule	7^{th} Week	14^{th} Week	15^{th} Week	16^{th} 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 & Procedure	35
B	Execution and Result	15
TOTAL		**50**

- **CA 3:** Practical document should be maintained for every exercise / experiment immediately after completion of the practice. The same should be evaluated for 10Marks. 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 the next day of practice before commencement of next exercise. The detailed date of the practices and its evaluations should be maintained in the log book and should be submitted for the verification.

- **CA 4:** All the exercises/experiments 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

Model Practical Examination and End Semester Examination- Practical Exam

PART	DESCRIPTION	MARKS
1	Aim (05) ,Program from Part – A (30)	35
2	Aim (05) ,Program from Part – B (30)	35
3	Executing any one program (Part A or Part –B)	15
4	Output	10
5	Viva Voce	05
TOTAL		**100**

CTE5320 – INTERNET OF THINGS AND DIGITAL TWINS

CTE5320	INTERNET OF THINGS AND DIGITAL TWINS	L	T	P	C
PRACTICAL		0	0	4	2
PART -A	**INTRODUCTION TO INTERNET OF THINGS**				**30 Hrs**
Internet of Things – Sensors – Actuators – Micro Controllers - Introduction to Arduino Board and Arduino IDE – Arduino Programming.					
EX.NO	**NAME OF THE EXPERIMENTS**				
Ex No:1	Creating different LED patterns and controlling them with push button switches using Arduino.				[6 Hrs]
Ex No:2	Controlling servo motor based on the input from Joystick or PIR or IR sensor using Arduino.				[6 Hrs]
Ex No:3	Calculate the distance to an object with the help of ultrasonic sensor and display it onan LCD using Arduino.				[6 Hrs]
Ex No:4	Build a basic burglar alert security system with the help of PIR or IR sensor andBuzzer/LED Pattern using Arduino.				[6 Hrs]
Ex No:5	Create automated LED light control based on the input from LDR using Arduino.				[6 Hrs]
PART-B	**CLOUD AND DIGITAL TWINS**				**30 Hrs**
Thing Speak Cloud – Introduction to Digital Twin Technology - Setting up a cloud account inThing Speak cloud platform.					[5 Hrs]
Ex No: 6	Upload the temperature data from LM35 sensor to ThingSpeak cloud with NodeMCU/Raspberry Pi.				[5 Hrs]
Ex No:7	Automatic streetlight simulation with Wokwi and ThingSpeak.				[5 Hrs]
Ex No :8	Create your first thing using ditto.				[5 Hrs]
Ex No:9	Query an existing thing using ditto.				[5 Hrs]
Ex No:10	Connect an Arduino based device to Eclipse ditto.				[5 Hrs]
Total Hours					**60 Hrs**

Suggested List of Students Activity

- Conduct of Ideathon to generate innovative solutions for real life problems.
- Micro project that shall be an extension of any practical lab exercise to real-world Application.

Text books for Reference:

S.NO	TITLE	AUTHOR	PUBLISHER WITH EDITION
1.	Internet of Things – A Hands-On Approach	Arsheep Bahga, Vijay Madisetti	First Edition, UniversitiesPress, 2015
2.	Internet of Things	Raj Kamal	First Edition, McGraw HillEducation, 2017.
3.	Digital Twin Technology	Gopal Chaudhary, Manju Khari,Mohamed Elhoseny	First Edition, CRC Press,2022.

Web-based/Online Resources:

S.No.	WEBSITES/LINK
1.	Arduino IDE: https://www.arduino.cc/en/IoT/HomePage
2.	Wokwi Simulator: https://wokwi.com/
3.	Eclipse Ditto: https://eclipse.dev/ditto/
4.	Ditto Example: https://github.com/eclipse-ditto/ditto-examples
5.	Thing Speak Cloud: https://thingspeak.com/

Equipment / Facilities required to conduct the Practical Course

Software Requirement:

S.No.	SOFTWARE
1.	Arduino IDE
2.	Wokwi Simulator
3.	Eclipse Ditto
4.	Thing Speak Cloud

Hardware Requirement:

S.No.	HARDWARE
1.	Arduino kit - 10 Numbers
2.	Node MCU / Raspberry Pi - 10 Numbers
3.	LED Lights – 10 Numbers
4.	330K Resistor - 10 Numbers
5.	Push Button - 10 Number
6.	Servo Motor 5 V DC - 10 Numbers
7.	Joystick - 10 Numbers
8.	Ultrasonic Sensor - 10 Numbers
9.	16x2 LCD Display - 10 Numbers
10.	PIR Sensor - 10 Numbers
11.	Buzzer - 10 Numbers
12	IR Sensor - 10 Numbers
13.	LDR - 10 Numbers
14.	LM35 Temperature Sensor- 10 Numbers
15.	5V DC Relay - 10 Numbers
16.	Mini Bread Board - 10 Numbers
17.	Jumper Wires
18.	Data Cables - 10 Number

CTE5320 – INTERNET OF THINGS AND DIGITAL TWINS

MODEL QUESTION PAPER

Duration: 3 hrs. **Max. Marks: 100**

S.NO	NAME OF THE EXPERIMENTS	CO	PO
	PART - A		
1	Creating different LED patterns and controlling them with push button switches using Arduino.	E5320.1	PO1, PO2, PO3, PO4, PO5, PO6,PO7
2	Controlling servo motor based on the input fromJoystick or PIR or IR sensor using Arduino.	E5320.1	PO1, PO2, PO3, PO4, PO5, PO6,PO7
3	Calculate the distance to an object with the help of ultrasonic sensor and display it on an LCD using Arduino.	E5320.1	PO1, PO2, PO3, PO4, PO5, PO6,PO7
4	Build a basic burglar alert security system with the help of PIR or IR sensor and Buzzer/LED Pattern using Arduino.	E5320.2	PO1, PO2, PO3, PO4, PO5, PO6,PO7
5	Create automated LED light control based on the input from LDR using Arduino.	E5320.2	PO1, PO2, PO3, PO4, PO5, PO6,PO7
	PART – B		
6	Upload the temperature data from LM35 sensor to ThingSpeak cloud with Node MCU/Raspberry Pi.	E5320.3	PO1, PO2, PO3, PO4, PO5, PO6,PO7
7	Automatic streetlight simulation with Wokwi and ThingSpeak.	E5320.4	PO1, PO2, PO3, PO4, PO5, PO6,PO7
8	Create your first thing using ditto.	E5320.4	PO1, PO2, PO3, PO4, PO5, PO6,PO7
9	Query an existing thing using ditto	E5320.5	PO1, PO2, PO3, PO4, PO5, PO6,PO7
10	Connect an Arduino based device to Eclipse ditto.	E5320.5	PO1, PO2, PO3, PO4, PO5, PO6,PO7
11	Upload the temperature data from LM35 sensor to ThingSpeak cloud with Node MCU/Raspberry Pi.	E5320.5	PO1, PO2, PO3, PO4, PO5, PO6,PO7

CTE5440 – COMPUTER HARDWARE AND NETWORKING

L	T	P	C
1	0	4	3

Programme Name : COMPUTER ENGINEERING
Course Code : CTE5440
Semester : V SEMESTER
Course Title : COMPUTER HARDWARE AND NETWORKING
Course Type : PRACTICUM

TEACHING AND SCHEME OF EXAMINATION

No. of weeks per semester: 15weeks

Course	Instructions		Examination			
			Marks			Duration
	Hours / Week	Hours / Semester	Internal Assessment	Autonomous Examination	Total	
COMPUTER HARDWARE AND NETWORKING	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	Computer Hardware	10
II	Operating System & Peripheral Device Installation	14
III	Administering Windows Server	21
IV	Network Devices	30
TOTAL HOURS		**75**

COURSE DESCRIPTION

The course aims at making the students familiar with various parts of computers and know the different types of peripherals. They will learn to assemble and repair desktop PC with all its internal components. Students will able to install different types of operating system and all other application software, customization of OS, updating device driver, setting firewall security, junk file removal, data backup and data recovery techniques. The students will learn to setup and configure networking system using various network devices using crimping, punching, setting IP addressing techniques. They are able to share and control resource and internet connection over network. They learn to secure networking system from different types of attacks.

COURSE OBJECTIVES

The objective of this course is to enable the student to

- Identify the hardware components, assembling a computer, install and configure peripheral device.
- Install Windows Server OS
- Do Network Cabling and IP Configuration, Testing
- Configure DNS Server & AD
- Configure Web Server, FTP Server, SMTP Server.

COURSE OUTCOMES:

After successful completion of this course, the students should be able to	
E5440.1	Identify the hardware components, assembling a computer, Install and configure Peripheral device.
E5440.2	Install Windows Server OS
E5440.3	Do Network Cabling and IP Configuration, Testing
E5440.4	Configure DNS Server & AD
E5440.5	Configure Web Server, FTP Server, SMTP Server.

Pre-requisites : Nil

CO- POs & PSOs MAPPING MATRIX:

CO/ PO & PSO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PSO1**	**PSO2**	**PSO3**
E5440.1	3	3	3	3	2	2	3	2	3	2
E5440.2	3	3	3	3	2	2	3	2	3	2
E5440.3	3	3	3	3	2	2	3	2	3	2
E5440.4	3	3	3	3	2	2	3	2	3	2
E5440.5	3	3	3	3	2	2	3	2	3	2
Total	15	15	15	15	10	10	15	10	15	10
Correlation level	3	3	3	3	2	2	3	2	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 get 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.
- All demonstrations/Hand-on practices are under a simulated environment (may be followed by a real environment as far as possible).

Assessment Methodology:

	Continuous Assessment (40 marks)				**End Semester Examination (60 marks)**
	CA1	**CA2**	**CA3**	**CA4**	
Mode	Practical Test	Practical Test	Written Test Theory	Practical Test	Practical Examination
Portion	PART-A Exercises	PART-B Exercises	All Units	All Exercises	All Exercises
Duration	2 Periods	2 Periods	3 hours	3 hours	3 hours
Exam Marks	60	60	100	100	100
Converted to	10	10	10	10	60
Marks	40				60
Tentative Schedule	7th Week	14th Week	15th Week	16th 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.

The exercise should be completed on the day of practice. The same shall be

evaluated for 10 marks on the day or the next day of practice before commencementof next exercise. The detailed date of the practices and its evaluations should be maintained in the log book and should be submitted for the verification.

SCHEME OF EVALUATION

PART	DESCRIPTION	MARKS
A	Aim (05) , Procedure (30)	35
B	Execution and Output	15
TOTAL		50
C	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	Answer any ten questions out of twelve. Each carries three marks.	10 x 3	30
Part – B	Answer any seven questions out of ten. Each carries ten marks	7 x 10	70
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 (05) , Procedure from Part – A (30)	35
B	Aim (05) , Procedure from Part – B (30)	35
C	Executing any one from (Part A or Part –B)	15
D	Output	10
E	Viva Voce	05
TOTAL		**100**

CTE5440 – COMPUTER HARDWARE AND NETWORKING

CTE5440	COMPUTER HARDWARE AND NETWORKING	L	T	P	C
PRACTICUM		1	0	4	3

Unit I	**COMPUTER HARDWARE**	**[10 Hrs]**
Introduction: Hardware, Software and Firmware. Mother board Components, SMPS: Principles of Operation and block diagram of ATX Power supply, Connector Specifications. Processors, Memory: Introduction-Main Memory, Cache memory Secondary Storage: Hard Disk – SSD- Format, Partition I/O devices and interface Keyboard-Mouse-Printers-Scanner-Displays Graphic Cards		[1Hr] [1Hr] [1Hr] [1Hr]
Ex No 1: Assemble and disassembling a computer & Troubleshooting (Study Experiment) Hard Disk/SSD a) Partition and Format. b) Scan Disk, Disk Cleanup, Disk De-Fragmentation		[6 Hrs]
Unit II	**OPERATING SYSTEM & PERIPHERAL DEVICE INSTALLATION**	**[14 Hrs]**
Operating System-Server OS Installation, User Creation, Disk Cleaning, Defragmentation Peripheral device (Scanner, Web cam, and bio-metric) Installation & Updating of Device Driver Software.		[1Hr] [1Hr]
Ex No 2: Install and configure any one device (Printer, Scanner, Web cam, biometric device) with system and troubleshoot the problems. **Ex No 3:** Windows Server OS installation		[6 Hrs] [6 Hrs]
Unit III	**ADMINISTERING WINDOWS SERVER**	**[21 Hrs]**
Active directory- Use of AD-Installation & Configuration of AD, Domain Name Service Use of DNS-Installation & Configuration of DNS. Web Server - Installation & Configuration of IIS web Server –HTTP Protocol Usage. FTP Server - Installation & Configuration of FTP Server-FTP Protocol Usage . SMTP Server - Installation & Configuration of SMTP Server		[1Hr] [1Hr] [1Hr]
Ex No 4: Installation and configuration of DNS Server **Ex No 5**: Installation and configuration of DHCP Server **Ex No 6:** Installation and Configuration of any one of Service (Telnet, FTP Server, WebServer)		[6 Hrs] [6 Hrs] [6 Hrs]
Unit IV	**NETWORK DEVICES**	**[30 Hrs]**
Network Devices: Cable, Cable Crimping (Cross, Straight Through Cabling)Switch -Features and concepts of Switches Routers (Wired and Wireless)- Gateways. IP Addressing: Dotted Decimal Notation Subnetting & Supernetting, Data backup and data recoveryFirewall, VPN		[1Hr] [1Hr] [1Hr] [1Hr] [1Hr] [1Hr]

Ex No 7: Practice the following cabling works in a network. a) Cable Crimping b) Standard Cabling c) Cross Cabling d)Testing the Crimped cable using a Cable tester	[5 Hrs]
Ex No 8: Create a Network topology using any network simulation software.	[5 Hrs]
Ex No 9: IP Configuration & Testing a) Configure Host IP, Subnet Mask and Default Gateway in a system in LAN (TCP/IP Configuration). b) Configure Internet connection and use IPCONFIG, PING /Tracert and Netstat utilities to Debug the Network issues.	[5 Hrs]
Ex No 10: Data Backup & Network Security a. Create and configure user accounts (Administrative and Standard) in Windows. b. Create automated backups to ensure no data loss & you always have a recent backup c. Create rules on firewall to allow clients to connect to the Server Service	[5 Hrs]
Ex No 11: Transfer files between systems in LAN using FTP Configuration. Install a printer in LAN and share it in the network.	[4 Hrs]
TOTAL HOURS	**75 Hrs**

Suggested List of Students Activity

- PC Assembling, Troubleshooting of Hardware effects using indicators.
- OS installation & Configuration in Server and Client
- Printer, Scanner, Biometric, Camera Installation and Configuration
- Usage of various networking tools

Text books for Reference:

S.NO	TITLE	AUTHOR	PUBLISHER WITH EDITION
1.	Computer Installation And Servicing	D.Balasubramanian	Second Edition, Tata McGraw Hill, New Delhi 2010
2.	Data Communication and Networking	Behrouza.Forouzan	4th Edition, Tata Mc-Graw Hill, New Delhi,2017.
3.	Computer Networks	Andrew S. Tanenbaum, David J. Wetherall	Fifth Edition, Pearson,2010

Web-based/Online Resources

S.NO	WEBSITES/LINKS
1.	https://epathshala.nic.in/process.php?id=students&type=eTextbooks&ln=en
2.	https://www.edx.org/learn/computer-hardware
3.	https://www.simplilearn.com/ccna-300-301-network-fundamentals-course-skillup
4.	https://rajshaladarpan.nic.in/sd4/home/public3/VocationalSchool/Textbook/

Equipment / Facilities required to conduct the Practical Portion

Software Requirement:

S.NO.	SOFTWARE
1.	Windows server OS, Oracle Virtual Box, Windows OS(Host System),
2.	Simulation Software (GNS3/ Cisco Packet Tracer)

Hardware Requirement:

S.NO.	HARDWARE
1.	Desktop Systems, Laser Printer, Web camera
2.	Biometric Device, Scanner, Crimping Tool
3.	Screwdriver set,
4.	Network Cables, Switch,
5.	Router, Cable, Cable Tester, RJ45

CTE5440 – COMPUTER HARDWARE AND NETWORKING

MODEL QUESTION PAPER

Duration: 3 hrs. **Max. Marks: 100**

S. NO	NAME OF THE EXPERIMENTS	CO	PO
	PART - A		
1	Assemble and disassembling a computer & Troubleshooting (Study Experiment). Hard Disk/SSD a) Partition and Format. b) Scan Disk, Disk Cleanup,Disk De-Fragmentation	E5440.1	PO1, PO2, PO3, PO4, PO5, PO6,PO7
2	Install and configure any one device (Printer, Scanner, Web cam, biometric device) with system and troubleshoot the problems.	E5440.1	PO1, PO2, PO3, PO4, PO5, PO6,PO7
3	Windows Server OS installation	E5440.2	PO1, PO2, PO3, PO4, PO5, PO6,PO7
4	Installation and configuration of DNS Server	E5440.2	PO1, PO2, PO3, PO4, PO5, PO6,PO7
5	Installation and configuration of DHCP Server	E5440.3	PO1, PO2, PO3, PO4, PO5, PO6,PO7
	PART - B		
6	Installation and Configuration of any one of Service (Telnet, FTP Server, Web Server)	E5440.3	PO1, PO2, PO3, PO4, PO5, PO6,PO7
7	Practice the following cabling works in a network. a) Cable Crimping b) Standard Cabling c) Cross Cabling d) Testing the Crimped cable using a Cable tester	E5440.4	PO1, PO2, PO3, PO4, PO5, PO6,PO7
8	Create a Network topology using any network simulation software.	E5440.4	PO1, PO2, PO3, PO4, PO5, PO6,PO7
9	IP Configuration & Testing a) Configure Host IP, Subnet Mask and Default Gateway in a system in LAN (TCP/IP Configuration). b) Configure Internet connection and use IPCONFIG, PING /Tracert and Netstat utilities to Debug the Network issues.	E5440.5	PO1, PO2, PO3, PO4, PO5, PO6,PO7
10	Data Backup & Network Security a. Create and configure user accounts (Administrative and Standard) in Windows. b. Create automated backupsto ensure no data loss & you always have a recent backup c. Create rules on firewall to allow clients to connect to the Server Service	E5440.5	PO1, PO2, PO3, PO4, PO5, PO6,PO7
11	Transfer files between systems in LAN using FTP Configuration. Install aprinter in LAN and share it in the network.	E5440.5	PO1, PO2, PO3, PO4, PO5, PO6,PO7

CTE5541 – DATA ANALYTICS

L	T	P	C
1	0	4	3

Programme Name : COMPUTER ENGINEERING
Course Code : CTE5541
Semester : V SEMESTER
Course Title : DATA ANALYTICS
Course Type : PRACTICUM

TEACHING AND SCHEME OF EXAMINATION

No. of weeks per semester: 15weeks

Course	Instructions		Examination			
			Marks			Duration
	Hours / Week	Hours / Semester	Internal Assessment	Autonomous Examination	Total	
DATA ANALYTICS	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 to Data Analytics and Python	16
II	Data Loading and Cleaning	22
III	Data Analysis	15
IV	Data Visualization and Prediction	22
TOTAL HOURS		**75**

COURSE DESCRIPTION

Being able to do the basics data analysis with Python to build and evaluate data models which includes collecting and importing data, cleaning & preparing data, summarizing & visualization data, building machine learning regression models with python in build libraries.

COURSE OBJECTIVES

The objective of this course is to enable the student to

- Introduce the data analytics process and its applications.
- Explore the python's sequence data structures and functional programming for data analytics.

- Apply the functionality of python's package Pandas to import, clean and analyze data from multiple sources.
- Create data visualizations with Python library – pyplot.
- Model and interpret data using Python library – scikit-learn

COURSE OUTCOMES:

After successful completion of this course, the students should be able to	
E5541.1	Demonstrate the process involved in data analytics.
E5541.2	Experiment the basic data analytics with python's sequence data structures & functional programming.
E5541.3	Import, clean and analyze data from multiple sources using python library panda.
E5541.4	Create data visualizations with Python library – pyplot.
E5541.5	Model and interpret data using Python library – scikit-learn.

Pre-requisites : Python Programming, Data Structures Using Python.

CO- POs & PSOs MAPPING MATRIX:

CO/ PO & PSO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PSO1**	**PSO2**	**PSO3**
E5541.1	3	3	3	3	2	2	3	2	3	2
E5541.2	3	3	3	3	2	2	3	2	3	2
E5541.3	3	3	3	3	2	2	3	2	3	2
E5541.4	3	3	3	3	2	2	3	2	3	2
E5541.5	3	3	3	3	2	2	3	2	3	2
Total	**15**	**15**	**15**	**15**	**10**	**10**	**15**	**10**	**15**	**10**
Correlation level	**3**	**3**	**3**	**3**	**2**	**2**	**3**	**2**	**3**	**2**

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 engineering 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.
- Encourage Critical Analysis: Foster an environment where students can honestly assess experiment outcomes and analyze potential sources of error in case of discrepancies.

Assessment Methodology:

	Continuous Assessment (40 marks)				**End Semester Examination (60 marks)**
	CA1	**CA2**	**CA3**	**CA4**	
Mode	Practical Test	Practical Test	Written Test Theory	Practical Test	Practical Examination
Portion	PART-A Exercises	PART-B Exercises	All Units	All Exercises	All Exercises
Duration	2 Periods	2 Periods	3 hours	3 hours	3 hours
Exam Marks	60	60	100	100	100
Converted to	10	10	10	10	60
Marks	40				60
Tentative Schedule	7th Week	14th Week	15th Week	16th 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.

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

date of the practices and its evaluations should be maintained in the log book and should be submitted for the verification.

SCHEME OF EVALUATION

PART	DESCRIPTION	MARKS
A	Aim (05) , Program (30)	35
B	Execution and Output	15
TOTAL		50
C	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	Answer any ten questions out of twelve. Each carries three marks.	10 x 3	30
Part – B	Answer any seven questions out of ten. Each carries ten marks	7 x 10	70
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 (05) , Program from Part – A (30)	35
B	Aim (05) , Program from Part – B (30)	35
C	Executing any one program (Part A or Part –B)	15
D	Output	10
E	Viva Voce	05
TOTAL		**100**

CTE5541 – DATA ANALYTICS

CTE5541	DATA ANALYTICS	L	T	P	C
PRACTICUM		1	0	4	3

Unit I	**INTRODUCTION TO DATA ANALYTICS AND PYTHON**	**[16 Hrs]**
Define Data, Types of Data, Data Analytics, - Data Analysis Vs Data Analytics Data Analysis Process, Quantitative and Qualitative analysis Application of Data Analysis: Prediction and recommendation. Python functional programming: map, filter, reduce, lamda, list comprehension.		[1Hr] [1Hr] [1Hr] [1Hr]
Ex No 1: Write a python program to double the elements in list using map function and to find the sum of elements of a list using reduce functions. **Ex No 2**: Write a python program to filter only even numbers in the list using filter function and to create a list of squares of the elements of using list comprehension.		[6 Hrs] [6 Hrs]
Unit II	**DATA LOADING AND CLEANING**	**[22 Hrs]**
Data loading, Panda's data structures: Data Frame- Creating a data frame from dictionary, loading a CSV file into a data frame. Methods of data frame: head (), tail (), shape (), column (), describe (). Data Cleaning: Handling missing data: Filtering out missing data, filling in missing data Data Transformation: Removing duplicates, Replacing values..		[1Hr] [1Hr] [1Hr] [1Hr]
Ex No 3: Load a CSV file into a Pandas data frame and print the first five rows, shape of the dataset, and column names and their types **Ex No 4:** Load a data into a Pandas data frame, list out number of missing values in each column and fill the null values with suitable default value. **Ex No 5**: Load a dataset into a Pandas data frame, find and remove duplicate rows and rename indexes (Column name).		[6 Hrs] [6 Hrs] [6 Hrs]
Unit III	**DATA ANALYSIS**	**[15 Hrs]**
Introduction to static analysis -Basic static analysis using describe function. Correlation Analysis of feature, Introduction to Seaborn Correlation analysis using Heat map.		[1Hr] [1Hr] [1Hr]
Ex No 6: Load a dataset into a data frame, drop the non- numeric columns and list out the basic static analysis of each column. **Ex No 7:** Load a dataset into a data frame, find correlation matrix and plot the heat map to find highly correlated feature of the target feature.		[6 Hrs] [6 Hrs]
Unit IV	**DATA VISUALIZATION AND PREDICTION**	**[22 Hrs]**

Machine Learning Models: Linear Regression-Estimation Logistic Regression - Classification. Introduction to Modelling Library Scikit learn: Training Dataset, Testing Dataset, predicting target variable based on feature variable.	[1Hr] [1Hr] [1Hr] [1Hr]
Ex No 8: Load a pre-cleaned dataset into a data frame, plot the values of feature and target variables using scatterplot to visualize their relation. **Ex No 9** Visualize a pre-cleaned dataset to detect an outliner and filter out them. **Ex No 10**: Train the sklearn linear model with a pre-cleaned dataset using fit function and predict the target variable.	[6 Hrs] [6 Hrs] [6 Hrs]
TOTAL HOURS	**75 Hrs**

Suggested List of Students Activity

- Presentation/Seminars by students on any recent technological developments based on the course.
- Periodic class/online quizzes conducted based on the course.
- Blended learning activities to explore the recent trends and developments in the field.

Sample CSV file Source:

- https://www.kaggle.com/datasets/kunwarakash/chennai-housing-sales-price
- https://www.kaggle.com/datasets/arshid/iris-flower-dataset
- https://www.kaggle.com/datasets/ruchi798/housing-prices-in-metropolitan-areas-of india

Text books for Reference:

S.NO	TITLE	AUTHOR	PUBLISHER WITH EDITION
1.	IntelligentAnalysis Data	Michael Berthold, David J. Hand	Springer, 2007.
2.	Python for Data Analysis:DataWrangling with Pandas,NumPy,and IPython	Wes McKinney	O'REILLY 2018, Edition Second.
3.	Python Data Science Handbook, Essentialtool for working with data	Jake Vanderplas	First Edition, O'Reilly Media,Inc, 2017.

Web-based/Online Resources

S.NO	WEBSITES/LINKS
1.	https://www.kaggle.com/code/kumudadk/introduction-to-machine-learning#pandas
2.	https://www.kaggle.com/code/doukanelik/missing-values
3.	ttps://www.kaggle.com/code/shtrausslearning/bayesian-regression-house- priceprediction#3-|-DATA-PREPARATION
4.	https://www.kaggle.com/code/sukethae/housing-prices-prediction-in-hyderabad-india
5.	https://www.kaggle.com/code/mahnazarjmand/clustring-model-on-iris-dataset/input
6.	https://www.kaggle.com/code/pythonafroz/titanic-survival-prediction-with-11-algorithm.

Equipment / Facilities required to conduct the Practical Portion

Software Requirement:

S.NO.	SOFTWARE
1.	Windows / Linux Operating System
2.	Python IDLE /Spyder

Hardware Requirement:

S.NO.	HARDWARE
1.	Desktop Computers / Laptop
2.	Printer

CTE5541 – DATA ANALYTICS

MODEL QUESTION PAPER

Duration: 3 hrs. **Max. Marks: 100**

S. NO	NAME OF THE EXPERIMENTS	CO	PO
	PART - A		
1	Write a python program to double the elements inlist using map function and to find the sum of elements of a list using reduce functions.	E5441.1	PO1, PO2, PO3, PO4, PO5, PO6,PO7
2	Write a python program to filter only even numbers in the list using filter function and to create a list of squares of the elements of using list comprehension.	E5441.1	PO1, PO2, PO3, PO4, PO5, PO6,PO7
3	Load a CSV file into a Pandas data frame and printthe first five rows, shape of the dataset, and columnnames and their types	E5441.2	PO1, PO2, PO3, PO4, PO5, PO6,PO7
4	Load a data into a Pandas data frame, list out numberof missing values in each column and fill the null values with suitable default value.	E5441.2	PO1, PO2, PO3, PO4, PO5, PO6,PO7
5	Load a dataset into a Pandas data frame, find and remove duplicate rows and rename indexes (Column name)	E5441.3	PO1, PO2, PO3, PO4, PO5, PO6,PO7
	PART - B		
6	Load a dataset into a data frame, drop the non- numeric columns and list out the basic static analysis of each column.	E5441.3	PO1, PO2, PO3, PO4, PO5, PO6,PO7
7	Load a dataset into a data frame, find correlation matrix and plot the heat map to find highly correlatedfeature of the target feature.	E5441.4	PO1, PO2, PO3, PO4, PO5, PO6,PO7
8	Load a pre-cleaned dataset into a data frame, plot the values of feature and target variables using scatterplotto visualize their relation.	E5441.4	PO1, PO2, PO3, PO4, PO5, PO6,PO7
9	Visualize a pre-cleaned dataset to detect an outliner and filter out them.	E5441.5	PO1, PO2, PO3, PO4, PO5, PO6,PO7
10	Train the sklearn linear model with a pre-cleaned dataset using fit function and predict the target variable.	E5441.5	PO1, PO2, PO3, PO4, PO5, PO6,PO7

CTE5542 – MOBILE COMPUTING

Programme Name : COMPUTER ENGINEERING
Course Code : CTE5542
Semester : V SEMESTER
Course Title : MOBILE COMPUTING
Course Type : PRACTICUM

L	T	P	C
1	0	4	3

TEACHING AND SCHEME OF EXAMINATION

No. of weeks per semester: 15weeks

Course	Instructions		Examination			
			Marks			Duration
	Hours / Week	Hours / Semester	Internal Assessment	Autonomous Examination	Total	
MOBILE COMPUTING	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	Wireless Communication and Wireless Networks	23
II	Cellular Communication	17
III	Mobile Network Layer	17
IV	Mobile Transport Layer	11
V	Mobile Computing Platform	17
TOTAL HOURS		**75**

COURSE DESCRIPTION

This course introduces computer engineering students to the fundamental principles, theories, and practical aspects of mobile computing. Through a combination oftheoretical lectures and hands-on practical exercises, students will gain a comprehensive understanding of mobile computing concepts and technologies.

COURSE OBJECTIVES

- To learn the basics of wireless communication and cellular networks.
- To study the popular cellular networking technologies.
- To explore various protocols that support mobility at network layer and transport layer The students should be able to simulate various network topologies with different routing algorithms and they can analyze how each routing algorithm is performing its job.

COURSE OUTCOMES:

After successful completion of this course, the students should be able to	
E5542.1	To explore various modulation techniques, multiplexing techniques and familiarize with wireless LAN technologies including IEEE 803.11, HIPERLAN, and Bluetooth.
E5542.2	To understand the evolution and concepts of cellular communication explore the practical issues of mobile computing using network simulation tools.
E5542.3	To analyse and compare different ad hoc routing protocols.
E5542.4	To identify the limitations of traditional TCP and understand various TCP improvements and their benefits.
E5542.5	To understand mobile computing platforms and explore network simulators and programming platforms for mobile applications.

Pre-requisites : A background in computer networks is required.

CO- POs & PSOs MAPPING MATRIX:

CO/ PO & PSO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PSO1**	**PSO2**	**PSO3**
E5542.1	3	3	3	3	2	2	3	2	3	2
E5542.2	3	3	3	3	2	2	3	2	3	2
E5542.3	3	3	3	3	2	2	3	2	3	2
E5542.4	3	3	3	3	2	2	3	2	3	2
E5542.5	3	3	3	3	2	2	3	2	3	2
Total	15	15	15	15	10	10	15	10	15	10
Correlation level	3	3	3	3	2	2	3	2	3	2

Correlation level 1 – Slight (low)

Correlation level 2 – Moderate (Medium)

Correlation level 3 – Substantial (high)

Instructional Strategy:

- Combination of lectures, practical exercises, and simulations to reinforce theoretical concepts.
- Emphasis on hands-on experience with network simulators and programming platforms to enhance understanding and skills in mobile communication technologies.
- Simulation and Real-World Practice: Conduct demonstrations and hands-on activities in a simulated environment, transitioning to real-world scenarios when possible.
- Encourage Critical Analysis: Foster an environment where students can honestly assess experiment outcomes and analyze potential sources of error in case of discrepancies.
- 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.

Assessment Methodology:

	Continuous Assessment (40 marks)				**End Semester Examination (60 marks)**
	CA1	**CA2**	**CA3**	**CA4**	
Mode	Practical Test	Practical Test	Written Test Theory	Practical Test	Practical Examination
Portion	PART-A Exercises	PART-B Exercises	All Units	All Exercises	All Exercises
Duration	2 Periods	2 Periods	3 hours	3 hours	3 hours
Exam Marks	60	60	100	100	100
Converted to	10	10	10	10	60
Marks	40				60
Tentative Schedule	7th Week	14th Week	15th Week	16th 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.

The exercise should be completed on the day of practice. The same shall be evaluated for 10 marks on the day or the next day of practice before commencement of next exercise. The detailed date of the practices and its evaluations should be maintained in the log book and should be submitted for the verification.

SCHEME OF EVALUATION

PART	DESCRIPTION	MARKS
A	Aim (05) , Program (30)	35
B	Execution and Output	15
TOTAL		50
C	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	Answer any ten questions out of twelve. Each carries three marks.	10 x 3	30
Part – B	Answer any seven questions out of ten. Each carries ten marks	7 x 10	70
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 (05) , Program from Part – A (30)	35
B	Aim (05) , Program from Part – B (30)	35
C	Executing any one program (Part A or Part –B)	15
D	Output	10
E	Viva Voce	05
TOTAL		**100**

CTE5542 – MOBILE COMPUTING

CTE5542	MOBILE COMPUTING	L	T	P	C
PRACTICUM		1	0	4	3

Unit I	**WIRELESS COMMUNICATION AND WIRELESS NETWORKS**	**[23Hrs]**
Challenges of Wireless Transmission - Multi-carrier modulation - Spread		[1Hr]
Spectrum Satellite Communication - Broadcast systems - Multiplexing		[1Hr]
FDMA, TDMA and CDMA		[1Hr]
Duplexing Techniques: FDD, TDD. Wireless LAN – Infrared Vs Radio Transmission –		[1Hr]
Infrastructure Networks – IEEE 803.11 – HIPERLAN – Bluetooth – Wireless ATM.		[1Hr]
Ex No 1: Installation of Network Simulator (Eg.NS2)		[6 Hrs]
Ex No 2: Implementation of Bluetooth network (transfer a file from one device to another).		[6 Hrs]
Ex No 3: Implement a basic function of Code Division Multiple Access (CDMA).		[6 Hrs]
Unit II	**CELLULAR COMMUNICATION**	**[17Hrs]**
Cellular Communication – Tessellation, Frequency Reuse and Handoff Evolution of		[1Hr]
cellular communication systems: 1G, 2G, 3G, 4G and 5G. Overview of GSM - GPRS		[1Hr]
Network - UMTS and IMT 2000		[1Hr]
Packet Switching Domain - Core Network		[1Hr]
Radio Access Network - LTE - Control Plane - User Plane.		[1Hr]
Ex No 4: Simulate authentication and encryption techniques used in GSM and analyze their performance.		[6 Hrs]
Ex No 5: Illustration of Hidden Terminal Problem using Network Simulator.		[6 Hrs]
Unit III	**MOBILE NETWORK LAYER**	**[17Hrs]**
Mobile IP		[1Hr]
Mobility features in IPv6		[1Hr]
Proactive and reactive ad hoc routing		[1Hr]
protocols DSDV,		[1Hr]
DSR and AODV.		[1Hr]
Ex No 6: Simulate the Distance Vector Routing Algorithm and Analyze the performance metrics such as throughput, packet drop rate etc.		[6 Hrs]
Ex No 7: Simulate AODV Protocol.		[6 Hrs]
Unit IV	**MOBILE TRANSPORT LAYER**	**[11Hrs]**
Traditional TCP - Limitations of Traditional TCP		[1Hr]
TCP improvements for Wireless Networks – Indirect TCP		[1Hr]
Snoop TCP, Mobile TCP		[1Hr]
Fast Retransmit/ Fast Recovery – Transmission/ Timeout Freezing		[1Hr]
Selective Retransmission – Transaction Oriented TCP.		[1Hr]
Ex No 8: Create a mobile chatting application using TCP with a mobile client.		[6 Hrs]

Unit V	MOBILE COMPUTING PLATFORM	[17Hrs]
PDA - Device characteristics and Software components - Smart Phone Convergence of Mobile devices Network simulators: NS2 – GLOMOSIM – SENSIM – OPNET Programming Platforms – J2ME – Palm OS - SYMBIAN OS Overview of other mobile Operating Systems.		[1Hr] [1Hr] [1Hr] [1Hr] [1Hr]
Ex No 9 Set up a simple mobile network topology using a network simulator. Configure and manage mobile devices within a simulated network Environment. **Ex No 10**: Setup & configure Wireless Access Point (AP) using Network Simulator. Analyze the Wi-Fi communication range in the presence of the access point (AP) and the base station (BS).		[6 Hrs] [6 Hrs]
TOTAL HOURS		**75 Hrs**

Suggested List of Students Activity

- Group activities challenging Netwrk configuration.
- Performing a survey of popular mobile phones and exploring their configuration and exploring the structure and operation of a cell phone tower.
- Activities, like contest, to develop Mobile application using Network Simulator.

Text books for Reference:

S.NO	TITLE	AUTHOR	PUBLISHER WITH EDITION
1.	Mobile Communication	J. Schiller	Pearson Education, 2009.
2.	Mobile Computing	K. Ashoke Talukder,Roopa Yavagal	Tata McGraw Hill, 2005
3.	Cellular networks: Design and Operation – A real world Perspective	Paul Bedell	Outskirts Press, 2014.

Equipment / Facilities required to conduct the Practical Portion

Software Requirement:

S.NO.	SOFTWARE
Any Network Simulator (Options)	
1.	NS2
2.	NS3
3.	OMNeT++ (Objective Modular Network Testbed in C++)
4.	Cisco Packet Tracer
5.	GNS3 (Graphical Network Simulator-3)

Hardware Requirement:

S.NO.	HARDWARE
1.	Desktop Computers / Laptop
2.	Printer

CTE5542 – MOBILE COMPUTING

MODEL QUESTION PAPER

Duration: 3 hrs. **Max. Marks: 100**

S. NO	NAME OF THE EXPERIMENTS	CO	PO
	PART - A		
1	Installation of Network Simulator (Eg.NS3)	E5542.1	PO1, PO2, PO3, PO4, PO5, PO6,PO7
2	Implementation of Bluetooth network (transfer a file from one device to another).	E5542.1	PO1, PO2, PO3, PO4, PO5, PO6,PO7
3	Implement a basic function of Code Division Multiple Access (CDMA).	E5542.2	PO1, PO2, PO3, PO4, PO5, PO6,PO7
4	Simulate authentication and encryption techniques used in GSM and analyze their performance.	E5542.2	PO1, PO2, PO3, PO4, PO5, PO6,PO7
5	Illustration of Hidden Terminal Problem using Network Simulator.	E5542.3	PO1, PO2, PO3, PO4, PO5, PO6,PO7
	PART - B		
6	Simulate AODV Protocol.	5542.3	PO1, PO2, PO3, PO4, PO5, PO6,PO7
7	Write a JavaScript program to control (play, pause, stop) the audio/video in a web page	5542.4	PO1, PO2, PO3, PO4, PO5, PO6,PO7
8	Create a mobile chatting application using TCP witha mobile client.	5542.4	PO1, PO2, PO3, PO4, PO5, PO6,PO7
9	Set up a simple mobile network topology using a network simulator. Configure and manage mobile devices within a simulated network environment.	5542.5	PO1, PO2, PO3, PO4, PO5, PO6,PO7
10	Setup & configure Wireless Access Point (AP) using Network Simulator. Analyze the Wi-Fi communication range in the presence of the access point (AP) and the base station (BS).	5542.5	PO1, PO2, PO3, PO4, PO5, PO6,PO7

CTE5543 – COMPONENT BASED TECHNOLOGIES

L	T	P	C
1	0	4	3

Programme Name : COMPUTER ENGINEERING

Course Code : CTE5543

Semester : V SEMESTER

Course Title : COMPONENT BASED TECHNOLOGY

Course Type : PRACTICUM

TEACHING AND SCHEME OF EXAMINATION

No. of weeks per semester: 15weeks

Course	Instructions		Examination			
			Marks			Duration
	Hours / Week	Hours / Semester	Internal Assessment	Autonomous Examination	Total	
COMPONENT BASED 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	Introduction to C#.Net	17
II	Introduction to Asp.Net	22
III	Introduction to Ado.Net	22
IV	Working With Xml In .Net	14
TOTAL HOURS		**75**

COURSE DESCRIPTION

NET Framework provides a number of components to create many types of applications including those for consoles, Windows, mobile and the web. This Subject uses the .NET platform as a vehicle to master component-based Technology.

COURSE OBJECTIVES

The objective of this course is to enable the student to

- Develop simple applications using .NET
- Understand the concepts of event handlers, Windows Form Based Application.
- Access SQL database by using ADO.NET

- Create web pages using ASP.NET
- Create Web Service Using ASP.NET
- Develop XML database handling methodologies

COURSE OUTCOMES:

After successful completion of this course, the students should be able to	
E5543.1	Develop simple applications using .NET
E5543.2	Understand the concepts of event handlers, Windows Form Based Application.
E5543.3	Access SQL database by using ADO.NET
E5543.4	Create Web Pages, Web Service Using ASP.NET
E5543.5	Develop XML database handling methodologies

Pre-requisites : Nil

CO- POs & PSOs MAPPING MATRIX:

CO/ PO & PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
E5543.1	3	3	3	3	2	2	3	2	3	2
E5543.2	3	3	3	3	2	2	3	2	3	2
E5543.3	3	3	3	3	2	2	3	2	3	2
E5543.4	3	3	3	3	2	2	3	2	3	2
E5543.5	3	3	3	3	2	2	3	2	3	2
Total	**15**	**15**	**15**	**15**	**10**	**10**	**15**	**10**	**15**	**10**
Correlation level	**3**	**3**	**3**	**3**	**2**	**2**	**3**	**2**	**3**	**2**

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 engineering 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.

- Encourage Critical Analysis: Foster an environment where students can honestly assess experiment outcomes and analyze potential sources of error in case of discrepancies.

Assessment Methodology:

	Continuous Assessment (40 marks)				End Semester Examination (60 marks)
	CA1	**CA2**	**CA3**	**CA4**	
Mode	Practical Test	Practical Test	Written Test Theory	Practical Test	Practical Examination
Portion	PART-A Exercises	PART-B Exercises	All Units	All Exercises	All Exercises
Duration	2 Periods	2 Periods	3 hours	3 hours	3 hours
Exam Marks	60	60	100	100	100
Converted to	10	10	10	10	60
Marks	40				60
Tentative Schedule	7^{th} Week	14^{th} Week	15^{th} Week	16th 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.

The exercise should be completed on the day of practice. The same shall be evaluated for 10 marks on the day or the next day of practice before commencement of next exercise. The detailed date of the practices and its evaluations should be maintained in the log book and should be submitted for the verification.

SCHEME OF EVALUATION

PART	DESCRIPTION	MARKS
A	Aim (05) , Program (30)	35
B	Execution and Output	15
TOTAL		50
C	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	Answer any ten questions out of twelve. Each carries three marks.	10 x 3	30
Part – B	Answer any seven questions out of ten. Each carries ten marks	7 x 10	70
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 (05) , Program from Part – A (30)	35
B	Aim (05) , Program from Part – B (30)	35
C	Executing any one program (Part A or Part –B)	15
D	Output	10
E	Viva Voce	05
TOTAL		**100**

CTE5543 – COMPONENT BASED TECHNOLOGY

CTE5543	COMPONENT BASED TECHNOLOGY	L	T	P	C
PRACTICUM		1	0	4	3

Unit I	INTRODUCTION TO C#.NET	[17Hrs]
Variables and constants–data types– declaration. Operators– types– precedence– Expressions – Program flow – Decision statements – if ... then, if...then…else, switch… case, Loop statements– while, do...while, for. Next, for…each. Next, Array, Classes & objects Creating and using your own classes – Data members and member methods Instantiate an object, abstract class – static class Windows programming Creating windows Forms-Working with Toolbox Controls & Advanced Controls Events-Menus and Dialog Boxes		[1Hr] [1Hr] [1Hr] [1Hr] [1Hr]
Ex No 1: Accept a character from console and check the case of the character. **Ex No 2**: Develop a menu-based application to implement a text editor with cut, copy, paste, save and close operations with accessing and shortcut keys.		[6 Hrs] [6 Hrs]

Unit II	INTRODUCTION TO ASP.NET	[22Hrs]
Basics of web development with ASP.NET Introduction to web forms and controls-Creating a simple ASP.NET web application **ASP.NET Web Forms and State Management** Working with web controls and server controls-State management techniques (view state, session, cookies) **Introduction to Web Services in .NET** Basics of web services and their importance-Creating and consuming web services in ASP.NET-SOAP and RESTful web services in .NET		[1Hr] [1Hr] [1Hr] [1Hr]
Ex No 3: Develop a web application to input data through a web form to a database and validate the data. Use the Required Field Validator and Range Validator Controls. **Ex No 4:** Implement state management techniques such as view state, session, and cookies in an ASP.NET web application. **Ex No 5**. Create a simple SOAP or RESTful web service in ASP.NET and consume it in a client application.		[6 Hrs] [6 Hrs] [6 Hrs]

Unit III	INTRODUCTION TO ADO.NET	[22Hrs]

Basics of database programming with ADO.NET-Connecting to a database using ADO.NET-Executing SQL queries and retrieving data -Stored Procedure	[1Hr]
Advanced ADO.NET Programming -Working with disconnected data	[1Hr]
-Using Data Sets and Data Adapters-Handling concurrency and transactions in ADO.NET	[1Hr]
Data Binding in ASP.NET	[1Hr]
Data binding concepts-Binding data to web controls-Displaying database data in	
Ex No 6: Connect to a database using ADO.NET and retrieve data using SQL queries.	[6 Hrs]
Ex No 7: Create an ADO.Net application using Stored Procedure	[6 Hrs]
Ex No 8: Bind data from a database to web controls in an ASP.NET web form	[6 Hrs]
Unit IV **WORKING WITH XML IN .NET**	**[14Hrs]**
Introduction to XML	[1Hr]
Construction of an XML document -: XML Serialization in the .NET Framework	[1Hr]
Ex No 9: Develop a Window application to read an XML document containing subject,mark scored, year of passing into a Dataset .	[4 Hrs]
Ex No 10: Develop a Window application to read students records from Database usingADO.NET and generate XML document containing students' records.	[4 Hrs]
Ex No 11: To develop a application using datagrid to add, edit and modified records.	[4 Hrs]
TOTAL HOURS	**75 Hrs**

Suggested List of Students Activity

- Creation of a Standalone .NET Application
- Creation of a Website.
- Creating a Web Service.

Text books for Reference:

S.NO	TITLE	AUTHOR	PUBLISHER WITH EDITION
1.	Head First C#: A Learner's Guide to Real-World Programming with C#, XAML, and .NET	Andrew Stellman , Jennifer Greene	Third edition , O'Reilly ,2013
2.	Beginning ASP.NET 4.5.1: in C# and VB	Imar Spaanjaars	1st Edition,Wrox,2014
3.	Microsoft ADO.NET 4 Step by Step	Tim Patrick	1st Edition Prentice Hall India, 2010

Web-based/Online Resources

S.NO	WEBSITES/LINKS
1.	https://www.w3schools.com/asp/
2.	https://learn.microsoft.com/en-us/dotnet/framework/data/
3.	https://www.tutorialspoint.com/xml/index.htm
4.	https://learn.microsoft.com/en-us/sql/
5.	https://learn.microsoft.com/en-us/dotnet/framework/wcf/

Equipment / Facilities required to conduct the Practical Portion

Software Requirement:

S.NO.	SOFTWARE
1.	Microsoft Visual Studio IDE

Hardware Requirement:

S.NO.	HARDWARE
1.	Desktop Computers / Laptop

CTE5543–COMPONENT BASED TECHNOLOGIES

MODEL QUESTION PAPER

Duration: 3 hrs. **Max. Marks: 100**

S. NO	NAME OF THE EXPERIMENTS	CO	PO
	PART - A		
1	Accept a character from console and check the caseof the character.	E5443.1	PO1, PO2, PO3, PO4, PO5, PO6,PO7
2	Develop a menu-based application to implement a text editor with cut, copy, paste, save and close operations with accessing and shortcut keys.	E5443.1	PO1, PO2, PO3, PO4, PO5, PO6,PO7
3	Develop a web application to input data through a web form to a database and validate the data. Use the Required Field Validator and Range Validator Controls.	E5443.2	PO1, PO2, PO3, PO4, PO5, PO6,PO7
4	Implement state management techniques such as view state, session, and cookies in an ASP.NET web application. 5. Create a simple SOAP or RESTful web service in ASP.NET and consume it in a client application.	E5443.2	PO1, PO2, PO3, PO4, PO5, PO6,PO7
5	Conduct Load Test on DC Series Motor and Drawthe Performance Curve	E5443.3	PO1, PO2, PO3, PO4, PO5, PO6,PO7
	PART - B		
6	Connect to a database using ADO.NET and retrieve data using SQL queries	E5443.3	PO1, PO2, PO3, PO4, PO5, PO6,PO7
7	Create an ADO.Net application using Stored Procedure	E5443.4	PO1, PO2, PO3, PO4, PO5, PO6,PO7
8	Bind data from a database to web controls in an ASP.NET web form.	E5443.4	PO1, PO2, PO3, PO4, PO5, PO6,PO7
9	Develop a Window application to read an XML document containing subject, mark scored, year of	E5443.5	PO1, PO2, PO3, PO4, PO5, PO6,PO7
10	Develop a Window application to read students records from Database using ADO.NET and generate XML document containing students' records	E5443.5	PO1, PO2, PO3, PO4, PO5, PO6,PO7
11	To develop a application using datagrid to add, edit and modified records.	E5443.5	PO1, PO2, PO3, PO4, PO5, PO6,PO7

CTE5544–MULTIMEDIA SYSTEMS

L	T	P	C
1	0	4	3

Programme Name : COMPUTER ENGINEERING
Course Code : CTE5544
Semester : V SEMESTER
Course Title : MULTIMEDIA SYSTEMS
Course Type : PRACTICUM

TEACHING AND SCHEME OF EXAMINATION

No. of weeks per semester: 15weeks

Course	Instructions		Examination			
			Marks			Duration
	Hours / Week	Hours / Semester	Internal Assessment	Autonomous Examination	Total	
MULTIMEDIA SYSTEMS	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 To Multimedia	3
II	Text	9
III	Images	21
IV	Sound	15
V	Video & Animation	27
TOTAL HOURS		**75**

COURSE DESCRIPTION

Multimedia application is the combined use of text, images, graphics, animation and video which can be used for business, education and entertainment. This practicum course prepares students to use digital multimedia for communication, creativity, collaboration and critical thinking. It also enables the students to implement their creativity to produce variety of multimedia objects using different multimedia software tools.

COURSE OBJECTIVES

The objective of this course is to

- Understand the basic concepts of multimedia systems

- Introduce various aspects of multimedia components like Images, audio, video, graphics and animation.
- Gain knowledge on Image, audio and video editing software tools
- Provide hands-on experience through a series of practical skill building tasks andexercises.
- Develop multimedia applications using various tools

COURSE OUTCOMES:

After successful completion of this course, the students should be able to	
E5544.1	Analyze the key components of multimedia systems
E5544.2	Design an image and edit images using image editing tools
E5544.3	Apply audio and video editing using different editing tools
E5544.4	Create an animation using animation tools
E5544.5	Apply acquired knowledge in the relevant field for the good cause

Pre-requisites : Nil

CO- POs & PSOs MAPPING MATRIX:

CO/ PO & PSO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PSO1**	**PSO2**	**PSO3**
E5544.1	3	3	3	3	2	3	3	3	3	2
E5544.2	3	3	3	3	2	3	3	3	3	2
E5544.3	3	3	3	3	2	3	3	3	3	2
E5544.4	3	3	3	3	2	3	3	3	3	2
E5544.5	3	3	3	3	2	3	3	3	3	2
Total	**15**	**15**	**15**	**15**	**10**	**15**	**15**	**15**	**15**	**10**
Correlation level	**3**	**3**	**3**	**3**	**2**	**3**	**3**	**3**	**3**	**2**

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 engineering 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.
- In addition to traditional lecture method, different types of teaching methods and media are to be employed to develop the outcome.
- Guide students to create multimedia objects and applying it in relevant application

Assessment Methodology:

	Continuous Assessment (40 marks)				**End Semester Examination (60 marks)**
	CA1	**CA2**	**CA3**	**CA4**	
Mode	Practical Test	Practical Test	Written Test Theory	Practical Test	Practical Examination
Portion	PART-A Exercises	PART-B Exercises	All Units	All Exercises	All Exercises
Duration	2 Periods	2 Periods	3 hours	3 hours	3 hours
Exam Marks	60	60	100	100	100
Converted to	10	10	10	10	60
Marks	40				60
Tentative Schedule	7th Week	14th Week	15th Week	16th 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.

  The exercise should be completed on the day of practice. The same shall be evaluated for 10 marks on the day or the next day of practice before commencementof next exercise. The detailed date of the practices and its evaluations should be maintained in the log book and should be submitted for the verification.

SCHEME OF EVALUATION

PART	DESCRIPTION	MARKS
A	Aim (05) , Program (30)	35
B	Execution and Output	15
TOTAL		50
C	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	Answer any ten questions out of twelve. Each carries three marks.	10 x 3	30
Part – B	Answer any seven questions out of ten. Each carries ten marks	7 x 10	70
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 (05) , Program from Part – A (30)	35
B	Aim (05) , Program from Part – B (30)	35
C	Executing any one program (Part A or Part –B)	15
D	Output	10
E	Viva Voce	05
TOTAL		**100**

CTE5544–MULTIMEDIA SYSTEMS

CTE5544	MULTIMEDIA SYSTEMS	L	T	P	C
		1	0	4	3
Unit I	**INTRODUCTION TO MULTIMEDIA**	**[3Hrs]**			
Definition of Multimedia, Multimedia applications, Multimedia elementsTransition from conventional media to digital media Delivering of Multimedia product, copy rights.		[1Hr] [1Hr] [1Hr]			
Unit II	**TEXT**	**[9Hrs]**			
Usage of text in multimedia, Fonts and Faces, Hypermedia documents and Hypertext, Hypermedia Structures, Hypertext Tools, Text Editing and Word Processing Tools, OCR Software		[1Hr] [1Hr] [1Hr]			
Ex No 1:	Design a poster with different text effects using suitable software	[6 Hrs]			
Unit III	**IMAGES**	**[9Hrs]**			
Introduction to image, Making Still Images, Image editing tools Color: Understanding Natural Light and Color, Color models, Color Palettes, Dithering, 2D graphics, Image compression File formats: GIF, JPEG, JPG, PNG, TIFF, EXIF, PS, PDF.		[1Hr] [1Hr] [1Hr]			
Ex. No 2 Convert the given image into pencil sketch using suitable photo editing software. **Ex. No 3** Create a two or more partial scanned images of large poster/photo. Create a panoramic view of multiple photos by stitching together them using any panorama software. **Ex. No 4** Using photo editor software and/or GIF creator software create an animation such as a flying balloon.		[6Hrs] [6Hrs] [6Hrs]			
Unit IV	**SOUND**	**[15Hrs]**			
Digital Audio, Making Digital Audio Files, MIDI Audio MIDI vs Digital Audio, Adding Sound to Your Multimedia Project Audio Recording, Audio file formats, Sound Editing Tools, sound synthesis		[1Hr] [1Hr] [1Hr]			
Ex. No 5 Use suitable software to (a) compress / decompress audio files. (b) convert audio to different formats (c) split, join, rip audio. **Ex. No 6** Use an audio processing software and perform the audio editing tasks– Import audio, select and edit the sound, create fade-in fade-out effects, label audio segments, use noise remove filter, mix audio, change stereo to mono tracks, export audio to different format and save.		[6Hrs] [6Hrs]			
UNIT V	**VIDEO & ANIMATION**	**[27Hrs]**			
Video basics - How video works, Analog Video, Digital Video, Video file formats, Shooting and Editing Video.		[1Hr] [1Hr]			

Principle of animations, animation techniques, animation file formats. Basics of multimedia authoring.	[1Hr]
Ex. No 7 Use a video processing software to perform – Trim video clips, crop video, rotate video, join video, add subtitles, edit video dimension, bit rate, frame rate, sample rate, channel, and video/audio quality tasks on a video. **Ex. No 8** Create a movie from video clips to demonstrate audio-video mixing, music, video effects, video transitions and titles. **Ex. No 9** Sketching of cartoon characters using suitable software **Ex. No 10** Create a 3D animation of an aero plane take off using suitable software. **Ex. No 11** Design a metallic text using 3D animation tool	[5Hrs] [5Hrs] [5Hrs] [5Hrs] [4Hrs]
TOTAL HOURS	**75 Hrs**

Suggested List of Students Activity

- Presentation/Seminars by students on any recent technological developments based on the course.
- Periodic class quizzes conducted on a weekly/fortnightly based on the course
- Blended learning activities to explore the recent trends and developments in the field.

Text books for Reference:

S.NO	TITLE	AUTHOR	PUBLISHER WITH EDITION
1.	Fundamental of Multimedia	Ze- Nian Li and M.S. Drew	SecondEdition, Pearson Education, 2014.
2.	Multimedia: Making It Work	Tay Vaughan	Ninth Edition, Tata-McGraw Hill, 2014

Website Based/Online Resources:

S.NO.	WEBSITES/LINKS
1.	https://helpx.adobe.com/in/photoshop/using/tools.html

Equipment / Facilities required to conduct the Practical Portion

Hardware Requirement:

S.NO.	HARDWARE
1.	Desktop Computers
2.	Printer

Software Requirement:

S.NO.	SOFTWARE
1.	Windows / Linux Operating System
2.	Software tools: open-source software or commercial software. The following list is suggestive list of open-source software and their commercial replacement. Experiments may be done using either opens-source or commercial software. open-source software is preferred.

List of Software's

S.NO.	LIST OF SOFTEARE	
1.	2D Graphics and Animation	a) Open-Source: OpenToonz, Pencil2D, Blender, Powtoon b) Commercial software: Adobe Flash
2.	Audio Players	a) Open-Source: CoolPlayer, MPC-HC, Zing 4g Mp3 Player b) Commercial software: Windows Media Player
3.	Audio Recorders and Editors	a) Open-Source: Audacity, Traverso, Qtractor,Frinika b) Commercial: Sonar X1, ACID music studio, Adobe Audition
4.	Multimedia Players	a) Open-Source: VLC Media Player, Kodi, Mplayer, MediaPortal b) Commercial: Windows Media Player
5.	Video Editing	a) Open-Source: OpenShot,Shotcut, Lightworks, Cinelerra, Kdenlive b) Commercial: Adobe Premiere Pro CS6
6.	Video File Conversion	a) Open-Source: DVDStyler, DVD Flick, HandBrake, ffdshow b) Commercial: Movavi Video Converter, Zamzar, Windows Movie Maker

CTE5544–MULTIMEDIA SYSTEMS

MODEL QUESTION PAPER

Duration: 3 hrs. **Max. Marks: 100**

S. NO	NAME OF THE EXPERIMENTS	CO	PO
	PART - A		
1	Design a poster with different text effects using suitable software	E5544.1	PO1, PO2, PO3, PO4, PO5, PO6,PO7
2	Convert the given image into pencil sketch using suitable photo editing software.	E5544.1	PO1, PO2, PO3, PO4, PO5, PO6,PO7
3	Create a two or more partial scanned images of large poster/photo. Create a panoramic view of multiple photos by stitching together them using any panorama software.	E5544.2	PO1, PO2, PO3, PO4, PO5, PO6,PO7
4	Using photo editor software and/or GIF creator software create an animation such as a flying balloon.	E5544.2	PO1, PO2, PO3, PO4, PO5, PO6,PO7
5	Use suitable software to (a) compress / decompress audio files. (b) convert audio to different formats (c)split, join, rip audio..	E5544.3	PO1, PO2, PO3, PO4, PO5, PO6,PO7
	PART - B		
6	Use an audio processing software and perform the audio editing tasks–Import audio, select and edit the sound,	5544.3	PO1, PO2, PO3, PO4, PO5, PO6,PO7
7	Use a video processing software to perform – Trim video clips, crop video, rotate video, join video, add subtitles, edit video dimension, bit rate, frame rate, sample rate, channel, and video/audio quality tasks on a video	5544.4	PO1, PO2, PO3, PO4, PO5, PO6,PO7
8	Create a movie from video clips to demonstrate audio-video mixing, music, video effects, video transitions and titles.	5542.4	PO1, PO2, PO3, PO4, PO5, PO6,PO7
9	Sketching of cartoon characters using suitable software	5544.5	PO1, PO2, PO3, PO4, PO5, PO6,PO7
10	Create a 3D animation of an aero plane take off using suitable software.	5544.5	PO1, PO2, PO3, PO4, PO5, PO6,PO7
11	Design a metallic text using 3D animation tool	5544.5	PO1, PO2, PO3, PO4, PO5, PO6,PO7

CTE5545 – FULL STACK DEVELOPER

L	T	P	C
1	0	4	3

Programme Name : COMPUTER ENGINEERING
Course Code : CTE5545
Semester : V SEMESTER
Course Title : FULL STACK DEVELOPER
Course Type : PRACTICUM

TEACHING AND SCHEME OF EXAMINATION

No. of weeks per semester: 15weeks

Course	Instructions		Examination			
			Marks			Duration
	Hours / Week	Hours / Semester	Internal Assessment	Autonomous Examination	Total	
FULL STACK DEVELOPER	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 To Full Stack Development	15
II	Front End Framework: Bootstrap	22
III	Javascript Framework: Angularjs	16
IV	Backend Framework Django	22
TOTAL HOURS		**75**

COURSE DESCRIPTION

Being able to understand the full stack development process and develop a complete website by using various frontend and backend frameworks.

COURSE OBJECTIVES

The objective of this course is to enable the student to

- Introduce the basic concepts of Full Stack development.
- Explore the Frontend frameworks - Bootstrap and AngularJS.
- Develop a website with front-end development languages and tools such a HTML, CSS, JavaScript, React, and Bootstrap.
- Create a backend for the website with Django.

COURSE OUTCOMES:

After successful completion of this course, the students should be able to	
E5545.1	Describe the Web Application Development Ecosystem.
E5545.2	Develop and host the website in the localhost.
E5545.3	Experiment the Frontend frameworks –Bootrap, AngularJS, ReactJS
E5545.4	Development of Database for a website using Django.
E5545.5	Connect the Front end of database with the backend.

Pre-requisites : Web Designing and Scripting Languages.

CO- POs & PSOs MAPPING MATRIX:

CO/ PO & PSO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PSO1**	**PSO2**	**PSO3**
E5545.1	3	3	3	3	2	2	3	2	3	2
E5545.2	3	3	3	3	2	2	3	2	3	2
E5545.3	3	3	3	3	2	2	3	2	3	2
E5545.4	3	3	3	3	2	2	3	2	3	2
E5545.5	3	3	3	3	2	2	3	2	3	2
Total	15	15	15	15	10	10	15	10	15	10
Correlation level	3	3	3	3	2	2	3	2	3	2

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 engineering 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.
- Encourage Critical Analysis: Foster an environment where students can honestly assess experiment outcomes and analyze potential sources of error in case of discrepancies.

Assessment Methodology:

	Continuous Assessment (40 marks)				**End Semester Examination (60 marks)**
	CA1	**CA2**	**CA3**	**CA4**	
Mode	Practical Test	Practical Test	Written Test Theory	Practical Test	Practical Examination
Portion	PART-A Exercises	PART-B Exercises	All Units	All Exercises	All Exercises
Duration	2 Periods	2 Periods	3 hours	3 hours	3 hours
Exam Marks	60	60	100	100	100
Converted to	10	10	10	10	60
Marks	40				60
Tentative Schedule	7th Week	14th Week	15th Week	16th 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.

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

detailed date of the practices and its evaluations should be maintained in the log book and should be submitted for the verification.

SCHEME OF EVALUATION

PART	DESCRIPTION	MARKS
A	Aim (05) , Program (30)	35
B	Execution and Output	15
TOTAL		50
C	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	Answer any ten questions out of twelve. Each carries three marks.	10 x 3	30
Part – B	Answer any seven questions out of ten. Each carries ten marks	7 x 10	70
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 (05) , Program from Part – A (30)	35
B	Aim (05) , Program from Part – B (30)	35
C	Executing any one program (Part A or Part –B)	15
D	Output	10
E	Viva Voce	05
TOTAL		**100**

CTE5545 – FULL STACK DEVELOPER

CTE5545	FULL STACK DEVELOPER	L	T	P	C
PRACTICUM		1	0	4	3

Unit I	**INTRODUCTION TO FULL STACK DEVELOPMENT**	**[15Hrs]**
Introduction: Roles and Responsibilities of a full stack developer, Overview of Front –End Technologies: HTML5, CSS and JavaScript, HTML5: Semantic Elements - <article> , <figure>, <footer>, <header>, <main>, <nav>, <section>,Form Creation. JavaScript: Validation of inputs.		[1Hr] [1Hr] [1Hr]
Ex No: 1 Design a webpage with header, footer and navigation sections using appropriate semantic elements of HTML5. **Ex No: 2** Design a Sign-up page for a website which would accept only numerical values in the phone number field and password of minimum length 8 using HTML5 and JavaScript.		[6 Hrs] [6 Hrs]
Unit II	**FRONT END FRAMEWORK: BOOTSTRAP**	**[22Hrs]**
Introduction of Framework, Download Bootstrap, or Include Bootstrap through CDN links.Bootstrap Classes: Container Classes: .container, .container-fluid. 2.Grid Classes: row, col 3. Navigation Bars: navbar-default, navbar-inverse, Navbar-right. Advanced Plugin: Scrollspy.		[1Hr] [1Hr] [1Hr] [1Hr]
Ex No: 3 Design a web page to demonstrate the bootstrap container and grid classes. **Ex No: 4** Design a web page with navigation bar using. navbar classes. **Ex No: 5** Design a web page to demonstrate the scroll spy plugin.		[6 Hrs] [6 Hrs] [6 Hrs]
Unit III	**JAVASCRIPT FRAMEWORK: Angular JS**	**[16Hrs]**
Introduction to Angular JS: Angular JS DOM, Angula JS Events, Angular JS Forms, Angular JSValidation. Angular JS application: Dynamic List Creation: adding elements in the List, removing elements from the List.		[1Hr] [1Hr] [1Hr] [1Hr]
Ex No: 6 Display a list in a webpage in which list elements can be dynamically added using AngularJS. **Ex No: 7** Display a list in a webpage in which list elements can be dynamically removed using AngularJS.		[6 Hrs] [6 Hrs]
Unit IV	**BACKEND FRAMEWORK DJANGO**	**[22Hrs]**
Introduction to Django Framework Concepts: Virtual Environment, Project, App, View,Template, Django Models. SQLite, Model Creation, insertion, delete and update data in a Model.		[1Hr] [1Hr] [1Hr] [1Hr]

Ex No 8: Create a Django App to display "Hello World." **Ex No 9:** Create and display a template in Django App. **EX No 10:** Create a Model in a Django app and insert data	[6 Hrs] [6 Hrs] [6 Hrs]
TOTAL HOURS	**75 Hrs**

Suggested List of Students Activity

- Presentation/Seminars by students on any recent technological developments based on the course.
- Periodic class/online quizzes conducted based on the course.
- Blended learning activities to explore the recent trends and developments in the field.

Text books for Reference:

S.NO	TITLE	AUTHOR	PUBLISHER WITH EDITION
1.	Bootstrap 4 Quick	Jacob Lett	First Edition, Bootstrap Creative, 2018.
2.	Learning AngularJS: A Guide to AngularJS Development	Ken Williamson	First Edition, O'Reilly,2015.
3.	Django 3 By Example: Build powerful and reliable Python webapplications from scratch	Antonio Mele	Third Edition, Packt Publishing Limited,2020.

Web-based/Online Resources

S.NO	WEBSITES/LINKS
1.	https://www.w3schools.com/bootstrap/
2.	https://www.w3schools.com/django/

Equipment / Facilities required to conduct the Practical Portion
Software Requirement:

S.NO.	SOFTWARE
1.	Windows / Linux Operating System
2.	Any Browser – Microsoft Edge/Chrome.
3.	Editor – Notepad/ Notepad++
4.	Server Software - WSGIServer.
5.	Python IDLE /Spyder

Hardware Requirement:

S.NO.	HARDWARE
1.	Desktop Computers / Laptop
2.	Printer

CTE5545– FULL STACK DEVELOPER

MODEL QUESTION PAPER

Duration: 3 hrs. **Max. Marks: 100**

S. NO	NAME OF THE EXPERIMENTS	CO	PO
	PART - A		
1	Design a webpage with header, footer and navigation sections using appropriate semantic elements of HTML5	E5445.1	PO1, PO2, PO3, PO4, PO5, PO6,PO7
2	Design a Sign-up page for a website which would accept only numerical values in the phone number field and password of minimum length 8 using HTML5 and JavaScript.	E5445.1	PO1, PO2, PO3, PO4, PO5, PO6,PO7
3	Design a web page to demonstrate the bootstrap container and grid classes.	E5445.2	PO1, PO2, PO3, PO4, PO5, PO6,PO7
4	Design a web page with navigation bar using. navbar classes.	E5445.2	PO1, PO2, PO3, PO4, PO5, PO6,PO7
5	Design a web page to demonstrate the scroll spyplugin.	E5445.3	PO1, PO2, PO3, PO4, PO5, PO6,PO7
	PART - B		
6	Display a list in a webpage in which list elements canbe dynamically added using Angular JS.	E5445.3	PO1, PO2, PO3, PO4, PO5, PO6,PO7
7	Display a list in a webpage in which list elements canbe dynamically removed using Angular JS.	E5445.4	PO1, PO2, PO3, PO4, PO5, PO6,PO7
8	Create a Django App to display “Hello World.”	E5445.4	PO1, PO2, PO3, PO4, PO5, PO6,PO7
9	Create and display a template in Django App.	E5445.5	PO1, PO2, PO3, PO4, PO5, PO6,PO7
10	Create a Model in a Django app and insert data.	E5445.5	PO1, PO2, PO3, PO4, PO5, PO6,PO7

CTE5546 – ROBOTIC PROCESS AUTOMATION

Programme Name : COMPUTER ENGINEERING
Course Code : CTE5546
Semester : V SEMESTER
Course Title : ROBOTIC PROCESS AUTOMATION
Course Type : PRACTICUM

L	T	P	C
1	0	4	3

TEACHING AND SCHEME OF EXAMINATION

No. of weeks per semester: 15weeks

Course	Instructions		Examination			
			Marks			Duration
	Hours / Week	Hours / Semester	Internal Assessment	Autonomous Examination	Total	
ROBOTIC PROCESS AUTOMATION	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	RPA Tool Introduction	15
II	Basic Programming Concepts	15
III	Advanced Automation Concepts & Techniques	21
IV	Handling User Events & Exception Handling	9
V	Deploying And Managing The BOT:	15
TOTAL HOURS		**75**

COURSE DESCRIPTION

In today's digital landscape, businesses are employing automation more and more to increase productivity, streamline operations and reduce cost. This technology revolution is being led by Remote Process Automation, or RPA, which offers powerful tools and techniques to automate repetitive tasks and workflows across various industries. This syllabus is designed to provide students with hands-on experience and comprehensive understanding of Remote Process Automation.

COURSE OBJECTIVES

The objective of this course is to enable the student to

- Understand the fundamentals of RPA tools, including their features and user interface.
- Master the concept of variables in UiPath, covering various variable types.
- Gain proficiency in basic programming concepts such as control flow, including ifelse statements, loops, and advanced control flow structures, through hands-on experience in UiPath Studio.
- Develop skills in advanced automation techniques including recording, table extraction, selectors, and automation of Excel and PDF files using UiPath.
- Learn how to build and manipulate data tables both statically and dynamically using UiPath, including techniques such as data scraping for dynamic table creation.

COURSE OUTCOMES:

After successful completion of this course, the students should be able to	
E5546.1	Download, install, and activate UiPath Studio, and gain proficiency in using the tool to develop RPA solutions.
E5546.2	Demonstrate a deep understanding of variables in UiPath, including their types and management best practices, allowing them to handle data effectively within automation workflows.
E5546.3	Identify and apply Image, Text, and Data Tables Automation.
E5546.4	Handle User Events and various types of Exceptions effectively.
E5546.5	Deploy and maintain Robots efficiently.

Pre-requisites : Nil

CO- POs & PSOs MAPPING MATRIX:

CO/ PO & PSO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PSO1**	**PSO2**	**PSO3**
E5546.1	3	3	3	3	2	2	3	2	3	2
E5546.2	3	3	3	3	2	2	3	2	3	2
E5546.3	3	3	3	3	2	2	3	2	3	2
E5546.4	3	3	3	3	2	2	3	2	3	2
E5546.5	3	3	3	3	2	2	3	2	3	2
Total	**15**	**15**	**15**	**15**	**10**	**10**	**15**	**10**	**15**	**10**
Correlation level	**3**	**3**	**3**	**3**	**2**	**2**	**3**	**2**	**3**	**2**

Correlation level 1 – Slight (low)

Correlation level 2 – Moderate (Medium)

Correlation level 3 – Substantial (high)

Instructional Strategy:

- Understanding RPA Concepts: Begin by introducing learners to the basic concepts of RPA, including its definition, benefits, and common use cases across different industries. Explain the difference between attended and unattended automation and introduce key RPA tools and platforms.
- Interactive Learning: Utilize interactive learning methods such as quizzes, polls, and group discussions to reinforce learning and promote engagement.
- Real-world Examples: Incorporate real-world examples and case studies to illustrate how RPA tools are used in various industries and scenarios. Showcasing practical applications will enhance understanding and highlight the relevance of RPA skills in the job market.
- Peer Learning: Encourage participants to exchange ideas, review each other's work, and provide constructive feedback.

Assessment Methodology:

	Continuous Assessment (40 marks)				**End Semester Examination (60 marks)**
	CA1	**CA2**	**CA3**	**CA4**	
Mode	Practical Test	Practical Test	Written Test Theory	Practical Test	Practical Examination
Portion	PART-A Exercises	PART-B Exercises	All Units	All Exercises	All Exercises
Duration	2 Periods	2 Periods	3 hours	3 hours	3 hours
Exam Marks	60	60	100	100	100
Converted to	10	10	10	10	60
Marks	40				60
Tentative Schedule	7th Week	14th Week	15th Week	16th 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.

The exercise should be completed on the day of practice. The same shall be evaluated for 10 marks on the day or the next day of practice before commencementof next exercise. The detailed date of the practices and its evaluations should be maintained in the log book and should be submitted for the verification.

SCHEME OF EVALUATION

PART	DESCRIPTION	MARKS
A	Aim (05) , Program (30)	35
B	Execution and Output	15
TOTAL		50
C	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	Answer any ten questions out of twelve. Each carries three marks.	10 x 3	30
Part – B	Answer any seven questions out of ten. Each carries ten marks	7 x 10	70
TOTAL			**100Marks**

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 (05) , Program from Part – A (30)	35
B	Aim (05) , Program from Part – B (30)	35
C	Executing any one program (Part A or Part –B)	15
D	Output	10
E	Viva Voce	05
TOTAL		**100**

CTE5546 – ROBOTIC PROCESS AUTOMATION

CTE5546	ROBOTIC PROCESS AUTOMATION	L	T	P	C
PRACTICUM		1	0	4	3

Unit I	**RPA TOOL INTRODUCTION**	**[15 Hrs]**
Theory Introduction to RPA Tools and User Interface Overview of popular RPA tools and their features Understanding the user interface of RPA tools. Variables: Types Generic Value Variables Text Variables True or False Variables Number Variables Array Variables Date and Time Variables Data Table Variables		[1Hr] [1Hr] [1Hr]
Practical **Ex No 1**: Download, Install and Activate Ui-Path Studio. Learn all the basics of RPA (Variables, arguments and Control flow etc.) **Ex No 2**: Write a program to empty the trash folder in Gmail.		[6 Hrs] [6 Hrs]
Unit II	**BASIC PROGRAMMING CONCEPTS**	**[15 Hrs]**
Theory Control flow concepts If Else Statements Loops Advanced Control Flow Sequences Flowcharts Control Flow Activities The Assign Activity The Delay Activity The Do While Activity The If Activity The Switch Activity The While Activity The For Each Activity The Break Activity.		[1Hr] [1Hr] [1Hr]
Practical **Ex No 3**: Write a program in UIPath that utilizes the If activity and Switch activity to find the smallest and largest numbers in an array. **Ex No 4**: Write a program in UIPath that utilizes the While activity, Do-While activity, and For-Each activity to increment an integer variable from 5 to 50 in increments of 5.		[6 Hrs] [6 Hrs]
Unit III	**ADVANCED AUTOMATION CONCEPTS & TECHNIQUES**	**[21 Hrs]**
Theory Recording Introduction – App / Web Recording – Table Extraction – Selectors – Excel Automation: Basics, Information Retrieval in Data Tables - Data Manipulation in excel – PDF Automation: Extracting Data from PDF - Extracting a single piece of data - Anchors - Usinganchors in PDF.		[1Hr] [1Hr] [1Hr]

Practical **Ex No 5**: Write a program to i) build a data table(static) ii) build a data table using data scraping(Dynamically). **Ex No 6**: Write a program to read an excel file and creating a data table by using data from the Excel file. **Ex No 7:** Write a program to demonstrate the concept of dynamic elements in UIPath selectors		[6 Hrs] [6 Hrs] [6 Hrs]
Unit IV	**HANDLING USER EVENTS & EXCEPTION HANDLING**	**[9 Hrs]**
Theory Triggers: Monitoring system event triggers Hotkey trigger Mouse trigger System trigger An example of monitoring email. Exception Handling Strategies for handling errors and exceptions Implementing error catching mechanisms in RPA workflows.		[1Hr] [1Hr] [1Hr]
Practical **Ex No 8**: Write a program to demonstrate email automation. (Note: use triggers and exception handling)		[6 Hrs]
Unit V	**DEPLOYING AND MANAGING THE BOT:**	**[15 Hrs]**
Theory Orchestrator overview for Automation Developers – Working with Orchestrator Resources. Managing packages – Uploading packages – Deleting packages.		[1Hr] [1Hr] [1Hr]
Practical **Ex No 9**. Create an automation project in UIPath studio and publish and control the same using UIPath orchestrator. **Ex No 10**. Write a program to demonstrate manage package, upload package and deleting package for a reusable component.		[6 Hrs] [6 Hrs]
TOTAL HOURS		**75 Hrs**

Suggested List of Students Activity

- Presentation/Seminars by students to identify and analyze a manual process in a business environment suitable for automation.
- Assign bot development projects to students as a group activity to automate specific tasks or processes.
- Blended learning activities to explore advanced RPA techniques and capabilities.

Textbooks for Reference:

S.NO	TITLE	AUTHOR	PUBLISHER WITH EDITION
1.	Learning Robotic Process Automation	Alok Mani Tripathi	Packt Publishing, 2018
2.	Introduction to Robotic Process Automation: a Primer	Frank Casale, Rebecca Dilla, Heidi Jaynes, Lauren Livingston	Institute of Robotic Process Automation, First Edition 2015.
3.	Robotic Process Automation: Guide to Building Software Robots Automate Repetitive Tasks & Become An RPA Consultant	Richard Murdoch	Independently Published, First Edition 2018.

Website Based/Online Resources:

S.NO	WEBSITE/LINKS
1.	https://www.uipath.com/rpa/robotic-process-automation
2.	https://www.academy.uipath.com

Equipment / Facilities required to conduct the Practical Portion

Software Requirement:

S.NO.	SOFTWARE
1.	UIPath Studio.

Hardware Requirement:

S.NO.	HARDWARE
1.	Desktop Computers / Laptop

CTE5546–ROBOTIC PROCESS AUTOMATION

MODEL QUESTION PAPER

Duration: 3 hrs. **Max. Marks: 100**

S. NO	NAME OF THE EXPERIMENTS	CO	PO
	PART - A		
1	Download, Install and Activate Ui-Path Studio. Learnall the basics of RPA	E5546.1	PO1, PO2, PO3, PO4, PO5, PO6,PO7
2	Write a program to empty the trash folder in Gmail.	E5546.1	PO1, PO2, PO3, PO4, PO5, PO6,PO7
3	Write a program in UIPath that utilizes the If activity and Switch activity to find the smallest and largest numbers inan array.	E5546.2	PO1, PO2, PO3, PO4, PO5, PO6,PO7
4	Write a program in UIPath that utilizes the While activity, Do-While activity, and For-Each activity to increment an integer variable from 5 to 50 in increments of 5.	E5546.2	PO1, PO2, PO3, PO4, PO5, PO6,PO7
5	Write a program to i) build a data table(static) ii) build a data table using data scraping (Dynamically).	E5546.3	PO1, PO2, PO3, PO4, PO5, PO6,PO7
	PART - B		
6	Write a program to read an Excel file and creating a data table by using data from the Excel file.	5546.3	PO1, PO2, PO3, PO4, PO5, PO6,PO7
7	Write a program to demonstrate the concept ofdynamic elements in UIPath selectors.	5546.4	PO1, PO2, PO3, PO4, PO5, PO6,PO7
8	Write a program to demonstrate email automation. (Note: use triggers and exception handling)	5546.4	PO1, PO2, PO3, PO4, PO5, PO6,PO7
9	Create an automation project in UiPath studio and publish and control the same using uipath orchestrator.	5546.5	PO1, PO2, PO3, PO4, PO5, PO6,PO7
10	Write a program to demonstrate manage package, upload package and deleting package for a reusablecomponent.	5546.5	PO1, PO2, PO3, PO4, PO5, PO6,PO7

CTE5654 – INNOVATION AND STARTUP

Programme Name : COMPUTER ENGINEERING
Course Code : CTE5654
Semester : V SEMESTER
Course Title : INNOVATION AND STARTUP
Course Type : PRACTICUM

L	T	P	C
1	0	2	2

TEACHING AND SCHEME OF EXAMINATION

No. of weeks per semester: 15weeks

Course	Instructions		Examination			
			Marks			Duration
	Hours / Week	Hours / Semester	Internal Assessment	Autonomous Examination	Total	
INNOVATION AND 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	Seminar	9
V	Exposure to Industry	18
TOTAL HOURS		**45**

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 real world 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 within 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 the practical experience in preparing Business plan for Start-ups
- To visit the existing nearby industry to prepare 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	
E5654.1	Differentiate between Innovation and Start-ups
E5654.2	Explain the importance of IPR, Patents and Copyrights.
E5654.3	Describe the methodology to be adopted for preparing the Business Plan
E5654.4	Gain practical experience by Industrial training and visiting the nearby industry
E5654.5	Explore and identify various funding facilities available from Government and Non-Government Schemes for Start-ups

Pre-equisites : There are no specific prerequisites for this course, although a basic understanding of business and technology concepts would be beneficial.

CO- POs & PSOs MAPPING MATRIX:

CO/ PO & PSO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PSO1**	**PSO2**	**PSO3**
E5654.1	3	3	3	3	2	2	3	2	3	2
E5654.2	3	3	3	3	2	2	3	2	3	2
E5654.3	3	3	3	3	2	2	3	2	3	2
E5654.4	3	3	3	3	2	2	3	2	3	2
E5654.5	3	3	3	3	2	2	3	2	3	2
Total	15	15	15	15	10	10	15	10	15	10
Correlation level	3	3	3	3	2	2	3	2	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
Marks	10	10	20	60

Continuous Assessment - 40 marks

S. No	**Description**	**Marks**
CA1 i) ii)	**Class Assessment (50 marks) - Unit – I, II & III** Written Examination - Theory Questions 10 questions out of 15 questions (10 x 3 marks :30 marks) 4 questions out of 6 questions (4 x 5 marks : 20 marks)	10 marks
CA 2	**Seminar Presentations (20 marks- each topic carries 10 marks) - Unit IV** Students should present any two topics with PPTs	10 marks
CA 3	Submission of Industry Visit Project Report - **(30 marks) - Unit V**	20 marks
	Total	**40 marks**

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.

Detailed Allocation of Marks

S. No	Description	Marks
Part A i) ii)	Written Examination – Unit –I,II & IIITheory Questions 10 questions out of 15 questions (10 x 3 marks = 30 marks) 3 questions either or pattern (3 x 5 marks = 15 marks)	45
Part B i) ii)	Presentation of Industry Visit Project Report	25
	Interaction and Evaluation	30
TOTAL		**100**

CTE5654 – INNOVATION AND STARTUP

CTE5654	INNOVATION AND STARTUP	L	T	P	C
PRACTICUM		1	0	2	2

Unit I	**INTRODUCTION TO INNOVATION**	**[6 Hrs]**
An Introduction to Innovation and Creativity-		[1Hr]
Innovation in current Environment –		[1Hr]
Types of Innovation –		[1Hr]
Challenges of Innovation - Steps of Innovation Management-		[1Hr]
Divergent v/s Convergent thinking –		[1Hr]
Design thinking and Entrepreneurship		[1Hr]
Unit II	**INCUBATION CLUBS, IPR, PATENTS AND COPYRIGHTS**	**[6 Hrs]**
Idea Generation - Incubation Clubs –		[1Hr]
Prototype Development - Marketing of Innovation –		[1Hr]
Management of Innovation –		[1Hr]
Creation of IPR -Types of IPR –		[1Hr]
Patents and Copyrights - Patents in India –		[1Hr]
Technological and Non-Technological Innovation Process.		[1Hr]
Unit III	**GOVERNMENT AND NON-GOVERNMENT FUNDING SCHEMES FORSTART-UPS**	**[6 Hrs]**
An introduction to Start-up – Start-ups in India –		[1Hr]
Procedure for registration of Start- ups –		[1Hr]
Business Model- Business Plan –		[1Hr]
Case Studies - Opportunities and Challenges –		[1Hr]
Funding supports from Government Schemes –		[1Hr]
MUDRA, TANSEED, NEEDS, PMEGP, UYEGP – Non-Government Schemes - CSR Fund - Angel Investors - Venture Capitalist		[1Hr]
Unit IV	**SEMINAR**	**[9 Hrs]**
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 1. Idea Generation 2. Innovation Management 3. Product Development 4. Business Model Innovation 5. Organizational Culture and Change Management		[9 Hrs]

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 How to start a start-up in India		
Unit V	**EXPOSURE TO INDUSTRY**	**[18 Hrs]**
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		[18 Hrs]
TOTAL HOURS		**45 Hrs**

CTE5773 – INDUSTRIAL TRAINING

Programme Name	: COMPUTER ENGINEERING
Course Code	: CTE5773
Semester	: V SEMESTER
Course Title	: INDUSTRIAL TRAINING
Course Type	: PROJECT

SUMMER VACATION	C
	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 demeanor.
- 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.

CO- POs & PSOs MAPPING MATRIX:

CO/ PO & PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
E5773.1	3	3	3	3	2	2	3	2	3	2
E5773.2	3	3	3	3	2	2	3	2	3	2
E5773.3	3	3	3	3	2	2	3	2	3	2
E5773.4	3	3	3	3	2	2	3	2	3	2
E5773.5	3	3	3	3	2	2	3	2	3	2
Total	**15**	**15**	**15**	**15**	**10**	**10**	**15**	**10**	**15**	**10**
Correlation level	**3**	**3**	**3**	**3**	**2**	**2**	**3**	**2**	**3**	**2**

Correlation level 1 – Slight (low)
Correlation level 2 – Moderate (Medium)
Correlation level 3 – Substantial (high)

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 Counseling:
    - Provide career guidance and counseling 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 counselor 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 preparethemselves effectively for future professional endeavors.

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 arecord 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 isto 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 studyon 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. Anydata, 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. Initiative in learning / working at site	10
C	Self expression / communication skills. Interpersonal skills / Human Relation.	10
D	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**

VI SEMESTER

CTE6111 – ADVANCED ENGINEERING MATHEMATICS

Programme Name : COMPUTER ENGINEERING
Course Code : CTE6111
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			
			Marks			Duration
	Hours / Week	Hours / Semester	Internal Assessment	Autonomous Examination	Total	
ADVANCED ENGINEERING MATHEMATICS	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	Eigen values and Eigen vectors	**7**
II	Functions of Several Variables	**7**
III	Vector Calculus	**7**
IV	Differential Equations	**7**
V	Laplace Transforms	**7**
TEST & REVISION		**10**
TOTAL		**45**

COURSE DESCRIPTION

Mathematics is essential for engineering students to understand core engineering subjects. 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 OBJECTIVES

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	
E6111.1	Find eigenvalues and corresponding eigenvectors of a square matrix.
E6111.2	Apply the knowledge of partial differentiation to evaluate Jacobian and extremities of two variable functions.
E6111.3	Evaluate the gradient of a scalar field and the divergence and curl of vector fields.
E6111.4	Solve ordinary differential equations using various techniques.
E6111.5	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/PO & PSO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PSO1**	**PSO2**	**PSO3**
E6111.1	3	2	2	3	3	2	3	3	3	2
E6111.2	3	2	2	3	3	2	3	3	3	2
E6111.3	3	2	2	3	3	2	3	3	3	2
E6111.4	3	2	2	3	3	2	3	3	3	2
E6111.5	3	2	2	3	3	2	3	3	3	2
Total	**15**	**10**	**10**	**15**	**15**	**10**	**15**	**15**	**15**	**10**
Correlation level	**3**	**2**	**2**	**3**	**3**	**2**	**3**	**3**	**3**	**2**

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 inducto-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 (40 marks)				**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	2 Periods	2 Periods	1 Hour	3 Hours	3 Hours
Exam Marks	50	50	60	100	100
Converted to	10	10	10	10	60
Marks	40				60
Tentative Schedule	6th Week	12th Week	13th-14th Week	16th week	

Note:

CA1 and CA2: Assessment written test should be conducted for 50 Marks for two units. The marks scored will be converted to 10 Marks for the internal assessment.

CA1 and CA2 Assessment test should be conducted for two units as below

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

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 10 marks 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 (5 X 2 X 10 Marks=100 Marks)

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 ThinkingSkills (HOTs)**
	R-Remember, **U**-Understand, **AP**-Apply	**An**- Analyse, **E**-Evaluate, **C**-Create
% to be included	90 %	10 %

CTE6111 – ADVANCED ENGINEERING MATHEMATICS

CTE6111	ADVANCED ENGINEERING MATHEMATICS	L	T	I	C
THEORY		3	0	0	3

Unit I	**EIGEN VALUES AND EIGEN VECTORS**	**[7 Hrs]**
Characteristic equation–Eigen-values of 2x2 and 3x3 real matrices		[1Hr]
Eigen-vectors of 2x2 real matrices		[1Hr]
Properties of eigen-values(excluding proof)		[2Hrs]
Cayley-Hamilton theorem(excluding proof)		[2Hrs]
Simple problems.		[1Hr]
Unit II	**FUNCTIONS OF SEVERAL VARIABLES**	**[7 Hrs]**
Partial derivatives of two variable and three variable functions (up to second order)		[2Hrs]
Homogeneous functions and Euler's theorem (excluding proof)		[2Hrs]
Jacobian matrix and determinant		[1Hr]
Maxima and minima of functions of two variables		[1Hr]
Simple problems.		[1Hr]
Unit III	**VECTOR CALCULUS**	**[7 Hrs]**
Scalar filed 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		[1Hr]
Simple problems.		[1Hr]
Unit IV	**DIFFERENTIAL EQUATIONS**	**[7 Hrs]**
Differential equation–Formation- Order and degree		[1Hr]
Solution of a differential equation–Equations of first order and first degree		[1Hr]
Variable separable method–Leibnitz's Linear equations–		[1Hr]
Second order equations of the form $(aD^2 + bD + c)y = e^{mx}$ where a, b, c and n are constants and the auxiliary equation $am^2+bm+c=0$ has only real roots)–		[2 Hrs]
complementary function–Particular integral–General solution–		[1Hr]
Simple problems.		[1Hr]
Unit V	**LAPLACE TRANSFORMS**	**[7 Hrs]**
Definition of Laplace transform – Laplace transforms of standard functions-		[1Hr]
Linearity and change of scale property (excluding proofs)		[1Hr]
First shifting property		[1Hr]
Laplace transforms of derivatives – Properties (excluding proofs)		[1Hr]
Inverse Laplace transforms–Properties (excluding proofs)		[1Hr]
Solving first order ordinary differential equation using Laplace transforms		[1Hr]
Simple problems.		[1Hr]
TEST & REVISION		**10**
TOTAL HOURS		**45 Hrs**

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 for Reference:

S.NO	TITLE	AUTHOR	PUBLISHER WITH EDITION
1.	Higher Engineering Mathematics	John Bird	Routledge, 9th Edition, 2021.
2.	Higher Engineering Mathematics	Grewal, B.S.,	Khanna Publishers, 42nd Edition, 2012.
3.	Differential Equations and Applications	Arumugam, S., Thangapandi Isaac,A., & Somasundaram, A.,	Yes Dee Publishing Pvt. Ltd., 2020.
4.	Vector Analysis	Duraipandian, P.,& Kayalal Pachaiyappa	S Chand and Company Limited, 2014.
5.	Calculus Volume Iand II	Narayanan, S., & Manicavachagom Pillai T.K.,	Viswanathan Publishers Pvt. Ltd., 2007.

Web-based/Online Resources:

S.NO	WEBSITES/LINKS
1.	www.khanacademy.org/math/
2.	https://www.mathportal.org/
3.	https://openstax.org/subjects/math
4.	www.mathhelp.com/
5.	https://www.geogebra.org/
6.	https://www.desmos.com/
7.	https://phet.colorado.edu/

MODEL QUESTION PAPER

CTE6111 – ADVANCED ENGINEERING MATHEMATICS

Time : [3 Hrs]. **Max. Marks : 100**

PART-A (5 X 2 X 10 Marks = 100 Marks)

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.	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	U	E6111.1	PO1,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	PO1,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	R	E6111.1	PO1,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	PO1,PO2,PO5,PO7
II	5.	Determine the partial derivative of the functions: $f(x,y) = 3x + 4y$ $f(x,y) = x^2y + \sin x + \cos y.$	II	R	E6111.2	PO1,PO2,PO5,PO7
	6.	Find the 1st order partial derivative of $f(x,y,z)=4x^3y^2-e^zy^4+\frac{x3}{x2}+4y-x^{16.}$	II	R	E6111.2	PO1,PO2,PO5,PO7
	7.	Find $\frac{\partial z}{\partial x}$ and $\frac{\partial z}{\partial y}$ for the following function. $x^2\sin(y^3)+xe^{3z}-\cos(z^2)=3y-6z+8$	II	U	E6111.2	PO1,PO2,PO5,PO7
	8.	Find the second partial derivatives of $f(x, y) = \sin(x)y^2$	II	R	E6111.2	PO1,PO2,PO5,PO7
III	9.	Calculate the angle between two vectors	III	R	E6111.3	PO1,PO2,PO5,PO7

		$\vec{i} - 2\vec{j} + 3k$ and $3\vec{i} - 2\vec{j} + k$.				
	10.	A girl walks 4 kilometers west, then 3 kilometers 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	PO1,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	R	E6111.3	PO1,PO2,PO5,PO7
	12.	Show that the parallelogram on the same base and between the same parallels are equal in area using the vector method.	III	R	E6111.3	PO1,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	PO1,PO2,PO5,PO7
	14.	Find the equation of a curve passing through (1, π/4) if the slope of the tangent to the curve at any point P (x, y) is $y/x - \cos^2(y/x)$.	IV	R	E6111.4	PO1,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	PO1,PO2,PO5,PO7
	16.	Solve the initial value problem: cos(a+b)dy =dx, y(0) = 0.	IV	U	E6111.4	PO1,PO2,PO5,PO7
V	17.	Find the Laplace transform of 3+t5+sin(πt)	V	AP	E6111.5	PO1,PO2,PO5,PO7
	18.	Solve x″+x=u(t−1) for initial conditions x(0)=0(0)=0 and x′(0).	V	U	E6111.5	PO1,PO2,PO5,PO7
	19.	Find the transfer function for mx″+cx′+kx=f(t) (assuming the initial conditions are zero).	V	U	E6111.5	PO1,PO2,PO5,PO7
	20.	Solve $x(t)=e^{-t}+\int_0^t \cos(t-\tau)x(\tau)\,d\tau$.	V	R	E6111.5	PO1,PO2,PO5,PO7

QUESTION PAPER SETTING

The teaching learning process and assessment are being carried out in accordance withthe revised Blooms Taxonomy. The question paper should consist of 90% questionsbased 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 ThinkingSkills (HOTs)**
	R-Remember, **U**-Understand, **AP**-Apply	**An**- Analyse, **E**-Evaluate, **C**-Create
% to be included	90 %	10 %

CTE6112 – ENTREPRENEURSHIP

Programme Name : COMPUTER ENGINEERING
Course Code : CTE6112
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	**7**
II	Business Idea	**7**
III	Banking	**7**
IV	Pricing And Cost Analysis	**7**
V	Business Plan Preparation	**7**
TEST & REVISION		**10**
TOTAL		**45**

COURSE DESCRIPTION

Development of a diploma curriculum is a dynamic process responsive to the society and reflecting the needs and aspiration 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 promoting concern for excellence. In this context the course on entrepreneurship and start 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 ensure good means of living for every individual, provides jobs and develop Indian economy.

COURSE OBJECTIVES

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	
E6112.1	Understand the process of entrepreneurship
E6112.2	Analyze the importance of generation of ideas and product selection
E6112.3	Familiarization of various financial and non financial schemes
E6112.4	Acquire various cost components to arrive pricing of the product
E6112.5	Learn the preparation of project feasibility report

Pre-requisites : Knowledge of basics of Engineering and industrial engineering

CO-POs & PSOs Mapping matrix

CO/PO & PSO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PSO1**	**PSO2**	**PSO3**
E6112.1	3	2	2	3	3	2	3	3	3	2
E6112.2	3	2	2	3	3	2	3	3	3	2
E6112.3	3	2	2	3	3	2	3	3	3	2
E6112.4	3	2	2	3	3	2	3	3	3	2
E6112.5	3	2	2	3	3	2	3	3	3	2
Total	**15**	**10**	**10**	**15**	**15**	**10**	**15**	**15**	**15**	**10**
Correlation level	**3**	**2**	**2**	**3**	**3**	**2**	**3**	**3**	**3**	**2**

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 asimulated environment, transitioning to real- world scenarios when possible.

Assessment Methodology

	Continuous Assessment (40 marks)				**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	2 Periods	2 Periods	1 Hour	3 Hours	3 Hours
Exam Marks	50	50	60	100	100
Converted to	10	10	10	10	60
Marks	40				60
Tentative Schedule	6th Week	12th Week	13th-14th Week	16th week	

Note:

CA1 and CA2: Assessment written test should be conducted for 50 Marks for two units. The marks scored will be converted to 10 Marks for the internal assessment.

CA1 and CA2 Assessment test should be conducted for two units as below

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

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 10 marks 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 (5 X 2 X 10 Marks=100 Marks)

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 ThinkingSkills (HOTs)**
	R-Remember, **U**-Understand, **AP**-Apply	**An**- Analyse, **E**-Evaluate, **C**-Create
% to be included	90 %	10 %

CTE6112 – ENTREPRENEURSHIP

CTE6112	ENTREPRENEURSHIP	L	T	P	C
THEORY		3	0	0	3

Unit I	**ENTREPRENEURSHIP – INTRODUCTION AND PROCESS**	**[7 Hrs]**
Concept of entrepreneurship – Importance,		[1Hr]
Myths about Entrepreneurship, Pros and Cons of Entrepreneurship		[1Hr]
Process of Entrepreneurship, Competencies and Characteristics of an entrepreneur		[1Hr]
Ethical Entrepreneurship, Entrepreneurial Values and Attitudes,		[1Hr]
Creativity, Innovation and entrepreneurship		[1Hr]
Entrepreneurs - as problem solvers, Mindset of an employee and an entrepreneur,		[1Hr]
Risk Taking-Concepts		[1Hr]
Unit II	**BUSINESS IDEA**	**[7 Hrs]**
Types of Business: Manufacturing, Trading and Services,		[1Hr]
Stakeholders: sellers, vendors and consumers and Competitors, E- commerce Business Models		[1Hr]
business idea generation, Types of Resources - Human, Capital and Entrepreneurial tools and resources, etc.,- setting business goals-		[1Hr]
Patent, copyright and Intellectual property rights.		[1Hr]
Customer Relations and Vendor Management, -Business Ideas vs. Business Opportunities,		[1Hr]
Opportunity- SWOT ANALYSIS of a business idea - Business Failure – causes and remedies.- Types of business risks,		[1Hr]
Unit III	**BANKING**	**[7 Hrs]**
Size and capital based classification of business enterprises		[2Hrs]
Role of financial institutions,		[1Hr]
Role of Government policy, Entrepreneurial support systems		[2Hrs]
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, -financial Business Case Study		[2Hrs]
Understand the meaning and concept of the term Cash Inflow and Cash Outflow		[1Hr]
Pricing- 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]
Unit V	**BUSINESS PLAN PREPARATION**	**[7 Hrs]**
Feasibility Report – Technical analysis, financial analysis		[1Hr]
Market Research - Concept, Importance and Process,		[1Hr]
Tools for market research		[1Hr]
Market Sensing and Testing, Marketing and Sales strategy		[1Hr]
Digital marketing, Branding - Business name, logo, tag line,		[1Hr]
Promotion strategy, Business Plan Preparation, -		[1Hr]
Concept and Importance, Execution of Business Plan, Digital freelancer.		[1Hr]
TEST & REVISION		**10**
TOTAL HOURS		**45 Hrs**

Suggested List of Students Activity

- Students can explore app development or web design. They'll learn about technology, user experience, and marketing.
- Hosting events, workshops, or conferences allows students to practice project management, networking, and marketing skills.
- Encourage students to address social or environmental issues through innovative business solutions. This fosters empathy and creativity.
- Part of entrepreneurship clubs or organizations provides networking opportunities, mentorship, and exposure to real-world challenges.
- Competitions like business plan contests or pitch events allow students to showcase their ideas and receive feedback.
- Students can create and sell handmade crafts, artwork, or other products. This teaches them about production, pricing, and customer relations.
- Students can provide consulting services in areas they're knowledgeable about, such as social media marketing or financial planning.
- 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 for Reference:

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 & Management	R.K. Singal	S K Kataria and Sons, 2013.

Web-based/Online Resources:

S.NO	WEBSITES/LINKS
1.	https://ocw.mit.edu/courses/15-390-new-enterprises-spring-2013/resources/lecture1/
2.	https://onlinecourses.nptel.ac.in/noc20_ge08/preview

MODEL QUESTION PAPER

CTE6112 – ENTREPRENEURSHIP

Time : [3 Hrs]. **Max. Marks : 100**

PART-A (5 X 2 X 10 Marks = 100 Marks)

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 concepts of entrepreneurship and its importance	I	U	E6112.1	PO1,PO2,PO5,PO7
	2.	Explain about the Competencies and characteristics of anentrepreneur	I	R	E6112.1	PO1,PO2,PO5,PO7
	3.	Describe the Ethical Entrepreneurship	I	R	E6112.1	PO1,PO2,PO5,PO7
	4.	Briefly explain about the Process of Entrepreneurship	I	R	E6112.1	PO1,PO2,PO5,PO7
II	5.	Describe the SWOT ANALYSIS of a business idea	II	R	E6112.2	PO1,PO2,PO5,PO7
	6.	Write the causes and remedies of business failure	II	R	E6112.2	PO1,PO2,PO5,PO7
	7.	Explain the Types of Business	II	U	E6112.2	PO1,PO2,PO5,PO7
	8.	Explain about the Types of Resources	II	R	E6112.2	PO1,PO2,PO5,PO7
III	9.	Explain the classification of business enterprisesbased on Size and capital	III	R	E6112.3	PO1,PO2,PO5,PO7
	10.	Briefly explain the role of financial institutions	III	U	E6112.3	PO1,PO2,PO5,PO7
	11.	Write the Incentive Schemes for state government	III	R	E6112.3	PO1,PO2,PO5,PO7
	12.	Write the Incentive schemes for Central governments.	III	R	E6112.3	PO1,PO2,PO5,PO7
IV	13.	Explain the Types of Costs	IV	R	E6112.4	PO1,PO2,PO5,PO7
	14.	What do you understand the meaning and concept of theterm Cash Inflow and Cash Outflow	IV	R	E6112.4	PO1,PO2,PO5,PO7
	15.	Explain the process of Calculating Per Unit Cost of asingle product	IV	R	E6112.4	PO1,PO2,PO5,PO7
	16.	Describe the importance and preparation of Income Statement	IV	U	E6112.4	PO1,PO2,PO5,PO7
V	17.	Explain about the Technical analysis and Financial analysis	V	AP	E6112.5	PO1,PO2,PO5,PO7
	18.	Briefly explain about the Concept, Importance and Process for Market Research	V	U	E6112.5	PO1,PO2,PO5,PO7
	19.	Describe the Digital marketing	V	U	E6112.5	PO1,PO2,PO5,PO7
	20.	Explain the process of Branding	V	R	E6112.5	PO1,PO2,PO5,PO7

QUESTION PAPER SETTING

The teaching learning process and assessment are being carried out in accordance withthe revised Blooms Taxonomy. The question paper should consist of 90% questionsbased 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 ThinkingSkills (HOTs)**
	R-Remember, **U**-Understand, **AP**-Apply	**An**- Analyse, **E**-Evaluate, **C**-Create
% to be included	90 %	10 %

CTE6113 – PROJECT MANAGEMENT

Programme Name : COMPUTER ENGINEERING
Course Code : CTE6113
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			
			Marks			Duration
	Hours / Week	Hours / Semester	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	**7**
II	Various Stages and Components of Project Feasibility Studies, Phases of a Project, Stages in Project Life Cycle and Project Constraints	**7**
III	Project Evaluation Under Certainty and Uncertainty, Project Evaluation, Commercial and Social Cost Benefit Analysis	**7**
IV	Developing Project Network Using PERT and CPM, Project Appraisal and Control Process.	**7**
V	Project Managing Versus Leading of Project, Qualities of Project Manager and Managing Project Teams, Team Building Models and Performance Teams and Team Pitfalls.	**7**
TEST & REVISION		**10**
TOTAL		**45**

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, 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 OBJECTIVES

After completing this subject, the student will be able to

- 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 Team Development model.

COURSE OUTCOMES

After successful completion of this course, the students should be able to	
E6113.1	Understand the Project Management Principles.
E6113.2	Learn to create and manage project schedules.
E6113.3	Create structure and manage the project commitments.
E6113.4	Gain enterprise support.
E6113.5	Prepare Detailed Project Report (DPR).

Pre-requisites : Basic Knowledge

CO-POs & PSOs Mapping matrix

CO/PO & PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
E6113.1	3	2	2	3	3	2	3	3	3	2
E6113.2	3	2	2	3	3	2	3	3	3	2
E6113.3	3	2	2	3	3	2	3	3	3	2
E6113.4	3	2	2	3	3	2	3	3	3	2
E6113.5	3	2	2	3	3	2	3	3	3	2
Total	**15**	**10**	**10**	**15**	**15**	**10**	**15**	**15**	**15**	**10**
Correlation level	**3**	**2**	**2**	**3**	**3**	**2**	**3**	**3**	**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 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 (40 marks)				**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	2 Periods	2 Periods	1 Hour	3 Hours	3 Hours
Exam Marks	50	50	60	100	100
Converted to	10	10	10	10	60
Marks	40				60
Tentative Schedule	6th Week	12th Week	13th-14th Week	16th week	

Note:

CA1 and CA2: Assessment written test should be conducted for 50 Marks for two units. The marks scored will be converted to 10 Marks for the internal assessment.

CA1 and CA2 Assessment test should be conducted for two units as below

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

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 10 marks 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 (5 X 2 X 10 Marks=100 Marks)

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 ThinkingSkills (HOTs)**
	R-Remember, **U**-Understand, **AP**-Apply	**An**- Analyse, **E**-Evaluate, **C**-Create
% to be included	90 %	10 %

CTE6113 – PROJECT MANAGEMENT

CTE6113	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**	**[7 Hrs]**
Project – Classification – Importance of Project Management		[1Hr]
An Integrated Approach – Project Portfolio Management System		[1Hr]
The Need - Choosing the appropriate Project Management Structure:		[1Hr]
Organizational considerations and project considerations		[1Hr]
steps in defining the project – project Rollup		[1Hr]
Process breakdown structure – Responsibility Matrices		[1Hr]
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**	**[7 Hrs]**
Project feasibility studies - Opportunity studies, General opportunity studies,		[1Hr]
specific opportunity studies, pre-feasibility studies		[1Hr]
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**	**[7 Hrs]**
Project Evaluation under certainty - Net Present Value (Problems - Case Study)		[1Hr]
Benefit Cost Ratio, Internal Rate of Return,		[1Hr]
Urgency, Payback Period,		[1Hr]
ARR Project Evaluation under uncertainty		[1Hr]
Methodology for project evaluation		[1Hr]
Commercial vs. National Profitability Social Cost Benefit Analysis,		[1Hr]
Commercial or National Profitability social or national profitability.		[1Hr]
Unit IV	**DEVELOPING PROJECT NETWORK USING PERT AND CPM, PROJECT APPRAISAL AND CONTROL PROCESS.**	**[7 Hrs]**
Developing a Project Plan - Developing the Project Network		[1Hr]
Constructing a Project Network (Problems) PERT – CPM-		[1Hr]
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 Project		[1Hr]
Audits – the Project Audit Process project closure		[1Hr]
team, team member and project manager evaluations.		[1Hr]

Unit V	PROJECT MANAGING VERSUS LEADING OF PROJECT,QUALITIES OF PROJECT MANAGER AND MANAGING PROJECT TEAMS, TEAM BUILDING MODELS AND PERFORMANCE TEAMS AND TEAM PITFALLS.	[7 Hrs]
Managing versus leading a project		[1Hr]
managing project stakeholders		[1Hr]
social network building (Including management by wandering around)		[1Hr]
qualities of an effective project manager – managing project teams		[1Hr]
Five Stage Team Development Model		[1Hr]
Situational factors affecting team development project team pitfalls.		[1Hr]
Project monitoring and control		[1Hr]
TEST & REVISION		**10**
TOTAL HOURS		**45 Hrs**

Suggested List of Students Activity

Project Simulation and Role-Playing:

- Activity: Participate in simulated project scenarios where students take on different roles within aproject 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 theirskills in planning and organizing project activities.

Group Project:

- Activity: Work in teams to manage a project from initiation to closure, simulating a real projectenvironment.
- 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 for Reference:

S.NO	TITLE	AUTHOR	PUBLISHER WITH EDITION
1.	Project Management – The Managerial Process	Clifford F. Gray And Erik W. Larson	Tata Mcgraw Hill.
2.	Project Management Toolbox: Tools And Techniques For The Practicing Project Manager	Dragan Z. Milosevic	
3.	Textbook Of Project Management	Gopalakrishnan, P/Ramamoorthy, V.E	Macmillan India. Ltd.
4.	Project Management: A Systems Approach To Planning, Scheduling, And Controlling	Harold Kerzner	Eighth Edition, JohnWiley & Sons
5.	Project Management Methodologies: Selecting, Implementing, And Supporting Methodologies And Processes For Projects	Jason Charvat	John Wiley & Sons
6.	Visualizing Project Management: A Model For Business And Technical Success	Kevin Forsberg, Ph.D, HalMooz	Second Edition, Pmp And Howard Cotterman, John Wiley & Sons

Web-based/Online Resources:

S.NO	WEBSITES/LINKS
1.	https://youtu.be/pc9nvBsXsuM
2.	NPTEL Courses
3.	https://youtu.be/PqQqTAu_FiM

CTE6113 – PROJECT MANAGEMENT

MODEL QUESTION PAPER

Time : [3 Hrs]. **Max. Marks : 100**

PART-A (5 X 2 X 10 Marks = 100 Marks)

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.	Discuss about the classification of Process	I	U	E6113.1	PO1,PO2,PO5,PO7
	2.	Explain about the Importance of Project Management	I	R	E6113.1	PO1,PO2,PO5,PO7
	3.	Describe about the External causes of delay and internal constraints.	I	R	E6113.1	PO1,PO2,PO5,PO7
	4.	Briefly explain the Project Portfolio Management System	I	R	E6113.1	PO1,PO2,PO5,PO7
II	5.	State the following project feasibility studies on Opportunity studies, General opportunity studies, specific opportunity studies, pre-feasibility studies	II	R	E6113.2	PO1,PO2,PO5,PO7
	6.	Explain components of project feasibility studies	II	R	E6113.2	PO1,PO2,PO5,PO7
	7.	Explain about the process of project planning to project completion	II	U	E6113.2	PO1,PO2,PO5,PO7
	8.	Briefly explain the Project Life Cycle	II	R	E6113.2	PO1,PO2,PO5,PO7
III	9.	Explain about the Project Evaluation under certainty	III	R	E6113.3	PO1,PO2,PO5,PO7
	10.	Explain about the Project Evaluation under uncertainty	III	U	E6113.3	PO1,PO2,PO5,PO7
	11.	Write the Benefit Cost Ratio	III	R	E6113.3	PO1,PO2,PO5,PO7
	12.	What are the method for Project Evaluation	III	R	E6113.3	PO1,PO2,PO5,PO7
IV	13.	Explain about the Developing a Project Plan	IV	R	E6113.4	PO1,PO2,PO5,PO7
	14.	Explain about the Developing the Project Network	IV	R	E6113.4	PO1,PO2,PO5,PO7
	15.	State the following Project Network CPM PERT.	IV	R	E6113.4	PO1,PO2,PO5,PO7
	16.	Brief y explain Project Audits	IV	U	E6113.4	PO1,PO2,PO5,PO7

V	17.	Difference between Managing and leading a project	V	AP	E6113.5	PO1,PO2,PO5,PO7
	18.	What are the qualities of an effective project manager.	V	U	E6113.5	PO1,PO2,PO5,PO7
	19.	Describe the Five Stage Team Development Model	V	U	E6113.5	PO1,PO2,PO5,PO7
	20.	Brief y explain Situational factors affecting team development	V	R	E6113.5	PO1,PO2,PO5,PO7

QUESTION PAPER SETTING

The teaching learning process and assessment are being carried out in accordance withthe revised Blooms Taxonomy. The question paper should consist of 90% questionsbased 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 ThinkingSkills (HOTs)**
	R-Remember, **U**-Understand, **AP**-Apply	**An**- Analyse, **E**-Evaluate, **C**-Create
% to be included	90 %	10 %

CTE6114 – FINANCE FUNDAMENTALS

Programme Name : COMPUTER ENGINEERING
Course Code : CTE6114
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			
			Marks			Duration
	Hours / Week	Hours / Semester	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 OBJECTIVES

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. Instill the concept of costing and its impact on proftability

COURSE OUTCOMES

After successful completion of this course, the students should be able to	
E6114.1	Manage financial resources effectively to achieve personal goals
E6114.2	Ensure that the business has enough money to meet its obligations and that it can recover in the future
E6114.3	Exhibit financial literacy through the usage of different terminologies appropriate to the context
E6114.4	Differentiate different types of budgeting and allocate the resources
E6114.5	Apply the idea of marginal costing in decision making

Pre-requisites : Knowledge of basic mathematics

CO-POs & PSOs Mapping matrix

CO/PO & PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
E6114.1	3	2	2	3	3	2	3	3	3	2
E6114.2	3	2	2	3	3	2	3	3	3	2
E6114.3	3	2	2	3	3	2	3	3	3	2
E6114.4	3	2	2	3	3	2	3	3	3	2
E6114.5	3	2	2	3	3	2	3	3	3	2
Total	**15**	**10**	**10**	**15**	**15**	**10**	**15**	**15**	**15**	**10**
Correlation level	**3**	**2**	**2**	**3**	**3**	**2**	**3**	**3**	**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 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 (40 marks)				**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	2 Periods	2 Periods	1 Hour	3 Hours	3 Hours
Exam Marks	50	50	60	100	100
Converted to	10	10	10	10	60
Marks	40				60
Tentative Schedule	6th Week	12th Week	13th-14th Week	16th week	

Note:

CA1 and CA2: Assessment written test should be conducted for 50 Marks for two units. The marks scored will be converted to 10 Marks for the internal assessment.

CA1 and 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. Each unit four questions can be asked.

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 10 marks 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 (5 X 2 X 10 Marks=100 Marks)

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 ThinkingSkills (HOTs)**
	R-Remember, **U**-Understand, **AP**-Apply	**An**- Analyse, **E**-Evaluate, **C**-Create
% to be included	90 %	10 %

CTE6114 – FINANCE FUNDAMENTALS

CTE6114	FINANCE FUNDAMENTALS	L	T	P	C
THEORY		3	0	0	3

Unit I	**PERSONAL FINANCE**	**[7 Hrs]**
Personal Finance – Meaning, Objectives and advantages		[1Hr]
Individual Perspective – Family Perspective - Time Value of Money		[1Hr]
Personal Savings: Meaning, Different modes of Saving,		[1Hr]
Bank Deposit, Online Investments, Insurance, Stocks Gold, Real Estate ,		[1Hr]
Returns Vs Risk		[1Hr]
Financial Discipline		[1Hr]
Setting Alerts for commitments (With Real time Examples)		[1Hr]
Unit II	**BUSINESS FUNDING**	**[7 Hrs]**
Sources: Personal savings		[1Hr]
Borrowings		[1Hr]
Venture Capital		[1Hr]
Venture Capital Process		[1Hr]
Commercial Banks		[1Hr]
Government Grants and Scheme.		[2Hrs]
Unit III	**FINANCE LANGUAGE**	**[7 Hrs]**
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 – External Liabilities		[1Hr]
Share holders fund: Equity Share capital,		[1Hr]
Preference Share Capital,		[1Hr]
Reserve & Surplus Borrowings: Debentures, Bank Loan,		[1Hr]
Other Loan - Depreciation – Reserve Vs Provision.		[1Hr]
Unit IV	**BUDGETING**	**[7 Hrs]**
Budgetary Control – Meaning		[1Hr]
Preparation of various budgets		[1Hr]
Purchase budget		[1Hr]
Sales Budget		[1Hr]
Production budget		[1Hr]
Cash Budget		[1Hr]
Flexible budgets. (With Problems)		[1Hr]
Unit V	**MARGINAL COSTING**	**[7 Hrs]**
Marginal Costing – Meaning – Marginal Costing Vs Absorption Costing		[1Hr]
Concepts of Variable Cost,		[1Hr]
Fixed Cost and Contribution		[1Hr]

PV Ratio – Break Even Point Margin of Safety – Key Factor	[1Hr]
Application of Marginal Costing in decision making	[1Hr]
Make or Buy – Shutdown or Continue	[1Hr]
Exploring New Markets (With Problems)	[1Hr]
TEST & REVISION	**10**
TOTAL HOURS	**45 Hrs**

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.

Financial Modeling:

- Activity: Build financial models using spreadsheets to forecast future financial performance, conduct sensitivity analysis, and evaluate business projects.
- Purpose: Financial modeling is a critical skill in finance, enabling students to project financial outcomes and support strategic decision-making with quantitative analysis.

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 matters.

Text books for Reference:

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.

MODEL QUESTION PAPER

CTE6114– FINANCE FUNDAMENTALS

Time : [3 Hrs]. **Max. Marks : 100**

PART-A (5 X 2 X 10 Marks = 100 Marks)

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 Objectives and advantages of Personal	I	U	E6114.1	PO1,PO2,PO5,PO7
	2.	Explain Individual Perspective and Family Perspective	I	R	E6114.1	PO1,PO2,PO5,PO7
	3.	What are the Differentmodes of Saving.	I	R	E6114.1	PO1,PO2,PO5,PO7
	4.	Difference between Returns and Risk.	I	R	E6114.1	PO1,PO2,PO5,PO7
II	5.	Describe sources of Business Funding.	II	R	E6114.2	PO1,PO2,PO5,PO7
	6.	Explain about Venture Capital.	II	R	E6114.2	PO1,PO2,PO5,PO7
	7.	What do you mean by Commercial Banks.	II	U	E6114.2	PO1,PO2,PO5,PO7
	8.	Briefly explain about the Government Grants and Scheme.	II	R	E6114.2	PO1,PO2,PO5,PO7
III	9.	Explain about the types of Assets and Liabilities.	III	R	E6114.3	PO1,PO2,PO5,PO7
	10.	Difference between Revenue and Capital items.	III	An	E6114.3	PO1,PO2,PO5,PO7
	11.	Explain about the Share holders fund with examples.	III	R	E6114.3	PO1,PO2,PO5,PO7
	12.	Explain about the Borrowings.	III	R	E6114.3	PO1,PO2,PO5,PO7
IV	13.	Describe the Finance language with examples.	IV	R	E6114.4	PO1,PO2,PO5,PO7
	14.	What are the process for Preparation of various budgets.	IV	R	E6114.4	PO1,PO2,PO5,PO7
	15.	Explain Types of budget.	IV	R	E6114.4	PO1,PO2,PO5,PO7
	16.	Prepare a sales budget for the year 2024.	IV	U	E6114.4	PO1,PO2,PO5,PO7
V	17.	Write the concepts of Marginal costing.	V	AP	E6114.5	PO1,PO2,PO5,PO7
	18.	Difference between Marginal Costing and absorption Costing.	V	U	E6114.5	PO1,PO2,PO5,PO7
	19.	Find out the following problemsVariable costs Fixed costs contribution	V	U	E6114.5	PO1,PO2,PO5,PO7

	20.	Brief y explain Application of Marginal Costing indecision making	V	R	E6114.5	PO1,PO2,PO5,PO7

QUESTION PAPER SETTING

The teaching learning process and assessment are being carried out in accordance withthe revised Blooms Taxonomy. The question paper should consist of 90% questionsbased 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 ThinkingSkills (HOTs)**
	R-Remember, **U**-Understand, **AP**-Apply	**An**- Analyse, **E**-Evaluate, **C**-Create
% to be included	90 %	10 %

CTE6115 – 5G TECHNOLOGY

Programme Name : COMPUTER ENGINEERING
Course Code : CTE6115
Semester : VI SEMESTER
Course Title : 5G 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			
			Marks			Duration
	Hours / Week	Hours / Semester	Internal Assessment	Autonomous Examination	Total	
5G 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	Introduction to 5G Technology	**9**
II	Radio Access Technologies in 5G	**9**
III	Core Network in 5G	**9**
IV	5G Protocols And Standards	**9**
V	Emerging Technologies And Applications in 5G	**9**
TOTAL HOURS		**45**

COURSE DESCRIPTION

This course provides an in-depth understanding of 5G technology, covering foundational concepts, essential radio access technologies, core network architecture, protocols and standards, and emerging technologies in wireless communication.

COURSE OBJECTIVES

The objective of this course is to enable the students to

- Understand the fundamental principles and evolution of wireless communication systems,including the transition from previous generations to 5G.
- Identify and explain the key features, requirements, and use cases of 5G networks in various industries and applications.
- Analyze the architecture and components of 5G networks, including radio access technologies, core network elements, and network slicing.
- Develop proficiency in radio access technologies such as OFDM, MIMO.
- Explore emerging technologies and applications in 5G, such as IoT, edge computing, and AI integration, and assess their impact on future communication systems.
- Gain hands-on experience in implementing and troubleshooting 5G networks through practical exercises and simulations.
- Understand the regulatory and standardization processes governing 5G deployment, ensuring compliance and interoperability with global standards.
- Analyze security protocols and mechanisms implemented in 5G networks to ensure data confidentiality, integrity, and availability.
- Develop critical thinking and problem-solving skills to address challenges and optimize performance in 5G network design, deployment, and management.

COURSE OUTCOMES

After successful completion of this course, the students should be able to	
E6115.1	Understanding 5G principles, features, and applications.
E6115.2	Proficiency in 5G radio access technologies.
E6115.3	Mastery of 5G core network architecture and protocols.
E6115.4	Knowledge of 5G protocol stack and interworking mechanisms.
E6115.5	Exploring emerging technologies and applications in 5G networks.

Pre-requisites :

- Basic understanding of telecommunications and networking principles.
- Proficiency in mathematics, including algebra and trigonometry.
- Knowledge of computer architecture and programming concepts.
- Familiarity with wireless communication technologies and laboratory equipment.

CO-POs & PSOs Mapping matrix

CO/PO & PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
E6115.1	3	2	2	3	3	2	3	3	3	2
E6115.2	3	2	2	3	3	2	3	3	3	2
E6115.3	3	2	2	3	3	2	3	3	3	2
E6115.4	3	2	2	3	3	2	3	3	3	2
E6115.5	3	2	2	3	3	2	3	3	3	2
Total	**15**	**10**	**10**	**15**	**15**	**10**	**15**	**15**	**15**	**10**
Correlation level	**3**	**2**	**2**	**3**	**3**	**2**	**3**	**3**	**3**	**2**

Correlation level 1 – Slight (low)

Correlation level 2 – Moderate (Medium)

Correlation level 3 – Substantial (high)

Instructional Strategy:

- **Real-world Applications:** Integrate real-world examples and applications of digital logic design, such as binary arithmetic in computer architecture, digital communication systems, and control systems. Showing practical applications helps students understand the relevance of the subject.
- **Interactive Lectures:** Conduct interactive lectures with demonstrations, multimedia presentations, and interactive whiteboards to illustrate abstract concepts effectively. Encourage student participation through discussions, questions, and problem-solving exercises.
- **Use of Visual Aids:** Utilize visual aids such as diagrams, charts, and animations to clarify complex concepts like Boolean algebra, logic gates, and sequential logic circuits. Visual representations help reinforce learning and improve comprehension.
- **Flipped Classroom Approach:** Implement a flipped classroom model where students review lecture materials and resources independently before class and use class time for hands-on activities, problem-solving, and discussions. This approach encourages active learning and fosters deeper understanding.
- **Formative Assessment:** Use formative assessment techniques such as quizzes, concept mapping, and in-class exercises to gauge student understanding and provide timely feedback. Adjust teaching strategies based on assessment results to address areas of difficulty.
- **Self-directed Learning Resources:** Provide self-directed learning resources such as textbooks, online tutorials, and supplementary materials to accommodate diverse learning styles and allow students to explore topics at their own pace.

Assessment Methodology

	Continuous Assessment (40 marks)				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	2 Periods	2 Periods	1 Hour	3 Hours	3 Hours
Exam Marks	50	50	60	100	100
Converted to	10	10	10	10	60
Marks	40				60
Tentative Schedule	6th Week	12th Week	13th-14th Week	16th week	

Note:

CA1 and CA2: Assessment written test should be conducted for 50 Marks for two units. The marks scored will be converted to 10 Marks for the internal assessment.

CA1 and 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. Each unit four questions can be asked.

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 10 marks 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 (5 X 2 X 10 Marks=100 Marks)

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 ThinkingSkills (HOTs)**
	R-Remember, **U**-Understand, **AP**-Apply	**An**- Analyse, **E**-Evaluate, **C**-Create
% to be included	90 %	10 %

CTE6115 – 5G TECHNOLOGY

CTE6115	5G TECHNOLOGY	L	T	P	C
THEORY		3	0	0	3

Unit I	INTRODUCTION TO 5G TECHNOLOGY	[9 Hrs]
	Overview of wireless communication systems - Evolution from 1G to 5G	[1Hr]
	Key features and requirements of 5G networks	[1Hr]
	Comparison between 4G and 5G technologies	[1Hr]
	network latency and its importance in 5G - 5G spectrum bands and frequency ranges	[1Hr]
	Basics of network coverage and capacity in 5G	[1Hr]
	5G enabled devices and their functionalities	[1Hr]
	Role of AI and ML in enhancing 5G capabilities	[1Hr]
	Network slicing and its benefits in 5G deployment	[1Hr]
	5G architecture and network elements	[1Hr]
Unit II	**RADIO ACCESS TECHNOLOGIES IN 5G**	**[9 Hrs]**
	Introduction to radio access technologies (RATs) and	[1Hr]
	Their role in wireless communication multiple access techniques (FDMA, TDMA, CDMA)	[2Hrs]
	and Their evolution in 5G - orthogonal frequency	[1Hr]
	division multiplexing (OFDM) and its significance in 5G	[1Hr]
	Multiple-input multiple-output (MIMO) and its application	[1Hr]
	Beam forming techniques - small cell deployment	[2 Hr]
	Heterogeneous network (HetNet) architecture	[1Hr]
Unit III	**CORE NETWORK IN 5G**	**[9 Hrs]**
	Evolution of core network architecture from 4G to 5G (e.g., LTE to NGC)	[1Hr]
	Network slicing and virtualization in 5G core	[2Hrs]
	Service-based architecture (SBA) and control plane/user plane separation (CUPS)	[2Hrs]
	Network functions virtualization (NFV) and software-defined networking (SDN)	[2Hrs]
	Edge computing and mobile edge computing (MEC) in 5G networks.	[2Hrs]
Unit IV	**5G PROTOCOLS AND STANDARDS**	**[9 Hrs]**
	Overview of 5G protocol stack (PHY, MAC, RLC, PDCP, RRC,	[1Hr]
	etc.) 3GPP standardization process and release versions	[2Hrs]
	NR (New Radio) air interface protocol architecture	[2Hrs]
	Signalling procedures and message flows in 5G networks	[2Hrs]
	Interworking and coexistence with legacy networks (e.g., LTE, Wi-Fi).	[2Hrs]
Unit V	**EMERGING TECHNOLOGIES AND APPLICATIONS IN 5G**	**[9 Hrs]**

Internet of Things (IoT) and machine-to-machine (M2M) communications in 5G Vehicle-to-everything (V2X) communication and smart transportation systems Augmented reality (AR), virtual reality (VR), and immersive multimedia applications. Network security and privacy considerations in 5G networks Future trends and challenges in 5G technology development.	[1Hr] [2Hrs] [2Hrs] [2Hrs] [2Hrs]
TOTAL HOURS	**45 Hrs**

Suggested List of Students Activity:
The following student activities or similar activities can be assigned for assessing IA marks

- Students are tasked with conducting research on the evolution of wireless communication systems, spanning from the first-generation (1G) to the fifth-generation (5G) networks. They gather information on the technological advancements, key milestones, and the impact of each generation on society and industries
- Using simulation software such as OPNET or NS-3, students simulate a 5G network deployment scenario. They configure parameters such as base stations, user equipment, and traffic patterns to model realistic network conditions.
- Students analyze a real-world case study of a 5G network deployment project. They examine the challenges faced by the network operators, the design decisions made during the deployment process, and the outcomes achieved.
- Students conduct an in-depth analysis of the signalling protocols used in 5G networks. They examine protocols such as the Radio Resource Control (RRC) protocol, Session Management (SM) protocol, and User Plane Protocol (UPP), studying their functionalities, message formats, and interactions.
- Each student selects an emerging technology relevant to 5G, such as Internet of Things (IoT), edge computing, or network slicing. They research the technology's principles, applications, and potential impact on 5G networks
- In the laboratory, students perform hands-on experiments related to radio access technologies or core network components. For example, students may configure and test a small-scale OFDM-MIMO system to understand its performance characteristics.
- Students collaborate in groups to design a 5G network architecture tailored to a specific use case or scenario. Each group conducts comprehensive research on network requirements, technology options, and deployment considerations. They develop a detailed network design proposal, considering factors such as coverage, capacity, scalability, and cost-effectiveness. Finally, groups present their design proposals to the class, showcasing their understanding of 5G network planning and their ability to address environmental and sustainability concerns.

Text books for Reference:

S.NO	TITLE	AUTHOR	PUBLISHER WITH EDITION
1.	5G Mobile and Wireless Communications Technology	Afif Osseiran, Jose F Monserrat, Patrick Marsch	1st Edition, Cambridge University Press, 2016
2.	5G NR: The Next GenerationWireless Access Technology	Erik Dahlman	1st Edition, Elsevier, 2016.
3.	Fundamentals of 5G Mobile Networks	Jonathan Rodriguez	1st Edition, Wiley, 2015
4.	"5G Technology 3GPP NEW RADIO"	HarriHolma, AnttiToskala, Takehiro Nakamura	John Wiley & Sons, 1/e, 2020

Web-based/Online Resources:

S.NO	WEBSITES/LINKS
1.	https://nptel.ac.in/courses/108/105/108105134/
2.	https://www.udemy.com/course/5g-mobile-networksmodern-wireless-communication-technology/

MODEL QUESTION PAPER

CTE6115 – 5G TECHNOLOGY

Time : [3 Hrs]. **Max. Marks : 100**

PART-A (5 X 2 X 10 Marks = 100 Marks)

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.	Describe the Evolution from 1G to 5G	I	U	E6115.1	PO1,PO2,PO5,PO7
	2.	Difference between 4G and 5G technologies	I	R	E6115.1	PO1,PO2,PO5,PO7
	3.	What are the Key features and requirements of 5G networks	I	R	E6115.1	PO1,PO2,PO5,PO7
	4.	Explain the role of AI and ML in enhancing 5Gcapabilities	I	R	E6115.1	PO1,PO2,PO5,PO7
II	5.	Briefly explain about the (RATs) and their role in wirelesscommunication	II	R	E6115.2	PO1,PO2,PO5,PO7
	6.	State the following access techniques FDMA TDMA CDMA OFDM MIMO	II	R	E6115.2	PO1,PO2,PO5,PO7
	7.	Explain about the heterogeneous network (HetNet)architecture	II	U	E6115.2	PO1,PO2,PO5,PO7
	8.	What do you mean by small cell deployment	II	R	E6115.2	PO1,PO2,PO5,PO7
III	9.	Explain about the Evolution of core network architecturefrom 4G to 5G (e.g., LTE to NGC)	III	R	E6115.3	PO1,PO2,PO5,PO7
	10.	State the following access techniques SBA CUPS NFV SDN MEC	III	U	E6115.3	PO1,PO2,PO5,PO7
	11.	Explain about the Network slicing and virtualization in 5G core	III	R	E6115.3	PO1,PO2,PO5,PO7
	12.	Describe the Edge computing and mobile edge computing (MEC) in 5G networks	III	R	E6115.3	PO1,PO2,PO5,PO7
IV	13.	Explain the overview of 5G protocol stack (PHY, MAC,RLC, PDCP, RRC, etc.)	IV	R	E6115.4	PO1,PO2,PO5,PO7
	14.	Explain about the NR (New Radio) air interface protocol architecture	IV	R	E6115.4	PO1,PO2,PO5,PO7
	15.	What are the process for Signalling procedures and message flows in 5G	IV	R	E6115.4	PO1,PO2,PO5,PO7

		networks				
	16.	Write the Interworking and coexistence with legacynetworks with examples	IV	U	E6115.4	PO1,PO2,PO5,PO7
V	17.	Briefly explain the Emerging Technologies and Applications in 5G	V	AP	E6115.5	PO1,PO2,PO5,PO7
	18.	State the following Techiques IoT M2M AR VR	V	U	E6115.5	PO1,PO2,PO5,PO7
	19.	Describe the Future trends and challenges in 5G technology development.	V	U	E6115.5	PO1,PO2,PO5,PO7
	20.	Brief y explain Network security and privacyconsiderations in 5G	V	R	E6115.5	PO1,PO2,PO5,PO7

QUESTION PAPER SETTING

The teaching learning process and assessment are being carried out in accordance withthe revised Blooms Taxonomy. The question paper should consist of 90% questionsbased 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 ThinkingSkills (HOTs)**
	R-Remember, **U**-Understand, **AP**-Apply	**An**- Analyse, **E**-Evaluate, **C**-Create
% to be included	90 %	10 %

CTE6116 – DEVOPS

Programme Name : COMPUTER ENGINEERING
Course Code : CTE6116
Semester : VI SEMESTER
Course Title : DEVOPS
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	
DEVOPS	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 Devops	**8**
II	Compile and Build Using Maven	**10**
III	Continuous Integration Using jenkins	**10**
IV	Version Control Using Git	**10**
V	Configuration Management Using Ansible	**7**
TOTAL HOURS		**45**

COURSE DESCRIPTION

The DevOps is the combination of two words, one is Development and other is Operations. It is a culture to promote the development and operation process collectively. The DevOps course will help to learn DevOps basics and provide depth knowledge of various DevOps tools such as Git, Maven, Ansible, Jenkins.

COURSE OBJECTIVES

The objectives of this course is to enable the student to

- To understand basics of Devops.
- To illustrate the benefits and drive the adoption of cloud-based Devops tools

to solve real world problems.

- To understand the concepts of Continuous Integration/ Continuous Testing/ Continuous Deployment).
- To understand the version control tools like Git.
- To understand about configuration management using Ansible

COURSE OUTCOMES

After successful completion of this course, the students should be able to	
E6116.1	Understand basics of Devops.
E6116.2	Perform continuous integration and continuous testing and Continuous deployment using Jenkins by building and automating test case using Maven.
E6116.3	Ability to perform automated continuous deployment.
E6116.4	Understand different actions performed through version control tools like Git.
E6116.5	Ability to do configuration management using Ansible.

Pre-requisites : Nil

CO-POs & PSOs Mapping matrix

CO/PO & PSO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PSO1**	**PSO2**	**PSO3**
E6116.1	3	2	2	3	3	2	3	3	3	2
E6116.2	3	2	2	3	3	2	3	3	3	2
E6116.3	3	2	2	3	3	2	3	3	3	2
E6116.4	3	2	2	3	3	2	3	3	3	2
E6116.5	3	2	2	3	3	2	3	3	3	2
Total	**15**	**10**	**10**	**15**	**15**	**10**	**15**	**15**	**15**	**10**
Correlation level	**3**	**2**	**2**	**3**	**3**	**2**	**3**	**3**	**3**	**2**

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 engineering 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.
- Encourage Critical Analysis: Foster an environment where students can honestly assess experiment outcomes and analyze potential sources of error in case of discrepancies.

Assessment Methodology

	Continuous Assessment (40 marks)				**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	2 Periods	2 Periods	1 Hour	3 Hours	3 Hours
Exam Marks	50	50	60	100	100
Converted to	10	10	10	10	60
Marks	40				60
Tentative Schedule	6th Week	12th Week	13th-14th Week	16th week	

Note:

CA1 and CA2: Assessment written test should be conducted for 50 Marks for two units. The marks scored will be converted to 10 Marks for the internal assessment.

CA1 and 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. Each unit four questions can be asked.

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 10 marks 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 ExaminationTheory Exam
PART - A (5 X 2 X 10 Marks=100 Marks)

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 ThinkingSkills (HOTs)**
	R-Remember, **U**-Understand, **AP**-Apply	**An**- Analyse, **E**-Evaluate, **C**-Create
% to be included	90 %	10 %

CTE6116 – DEVOPS

CTE6116	DEVOPS	L	T	P	C
THEORY		3	0	0	3

Unit I	INTRODUCTION TO DEVOPS	[8 Hrs]
	Introduction to Devops	[1Hr]
	History of Devops	[1Hr]
	Devops Definition	[1Hr]
	Devops Main Objectives	[1Hr]
	Devops and Software Development Life Cycle	[2Hrs]
	Waterfall Model	[1Hr]
	Agile Model.	[1Hr]
Unit II	**COMPILE AND BUILD USING MAVEN**	**[10 Hrs]**
	Introduction - Installation of Maven	[2Hrs]
	Maven Build Requirements	[2Hrs]
	Maven POM Builds (pom.xml), Maven Build lifecycle	[2Hrs]
	Maven repositories(local, global) ,Maven create and build Artifacts,	[2Hrs]
	Maven Dependencies – Maven Plugins.	[2Hrs]
Unit III	**CONTINUOUS INTEGRATION USING JENKINS**	**[10 Hrs]**
	Introduction to Jenkins – Continuous Integration with Jenkins	[2Hrs]
	Jenkins Management – Scheduling build jobs	[2Hrs]
	Configuring Jenkins to work with java,	[2Hrs]
	Git and Maven,	[2Hrs]
	Creating a Jenkins Build and Jenkins workspace Management.	[2Hrs]
Unit IV	**VERSION CONTROL USING GIT**	**[10Hrs]**
	GIT Features – 3	[2Hrs]
	Tree Architecture – GIT Clone/Commit/Push	[2Hrs]
	GIT Hub Projects – GIT Rebase & Merge	[2Hrs]
	GIT Stash, Reset, Checkout	[2Hrs]
	GIT Clone, Fetch, Pull.	[2Hrs]
Unit V	**CONFIGURATION MANAGEMENT USING ANSIBLE**	**[7 Hrs]**
	Introduction to Ansible	[1Hr]
	Installation Ansible master/slave configuration,YAML basics	[2Hrs]
	Ansible modules Ansible Inventory files	[2Hrs]
	Ansible playbooks	[1Hr]
	Ansible Roles.	[1Hr]
	TOTAL HOURS	**45 Hrs**

Suggested List of Students Activity

- Presentation/Seminars by students on any recent technological developments based on the course.
- Periodic class/online quizzes conducted based on the course.
- Blended learning activities to explore the recent trends and developments in the field

Text books for Reference:

S.NO	TITLE	AUTHOR	PUBLISHER WITH EDITION
1.	Effective DevOps",	Jennifer Davis, Ryn Daniels	1 st edition, O'Reilly, 2017.
2.	Ansible for DevOps: Everything You Need to Know to Use Ansible for DevOps	David Johnson	Second Edition, CreateSpace Independent Publishing Platform, 2016.
3.	Ansible 6. Beginning Git and GitHub: A Comprehensive Guideto Version Control, Project Management, and Teamwork for the New Developer	Mariot Tsitoara	Second Edition, Apress,2019

Web-based/Online Resources:

S.NO	WEBSITES/LINKS
1.	https://www.jenkins.io/doc/tutorials/
2.	https://maven.apache.org/index.html

MODEL QUESTION PAPER

CTE6116 – DEVOPS

Time : [3 Hrs]. **Max. Marks : 100**

PART-A (5 X 2 X 10 Marks = 100 Marks)

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 concepts of Devops	I	U	E6116.1	PO1,PO2,PO5,PO7
	2.	Explain Waterfall Model and Agile Model	I	R	E6116.1	PO1,PO2,PO5,PO7
	3.	Write the Main objectives of Devops	I	R	E6116.1	PO1,PO2,PO5,PO7
	4.	Explain about the Life Cycle for Devops and SoftwareDevelopment	I	R	E6116.1	PO1,PO2,PO5,PO7
II	5.	Explain about the Maven create and build Artifacts, MavenDependencies	II	R	E6116.2	PO1,PO2,PO5,PO7
	6.	Write the Maven POM Builds with (pom.xml)	II	R	E6116.2	PO1,PO2,PO5,PO7
	7.	Explain about the Maven	II	U	E6116.2	PO1,PO2,PO5,PO7
	8.	Describe the Maven Build Requirements	II	R	E6116.2	PO1,PO2,PO5,PO7
III	9.	Explain about the continuous integration using Jenkins	III	R	E6116.3	PO1,PO2,PO5,PO7
	10.	What do you mean by Jenkins Management	III	U	E6116.3	PO1,PO2,PO5,PO7
	11.	What are the Scheduling build jobs	III	R	E6116.3	PO1,PO2,PO5,PO7
	12.	Write the Creating a Jenkins Build and Jenkins workspace Management.	III	R	E6116.3	PO1,PO2,PO5,PO7
IV	13.	Explain about the version control using Gi	IV	R	E6116.4	PO1,PO2,PO5,PO7
	14.	What do you mean by Tree Architecture.	IV	R	E6116.4	PO1,PO2,PO5,PO7
	15.	Describe the GIT HubProjects.	IV	R	E6116.4	PO1,PO2,PO5,PO7
	16.	Explain about the GIT Rebase & Merge	IV	U	E6116.4	PO1,PO2,PO5,PO7
V	17.	Explain about the configuration management using Ansible.	V	AP	E6116.5	PO1,PO2,PO5,PO7
	18.	What are the process for installation of Ansible.	V	U	E6116.5	PO1,PO2,PO5,PO7
	19.	Write the role of Ansible.	V	U	E6116.5	PO1,PO2,PO5,PO7
	20.	Brief y explain Ansible playbooks.	V	R	E6116.5	PO1,PO2,PO5,PO7

QUESTION PAPER SETTING

The teaching learning process and assessment are being carried out in accordance withthe revised Blooms Taxonomy. The question paper should consist of 90% questionsbased 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 ThinkingSkills (HOTs)**
	R-Remember, **U**-Understand, **AP**-Apply	**An**- Analyse, **E**-Evaluate, **C**-Create
% to be included	90 %	10 %

CTE6241 – DATA SCIENCE

Programme Name : COMPUTER ENGINEERING
Course Code : CTE6241
Semester : VI SEMESTER
Course Title : DATA SCIENCE
Course Type : PRACTICUM

L	T	P	C
1	0	4	3

TEACHING AND SCHEME OF EXAMINATION

No. of weeks per semester: 15weeks

Course	Instructions		Examination			
			Marks			Duration
	Hours / Week	Hours / Semester	Internal Assessment	Autonomous Examination	Total	
DATA SCIENCE	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 to Data Science	15
II	Describing Data	15
III	Python Libraries For Data Wrangling	15
IV	Data Visualization	15
V	Machine Learning Algorithms	15
TOTAL HOURS		**75**

COURSE DESCRIPTION

Data science is like being a digital detective, utilizing tools and algorithms to unveil hidden patterns in raw data. This course on Data Science equips learners with the ability to understand the process of Data Science, manipulate structured and unstructured data through various tools, algorithms, and software. This course also gives the insights about statistical data analysis and python libraries for data wrangling and data visualization. Data science is often considered as the twenty-first century's most lucrative career pathway this course gains much attention. This course also introduce basic machine learning algorithms.

COURSE OBJECTIVES

The objective of this course is to

- To learn to describe the data for the data science process.
- To learn to describe the relationship between data

- To utilize the Python libraries for data wrangling.
- To present and interpret data using visualization libraries in Python
- To know the basic machine learning models.

COURSE OUTCOMES:

After successful completion of this course, the students should be able to	
E6241.1	Define the data sciences and data science process
E6241.2	Perform statistical calculation on data using python.
E6241.3	Perform wrangling on data with python libraries
E6241.4	Create effective visualization of given data
E6241.5	Build data science applications with Support vector machines, Naive Bayes, Decision Trees and with Clustering algorithms.

Pre-requisites : Nil

CO- POs & PSOs MAPPING MATRIX:

CO/ PO & PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
E6241.1	3	3	3	3	2	2	3	2	3	2
E6241.2	3	3	3	3	2	2	3	2	3	2
E6241.3	3	3	3	3	2	2	3	2	3	2
E6241.4	3	3	3	3	2	2	3	2	3	2
E6241.5	3	3	3	3	2	2	3	2	3	2
Total	**15**	**15**	**15**	**15**	**10**	**10**	**15**	**10**	**15**	**10**
Correlation level	**3**	**3**	**3**	**3**	**2**	**2**	**3**	**2**	**3**	**2**

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 engineering 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 with built0 in Models in data science
- Encourage Critical Analysis: Foster an environment where students can honestly assess experiment outcomes and analyze potential sources of error in case of discrepancies.

Assessment Methodology:

	Continuous Assessment (40 marks)				End Semester Examination (60 marks)
	CA1	**CA2**	**CA3**	**CA4**	
Mode	Practical Test	Practical Test	Written Test Theory	Practical Test	Practical Examination
Portion	PART-A Exercises	PART-B Exercises	All Units	All Exercises	All Exercises
Duration	2 Periods	2 Periods	3 hours	3 hours	3 hours
Exam Marks	60	60	100	100	100
Converted to	10	10	10	10	60
Marks	40				60
Tentative Schedule	7th Week	14th Week	15th Week	16th 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.** The exercise should be completed on the day of practice. The same shall beevaluated for 10 marks on the day or next day of practice before commencementof the next exercise.

- The detailed date of the practices and its evaluations should be maintained in the log book and should be submitted for the verification.

SCHEME OF EVALUATION

PART	DESCRIPTION	MARKS
A	Aim (05) , Program (30)	35
B	Execution and Output	15
TOTAL		50
C	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	Answer any ten questions out of twelve. Each carries three marks.	10 x 3	30
Part – B	Answer any seven questions out of ten. Each carries ten marks	7 x 10	70
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 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 (05) , Program from Part – A (30)	35
B	Aim (05) , Program from Part – B (30)	35
C	Executing any one program (Part A or Part –B)	15
D	Output	10
E	Viva Voce	05
TOTAL		**100 Marks**

CTE6241 – DATA SCIENCE

CTE6241	DATA SCIENCE	L	T	P	C
PRACTICUM		1	0	4	3

Unit I	INTRODUCTIONTO DATA SCIENCE	[15 Hrs]
Theory Data Science: Need, benefits and uses – facets of dataData Science Process Basics of Numpy Arrays.		 [1Hr] [1Hr] [1Hr]
Practical **Ex No 1:** Create a Python List / tuple which stores the details of a student (rollno, name, dept, branch, percentage of mark) in Python and print the values. **Ex No 2:** Create the python list, convert the list and tuple as NumPy array and print its elements. Slice the NumPy array in to 3 slices and print all		 [6 Hrs] [6 Hrs]
Unit II	**DESCRIBING DATA**	**[15 Hrs]**
Theory Statistical Analysis: Mean Median, Mode, Standard Deviation Range, Percentile. Missing value analysis Numpy arrays : aggregations –computations on arrays, Introduction to Pandas		 [1Hr] [1Hr] [1Hr]
Practical **Ex No 3:** Load your class Marklist data from a csv (comma-separated value) file into numpy array. Perform the following operations to inspect your array: Len(), ndim, size, dtype, shape, info(). **Ex No 4:** Load a data into a pandas dataframe and perform following functions on it : min(), max(), cumsum(), mean(), median(), corrcoef(), std().		 [6 Hrs] [6 Hrs]
Unit III	**PYTHON LIBRARIES FOR DATA WRANGLING**	**[15 Hrs]**
Theory Data manipulation with Pandas: data indexing and selection – missing data Data Transformation: Removing duplicates Replacing values -aggregation and grouping.		 [1Hr] [1Hr] [1Hr]
Practical **Ex No 5:** Load a data into a pandas data frame, list out number of missing values in each columnand fill the missing values with suitable default value. **Ex No 6:** Load two csv file into two data frame(d1,d2), combine both the Data frame and find and remove duplicate rows and rename indexes.		 [6 Hrs] [6 Hrs]
Unit IV	**DATA VISUALIZATION**	**[15 Hrs]**
Theory Importing Matplotlib – Line plots – Scatter plots Visualizing errors – density and contour plots Histograms - Visualization with Seaborn.		 [1Hr] [2Hrs]
Practical Iris Dataset is one of best know datasets in pattern recognition literature. This dataset contains 3 classes of 50 instances each, where each class refers to a type of iris plant. One class is linearly separable from the other 2 the latter are NOT linearly separable from		

each other. **Attribute Information:** • Sepal Length in cm , Sepal Width in cm • Petal Length in cm, Petal Width in cm **Class:** • Iris Setosa • Iris Versicolour • Iris Virginica **Ex No 7:**Load the Iris dataset, where observations belong to either one of three iris flower classes and visualize the average value for each feature of the Setosa iris class using a barchart with suitable line width and color. **Ex No 8:** Load the Iris dataset; plot all the column's relationships using a pairplot for multivariate analysis. Save the plot as JPEG file.		[6Hrs] [6Hrs]
Unit V	**MACHINE LEARNING ALGORITHMS**	**[15 Hrs]**
Theory Basic Machine Learning Algorithms: Classification Support vector machines Naive Bayes- Decision Trees Clustering- Confusion Matrix.		[1Hr] [2Hrs]
Practical **Ex.no 9 :** Implement the Machine learning model for clustering with Iris dataset and analyse Decision Tree. **Ex.no 10 :** Implement the Machine learning model for clustering with Iris dataset and analyse K-means Clustering.		[6 Hrs] [6 Hrs]
TOTAL HOURS		**75 Hrs**

Suggested List of Students Activity

- Presentation/Seminars by students on any recent technological developments in data science.
- online quizzes
- Blended learning activities to explore the recent trends and developments in the field.
- Model Development

Text books for Reference:

S.NO	TITLE	AUTHOR	PUBLISHER WITH EDITION
1.	Introducing Data Science: Big Data, Machine Learning, and More, Using Python Tools	Davy Cielen, Arno D.B.Meysman, Mohamed Ali	Manning Publications, 2016.
2.	Think Stats: Exploratory Data Analysis in Python	Allen Downey	Second Edition, O'Reilly, 2014.
3.	Hands-On Machine Learning withScikit-Learn, Keras, and TensorFlow	Aurelien Geron	Second Edition, O'Reilly Media, 2019.

Web-based/Online Resources

S.NO	WEBSITES/LINKS
1.	NPTEL Course on Foundation of Data Science https://onlinecourses.swayam2.ac.in/imb24_mg31/preview
2.	NPTEL Course on Python for Data Science https://onlinecourses.nptel.ac.in/noc24_cs54/preview
3.	https://www.kaggle.com/code/doukanelik/missing-values
4.	https://www.kaggle.com/code/mahnazarjmand/clustring-model-on-iris-dataset/input
5.	https://www.kaggle.com/datasets/saurabh00007/iriscsv/code
6.	IBM Data Science Professional Certificate https://www.coursera.org/professional-certificates/ibm-data-science

Equipment / Facilities required to conduct the Practical Portion

Software Requirement:

S.NO.	SOFTWARE
1.	Python /google colab

Hardware Requirement:

S.NO.	HARDWARE
1.	Desktop Computers/ Laptop

CTE6241 – DATA SCIENCE

MODEL QUESTION PAPER

Duration: 3 hrs. **Max. Marks: 100**

S. NO	NAME OF THE EXPERIMENTS	CO	PO
	PART - A		
1	Create a Python List / tuple which stores the detailsof a student (rollno, name, dept, branch, percentageof mark) in Python and print the values.	E6241.1	PO1, PO2, PO3, PO4, PO5, PO6,PO7
2	Create the python list, convert the list and tuple as NumPy array and print its elements. Slice the	E6241.1	PO1, PO2, PO3, PO4, PO5, PO6,PO7
3	Load your class Marklist data from a csv (comma-separated value) file into numpy array. Perform the	E6241.2	PO1, PO2, PO3, PO4, PO5, PO6,PO7
4	Load a data into a pandas dataframe and perform following functions on it : min(), max(), cumsum(), mean(), median(), corrcoef(), std().	E6241.2	PO1, PO2, PO3, PO4, PO5, PO6,PO7
5	Load a data into a pandas data frame, list out number of missing values in each column and fillthe missing values with suitable default value.	E6241.3	PO1, PO2, PO3, PO4, PO5, PO6,PO7
	PART – B		
6	Load two csv file into two data frame(d1,d2), combine both the Data frame and find and removeduplicate rows and rename indexes.	E6241.3	PO1, PO2, PO3, PO4, PO5, PO6,PO7
7	Load the Iris dataset, where observations belong to either one of three iris flower classes and visualizethe average value for each feature of the Setosa irisclass using a barchart with suitable line width and color.	E6241.4	PO1, PO2, PO3, PO4, PO5, PO6,PO7
8	Load the Iris dataset; plot all the column's relationships using a pairplot for multivariate analysis. Save the plot as JPEG file.	E6241.4	PO1, PO2, PO3, PO4, PO5, PO6,PO7
9	Implement the Machine learning model for clustering with Iris dataset and analyse Decision Tree	E6241.5	PO1, PO2, PO3, PO4, PO5, PO6,PO7
10	Implement the Machine learning model for clustering with Iris dataset and analyse K-means Clustering.	E6241.5	PO1, PO2, PO3, PO4, PO5, PO6,PO7

CTE6242 – CLOUD PLATFORM

Programme Name : COMPUTER ENGINEERING
Course Code : CTE6242
Semester : VI SEMESTER
Course Title : CLOUD PLATFORM
Course Type : PRACTICUM

L	T	P	C
1	0	4	3

TEACHING AND SCHEME OF EXAMINATION

No. of weeks per semester: 15weeks

Course	Instructions		Examination			
			Marks			Duration
	Hours / Week	Hours / Semester	Internal Assessment	Autonomous Examination	Total	
CLOUD PLATFORM	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	Amazon web services (AWS)	15
II	Google cloud platform (GCP)	15
III	Microsoft azure	15
IV	IoT cloud	15
V	Open source cloud and machine learning framework	15
TOTAL HOURS		**75**

COURSE DESCRIPTION

This course gives a comprehensive exposure to various commercial cloud Platforms Google, Amazon and Microsoft and Open source cloud platforms Eucalyptus and Open Stack. The course introduces the latest IoT technologies in Cloud. The focus of this course is to introduce students Machine Learning, a sub-field of Artificial Intelligence, and to Cloud applications of Machine Learning. This helps the students to combine these technologies to produce innovative business solutions.

COURSE OBJECTIVES

The objective of this course is to

- To provide an in-depth and comprehensive knowledge of various commercial and open source cloud platforms.
- To comprehend and apply the services offered by various cloud platforms practically.
- To understand and apply the concept of IoT in cloud.
- To apply Machine learning in cloud.
- To justify, adopt and combine various cloud technologies, applications, and services to effectively manage their transition into the IT function.

COURSE OUTCOMES:

After successful completion of this course, the students should be able to	
E6242.1	Analyze the trade-offs between deploying applications in the cloud and over the local infrastructure.
E6242.2	Use and Manage Virtual Machines on AWS, Google Cloud and Azure platforms.
E6242.3	Understand and apply the spectrum of Cloud computing capabilities to deploy virtual machines on Eucalyptus and Open Stack .
E6242.4	Learn about using hosting services, storage services, networking services, and machine learning services.
E6242.5	To Apply IoT in cloud and learn to combine them to cater to the practical needs of next-generation mobile devices and social media users.

CO- POs & PSOs MAPPING MATRIX:

CO/ PO & PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
E6242.1	3	3	3	3	2	2	3	2	3	2
E6242.2	3	3	3	3	2	2	3	2	3	2
E6242.3	3	3	3	3	2	2	3	2	3	2
E6242.4	3	3	3	3	2	2	3	2	3	2
E6242.5	3	3	3	3	2	2	3	2	3	2
Total	**15**	**15**	**15**	**15**	**10**	**10**	**15**	**10**	**15**	**10**
Correlation level	**3**	**3**	**3**	**3**	**2**	**2**	**3**	**2**	**3**	**2**

Correlation level 1 – Slight (low)
Correlation level 2 – Moderate (Medium)
Correlation level 3 – Substantial (high)

Instructional Strategy:

- The teacher can use experiential learning as an instructional strategy both in and outside the classroom.
- It may be necessary for the teacher to pre-teach the skills and processes necessary to achieve the intended learning outcomes.
- The teacher needs to encourage students to share their thoughts so that the entire class can benefit from individual insights.
- Teachers can encourage divergent thinking by asking students to transform a teacher guided image into several others of their own creation.

Assessment Methodology:

	Continuous Assessment (40 marks)				**End Semester Examination (60 marks)**
	CA1	**CA2**	**CA3**	**CA4**	
Mode	Practical Test	Practical Test	Written Test Theory	Practical Test	Practical Examination
Portion	PART-A Exercises	PART-B Exercises	All Units	All Exercises	All Exercises
Duration	2 Periods	2 Periods	3 hours	3 hours	3 hours
Exam Marks	60	60	100	100	100
Converted to	10	10	10	10	60
Marks	40				60
Tentative Schedule	7th Week	14th Week	15th Week	16th 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.** The exercise should be completed on the day of practice. The same shall beevaluated for 10 marks on the day or next day of practice before commencementof the next exercise.

- The detailed date of the practices and its evaluations should be maintained in the log book and should be submitted for the verification.

SCHEME OF EVALUATION

PART	DESCRIPTION	MARKS
A	Aim (05) , Program (30)	35
B	Execution and Output	15
TOTAL		50
C	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	Answer any ten questions out of twelve. Each carries three marks.	10 x 3	30
Part – B	Answer any seven questions out of ten. Each carries ten marks	7 x 10	70
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 (05) , Program from Part – A (30)	35
B	Aim , (05) , Program from Part – B (30)	35
C	Executing any one program (Part A or Part –B)	15
D	Output	10
E	Viva Voce	05
TOTAL		**100**

CTE6242–CLOUD PLATFORM

CTE6242	CLOUD PLATFORM	L	T	P	C
PRACTICUM		1	0	4	3

Unit I	**AMAZON WEB SERVICES (AWS)**	**[15 Hrs]**
AWS - Introduction - Services-Architecture-AWS Regions Availability zones, Working with AWS- EC2 Instances -Volumes on EC2 - Elastic Block Store(EBS) - Managing data in AWS S3 AWS VPC- working with Virtual Network -Cloud Watch.		[1Hr] [1Hr] [1Hr]
Ex No 1: Set up an AWS free tier account , navigate the AWS Management Console and deploying a Virtual Server (EC2 Instance) on AWS. **Ex No 2**: Host a Static Website in AWS using Amazon S3		[6 Hrs] [6 Hrs]
Unit II	**GOOGLE CLOUD PLATFORM (GCP)**	**[15 Hrs]**
GCP-Introduction -Core Services and Product GCP Global Infrastructure-Regions and Zones - GCP Security and Compliance Working with Google compute engine Managing data in Google Cloud Storage		[1Hr] [1Hr] [1Hr]
Ex No 3: Setup a GCP Account and project , Explore the GCP console and resource hierarchy and deploy a Virtual Machine (Compute Engine) on GCP. **Ex No 4:** Configure and Manage VPCs and Firewall Rules in GCP.		[6 Hrs] [6 Hrs]
Unit III	**MICROSOFT AZURE**	**[15 Hrs]**
Microsoft Azure Overview-Services and Solutions- Global Infrastructure and Data Centers-Identity and Access Management Pricing and Cost Management -Working with Azure Virtual Machines and disks Managing data in azure storage - Blob Storage -File Storage-Working with Virtual Networks.		[1Hr] [1Hr] [1Hr]
Ex No 5: Create an Azure account and subscription and explore the Azure portal and resourcegroups. Deploy Virtual Machines (VMs) on Azure. **Ex No 6:** Implement Azure Storage Solutions: Blob Storage and File Storage.		[6 Hrs] [6 Hrs]
Unit IV	**IOT CLOUD**	**[15 Hrs]**
IoT and Cloud - Architecture of IoT-Cloud - Local and Global Positioning Systems (GPS) IoT Interactions with GPS, Clouds, and Smart Machines-Cloud services for IoT IoT CloudPlatforms - AWS-IoT - Microsoft Azure IoT- Google IoT- Features -Working.		[1Hr] [1Hr] [1Hr]
Ex No 7 Add a device to Google IoTcore and collect data in IoT core.		[12 Hrs]
Unit V	**OPEN SOURCE CLOUD AND MACHINE LEARNING FRAMEWORK**	**[15 Hrs]**
Open Source Cloud – OpenStack -Introduction-Features- Architecture Components. Cloud-Based Machine Learning Frameworks - Introduction to machine learning concepts- Azure Machine Learning Workspace - AWS Machine Learning Platform.		[2Hrs] [1Hr]

Ex No 8: Create an instance using OpenStack. **Ex No 9:** Create a Virtual Private network using openstack. Associate the instance with theVPN created. **Ex No 10:** Use any Cloud based Machine learning framework to predict the employee salary based on experience. **Ex No 11:** To implement web services by creating website and collaborating with cloud.	[4 Hrs] [4 Hrs] [2 Hrs] [2 Hrs]
TOTAL HOURS	**75 Hrs**

Suggested List of Students Activity

- Presentation/Seminars by students on any recent technological developments based on the course.
- Micro project that shall be an extension of any practical lab exercise to real-world Application.

Text books for Reference:

S.NO	TITLE	AUTHOR	PUBLISHER WITH EDITION
1.	Cloud Computing Bible,.	Barrie Sosinsky	First Edition, Wiley-India, 2011
2.	Learning Amazon Web Services (AWS): A Hands-On Guide to the Fundamentals of AWS Cloud	Mark Wilkins	First Edition, Pearson Education., 2019
3.	Google Cloud Platform All-In-One Guide: Get Familiar with a Portfolio of Cloud-based Services in GCP	Praveen Kukreti	First Edition, BPB Publications, 2023.
4.	Fundamentals of Azure Second Edition	Michael Collier Robin Shahan	Microsoft Press, 2019
5.	Cloud IoT: Concepts, Paradigms, and Applications	Deepak Kumar Saxena, JitendraKumar Verma , Vicente Gonzalez-Prida Diaz , ViraShendryk	First Edition, Chapman & Hall, 2022
6.	Introduction to Machine Learning in theCloud with Python: Concepts and Practices	Naresh K. Sehgal , Pramod Gupta	First Edition, Cham, Switzerland : Springer 2021.

Web-based/Online Resources

S.NO	WEBSITES/LINKS
1.	https://docs.aws.amazon.com/
2.	https://dtcenter.org/sites/default/files/communitycode/nwp_containers/Documentation/AMS_2020/01_intro_to_cloud_and_aws.pdf
3.	https://aws.amazon.com/training/classroom/architecting-on-aws/
4.	https://www.techrepublic.com/resource-library/ebooks/google-cloud- platform-an-insider-s-guide-free-pdf/https://cloud.google.com/docs

Equipment / Facilities required to conduct the Practical Portion

Hardware Requirement:

S.NO.	HARDWARE
1.	Desktop Computers / LAPTOP with Internet Facility
2.	Printers

CTE6242 – CLOUD PLATFORM

MODEL QUESTION PAPER

Duration: 3 hrs. **Max. Marks: 100**

S. NO	NAME OF THE EXPERIMENTS	CO	PO
	PART - A		
1	Set up an AWS free tier account , navigate the AWS Management Console and deploying a VirtualServer (EC2 Instance) on AWS.	E6242.1	PO1, PO2, PO3, PO4, PO5, PO6,PO7
2	Host a Static Website in AWS using Amazon S3	E6242.1	PO1, PO2, PO3, PO4, PO5, PO6,PO7
3	Setup a GCP Account and project ,explore the GCP console and resource hierarchy and deploy a Virtual Machine (Compute Engine) on GCP.	E6242.2	PO1, PO2, PO3, PO4, PO5, PO6,PO7
4	Configure and Manage VPCs and Firewall Rules in GCP.	E6242.2	PO1, PO2, PO3, PO4, PO5, PO6,PO7
5	Create an Azure account and subscription and explore the Azure portal and resource groups. Deploy Virtual Machines (VMs) on Azure.	E6242.3	PO1, PO2, PO3, PO4, PO5, PO6,PO7
	PART – B		
6	Implement Azure Storage Solutions: Blob Storageand File Storage.	E6242.3	PO1, PO2, PO3, PO4, PO5, PO6,PO7
7	Add a device to Google IoTcore and collect data inIoT core.	E6242.4	PO1, PO2, PO3, PO4, PO5, PO6,PO7
8	Create an instance using OpenStack.	E6242.4	PO1, PO2, PO3, PO4, PO5, PO6,PO7
9	Create a Virtual Private network using openstack. Associate the instance with the VPN created.	E6242.5	PO1, PO2, PO3, PO4, PO5, PO6,PO7
10	Use any Cloud based Machine learning framework to predict the employee salary based on experience.	E6242.5	PO1, PO2, PO3, PO4, PO5, PO6,PO7
11	To implement web services by creating website and collaborating with cloud.	E6242.5	PO1, PO2, PO3, PO4, PO5, PO6,PO7

CTE6243–DATA VISUALIZATION

Programme Name : COMPUTER ENGINEERING
Course Code : CTE6243
Semester : VI SEMESTER
Course Title : DATA VISUALIZATION
Course Type : PRACTICUM

L	T	P	C
1	0	4	3

TEACHING AND SCHEME OF EXAMINATION

No. of weeks per semester: 15weeks

Course	Instructions		Examination			
			Marks			Duration
	Hours / Week	Hours / Semester	Internal Assessment	Autonomous Examination	Total	
DATA VISUALIZATION	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 to Data Visualization	15
II	Data Exploratory Analysis and Data Manipulation	15
III	Basic Principles of Visualization and Techniques	15
IV	Advanced Visualization Techniques	15
V	Recent Trends and Ethics in Visualization	15
TOTAL HOURS		**75**

COURSE DESCRIPTION

Data visualization is one of the most powerful tools to explore, understand and communicate patterns in quantitative information. Therefore, this course is intended to introduce participants to key principles of analytic design and useful visualization techniques for the exploration and presentation of univariate and multivariate data. This course is highly applied in nature and emphasizes the practical aspects of data visualization in the data sciences. Students will learn how to evaluate data visualizations based on principles of data analytic, how to construct compelling visualizations using the free statistics software(s),and how to explore and present their data with visual methods.

COURSE OBJECTIVES

The objective of this course is to

- To evaluate data visualizations techniques based on principles of data analytic
- To explore and present their data with visual methods
- To understand which graphical formats are useful for which types of data
- To construct compelling visualizations using the free software
- To know about recent tools and advancements in data visualization

COURSE OUTCOMES:

After successful completion of this course, the students should be able to	
E6243.1	Explain the principles of effective data visualization.
E6243.2	Gain proficiency in using data visualization tools.
E6243.3	Use techniques for designing and creating various types of visualizations.
E6243.4	Develop critical thinking skills for evaluating and improving visualizations.
E6243.5	Apply data visualization concepts to real-world datasets.

Pre-requisites : Basics of statistics

CO- POs & PSOs MAPPING MATRIX:

CO/ PO & PSO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PSO1**	**PSO2**	**PSO3**
E6243.1	3	3	3	3	2	2	3	2	3	2
E6243.2	3	3	3	3	2	2	3	2	3	2
E6243.3	3	3	3	3	2	2	3	2	3	2
E6243.4	3	3	3	3	2	2	3	2	3	2
E6243.5	3	3	3	3	2	2	3	2	3	2
Total	**15**	**15**	**15**	**15**	**10**	**10**	**15**	**10**	**15**	**10**
Correlation level	**3**	**3**	**3**	**3**	**2**	**2**	**3**	**2**	**3**	**2**

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 engineering

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.
- Encourage Critical Analysis: Foster an environment where students can honestly assess experiment outcomes and analyze potential sources of error in case of discrepancies.

Assessment Methodology:

	Continuous Assessment (40 marks)				**End Semester Examination (60 marks)**
	CA1	**CA2**	**CA3**	**CA4**	
Mode	Practical Test	Practical Test	Written Test Theory	Practical Test	Practical Examination
Portion	PART-A Exercises	PART-B Exercises	All Units	All Exercises	All Exercises
Duration	2 Periods	2 Periods	3 hours	3 hours	3 hours
Exam Marks	60	60	100	100	100
Converted to	10	10	10	10	60
Marks	40				60
Tentative Schedule	7th Week	14th Week	15th Week	16th 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.** The exercise should be completed on the day of practice. The same shall beevaluated for 10 marks on the day or next day of practice before commencementof the next exercise.

- The detailed date of the practices and its evaluations should be maintained in the log book and should be submitted for the verification.

SCHEME OF EVALUATION

PART	DESCRIPTION	MARKS
A	Aim (05) , Program (30)	35
B	Execution and Output	15
TOTAL		50
C	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	Answer any ten questions out of twelve. Each carries three marks.	10 x 3	30
Part – B	Answer any seven questions out of ten. Each carries ten marks	7 x 10	70
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 (05) , Program from Part – A (30)	35
B	Aim (05) , Program from Part – B (30)	35
C	Executing any one program (Part A or Part –B)	15
D	Output	10
E	Viva Voce	05
TOTAL		**100**

CTE6243–DATA VISUALIZATION

CTE6243	DATA VISUALIZATION	L	T	P	C
PRACTICUM		1	0	4	3

Unit I	**INTRODUCTION TO DATA VISUALIZATION**	**[15 Hrs]**
Fundamentals of Data Visualization: Importance of Data Visualization - Different Types of Data Visualization		[1Hr]
Data Visualization Process/Workflow - Advantages and Disadvantages of Data Visualization Applications of Data Visualization - Tools and Software for Data Visualization		[1Hr] [1Hr]
Ex. No. 1 Installing Python and Exploring Visualization Environment, Importing and Exporting Dataset		[6 Hrs]
Ex. No. 2 Explore your dataset using Dataframe, info, shape, head, tail, dtypes, describe, grouping of data in python		[6 Hrs]
Unit II	**DATA EXPLORATORY ANALYSIS AND DATA MANIPULATION**	**[15 Hrs]**
Exploratory Data Analysis (EDA): Significance of EDA –		[1Hr]
Basic Steps: Data Collection- Data Understanding- Data Cleaning		[1Hr]
Analyze Relationship -Visualizing Results- Performing EDA Using Python		[1Hr]
Ex. No. 3 Extract important variables and remove useless variables from the dataset		[6 Hrs]
Ex. No. 4 Identify and fill missing values within the dataset		[6 Hrs]
Unit III	**BASIC PRINCIPLES OF VISUALIZATION AND TECHNIQUES**	**[15 Hrs]**
Basic Statistics behind Data Visualization: Measuring the Central Tendency of Data-Measuring Dispersion of Data-		[1Hr]
Skewness of Data-Graphic Displays of Basic Statistical Descriptions of Data.		[1Hr]
Visualizing Relationships: Scatter Plots, Line Charts. Visualizing Distributions: Histograms-Density Plots.		[1Hr]
Ex. No. 5 Creating Scatter Plot, Bar Chart, Pie Chart, Pair Plot with Matplotlib		[6 Hrs]
Ex. No. 6 Creating Density Plot and Histogram with ggplot		[6 Hrs]
Unit IV	**ADVANCED VISUALIZATION TECHNIQUES**	**[15 Hrs]**
Visualizing Categorical Data: Bar Chart-Box Plot		[1Hr]
FrequencyViolin plot - Regression plot –Interactive		[1Hr]
Data Visualization: Plotly		[1Hr]
Ex. No. 7. Plotting data using Heatmaps, Treemaps and Regression plot		[6 Hrs]
Ex. No. 8. Creating Violin Plot and Boxplot with Seaborn		[6 Hrs]
Unit V	**RECENT TRENDS AND ETHICS IN VISUALIZATIO**	**[15 Hrs]**
Text Data Visualization – Visualizing Spatial DataTime Series Data		[1Hr]
visualization. Common Mistakes in		[1Hr]
Visualization-Evaluating Visualizations.		[1Hr]

Ex. No. 9. Visualization of Time Series Data. **Ex. No. 10** Visualization of Spatial Data.	[6 Hrs] [6 Hrs]
TOTAL HOURS	**75 Hrs**

Suggested List of Students Activity

- Presentation/Seminars by students on any recent technological developments based on the course.
- Programming assignments to demonstrate visualization techniques on various domain like finance, healthcare etc.
- Periodic class/online quizzes conducted based on the course.
- Blended learning activities to explore the recent trends and developments in the field.

Text books for Reference:

S.NO	TITLE	AUTHOR	PUBLISHER WITH EDITION
1.	Hands-On Exploratory Data Analysis with Python	Suresh Kumar Mukhiya, Usman Ahmed	First Edition, Packt Publishing, 2020
2.	Data Visualization: A Practical Introduction	Kieran Healy,	First Edition, Princeton University Press, 2019.
3.	Data Mining: Concepts and Techniques	Jiawei Han, Micheline Kamber, Jian Pei,	3 rd Edition, Morgan Kaufmann Publishers, 2011.

Web-based/Online Resources

S.NO	WEBSITES/LINKS
1.	https://egyankosh.ac.in/
2.	https://www.kaggle.com/code/benhamner/python-data-visualizations
3.	https://www.datacamp.com/tutorial/data-visualisation-tableau
4.	https://www.geeksforgeeks.org/data-visualization-with-python/
5.	https://nptel.ac.in/courses/106106212
6.	https://nptel.ac.in/courses/106107220

Equipment / Facilities required to conduct the Practical Portion

Software Requirement:

S.NO.	SOFTWARE
1.	Windows
2.	Python /Tableau / R/ Power BI

Hardware Requirement:

S.NO.	HARDWARE
1.	Desktop / Laptop
2.	Printer

Data Sources:

S.NO.	DATA SOURCES
1.	https://archive.ics.uci.edu/ml/index.php
2.	https://www.kaggle.com
3.	https://toolbox.google.com
4.	https://data.gov.in/

CTE6243–DATA VISUALIZATION

MODEL QUESTION PAPER

Duration: 3 hrs. **Max. Marks: 100**

S. NO	NAME OF THE EXPERIMENTS	CO	PO
	PART - A		
1	Installing Python and Exploring Visualization Environment, Importing and Exporting Dataset	E6243.1	PO1, PO2, PO3, PO4, PO5, PO6,PO7
2	Explore your dataset using Dataframe, info, shape, head, tail, dtypes, describe, grouping of data in	E6243.1	PO1, PO2, PO3, PO4, PO5, PO6,PO7
3	Extract important variables and remove useless variables from the dataset	E6243.2	PO1, PO2, PO3, PO4, PO5, PO6,PO7
4	Identify and fill missing values within the dataset	E6243.2	PO1, PO2, PO3, PO4, PO5, PO6,PO7
5	Creating Scatter Plot, Bar Chart, Pie Chart, PairPlot with Matplotlib	E6243.3	PO1, PO2, PO3, PO4, PO5, PO6,PO7
	PART – B		
6	Creating Density Plot and Histogram with ggplot	E6243.3	PO1, PO2, PO3, PO4, PO5, PO6,PO7
7	Plotting data using Heatmaps, Treemaps and Regression plot	E6243.4	PO1, PO2, PO3, PO4, PO5, PO6,PO7
8	Creating Violin Plot and Boxplot with Seaborn	E6243.4	PO1, PO2, PO3, PO4, PO5, PO6,PO7
9	Visualization of Time Series Data.	E6243.5	PO1, PO2, PO3, PO4, PO5, PO6,PO7
10	Visualization of Spatial Data.	E6243.5	PO1, PO2, PO3, PO4, PO5, PO6,PO7

CTE6244–ADVANCED DBMS

L	T	P	C
1	0	4	3

Programme Name : COMPUTER ENGINEERING
Course Code : CTE6244
Semester : VI SEMESTER
Course Title : ADVANCED DBMS
Course Type : PRACTICUM

TEACHING AND SCHEME OF EXAMINATION

No. of weeks per semester: 15weeks

Course	Instructions		Examination			
			Marks			Duration
	Hours / Week	Hours / Semester	Internal Assessment	Autonomous Examination	Total	
ADVANCED DBMS	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	Query Optimization and Object Based Database Concepts	15
II	Distributed and Parallel Databases	15
III	Spatial Temporal and XML Databases	15
IV	Unstructured and Non-Relational Databases	15
V	Emerging Databases	15
TOTAL HOURS		**75**

COURSE DESCRIPTION

Advanced Database Management Systems ontain comprehensive contents on various concepts related to Query optimization and structured , unstructured and semi structured databases. An in-depth knowledge of distributed and parallel databases is imparted during the course of study. The design and querying of spatial and temporal databases along with hands on experience is emphasized. This course includes study of XML database design and querying. Students will get a detailed introduction to the non relational databases like NoSQL and emerging databases like mobile, web and cloud databases. After learning this subject, students will be able to design and use Advanced Database Management Systems as a backend for developing realtime applications.

COURSE OBJECTIVES

The objective of this course is to

1. To design conceptual and physical database tuning .
2. To comprehend and apply the concepts of Object, Distributed, Parallel, Spatial Temporal and XML databases.
3. To learn and apply the concepts of Multimedia and NoSql databases.
4. To understand and use the concepts of emerging database technologies like Web Mobile and Cloud Databases.

COURSE OUTCOMES:

After successful completion of this course, the students should be able to	
E6244.1	Analyze the basics of query optimization techniques and apply it to minimize the cost.
E6244.2	Design a Distributed database system and execute distributed queries.
E6244.3	Design Spatial and Temporal Database systems and implement it in corresponding applications.
E6244.4	Design XML database systems and validate with XML schema
E6244.5	Apply NoSQL database systems and manipulate the data associated with it. Design a database system in Cloud and integrate it with application.

Pre-requisites : Nil

CO- POs & PSOs MAPPING MATRIX:

CO/ PO & PSO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PSO1**	**PSO2**	**PSO3**
E6244.1	3	3	3	3	2	2	3	2	3	2
E6244.2	3	3	3	3	2	2	3	2	3	2
E6244.3	3	3	3	3	2	2	3	2	3	2
E6244.4	3	3	3	3	2	2	3	2	3	2
E6244.5	3	3	3	3	2	2	3	2	3	2
Total	**15**	**15**	**15**	**15**	**10**	**10**	**15**	**10**	**15**	**10**
Correlation level	**3**	**3**	**3**	**3**	**2**	**2**	**3**	**2**	**3**	**2**

Correlation level 1 – Slight (low)
Correlation level 2 – Moderate (Medium)
Correlation level 3 – Substantial (high)

Instructional Strategy:

- The teacher can use experiential learning as an instructional strategy both in and outside the classroom.
- It may be necessary for the teacher to pre-teach the skills and processes necessary to achieve the

intended learning outcomes.

- The teacher needs to encourage students to share their thoughts so that the entire class can benefit from individual insights.
- Teachers can encourage divergent thinking by asking students to transform a teacher guided image into several others of their own creation.

Assessment Methodology:

	Continuous Assessment (40 marks)				End Semester Examination (60 marks)
	CA1	**CA2**	**CA3**	**CA4**	
Mode	Practical Test	Practical Test	Written Test Theory	Practical Test	Practical Examination
Portion	PART-A Exercises	PART-B Exercises	All Units	All Exercises	All Exercises
Duration	2 Periods	2 Periods	3 hours	3 hours	3 hours
Exam Marks	60	60	100	100	100
Converted to	10	10	10	10	60
Marks	40				60
Tentative Schedule	7th Week	14th Week	15th Week	16th 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.** The exercise should be completed on the day of practice. The same shall beevaluated for 10 marks on the day or next day of practice before commencementof the next exercise.

- The detailed date of the practices and its evaluations should be maintained in the log book and should be submitted for the verification.

SCHEME OF EVALUATION

PART	DESCRIPTION	MARKS
A	Aim (05) , Program (30)	35
B	Execution and Output	15
TOTAL		50
C	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	Answer any ten questions out of twelve. Each carries three marks.	10 x 3	30
Part – B	Answer any seven questions out of ten. Each carries ten marks	7 x 10	70
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 (05) , Program from Part – A (30)	35
B	Aim (05) , Program from Part – B (30)	35
C	Executing any one program (Part A or Part –B)	15
D	Output	10
E	Viva Voce	05
TOTAL		**100**

CTE6244–ADVANCED DBMS

CTE6244 PRACTICUM	ADVANCED DBMS	L	T	P	C
		1	0	4	3

Unit I	QUERY OPTIMIZATION AND OBJECT BASED DATABASE CONCEPTS	[15 Hrs]
Theory: Query optimization –Basic steps in query optimization -Query processing.--Query evaluation plans. Transaction Management concepts - Properties of Transactions.		[1Hr]
Object Oriented Database Management System(OODBMS) - The ODMG Data Model - Applications of an OODBMS- Object Relational DBMS- Object-Relational Database Model		[1Hr] [1Hr]
Ex No	**Name of the Experiment**	
1	Consider the SQL query select * from employee, department where employee.dept_id = department. dept_id What evaluation plan would a query optimizer likely choose to get the least estimated cost?	[4 Hrs]
2	Design an ORDBMS for the following schema of a Library Database: BOOK (Book_id, Title, Publisher_Name, Pub_Year) BOOK_AUTHORS (Book_id, Author_Name, Address) PUBLISHER(Name, Address, Phone) BOOK_COPIES(Book_id, Branch_id, No- of_Copies) BOOK_LENDING (Book_id, Branch_id, Card_No, Date_Out, Due_Date) .Write SQL queries to a) Retrieve details of all books in the library – id, title, name of publisher, authors,number of copies in each branch, etc. b) Get the particulars of borrowers who have borrowed more than 3 books, but fromJan 2017 to Jun 2017. c) Delete a book in BOOK table. d) Update the contents of other tables to reflect this data manipulation operation	[8 Hrs]
Unit II	**DISTRIBUTED AND PARALLEL DATABASES**	**[15 Hrs]**
Distributed Database Management System (DDBMS)- Definition- DDBMS Architecture, Distributed database design, Allocation, Fragmentation, Replication, query processing, transaction processing, Parallel Databases		[1Hr] [1Hr]
Architecture, Data partitioning strategy, Interquery and Intraquery Parallelism –Parallel query Evaluation.		[1Hr]
Ex No	**Name of the Experiment**	

3.	Consider a schema that contains the following table with the key underlined: Employee (Eno, Ename, Desg, Dno). Assume that we horizontally fragment the table as follows: Employee1(Eno, Ename, Desg, Dno), where 1 <= Dno<=10, Employee2(Eno, Ename, Desg, Dno), where 11 <= Dno<=20, Employee3 (Eno, Ename, Desg, Dno), where 21 <= Dno<=30 . In addition, assume we have 4 sites that contain the following fragments: Site1 has Employee1, Site2 has Employee2, Site3 has Employee2 and Employee3, Site4 has Employee1. Add relations to the database as per yourrequirements. Perform the following operations: a) Create the above database. b) Insert values into the database. c) Create the specified fragments. d) Implement at least five suitable queries on Employee fragments.	[12 Hrs]
Unit III	**SPATIAL TEMPORAL AND XML DATABASES**	**[15 Hrs]**
Spatial Databases- Definition, Types of spatial data, Querying- spatial selection, spatial join, andother set operations.		[1Hr]
Temporal Databases- Introduction, Temporal data models.		[1Hr]
Semi structured Databases--XML Databases- – XML Hierarchical Data Model – XML Schema -DTD - XPath - XQuery .		[1Hr]
Ex No	**Name of the Experiment**	
4.	Create a spatial database of Tamilnadu and form the following queries a)Show a list of all the names of places adjoining your location.. b)List the unique town names in your region. c)Find the restaurants close to your location. d)Find the distance between any two places in Tamilnadu.	[4 Hrs]
5.	Create the employees table and form the following SQL queries: a) Find the number of employees hired each year. b) Find the number of employees hired each month. c) Find the number of employees hired each week. d) Find the 3 most recently hired employees and what department they work in.	[4 Hrs]
6.	Write a DTD for XML documents with student data: name, address and a student_id, one or more subjects (computer science, Mechanical, Electrical, Civil etc). Write an XML document containing student data conforming to the DTD, andcheck it for validity. a) Write a XQuery which returns The names of all students in ascending order. b) The students who study the same subjects. c) The subjects which are studied by more than 10 students.	[4 Hrs]
Unit IV	**UNSTRUCTURED AND NON-RELATIONAL DATABASES**	**[15 Hrs]**
Multimedia databases-Multimedia sources, issues and applications. NoSQL databases - CAPTheorem – Sharding- Document based		[1Hr]
MongoDB Operation– Insert, Update, Delete, Query, Indexing, Application, Replication, Sharding–		[1Hr]
Cassandra: Data Model, Key Space, Table Operations, CRUD Operations, CQL Types.		[1Hr]

Ex No	Name of the Experiment	
7.	a) Consider a student database consisting of (Register_no, Fname, Lname, Address (Street,City, Pincode), Mobile Nos, Total Marks). as data. Design the database using MongoDB and perform the following operations: i. Create the above student database. ii. Insert values into the above database. iii. Find the Students who have got Total Marks greater than 450. iv. Update the Pincode of the students who belong to a particular City. v. Delete a particular student given the Register No.	[6 Hrs]
8.	Perform the above operations using Cassandra followed by the following operations: vi. Insert additional mobile numbers for a particular student. vii. Delete the street name in the address given a particular city.	[6 Hrs]
Unit V	**EMERGING DATABASES**	**[15 Hrs]**
Web databases -Web search engines, web search architecture Inverted indexes for web searchengines, web crawling, web search statistics . Mobile Databases- Concept -Mobile Database Architecture - Modes of Operations of Mobile Database - Transaction Model in MDS Cloud Databases Database options in Cloud, Changing role of the DBA in the cloud- Moving your databases tothe cloud.		[1Hr] [1Hr] [1Hr]
Ex No	**Name of the Experiment**	
9.	Provision a cloud database using AWS RDS service. Understand the setup process,configurations, and common management tasks.	[6 Hrs]
10.	Integrate your application with the cloud database. Learn how to establish a connection, perform database operations, and handle responses in your application.	[6 Hrs]
TOTAL HOURS		**75 Hrs**

Suggested List of Students Activity

- Presentation/Seminars by students on any recent technological developments based on the course.
- Micro project that shall be an extension of any practical lab exercise to real-world application

Text books for Reference:

S.NO	TITLE	AUTHOR	PUBLISHER WITH EDITION
1.	Fundamentals of Database Systems	RamezElmasri, Shamkant B. Navathe	Seventh Edition, Pearson Education,2017
2.	Database Management Systems	Raghu Ramakrishnan	4th edition, Mcgraw -Hill, 2015
3.	Database System Concepts	Abraham Silberschatz,Henry F. Korth, S. Sudharshan	Seventh Edition, Tata McGraw Hill, 2019.

Web-based/Online Resources

S.NO	WEBSITES/LINKS
1.	https://archive.nptel.ac.in/courses/106/105/106105175
2.	https://link.springer.com/book/10.1007/3-540-57507-34.

Equipment / Facilities required to conduct the Practical Portion

Software Requirement:

S.NO.	SOFTWARE
1.	Java / Python
2.	MySQL, MongoDB, Cassandra

Hardware Requirement:

S.NO.	HARDWARE
1.	Desktop Computers / Laptop
2.	Printer

CTE6244–ADVANCED DBMS

MODEL QUESTION PAPER

Duration: 3 hrs. **Max. Marks: 100**

S. NO	NAME OF THE EXPERIMENTS	CO	PO
	PART - A		
1	What evaluation plan would a query optimizer likely choose to get the least estimated cost?	E6244.1	PO1, PO2, PO3, PO4, PO5, PO6,PO7
2	Design an ORDBMS for the following schema of a Library Database: BOOK (Book_id, Title, Publisher_Name Pub_Year) BOOK_AUTHORS(Book_id,Author_Name,Address) PUBLISHER(Name,Address,Phone) BOOK_COPIES(Book_id,Branch_id, No- of_Copies) BOOK_LENDING (Book_id, Branch_id, Card_No, Date_Out, Due_Date) . Write SQL queries to a) Retrieve details of all books in the library – id, title, name ofpublisher, authors, number of copies in each branch, etc. b) Get the particulars of borrowers who have borrowed more than 3 books, but from Jan 2017 to Jun 2017. c) Delete a book in BOOK table. d) Update the contents of other tables to reflect this data manipulation operation.	E6244.1	PO1, PO2, PO3, PO4, PO5, PO6,PO7
3	Consider a schema that contains the following table with the key underlined: Employee (Eno, Ename, Desg, Dno). Assume that we horizontally fragment the table as follows: Employee1(Eno, Ename, Desg, Dno), where 1 <= Dno<=10, Employee2(Eno, Ename, Desg, Dno), where 11 <= Dno<=20, Employee3 (Eno, Ename, Desg, Dno), where 21 <= Dno<=30 .In addition, assume we have 4 sites that contain the following fragments: Site1 has Employee1, Site2 has Employee2, Site3 has Employee2 and Employee3, Site4 has Employee1. Add relations to the database as per your requirements. Perform the following operations: a) Create the above database. b) Insert values into the database. c) Create the specified fragments.	E6244.2	PO1, PO2, PO3, PO4, PO5, PO6,PO7

4	Create a spatial database of Tamilnadu and form the followingqueries a) Show a list of all the names of places adjoining your	E6244.2	PO1, PO2, PO3, PO4, PO5, PO6,PO7
5	Create the employees table and form the following SQL queries: a) Find the number of employees hired each year. b) Find the number of employees hired each month. c) Find the number of employees hired each week. d) Find the 3 most recently hired employees and what department they work in.	E6244.3	PO1, PO2, PO3, PO4, PO5, PO6,PO7
	PART – B		
6	Write a DTD for XML documents with student data: name, address and a student_id, one or more subjects (computer science, Mechanical, Electrical, Civil etc). Write an XML document containingstudent data conforming to the DTD, and check it for validity. a) Write a XQuery which returns The names of all students inascending order. b) The students who study the same subjects. c) The subjects which are studied by more than 10 students.	E6244.3	PO1, PO2, PO3, PO4, PO5, PO6,PO7
7	a) Consider a student database consisting of (Register_no, Fname, Lname, Address (Street,City, Pincode), Mobile Nos, Total Marks). as data. Design the database using MongoDB and perform thefollowing operations: i.Create the above student database. i. Insert values into the above database. ii. Find the Students who have got Total Marks greater than 450. iii. Update the Pincode of the students who belong to a particularCity. iv. Delete a particular student given the Register No.	E6244.4	PO1, PO2, PO3, PO4, PO5, PO6,PO7
8	Perform the above operations using Cassandra followed by the following operations: vi. Insert additional mobile numbers for a particular student. vii. Delete the street name in the address given aparticular city.	E6244.4	PO1, PO2, PO3, PO4, PO5, PO6,PO7
9	Provision a cloud database using AWS RDS service. Understand the setup process,configurations, and common management tasks.	E6244.5	PO1, PO2, PO3, PO4, PO5, PO6,PO7
10	Integrate your application with the cloud database. Learn how to establish a connection, perform database operations, and handle responses in your application.	E6244.5	PO1, PO2, PO3, PO4, PO5, PO6,PO7

CTE6245 –MOBILE APPLICATION DEVELOPMENT

L	T	P	C
1	0	4	3

Programme Name : COMPUTER ENGINEERING

Course Code : CTE6245

Semester : VI SEMESTER

Course Title : MOBILE APPLICATION DEVELOPMENT

Course Type : PRACTICUM

TEACHING AND SCHEME OF EXAMINATION

No. of weeks per semester: 15weeks

Course	Instructions		Examination			
			Marks			Duration
	Hours / Week	Hours / Semester	Internal Assessment	Autonomous Examination	Total	
MOBILE APPLICATION DEVELOPMENT	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 to Mobile Application Development	15
II	Introduction to Andriod	15
III	Android User Interface Design	15
IV	Testing and Managing Android Applications	15
V	Android APIs and Deploying Android Application	15
TOTAL HOURS		**75**

COURSE DESCRIPTION

This course is concerned with the development of applications on mobile and wireless computing platforms. Android will be used as a basis for teaching programming techniques. Students will work at all stages of the software development life-cycle from inception through to implementation and testing.

COURSE OBJECTIVES

The objective of this course is to

- To facilitate students to understand android SDK.
- To help students to gain a basic understanding of Android application development.
- To inculcate working knowledge of Android Studio development tool.
- To test Android applications.
- To deploy Android applications

COURSE OUTCOMES:

On successful completion of this course, the students should be able to	
E6245.1	Identify various concepts of mobile programming that make it unique from programming for other platform.
E6245.2	Critique mobile applications on their design pros and cons.
E6245.3	Utilize rapid prototyping techniques to design and develop sophisticated mobile interfaces.
E6245.4	Test Android applications.
E6245.5	Deploy applications to the Android marketplace for distribution.

Pre-requisites : Nil

CO- POs & PSOs MAPPING MATRIX:

CO/ PO & PSO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PSO1**	**PSO2**	**PSO3**
E6245.1	3	3	3	3	2	2	3	2	3	2
E6245.2	3	3	3	3	2	2	3	2	3	2
E6245.3	3	3	3	3	2	2	3	2	3	2
E6245.4	3	3	3	3	2	2	3	2	3	2
E6245.5	3	3	3	3	2	2	3	2	3	2
Total	**15**	**15**	**15**	**15**	**10**	**10**	**15**	**10**	**15**	**10**
Correlation level	**3**	**3**	**3**	**3**	**2**	**2**	**3**	**2**	**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 (40 marks)				**End Semester Examination (60 marks)**
	CA1	**CA2**	**CA3**	**CA4**	
Mode	Practical Test	Practical Test	Written Test Theory	Practical Test	Practical Examination
Portion	PART-A Exercises	PART-B Exercises	All Units	All Exercises	All Exercises
Duration	2 Periods	2 Periods	3 hours	3 hours	3 hours
Exam Marks	60	60	100	100	100
Converted to	10	10	10	10	60
Marks	40				60
Tentative Schedule	7^{th} Week	14^{th} Week	15^{th} Week	16^{th} 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.** The exercise should be completed on the day of practice. The same shall beevaluated for 10 marks on the day or next day of practice before commencementof the next exercise.

- The detailed date of the practices and its evaluations should be maintained in the log book and should be submitted for the verification.

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SCHEME OF EVALUATION

PART	DESCRIPTION	MARKS
A	Aim (05) , Program (30)	35
B	Execution and Output	15
TOTAL		50
C	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	Answer any ten questions out of twelve. Each carries three marks.	10 x 3	30
Part – B	Answer any seven questions out of ten. Each carries ten marks	7 x 10	70
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 (05) , Program from Part – A (30)	35
B	Aim (05) , Program from Part – B (30)	35
C	Executing any one program (Part A or Part –B)	15
D	Output	10
E	Viva Voce	05
TOTAL		**100**

CTE6245–MOBILE APPLICATION DEVELOPMENT

CTE6245	MOBILE APPLICATION DEVELOPMENT	L	T	P	C
PRACTICUM		1	0	4	3
Unit I	**INTRODUCTION TO MOBILE APPLICATION DEVELOPMENT**	**[15 Hrs]**			
THEORY: Introduction to Android: The Android Platform Android SDK, Eclipse Installation Android Installation, Building First Android application		[1Hr] [1Hr] [1Hr]			
Ex No 1: Implement "Hello World" Android example.. **Ex No 2**: Develop an application that uses GUI components, Font and Colours.		[6 Hrs] [6 Hrs]			
Unit II	**INTRODUCTION TO ANDRIOD**	**[15 Hrs]**			
THEORY: Android Application Design Essentials: Anatomy of an Android applications, Android terminologies, Application Context, Activities, Services, Intents, Android Manifest File and its common settings.		[1Hr] [1Hr] [1Hr]			
Ex No 3: Develop an application that uses Layout Managers and event listeners. **Ex No 4:** Write an application that draws basic graphical primitives on the screen.		[6 Hrs] [6 Hrs]			
Unit III	**ANDROID USER INTERFACE DESIGN**	**[15 Hrs]**			
THEORY: Android User Interface Design Essentials: User Interface Screen elements Designing User Interfaces with Layouts.		[1Hr] [2 Hrs]			
Ex No 5: Develop an application that makes use of Notification Manager. **Ex No 6:** Implement an application that writes data to the SD card.		[6 Hrs] [6 Hrs]			
Unit IV	**TESTING AND MANAGING ANDROID APPLICATIONS**	**[15 Hrs]**			
THEORY: Testing Android applications Publishing Android application Using Android preferences		[1Hr] [1Hr] [1Hr]			
Ex No 7: Develop a native application that uses GPS location information. **Ex No 8**: Develop an application for sending & receiving SMS.		[6 Hrs] [6 Hrs]			
Unit V	**ANDROID APIS AND DEPLOYING ANDROID APPLICATION**	**[15 Hrs]**			
THEORY: Using Common Android APIs: Using Android Data and Storage APIs Managing data using Sqlite, Using Android Networking APIs, Using Android Web and Telephony APIs, Deploying Android Application to the World.		[1Hr] [1Hr] [1Hr]			

Ex No 9: Develop an application that makes use of SQLite databases. **Ex No 10:** Write an application that creates alarm clock.	[6 Hrs] [6 Hrs]
TOTAL HOURS	**75 Hrs**

Suggested List of Students Activity

- Presentation/Seminars by students on any recent technological developments based on the course
- 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

Text books for Reference:

S.NO	TITLE	AUTHOR	PUBLISHER WITH EDITION
1.	Head First Android Development: A Brain-FriendlyGuide	Dawn Griffiths, DavidGriffiths	1 st edition, O'Reilly,2017
2.	Android Programming for Beginners	John Horton	2nd edition, Packt Publishing, 2018.
3.	Android Application Development All-in-One For Dummies	Barry Burd	2nd edition, For Dummies, 2020.

Web-based/Online Resources

S.NO	WEBSITES/LINKS
1.	https://developer.android.com/get-started/overview
2.	https://developer.android.com/courses/

CTE6245–MOBILE APPLICATION DEVELOPMENT

MODEL QUESTION PAPER

Duration: 3 hrs. **Max. Marks: 100**

S. NO	NAME OF THE EXPERIMENTS	CO	PO
	PART - A		
1	Implement “Hello World” Android example.	E6245.1	PO1, PO2, PO3, PO4, PO5, PO6,PO7
2	Develop an application that uses GUI components, Font and Colours.	E6245.1	PO1, PO2, PO3, PO4, PO5, PO6,PO7
3	Develop an application that uses Layout Managers and event listeners.	E6245.2	PO1, PO2, PO3, PO4, PO5, PO6,PO7
4	Write an application that draws basic graphical primitives on the screen	E6245.2	PO1, PO2, PO3, PO4, PO5, PO6,PO7
5	Develop an application that makes use of Notification Manager.	E6245.3	PO1, PO2, PO3, PO4, PO5, PO6,PO7
	PART - B		
6	Implement an application that writes data to the SD card.	E6245.3	PO1, PO2, PO3, PO4, PO5, PO6,PO7
7	Develop a native application that uses GPS location information.	E6245.4	PO1, PO2, PO3, PO4, PO5, PO6,PO7
8	Develop an application for sending & receiving SMS.	E6245.4	PO1, PO2, PO3, PO4, PO5, PO6,PO7
9	Develop an application that makes use of SQLite databases.	E6245.5	PO1, PO2, PO3, PO4, PO5, PO6,PO7
10	Write an application that creates alarm clock.	E6245.5	PO1, PO2, PO3, PO4, PO5, PO6,PO7

CTE6246–UI AND UX DESIGN

L	T	P	C
1	0	4	3

Programme Name : COMPUTER ENGINEERING
Course Code : CTE6246
Semester : VI SEMESTER
Course Title : UI AND UX DESIGN
Course Type : PRACTICUM

TEACHING AND SCHEME OF EXAMINATION

No. of weeks per semester: 15weeks

Course	Instructions		Examination			
			Marks			Duration
	Hours / Week	Hours / Semester	Internal Assessment	Autonomous Examination	Total	
UI AND UX DESIGN	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 To UI And UX Design	15
II	UX Design	15
III	User Research	15
IV	Interaction Design	15
V	Visual Design	15
TOTAL HOURS		**75**

COURSE DESCRIPTION

User Interface (UI) and User Experience (UX) Design play key roles in the experience users have when interacting with digital products and applications. In this course, student will learn the theory and methodologies behind UI and UX design. Student will learn design their own wireframes and interactive prototypes. Learning UI and UX basics can help to student collaborate better on team projects and create new career opportunities.

COURSE OBJECTIVES

The objective of this course is to

- To learn problem solving skills.
- To gain knowledge of UI and UX Design.
- To understand the concept of functions and their role in UX Design.
- To comprehend the basics of interaction structures and its importance in application development.
- To recognize the importance of visual design.

COURSE OUTCOMES:

After successful completion of this course, the students should be able to	
E6246.1	Demonstrate knowledge on UI and UX design concepts.
E6246.2	Develop and performing a competitive analysis in UX design.
E6246.3	Design user personas using persona UXPressia's online builder tool.
E6246.4	Develop interaction design and functional layout.
E6246.5	Creating web and mobile app applications using visual design tools.

Pre-requisites : Nil

CO- POs & PSOs MAPPING MATRIX:

CO/ PO & PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
E6246.1	3	3	3	3	2	2	3	2	3	2
E6246.2	3	3	3	3	2	2	3	2	3	2
E6246.3	3	3	3	3	2	2	3	2	3	2
E6246.4	3	3	3	3	2	2	3	2	3	2
E6246.5	3	3	3	3	2	2	3	2	3	2
Total	**15**	**15**	**15**	**15**	**10**	**10**	**15**	**10**	**15**	**10**
Correlation level	**3**	**3**	**3**	**3**	**2**	**2**	**3**	**2**	**3**	**2**

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 engineering 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.
- Encourage Critical Analysis: Foster an environment where students can honestly assess experiment outcomes and analyze potential sources of error in case of discrepancies.

Assessment Methodology:

	Continuous Assessment (40 marks)				End Semester Examination (60 marks)
	CA1	**CA2**	**CA3**	**CA4**	
Mode	Practical Test	Practical Test	Written Test Theory	Practical Test	Practical Examination
Portion	PART-A Exercises	PART-B Exercises	All Units	All Exercises	All Exercises
Duration	2 Periods	2 Periods	3 hours	3 hours	3 hours
Exam Marks	60	60	100	100	100
Converted to	10	10	10	10	60
Marks	40				60
Tentative Schedule	7^{th} Week	14^{th} Week	15^{th} Week	16^{th} 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.** The exercise should be completed on the day of practice. The same shall beevaluated for 10 marks on the day or next day of practice before commencementof the next exercise.

- The detailed date of the practices and its evaluations should be maintained in the log book and should be submitted for the verification.

SCHEME OF EVALUATION

PART	DESCRIPTION	MARKS
A	Aim (05) , Program (30)	35
B	Execution and Output	15
TOTAL		50
C	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	Answer any ten questions out of twelve. Each carries three marks.	10 x 3	30
Part – B	Answer any seven questions out of ten. Each carries ten marks	7 x 10	70
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 (05) , Program from Part – A (30)	35
B	Aim (05) , Program from Part – B (30)	35
C	Executing any one program (Part A or Part –B)	15
D	Output	10
E	Viva Voce	05
TOTAL		**100**

CTE6246–UI AND UX DESIGN

CTE6246	UI AND UX DESIGN	L	T	P	C
PRACTICUM		1	0	4	3
Unit I	**INTRODUCTION TO UI AND UX DESIGN**	**[15 Hrs]**			
Introduction to UI and UX Design and the Key Methodologies such as Product Design Life Cycle.		[3 Hrs]			
Ex No 1: Identifying interface connectivity and establishing interface connectivity between two different program modules. **Ex No 2**:Understand front end and backend interfacing and Implementation of both interfacing.		[6 Hrs] [6 Hrs]			
Unit II	**UX DESIGN**	**[15 Hrs]**			
User Centred Design - Design Thinking – Activity Based Design - Agile Process.		[1Hr] [2Hrs]			
Ex No 3: Create and performing a competitive analysis in UX design helps companies identify competitors' strengths and weaknesses relative to their own business, product, and design. **Ex No 4:** Designing a Responsive layout for a societal application		[6 Hrs] [6 Hrs]			
Unit III	**USER RESEARCH**	**[15 Hrs]**			
Stakeholder & User Interviews - Creating Personas Empathy Mapping - Information Architecture - Building User Journey		[1Hr] [2Hrs]			
Ex No 5: Hands on Design Thinking Process for a new product. **Ex No 6:** Conduct end-to-end user research - User research, creating personas, Ideation process (User stories, Scenarios), Flow diagrams, Flow Mapping.		[6 Hrs] [6 Hrs]			
Unit IV	**INTERACTION DESIGN**	**[15 Hrs]**			
Ideation Methods - Interaction & Prototyping Paper & Digital Prototyping - Design a Web / Mobile App.		[1Hr] [2Hrs]			
Ex No 7: Identifying interaction design and functional layout. practical implementation of interaction design and functional layout. **Ex No 8**: Exploring various UI Interaction Patterns.		[6 Hrs] [6 Hrs]			
Unit V	**VISUAL DESIGN**	**[15 Hrs]**			
Web & Mobile App Design - Grid Systems – Colors Theory and Palette - Understanding Typography.		[1Hr] [2Hrs]			
Ex No 9: Create Social media advertisement using online tools and applications. **Ex No 10:** Design super market special offer sales poster using online tools and applications.		[6 Hrs] [6 Hrs]			
	TOTAL HOURS	**75 Hrs**			

Suggested List of Students Activity

- Presentation/Seminars by students on any recent technological developments based on the course.
- Programming assignments
- Periodic class/online quizzes conducted based on the course.
- Blended learning activities to explore the recent trends and developments in the field.

Text books for Reference:

S.NO	TITLE	AUTHOR	PUBLISHER WITH EDITION
1.	A Guide to UX Design and Development: Developer's Journey Through the UX Process (Design Thinking)	Tom Green, Joseph Labrecque	First Edition, APress,2023
2.	Laws of UX: Using Psychology to Design Better Products & Services	Jon Yablonski	First Edition, O′Reilly, 2020
3.	UX for Dummies	Donald Chesnut, Kevin P. Nichols	Frist Edition, Wiley, 2014.

Web-based/Online Resources

S.NO	WEBSITES/LINKS
1.	NPTEL User Interface Design: https://archive.nptel.ac.in/courses/124/107/124107008/
2.	MIT OpenCourseWare: https://ocw.mit.edu/courses/6-831-user-interface-designand-implementation-spring-2011/pages/lecture-notes/

Equipment / Facilities required to conduct the Practical Portion

Software Requirement:

S.NO.	SOFTWARE
1.	Windows / Linux Operating System

Hardware Requirement:

S.NO.	HARDWARE
1.	Desktop Computer/ Laptop
2.	Printer

CTE6246–UI AND UX DESIGN

MODEL QUESTION PAPER

Duration: 3 hrs. **Max. Marks: 100**

S. NO	NAME OF THE EXPERIMENTS	CO	PO
	PART - A		
1	Identifying interface connectivity and establishing interface connectivity between two different	E6246.1	PO1, PO2, PO3, PO4, PO5, PO6,PO7
2	Understand front end and backend interfacing and Implementation of both interfacing.	E6246.1	PO1, PO2, PO3, PO4, PO5, PO6,PO7
3	Create and performing a competitive analysis in UX design helps companies identify competitors'	E6246.2	PO1, PO2, PO3, PO4, PO5, PO6,PO7
4	Designing a Responsive layout for a societal application	E6246.2	PO1, PO2, PO3, PO4, PO5, PO6,PO7
5	Hands on Design Thinking Process for a new product.	E6246.3	PO1, PO2, PO3, PO4, PO5, PO6,PO7
	PART – B		
6	Conduct end-to-end user research - User research, creating personas, Ideation process (User stories, Scenarios), Flow diagrams, Flow Mapping.	E6246.3	PO1, PO2, PO3, PO4, PO5, PO6,PO7
7	Identifying interaction design and functional layout. practical implementation of interaction design and functional layout.	E6246.4	PO1, PO2, PO3, PO4, PO5, PO6,PO7
8	Exploring various UI Interaction Patterns.	E6246.4	PO1, PO2, PO3, PO4, PO5, PO6,PO7
9	Create Social media advertisement using onlinetools and applications.	E6246.5	PO1, PO2, PO3, PO4, PO5, PO6,PO7
10	Design super market special offer sales poster using online tools and applications.	E6246.5	PO1, PO2, PO3, PO4, PO5, PO6,PO7

CTE6351 – INTERNSHIP

Programme Name : COMPUTER ENGINEERING

Course Code : E6351

Semester : VI SEMESTER

Course Title : INTERNSHIP

Course Type : PROJECT

Periods	C
540	12

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 assignedin 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 zonesand take on new responsibilities.

- Build confidence and self-efficacy through successful completion of internshiptasks and projects.
- Give insight into the policies, regulations, and administrative practices.
- Allow interns to observe and understand the implementation of standards andpolicies 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, andcareer aspirations.
- Encourage sensitivity to the needs and backgrounds of different groups, promotinginclusive and equitable industrial practices.

COURSE OUTCOMES:

After successful completion of this course, the students should be able to	
E6351.1	Demonstrate improved skills
E6351.2	Exhibit increased professional behavior
E6351.3	Apply theoretical knowledge and principles in real-world practices.
E6351.4	Develop and utilize assessment tools to evaluate the learning and practices
E6351.5	Engage in reflective practice to continually improve their learning and professional growth

CO- POs & PSOs MAPPING MATRIX:

CO/ PO & PSO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PSO1**	**PSO2**	**PSO3**
E6351.1	3	3	3	3	2	2	3	2	3	2
E6351.2	3	3	3	3	2	2	3	2	3	2
E6351.3	3	3	3	3	2	2	3	2	3	2
E6351.4	3	3	3	3	2	2	3	2	3	2
E6351.5	3	3	3	3	2	2	3	2	3	2
Total	**15**	**15**	**15**	**15**	**10**	**10**	**15**	**10**	**15**	**10**
Correlation level	**3**	**3**	**3**	**3**	**2**	**2**	**3**	**2**	**3**	**2**

Correlation level 1 – Slight (low)
Correlation level 2 – Moderate (Medium)
Correlation level 3 – Substantial (high)

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 theconcerned 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 report in the form of diaryto 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 theweek should be accounted for clearly giving attendance particulars (Presence, absence, Leave, Holidays etc.). The concern of the Industrial supervisor is to periodically check theseprogress 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
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 internship period (Dec - May). 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 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**

CTE6353 – FELLOWSHIP

Programme Name : COMPUTER ENGINEERING
Course Code : CTE6353
Semester : VI SEMESTER
Course Title : FELLOWSHIP
Course Type : PROJECT

Periods	C
540	12

COURSE DESCRIPTION

The Fellowship in the Diploma in Engineering program is designed to provide aspiring 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 landscape.

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 andcomputer 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, criticalthinking, 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 endeavor; 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

After completing students will be able to,

- Provide fellows with a solid foundation in core engineering principles and advancedtechnical 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 integrationof 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	
E6353.1	Demonstrate a strong understanding of core engineering principles and possess the technical skills necessary to design, analyze, and implement engineering solutions across various disciplines.
E6353.2	Apply theoretical knowledge to practical scenarios, effectively solving engineering problems through hands-on projects, laboratory work, and internships.
E6353.3	Exhibit the ability to conduct research, develop innovative solutions, and contribute to advancements in engineering through critical thinking and creative approaches to complex challenges.
E6353.4	Understand and adhere to professional and ethical standards in engineering practice, demonstrating responsibility, integrity, and a commitment to sustainable and socially responsible engineering.
E6353.5	Enhance strong communication skills, both written and verbal, and be capable of working effectively in teams, demonstrating leadership and collaborative abilitiesin diverse and multidisciplinary environments.

CO- POs & PSOs MAPPING MATRIX:

CO/ PO & PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
E6353.1	3	3	3	3	2	2	3	2	3	2
E6353.2	3	3	3	3	2	2	3	2	3	2
E6353.3	3	3	3	3	2	2	3	2	3	2
E6353.4	3	3	3	3	2	2	3	2	3	2
E6353.5	3	3	3	3	2	2	3	2	3	2
Total	**15**	**15**	**15**	**15**	**10**	**10**	**15**	**10**	**15**	**10**
Correlation level	**3**	**3**	**3**	**3**	**2**	**2**	**3**	**2**	**3**	**2**

Correlation level 1 – Slight (low)
Correlation level 2 – Moderate (Medium)
Correlation level 3 – Substantial (high)

Important points to consider to select 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 counseling, 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 contributionsto 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 thatenhance 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. Prioritizetasks 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 andgaining 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 andtrends in engineering by reading industry journals, attending conferences, and takingadditional 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, 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 orstudy 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 forthe 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 for Fellowship.

Sl. No.	Topics	Description
1.	Alignment with Objectives	Assess how well the project aligns with the stated objectives and requirements. Determine if the student has addressed the key aspects outlined inthe 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. 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. 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. 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. Assess the student's ability to plan and execute the project effectively.
7.	Documentation and Reporting:	Check the quality of documentation, including code, experimental details, and any other relevant materials. 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. 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. 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. Assess adaptability and resilience in the face of challenges.

INTERNAL MARKS - 40 MARKS

As per the rubrics each topic should be considered for the Review 1 and Review 2. Equal weightage 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 the reviews shall be considered for theinternal assessment of 40 Marks.

Scheme of Evaluation

PART	DESCRIPTION	MARKS
A	Assessment as per the rubrics.	30
B	Attendance	10
Total		**40**

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
Total		**100**

CTE6374 – IN HOUSE PROJECT

Programme Name : COMPUTER ENGINEERING
Course Code : CTE6374
Semester : VI SEMESTER
Course Title : IN HOUSE PROJECT
Course Type : PROJECT

Periods	C
540	12

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.

COURSE 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 acquiredin coursework to solve practical engineering problems.
- **Skill Development**: Enhance technical skills related to the specific field ofengineering through hands-on experience and application.
- **Problem-Solving Abilities**: Develop critical thinking and problem-solving abilities byaddressing 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 ideasto 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	
E6374.1	Demonstrate the ability to apply theoretical concepts and principles learned in coursework to solve practical engineering problems encountered during the project.
E6374.2	Develop and enhance technical skills specific to the field of engineering relevant to the project, such as design, analysis, simulation, construction, testing, and implementation.
E6374.3	Apply critical thinking and problem-solving skills to identify, analyze, and propose solutions to engineering challenges encountered throughout the project lifecycle.
E6374.4	Acquire project management skills by effectively planning, organizing, and executing project tasks within defined timelines and resource constraints.
E6374.5	Improve communication skills through the preparation and delivery of project reports, presentations, and documentation that effectively convey technical information to stakeholders.

CO- POs & PSOs MAPPING MATRIX:

CO/ PO & PSO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PSO1**	**PSO2**	**PSO3**
E6353.1	3	3	3	3	2	2	3	2	3	2
E6353.2	3	3	3	3	2	2	3	2	3	2
E6353.3	3	3	3	3	2	2	3	2	3	2
E6353.4	3	3	3	3	2	2	3	2	3	2
E6353.5	3	3	3	3	2	2	3	2	3	2
Total	**15**	**15**	**15**	**15**	**10**	**10**	**15**	**10**	**15**	**10**
Correlation level	**3**	**3**	**3**	**3**	**2**	**2**	**3**	**2**	**3**	**2**

Correlation level 1 – Slight (low)
Correlation level 2 – Moderate (Medium)
Correlation level 3 – Substantial (high)

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.
- Instill 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 facilitatinggrant applications.
- Organize and participate in workshops, seminars, and other educational events thatenhance 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 andgaining 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 takingadditional 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

Sl. No.	Topics	Descriptio
1	Objectives	Clearly defined and specific objectives outlined. Objectives align with the project's scope and purpose.
2	Literature Review	Thorough review of relevant literature. Identification of gaps and justification for the project's contribution.
3	Research Design and Methodology	Clear explanation of the research design. Appropriateness and justification of chosen research methods.
4	Project Management	Adherence to project timeline and milestones. Effective organization and planning evident in the project execution.
5	Documentation	Comprehensive documentation of project details. Clarity and completeness in recording methods, results, and challenges.
6	Presentation Skills	Clear and articulate communication of project findings. Effective use of visuals, if applicable.
7	Analysis and Interpretation	In-depth analysis of data. Clear interpretation of results in the context of research
8	Problem-Solving	Demonstrated ability to identify and address challenges encountered during the project. 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. Demonstrated effort to produce high-quality work.

SCHEME OF EVALUATION

The mark allocation for Internal and End Semester Viva Voce are as below.

Internal Mark Split (40 Marks)*		
Review 1 (10 Marks)	Review 2 (15 Marks)	Review 3 (15 marks)
Committee : 5 Marks. Supervisor : 5 Marks	Committee : 7.5 Marks Supervisor : 7.5 Marks	Committee : 7.5 Marks Supervisor : 7.5 Marks

Note: * The rubrics should be followed for the evaluation of the internal marks during reviews.

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 Department project supervisor and an internal examiner.

End Semester (100)#			
Record (20 Marks)	Presentation (20 Marks)	Viva Voce (20 Marks)	Model / Analysis Report (40 Marks)
External : 10 Internal : 5 Supervisor: 5	External : 10 Internal : 5 Supervisor: 5	External : 10 Internal : 5 Supervisor: 5	External : 20 Internal : 10 Supervisor: 10

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 extendthe 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.