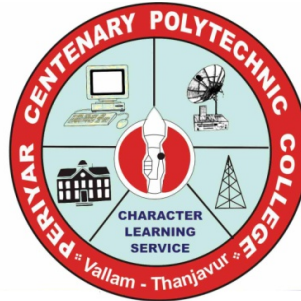# PERIYAR CENTENARY POLYTECHNIC COLLEGE
PERIYAR NAGAR – VALLAM – THANJAVUR – 613 403
(AUTONOMOUS INSTITUTION)

DIPLOMA IN ELECTRICAL AND ELECTRONICS ENGINEERING

SYLLABUS

EED/21/00

SEMESTER SYSTEM
D– SCHEME

CONTENTS

PERIYAR CENTENARY POLYTECHNIC COLLEGE
VALLAM – 613 403, THANJAVUR

Department of Electrical and Electronics Engineering

Programme Advisory Committee (PAC)

Syllabus Revision

Chairperson

Dr.R.Malliga
Principal
Periyar Centenary Polytechnic College
Vallam – 613 403, Thanjavur.

Convener

Mr.G.Rajaraman, HOD/EEE
Periyar Centenary Polytechnic College
Vallam – 613 403, Thanjavur.

Members

1	Mr.V.Ravichandran Assistant Executive Engineer TNEB Thanjavur.	5	Mr.G.Rajaganesan, Director, Vatio Energy India Pvt Ltd, Chennai.
2	Ms.R.Muthamizhilarasi HOD/EEE Thiyagarajar Polytechnic College Salem.	6	Mr.U.Sabarinathan Senior Engineer BSH House hold Appliance Manufacturing Pvt Ltd Chennai.
3	Mr.K.Arun Ganesh Asst. Prof /EEE, Periyar Maniammai Institute of Science and Technology Vallam, Thanjavur.	7	Mr.M.Veeramani Lecturer / EEE Periyar Centenary Polytechnic College Vallam- 613 403, Thanjavur.
4	Mr.R.Selvakumar, Proprietor, S.K.Electricals, No.7/3074, Safa Complex, Selvam Nagar Thanjavur.	8	Ms.M.Vanaja Lecturer / EEE Periyar Centenary Polytechnic College Vallam- 613 403, Thanjavur.

PERIYAR CENTENARY POLYTECHNIC COLLEGE

Periyar Nagar - Vallam - 613 403 - Thanjavur, Tamil Nadu

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.

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

VISION

Produce competent Engineers to excel in the field of Electrical and Electronics Engineering by providing necessary knowledge and skills with diverse and stimulating environment to meet the challenges in career.

MISSION

M1: To provide quality education and training, emphasis on engineering fundamentals through comprehensive curriculum.

M2: To provide a conducive learning environment and equip students with well structured Teaching learning practices.

M3: To strengthen soft skills especially for rural students through co curricular and extra curricular activities.

M4: To awake young minds to acquire knowledge continuously and learn to apply it.

PROGRAMME EDUCATIONAL OBJECTIVES (PEOs)

PEO1: Our Diploma graduates will be able to apply the knowledge, skills and competency to work in industry, organization and society at large.

PEO2: Our Diploma graduates will have the ability to engage in design of systems, tools and applications in the field of Electrical Engineering and allied Engineering Industries.

PEO3: Our Diploma graduates will be able to exhibit professionalism, ethical attitude communication skills, team work and adapt to current trends by engaging in lifelong learning.

PROGRAMME SPECIFIC OUTCOMES (PSOs)

PSO1: Understand the circuits design systems, components and processes related to Electrical Engineering.

PSO2: Apply principles of engineering and laboratory skills for testing, operation and maintenance of electrical systems, electrical machines, power and energy systems.

PSO3: Ability to work professionally in Power systems engineering, Electrical machinery and design.

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.

DIPLOMA PROGRAMME IN ENGINEERING / TECHNOLOGY
(Implemented from 2020 -2021)

D SCHEME

RULES AND REGULATIONS

1.   **Description of the Programme:**

a. Full Time (3 years)

The Programme for the Full Time Diploma in Engineering shall extend over a period of three academic years, consisting of 6 semesters***** and the First Year is common to all Engineering Branches.

b. Sandwich (31/2 years)

The Programme for the Sandwich Diploma in Engineering shall extend over a period of three and half academic years, consisting of 7 semesters***** and the First Year is common to all Engineering Branches. The courses of three years full time diploma programme being regrouped for academic convenience.

During 4th and/or during 7th semester the students undergo industrial training for six months / one year. Industrial training examination will be conducted after completion of every 6 months of industrial training.

*Each Semester will have 16 weeks duration of studies with 35 hrs / Week for all Diploma Programmes.

The Curriculum for all the 6 Semesters of Diploma Programme (Engineering & Special Diploma Programmes viz. Modern Office Practice) have been revised and revised curriculum is applicable for the candidates admitted from 2020 - 2021 academic year onwards.

2.   **Condition for Admission:**

Condition for admission to the Diploma Programmes shall be required to have passed in the S.S.L.C Examination of the Board of Secondary Education, Tamil Nadu.
                                        (Or)
The Anglo Indian High School Examination with eligibility for Higher Secondary Course in Tamil Nadu.
                                        (Or)
The Matriculation Examination of Tamil Nadu.
                                        (Or)
Any other Examinations recognized as equivalent to the above by the Board of Secondary Education, Tamil Nadu.

Note: In addition, at the time of admission the candidate will have to satisfy certain minimum requirements, which may be prescribed from time to time

3.   Admission to Second year (Lateral Entry):

A pass in HSC (academic) or (vocational) courses mentioned in the Higher Secondary Schools in Tamil Nadu affiliated to the Tamil Nadu Higher Secondary Board with eligibility for University Courses of study or equivalent examination &should have studied the following courses.

A pass in 2 Years ITI with appropriate Trade or Equivalent examination.

Sl.No	Programmes	H.Sc Academic	H.Sc Vocational		Industrial Training Institutes Courses
		Subjects Studied	Subjects Studied		
			Related Subjects	Vocational Subjects	
1	All the Regular and Sandwich Diploma Programmes	Physics and Chemistry as compulsory along with Mathematics / Biology	Maths / Physics / Chemistry	Related Vocational Subjects Theory & Practical	2 years courses to be passed with appropriate Trade
2	Diploma Programme in Modern Office Practice	English & Accountancy English & Elements of Economics English & Elements of Commerce	English & Accountancy English & Elements of Economics English & Management principles & Techniques English & Typewriting	Accountancy & Auditing Banking Business Management, Co – operative Management, International Trade, Marketing& Salesmanship, Insurance & Material Management, Office Secretaryship	-

- For the Diploma Programmes related with Engineering/ Technology, the related / equivalent subjects prescribed along with Practicals may also be taken for arriving the eligibility.
- Programme will be allotted according to merit through counseling by the Principal as per communal reservation.
- For admission to the Modern Office Practice Diploma Programme the candidates studied the related courses will be given first preference.
- Candidates who have studied Commerce courses are not eligible for Engineering Diploma Programmes.

4.   Age Limit: No Age limit.

5.   Medium of Instruction: English

6. Eligibility for the Award of Diploma:

No candidate shall be eligible for the Diploma unless he/she has undergone the prescribed Programme of study for a period of not less than 3 academic years in any institution affiliated to the State Board of Technical Education and Training, Tamil Nadu, when joined in First Year and two years if joined under Lateral Entry scheme in the second year and passed the prescribed examination.

The minimum and maximum period for completion of Diploma Programmes are as given below:

Diploma Programme	Minimum Period	Maximum Period
Full Time	3 Years	6 Years
Full Time (Lateral Entry)	2 Years	5 Years
Sandwich	3 ½ Years	6 ½ Years

This will come into effect from D Scheme onwards i.e. from the academic year 2020-2021

7. Courses of Study and Curriculum outline:

The courses of study shall be in accordance with the syllabus prescribed from time to time, both in theory and practical courses.

The curriculum outline is given in Annexure - I.

8. Examinations:

Autonomous Examinations in all courses of all the semesters under the scheme of examinations will be conducted at the end of each semester.

The internal assessment marks for all the courses will be awarded on the basis of continuous internal assessment earned during the semester concerned. For each course 25 marks are allotted for internal assessment. Autonomous Examinations are conducted for 100 marks and reduced to 75.

The total marks for result are $75 + 25 = 100$ Mark

9. Continuous Internal Assessment:

A . For Theory Courses
The Internal Assessment marks for a total of 25 marks, which are to be distributed as follows:

i)	Attendance	-	5 Marks
ii)	Test	-	10 Marks
iii)	Assignment	-	5 Marks
iv)	Seminar	-	5 Marks

	Total	-	**25 Marks**

6

i) Course Attendance   **5 Marks**

(Award of marks for course attendance to each course Theory/Practical will be as per the range given below)

80%	-	83%	1 Mark
84%	-	87%	2 Marks
88%	-	91%	3 Marks
92%	-	95%	4 Marks
96%	-	100%	5 Marks

ii)Test#   **10 Marks**

3 tests each of 2 hours duration for a total of 50 marks are to be Conducted. Average of these 3 test marks will be taken and the marks to be reduced   to: **05 Marks**

The Test – IV is to be the Model Examination covering all the five units and the marks so obtained will be reduced to: **05 Marks**

Test	Units	When to conduct	Marks	Duration
Test – I	Unit I & II	End of 6th week	50	2 hrs
Test – II	Unit III & IV	End of 12th week	50	2 hrs
Test – III	Unit V	End of 15th week	50	2 hrs
Test– IV	**Model Examination - Compulsory** Covering all the 5 units (Autonomous Examination – question paper pattern)	End of 16th Week	100	3 hrs

 # From the Academic Year 2020 – 2021 onwards.

Question Paper Pattern for the Test – I, Test – II and Test - III is as follows. The tests should be conducted by proper schedule. Retest marks should not be considered for internal assessment.

For I Year

Question Pattern (Without Choice):

Part A Type Questions: 6 Questions x 1 mark	:	06 marks	
Part B Type Questions: 8 Questions x 2 marks	:	16 marks	
Part C Type Questions: 4 Questions x 7 marks	:	28 marks	

Total :		**50 marks**	

For II & III Year

<u>**Question Pattern (Without Choice)**</u>:

Part A Type questions	: 5 Questions × 2 marks	:	10 marks
Part B Type questions	: 4 Questions × 3 marks	:	12 marks
Part C Type questions	: 2 Questions × 14 marks	:	28 marks

	Total :		**50 marks**
			-------------

iii) <u>**Assignment**</u>   **05 marks**

For each course, three assignments are to be given each for 20 marks and the average marks scored should be reduced for 5 marks.

Assignment 1: Written notes in relevant topics from the courses in unit I& II.

Assignment 2: Written notes in relevant topics from the courses in unit III , IV &V.

Assignment 3: Objective type online test to understand the principles and thereby gain in-depth knowledge about the course.

iv) <u>**Seminar Presentation**</u>   **05 Marks**

The students have to select the topics either from their courses or general courses which will help to improve their grasping capacity as well as their capacity to express the course in hand. The students will be allowed to prepare the material for the given topic using the library hour and they will be permitted to present seminar(For First and Second Year, the students will be permitted to present the seminar as a group not exceeding six members and each member of the group should participate in the presentation. For the Third Year, the students should present the seminar individually.) The seminar presentation is mandatory for all theory courses and carries 5 marks for each theory course. The respective course faculty may suggest topics to the students and will evaluate the submitted materials and seminar presentation. ($2\frac{1}{2}$ marks for the material submitted in writing and $2\frac{1}{2}$ marks for the seminar presentation). For each course minimum of two seminars are to be given and the average marks scored should be reduced to 5 marks.

All Test Papers, Assignment Papers / Notebooks and the seminar presentation written material after getting the signature with date from the students must be kept in safe custody in the department for verification and audit. It should be preserved for one semester after publication of Autonomous Exam results and produced to the flying squad and the inspection team at the time of inspection/verification.

B. For Practical Courses:

I, II and III Year

The Internal Assessment mark for a total of 25 marks which are to be distributed as follows:

a) Attendance (Award of marks same as theory courses)	:	**05 Marks**
b) Procedure/ observation and tabulation/ Other Practical related Work	:	**05 Marks**
c) Tests#	:	**10 Marks**
d) Student Centered Learning (SCL) work sheet	:	**05 Marks**

TOTAL		**25 Marks**

 # Tests   **10 Marks**

3 tests each of 2 hours duration for a total of 50 marks are to be conducted. Average of these 3 test marks will be taken and the marks to be reduced to: **05 Marks**

The Test – IV is to be the Model Examination covering all the experiments and the marks so obtained will be reduced to: **05 Marks**

- All the Experiments/Exercises indicated in the syllabus should be completed and the same to be given for final Autonomous examinations.

- The observation note book / manual should be maintained. The observation note book / manual with sketches, circuits, programme, reading and calculation written by the students manually depends upon the practical course during practical classes should be evaluated properly during the practical class hours with date.

- The Record work for every completed exercise should be submitted in the subsequent practical classes.

- At the end of the Semester, the average marks of all the exercises should be calculated for 20 marks (including Observation, Tests and SCL work sheet) and the marks awarded for attendance is to be added to arrive at the internal assessment mark for Practical. (20+5=25 marks)

- Only regular students, appearing first time have to submit the duly signed bonafide record note book/file during the Practical Autonomous Examinations.

  All the marks awarded for Assignments, Tests, Seminar presentation and Attendance should be entered periodically in the Personal Theory Log Book of the staff, who is handling the theory course. The marks awarded for Observation, SCL work sheet, Tests and Attendance should be entered periodically in the Personal Practical Log Book of the staff, who is handling the practical course.

10. **Communication Skill Practical, Computer Application Practical and Physical Education:**

The Communication Skill Practical and Computer Application Practical with more emphasis are being introduced in First Year. Much Stress is given to increase the Communicative skill and ICT skill of students. As per the recommendation of MHRD and under Fit India scheme, the Physical education is introduced to encourage students to remain healthy and fit by including physical activities and sports.

11. **Project Work and Internship:**

The students of all the Diploma Programmes have to do a Project Work as part of the Curriculum and in partial fulfillment for the award of Diploma by the State Board of Technical Education and Training, Tamil Nadu. In order to encourage students to do worthwhile and innovative projects, every year prizes are awarded for the best three projects i.e. institution wise, region wise and state wise**. The Project work must be reviewed twice in the same semester. The project work is approved during the V semester by the properly constituted committee with guidelines.**

a) Internal Assessment Mark for Project Work & Internship:

Project Review I	:	**10 marks**
Project Review II	:	**10 marks**
Attendance	:	**05 marks** (Award of marks same as theory course pattern)

Total	:	**25 marks**

Proper record should be maintained for the two Project Reviews and preserved for one semester after the publication of Autonomous Exams results. It should be produced to the flying squad and the inspection team at the time of inspection/verification.

b) Allocation of Marks for Project Work & Internship in Autonomous Examinations:

Demonstration/Presentation	25 marks
Report	25 marks
Viva Voce	30 marks
Internship Report	20 marks

Total	**100* marks**
	---------------

*Examination will be conducted for 100 marks and will be converted to 75 marks.

c) Internship Report:
The internship training for a period of two weeks shall be undergone by every candidate at the end of IV / V semester during vacation. The certificate shall be produced along with the internship report for evaluation. The evaluation of internship training shall be done along with final year "Project Work & Internship" for 20 marks. The internship shall be undertaken in any industry /

Government or Private certified agencies which are in social sector / Govt. Skill Centre / Institutions / Schemes.

A neatly prepared PROJECT REPORT as per the format has to be submitted by individual student during the Project Work & Internship Autonomous examination.

12. **Industrial Training and Project Work (Architectural Assistantship(SW)**

i. Industrial Training

In IV and VII semesters, students should undergo the industrial training under the registered architects without fail. During this period, they should have 80% of attendance. Candidates not fulfilling the above are not eligible to appear for the practical examinations and the candidates should redo the industrial training in the next academic year.

The internal Assessment is based on the monthly report, Weekly report and drawing works completed in training period.

Work diary (internal Assessment)	**25 marks**
Monthly report	5 Marks
Weekly report	5 Marks
Drawing works	10 Marks
Attendance	5 Marks

Total	**25 Marks**

Architect office and studio practice –I &II (IV & VII Sem)

Report writing	60 marks
Viva- voce	40 marks

Total	**100 marks***
	---------------

*Examination will be conducted for 100 marks and will be converted to 75 marks.

ii. Project work

a) Internal Assessment Mark for Project Work

Project Review I	**10 marks**
Project Review II	**10 marks**
Attendance	**05 marks** (Award of marks same as theory course pattern)

Total	**25 marks**
	--------------

b) Project work & Viva voce – Autonomous Examination

Project Report	25 marks
Drawing &Presentation	25 marks
Viva Voce	30 marks
Model	20 marks

Total	**100* marks**
	---------------

*Examination will be conducted for 100 marks and will be converted to 75 marks.

A neatly prepared PROJECT REPORT as per the format has to be submitted by individual student during the project Work & Viva voce Autonomous Examination.

13. **Scheme of Examinations:**

The Scheme of examinations for courses is given in Annexure - II.

14. **Criteria for Pass:**

1. No candidate shall be eligible for the award of Diploma unless he/she has undergone the prescribed programme of study successfully in an institution approved by AICTE and affiliated to the State Board of Technical Education & Training, Tamil Nadu and pass all the courses prescribed in the curriculum.

2. A candidate shall be declared to have passed the examination in a course if he/she secures not less than 40% in theory courses and 50% in practical courses out of the total prescribed maximum marks including both the Internal Assessment and the Autonomous Examinations marks put together, subject to the condition that he/she secures at least a minimum of 40 marks out of 100 marks in the Autonomous Theory Examinations and a minimum of 50 marks out of 100 marks in the Autonomous Practical Examinations.

15. **Classification of successful candidates:**

Classification of candidates who will pass out the final examinations from April 2023 onwards (Joined first year in 2020 -2021) will be done as specified below.

First Class with Superlative Distinction:

A candidate will be declared to have passed in **First Class with Superlative Distinction** if he/she secures not less than 75% of the marks in all the courses and passes all the semesters in the first appearance itself and passes all courses within the stipulated period of study 2/3/3 ½ /4 years [Full time(lateral entry)/Full Time/Sandwich/Part Time) without any break in study.

First Class with Distinction:

A candidate will be declared to have passed in **First Class with Distinction** if he/she secures not less than 75% of the aggregate marks in all the semesters put together and passes all the semesters except the I and II semester in the first appearance itself and passes all courses within the stipulated period of study 2/3/3 ½ /4 years [Full time(lateral entry)/Full Time/Sandwich/Part Time) without any break in study.

First Class:

A candidate will be declared to have passed in **First Class** if he/she secures not less than 60% of the aggregate marks in all the semesters put together and passes all the courses within the stipulated period of study 2 / 3/ 3½ / 4 years [Full time(lateral entry)/ Full Time/Sandwich/Part Time) without any break in study.

Second Class:

All other successful candidates will be declared to have passed in **Second Class**.

The above classifications are also applicable for the Sandwich / Part-Time students who pass out Final Examination from October 2023 /April 2024 onwards (both joined First Year in 2020 - 2021)

16. **Duration of a period in the Class Time Table:**

The duration of each period of instruction is 1 hour and the total period of instruction hours excluding interval and lunch break in a day should be uniformly maintained as 7 hours corresponding to 7 periods of instruction (Theory & Practical)

****

ANNEXURE – I

CURRICULUM OUTLINE

Third Semester

Sl. No	Course Code	Course	Hours Per Week			
			Theory hours	Drawing hours	Practical hours	Total hours
1	EED310	Electronic Devices and Circuits*	5	-	-	5
2	EED320	Electrical Circuit Theory	6	-	-	6
3	EED330	Electrical Machines -1	5	-	-	5
4	EED340	Electronic Devices and Circuits Practical*	-	-	4	4
5	EED350	Electrical Circuits and Machines Practical	-	-	4	4
6	EED360	Electrical Workshop Practical	-	-	4	4
7	EED370	Wiring & Winding Practical	-	-	4	4
Extra / Co-Curricular activities		Library	-	-	-	1
		Physical Education	-	-	-	2
					TOTAL	35

*Common with Electronics and Communication Engineering

Fourth Semester

Sl. No	Course Code	Course	Hours Per Week			
			Theory hours	Drawing hours	Practical hours	Total hours
1	EED410	Electrical Machines -II	5	-	-	5
2	EED420	Measurements, Instruments and Transducers	5	-	-	5
3	EED430	Analog and Digital Electronics*	4	-	-	4
4	EED440	E-Vehicle Technology and Policy#	4	-	-	4
5	EED450	Electrical Machines and Instrumentation Practical	-	-	5	5
6	EED460	Analog and Digital Electronics Practical*	-	-	5	5
7	EED470	Electrical Circuits and Simulation Practical	-	-	4	4
Extra / Co-Curricular activities		Library	-	-	-	1
		Physical Education	-	-	-	2
					TOTAL	35

*Common with Electronics and Communication Engineering
 # Common with Mechanical Engineering

Fifth Semester

Sl. No	Course Code	Course	Theory hours	Drawing hours	Practical hours	Total hours
			Hours Per Week			
1	EED510	Generation Transmission and Switchgear	5	-	-	5
2	EED520	Microcontroller and its Applications*	5	-	-	5
Elective - I Theory						
3	EED531	Control of Electrical Machines	5	-	-	5
	EED532	Programmable Logic Controllers				
	EED533	Renewable Energy Sources				
4	EED540	Computer Aided Electrical Drawing Practical	-	-	4	4
5	EED550	Microcontroller Practical*	-	-	4	4
Elective - I Practical						
6	EED561	Control of Electrical Machines Practical	-	-	5	5
	EED562	Programmable Logic Controller Practical				
	EED563	Renewable Energy Sources Practical				
7	EED570	Entrepreneurship and Startups #	-	-	4	4
Extra / Co-Curricular activities		Library	-	-	-	1
		Physical Education	-	-	-	2
					TOTAL	**35**

*Common with Electronics and Communication Engineering
Common with Mechanical Engineering

Sixth Semester

Sl. No	Course Code	Course	Hours Per Week			
			Theory hours	Drawing hours	Practical hours	Total hours
1	EED610	Distribution and Utilization	6	-	-	6
2	EED620	Energy Conservation and Audit	4	-	-	4
Elective - II Theory						
3	EED631	Power Electronics	5	-	-	5
	EED632	Bio-Medical Instrumentation				
	EED633	Computer Hardware and Networks				
4	EED640	Electrical Estimation and Costing Practical	-	-	5	5
Elective - II Practical						
5	EED651	Power Electronics Practical	-	-	6	6
	EED652	Bio-Medical Instrumentation Practical				
	EED653	Computer Hardware and Networks Practical				
6	EED 660	Project Work and Internship	-	-	6	6
			15	-	17	32
Extra / Co-Curricular activities						
Extra / Co-Curricular activities		Library	-	-	-	1
		Physical Education	-	-	-	2
					TOTAL	**35**

16

SCHEME OF EXAMINATION

Third Semester

Sl. No	Course Code	Course	Examination Marks			Min. for Pass	Duration of Exam Hours
			Internal Assessment Marks	Autonomous Exam Marks*	Total Marks		
1	EED310	Electronic Devices and Circuits	25	75	100	40	3
2	EED320	Electrical Circuit Theory	25	75	100	40	3
3	EED330	Electrical Machines -1	25	75	100	40	3
4	EED340	Electronic Devices and Circuits Practical	25	75	100	50	3
5	EED350	Electrical Circuits and Machines Practical	25	75	100	50	3
6	EED360	Electrical Workshop Practical	25	75	100	50	3
7	EED370	Wiring & Winding Practical	25	75	100	50	3
		Total	**175**	**525**	**700**		

* Examination will be conducted for 100 marks and it will be reduced to 75marks.

Fourth Semester

Sl. No	Course Code	Course	Examination Marks			Min. for Pass	Duration of Exam Hours
			Internal Assessment Marks	Autonomous Exam Marks*	Total Marks		
1	EED410	Electrical Machines -II	25	75	100	40	3
2	EED420	Measurements, Instruments and Transducers	25	75	100	40	3
3	EED430	Analog and Digital Electronics	25	75	100	40	3
4	EED440	E-Vehicle Technology and Policy	25	75	100	40	3
5	EED450	Electrical Machines and Instrumentation Practical	25	75	100	50	3
6	EED460	Analog and Digital Electronics Practical	25	75	100	50	3
7	EED470	Electrical Circuits and Simulation Practical	25	75	100	50	3
		Total	**175**	**525**	**700**		

* Examination will be conducted for 100 marks and it will be reduced to 75marks.

Fifth Semester

Sl. No	Course Code	Course	Examination Marks			Min. for Pass	Duration of Exam Hours
			Internal Assessment Marks	Autonomous Exam Marks*	Total Marks		
1	EED510	Generation Transmission and Switchgear	25	75	100	40	3
2	EED520	Microcontroller and its Applications	25	75	100	40	3
Elective - I Theory							
3	EED531	Control of Electrical Machines	25	75	100	40	3
	EED532	Programmable Logic Controllers					
	EED533	Renewable Energy Sources					
4	EED540	Computer Aided Electrical Drawing Practical	25	75	100	50	3
5	EED550	Microcontroller Practical	25	75	100	50	3
Elective - I Practical							
6	EED561	Control of Electrical Machines Practical	25	75	100	50	3
	EED562	Programmable Logic Controller Practical					
	EED563	Renewable Energy Sources Practical					
7	EED570	Entrepreneurship and Startup	25	75	100	50	3
		Total	**175**	**525**	**700**		

* Examination will be conducted for 100 marks and it will be reduced to 75marks.

Sixth Semester

Sl. No	Course Code	Course	Internal Assessment Marks	Autonomous Exam Marks*	Total Marks	Min. for Pass	Duration of Exam Hours
			Examination Marks				
1	EED610	Distribution and Utilization	25	75	100	40	3
2	EED620	Energy Conservation and Audit	25	75	100	40	3
Elective - II Theory							
3	EED631	Power Electronics	25	75	100	40	3
	EED632	Bio-Medical Instrumentation					
	EED633	Computer Hardware and Networks					
4	EED640	Electrical Estimation and Costing Practical	25	75	100	50	3
Elective - II Practical							
5	EED651	Power Electronics Practical	25	75	100	50	3
	EED652	Bio-Medical Instrumentation Practical					
	EED653	Computer Hardware and Networks Practical					
6	EED660	Project Work and Internship	25	75	100	50	3
		Total	**150**	**450**	**600**		

* Examination will be conducted for 100 marks and it will be reduced to 75marks.

DIPLOMA IN ELECTRICAL AND ELECTRONICS ENGINEERING

Equivalent Papers for C-Scheme to D-Scheme

III SEMESTER

COURSE CODE	COURSE	COURSE CODE	COURSE
C-SCHEME		**D-SCHEME**	
EEC310	Electrical Circuit Theory	EED320	Electrical Circuit Theory
EEC320	Electrical Machines - I	EED330	Electrical Machines - I
EEC330	Electronic Devices and Circuits	EED310	Electronic Devices and Circuits
EEC340	Electrical Circuits and Machines Practical	EED350	Electrical Circuits and Machines Practical
EEC350	Electronic Devices and Circuits Practical	EED340	Electronic Devices and Circuits Practical
EEC360	Computer Applications Practical	D002	Computer Application Practical
EEC370	Electrical Workshop Practical	EED360	Electrical Workshop Practical
---	---	EED370	Wiring and Winding Practical

IV SEMESTER

COURSE CODE	COURSE	COURSE CODE	COURSE
C-SCHEME		**D-SCHEME**	
EEC410	Electrical Machines II	EED410	Electrical Machines II
EEC420	Measurements and Instruments	EED420	Measurements, Instruments and Transducers
EEC430	Digital Electronics	EED430	Analog and Digital Electronics
EEC440	Transducers and Signal Conditioners	EED420	Measurements, Instruments and Transducers
---	---	EED440	E-Vehicle Technology and Policy
EEC450	Electrical Machines and Instrumentation Practical	EED450	Electrical Machines and Instrumentation Practical
EEC460	Integrated Circuits Practical	EED460	Analog and Digital Electronics Practical
EEC470	Life and Employability Skill Practical	---	No Equivalent
---	---	EED470	Electrical Circuits and Simulation Practical

V SEMESTER

COURSE CODE	COURSE	COURSE CODE	COURSE
C-SCHEME		**D-SCHEME**	
EEC510	Generation Transmission and Switch gear	EED510	Generation Transmission and Switch gear
EEC520	Micro Controller	EED520	Microcontroller and its Applications
EEC530	Electrical Estimation and Energy Auditing	EED640	Electrical Estimation and Costing Practical
Elective – I Theory		**Elective – I Theory**	
EEC541	Control of Electrical Machines	EED531	Control of Electrical Machines
EEC542	Programmable Logic Controller	EED532	Programmable Logic Controller
EEC543	Electrical Machine Design	--	No Equivalent
---	---	EED533	Renewable Energy Sources
EEC550	Computer Aided Electrical Drawing Practical	EED540	Computer Aided Electrical Drawing Practical
EEC560	Micro Controller Practical	EED550	Microcontroller Practical
Elective - I Practical		**Elective - I Practical**	
EEC571	Control of Electrical Machines Practical	EED561	Control of Electrical Machines Practical
EEC572	Programmable Logic Controller Practical	EED562	Programmable Logic Controller Practical
EEC573	Electrical Machine Design Practical	--	No Equivalent
---	---	EED563	Renewable Energy Sources Practical
---	---	EED570	Entrepreneurship and Startup

VI SEMESTER

COURSE CODE	COURSE	COURSE CODE	COURSE
C-SCHEME		**D-SCHEME**	
EEC610	Distribution and Utilization	EED610	Distribution and Utilization
EEC620	Operation and Maintenance of Electrical Equipment	--	No Equivalent
---	---	EED620	Energy Conservation and Audit
Elective - II Theory		**Elective - II Theory**	
EEC631	Power Electronics	EED631	Power Electronics
EEC632	Bio-Medical Instrumentation	EED632	Bio-Medical Instrumentation
EEC633	Computer Hardware and Networks	EED633	Computer Hardware and Networks
EEC640	Wiring and Winding Practical	--	Equivalent to III Sem EED 370
EEC650	Electrical Circuits Simulation Practical	--	Equivalent to IV Sem EED 470
Elective - II Practical		**Elective - II Practical**	
EEC661	Power Electronics Practical	EED651	Power Electronics Practical
EEC662	Bio – Medical Instrumentation Practical	EED652	Bio – Medical Instrumentation Practical
EEC663	Computer Hardware and Networks Practical	EED653	Computer Hardware and Networks Practical
EEC670	Project Work	EED660	Project Work and Internship

EED310 ELECTRONIC DEVICES AND CIRCUITS

TEACHING AND SCHEME OF EXAMINATION:

Number of Weeks/ Semester: 16 weeks

Course	Instructions		Examination			
	Hrs / Week	Hrs / Semester	Marks			Duration
			Internal Assessment	Autonomous Examinations	Total	
Electronic Devices and Circuits	5	80	25	100*	100	3 Hrs.

*Examinations will be conducted for 100 marks and it will be reduced to 75 marks.

TOPICS AND ALLOCATION OF HOURS:

UNIT	TOPICS	NO .OF HOURS
I	Filters, Zener diode and Opto-electronic devices	14
II	Bipolar Junction Transistor, Field Effect Transistor and UJT	15
III	Feedback, Amplifiers and Oscillators	15
IV	Special Semiconducting Devices(SCR, DIAC, MOSFET, TRIAC)	14
V	Wave shaping Circuits	13
	Tests and Model Exam	9
	TOTAL	**80**

COURSE DESCRIPTION:

Every Electronics Engineer should have sound knowledge about the components used in Electronics Industry. This is vital in R&D Department for chip level troubleshooting. To meet the industrial needs, diploma holders must be taught about the most fundamental course, Electronic devices and Circuits. By studying this course, they will be skilled in handling all types of electronic devices and able to apply the skill in electronics system.

OBJECTIVES:

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

➢ Know the importance of Filters
➢ Know the construction, working principle and applications of Zener diode
➢ Know the construction, working principle and applications of Opto electronic devices
➢ Know the biasing methods of Transistors and their applications
➢ Study the performance of special devices like UJT, FET
➢ Study the Concept of Feedback, different types of Negative feedback connections
➢ Know the Types of Transistor amplifiers ,Transistor oscillators and their applications
➢ Study the performance of Special semiconducting devices like SCR, DIAC, and TRIAC
➢ Explain the concept of wave shaping circuits, Bistable Multivibrator and Schmitt trigger
➢ Study the working principle of clippers, clampers, Voltage Multipliers and their applications

COURSE OUTCOMES:

Course	EED310 ELECTRONIC DEVICES AND CIRCUITS
After successful completion of this course, the students should be able to	
D310.1	Understand the basic concepts of Filters, types and its applications, Zener diode construction, working principle, characteristics and its application and opto electronic devices, types, symbol, working, characteristics and applications.
D310.2	Know the transistor biasing, types, the operation and applications of transistor, FET and UJT construction, working principle, classification and application.
D310.3	Understand the basic concepts of feedback, oscillators and amplifiers, types, working principle and applications.
D310.4	Learn the construction, operation, characteristics and applications of SCR, DIAC, TRIAC & MOSFET.
D310.5	Understand the construction, operation, characteristics of wave shaping circuit.

EED 310 ELECTRONIC DEVICES AND CIRCUITS

UNIT – I

FILTERS,ZENER DIODES AND OPTO-ELECTRONIC DEVICES   **14 Hrs**

1.1 FILTERS

Definition - Types - Capacitor filter -Inductor filter	2 Hrs
L section filter –Pi section and RC filter	2 Hrs
Comparison and Applications of Filters	1 Hr

1.2 ZENER DIODE

Construction, Working principle and Characteristics of Zener Diodes	3 Hrs
Zener breakdown-Avalanche breakdown	1 Hr
Zener diode as a Voltage regulator	1 Hr

1.3 OPTO-ELECTRONIC DEVICES

Definition - Types - Symbol, Working, Characteristics and Applications of LED, 7 Segment LED	2 Hrs
Photo diode	1 Hr
Phototransistor and Opto- coupler	1 Hr

UNIT-II

BIPOLAR JUNCTION TRANSISTOR (BJT), FIELD EFFECT TRANSISTOR (FET), AND UNI JUNCTION TRANSISTOR (UJT)   **15 Hrs**

2.1 BIPOLAR JUNCTION TRANSISTOR

Transistor biasing: Need for biasing	2 Hrs
Types- Fixed bias, Collector to base bias and Self bias (Operation only, No derivation of circuit elements and parameters)	2 Hrs
Define: Stability factor –Operation of Common Emitter Transistor as an Amplifier and as a switch	2 Hrs

2.2 FIELD EFFECT TRANSISTOR (FET)

Construction – Working principle	2 Hrs
Classification - Drain and Transfer Characteristics -Applications	1 Hr

Comparison between FET and BJT	1 Hr
- FET amplifier (common source amplifier).	1 Hr

2.3. UNIJUNCTION TRANSISTOR (UJT)

Construction-Equivalent circuit-Operation-Characteristics-–	2 Hrs
UJT as a relaxation oscillator	2 Hrs

UNIT-III

FEEDBACK, AMPLIFIERS AND OSCILLATORS	**15 Hrs**

3.1 FEEDBACK

Concept - effects of negative feedback-	2 Hrs
Types of negative feedback connections –	2 Hrs
-Applications	1 Hr

3.2 AMPLIFIERS

Transistor amplifiers - Types –	2 Hrs
RC coupled amplifier - Working and Frequency- response characteristics –	2 Hrs
Working of Common Collector Amplifier (Emitter- follower)	2 Hrs

3.3 OSCILLATORS

Transistor oscillators–Conditions for oscillation (Barkhausen criterion)-	1 Hr
Classifications– Hartley Oscillator–	1 Hr
Colpitts Oscillator – RC Phase shift oscillator	2 Hrs

UNIT IV

SPECIAL SEMICONDUCTING DEVICES (SCR, DIAC,TRIAC AND MOSFET)	**14 Hrs**

4.1 SCR (SILICON CONTROLLED RECTIFIER)

Symbol – Layered Structure – Transistor analogy - Working–	2 Hrs
VI characteristics– Applications	1 Hr
Comparison between SCR and Transistor	1 Hr

4.2 DIAC(DIODE FOR ALTERNATING CURRENT)

Symbol –Layered structure - Working –	2 Hrs
VI characteristics- Applications	1 Hr

4.3 TRIAC(TRIode FOR ALTERNATING CURRENT)

Symbol – Layered structure - Working –	2 Hrs
VI characteristics- Applications	2 Hrs

4.4 MOSFET

Types Construction and Characteristics of N Channel MOSFET	2 Hrs
and P channel MOSFET- Characteristics of enhancement and depletion mode MOSFET-	
MOSFET as a switch	1 Hr

UNIT -V

WAVE SHAPING CIRCUITS

13 Hrs

5.1 CLIPPERS AND CLAMPERS

Construction and working of Positive, Negative and biased Clippers –	2 Hrs
Construction and working of Positive and Negative Clamper	3 Hrs

5.2 VOLTAGE MULTIPLIERS

Construction and working of Voltage Doubler	2 Hrs
and Tripler	1 Hr

5.3 MULTIVIBRATOR AND SCHMITT TRIGGER

Construction – Working –	2 Hrs
Waveform of Astable and Monostable Multivibrator using Transistor	2 Hrs
and Schmitt Trigger using Transistors	1 Hr
Test & Model Exam	**9 Hrs**

TEXT BOOKS:

S.NO	TITLE	AUTHOR	PUBLISHER WITH EDITION
1.	Electronic Devices and Circuits	Sallaivahanan, N.Suresh Kumar, A.Vallavaraj	Tata McGraw Publication 3rd Edition 2016
2.	Electronics Devices and circuit theory	Boyestad &Nashelsky	PHI , New Delhi 2009

REFERENCE BOOKS:

S.NO	TITLE	AUTHOR	PUBLISHER WITH EDITION
1.	Electronic Principles	Malvino	Tata McGraw Hill Publication 2010
2.	Electronics Devices & Circuits	Allen Mottershed	PHI, 2009
3.	Electronics Devices & Circuits	Jacob Millman and Halkias	Tata McGraw – Hill publication 3rd Edition 2010
4.	Optical Fiber Communication	Gerd Keiser	Tata McGraw – Hill Publication 5th Edition 2013

LEARNING WEBSITES

1. https://www.electronics-tutorials.ws/
2. http://www.learnabout-electronics.org/
3. http://www.circuitstoday.com/4-great-books-to-study-basic-electronics
4. https://www.build-electronic-circuits.com/how-to-learn-electronics/
5. https://www.seeedstudio.com/blog/2017/02/24/electronic-websites/

CONTINUOUS INTERNAL ASSESSMENT

The Internal Assessment marks for a total of 25 marks, which are to be distributed as follows:

i)	Attendance	-	5 Marks
ii)	Test	-	10 Marks
iii)	Assignment	-	5 Marks
iv)	Seminar	-	5 Marks
	Total	**-**	**25 Marks**

CO- POs & PSOs MAPPING MATRIX

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
D310.1	3	3	3	-	2	2	3	3	2	2
D310.2	3	3	3	-	2	2	3	3	2	2
D310.3	3	3	3	-	2	2	3	3	2	2
D310.4	3	3	3	-	2	2	3	3	2	2
D310.5	3	3	3	-	2	2	3	3	2	2
Total	15	15	15	-	10	10	15	15	10	10
Correlation Level	3	3	3	-	2	2	3	3	2	2

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

QUESTION PAPER SETTING

The teaching learning process and assessment are being carried out in accordance with the revised Bloom's 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.

Bloom's Taxonomy	Lower Order Thinking Skills (LOTs)	Higher Order Thinking Skills (HOTs)
Level	R-Remember, U-Understand , Ap-Apply	An-Analyze, E-Evaluate, C-Create
% to be included	90%	10%

****

EED320 ELECTRICAL CIRCUIT THEORY

TEACHING AND SCHEME OF EXAMINATION:

No of weeks per semester =16 weeks

Course	Instructions		Examination			
	Hrs /Week	Hrs / Semester	Marks			Duration
			Internal Assessment	Autonomous Examinations	Total	
Electrical Circuit Theory	6	96	25	100*	100	3 Hrs.

*Examinations will be conducted for 100 marks and it will be reduced to 75 marks.

TOPICS AND ALLOCATION OF HOURS:

UNIT	TOPICS	NO. OF HOURS
I	DC Circuits	18
II	Circuit Theorems	18
III	Single Phase Circuits	18
IV	Three phase Circuits	17
V	Storage Batteries	16
	Test & Model Exam	09
	TOTAL	96

COURSE DESCRIPTION:

Electric circuit analysis is the process of finding the voltages across, and the currents through the components in the network. Many Techniques are available for calculating these values. Part of the course is deal with basics of Network Analysis, introduction to network elements and explains methods for finding voltage and current across any network Component with DC Source, Single Phase AC and Three Phase AC Sources. This Course aims at making the student to conversant with different techniques of solving the problems in the field of Electric Circuits and Analysis.

OBJECTIVES:

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

➢ Explain the concept of Resistance, Capacitance and analyze different CircuitElements, Energy Sources and analysis of Networks by Kirchhoff's Laws.

➢ Analyze the concepts of Nodal and Mesh Analysis and Analyze different Theorems forDC Circuits.

➢ Analyze Single Phase Circuits using Resistor, Inductor & Capacitor Elements.

➢ Analyze Balanced Three Phase AC Circuits and perform the Three Phase Power Measurement Calculations.

➢ Explain the Concept of storage batteries, care, maintenance and applications.

COURSE OUTCOMES:

Course	EED320 ELECTRICAL CIRCUIT THEORY
After successful completion of this course, the students should be able to	
D320.1	Explain about the basics of DC circuits.
D320.2	Analyze the different types theorems
D320.3	Analyze and evaluate the single phase AC circuits
D320.4	Analyze and evaluate the three phase AC circuits
D320.5	Explain about the batteries and its types

EED320 ELECTRICAL CIRCUIT THEORY

UNIT - I
DC CIRCUITS   **18 Hrs**

Basic Concepts of Current, EMF, Potential Difference, Resistance and Resistivity	2 Hrs
Ohm's Law –Work, Power, Energy	2 Hrs
Resistance in Series and Parallel	2 Hrs
Series - Parallel Circuits	1 Hr
Kirchhoff's Laws	1 Hr
Coulomb's law	1 Hr
Concept of Capacitance	1 Hr
Capacitors in Series and in Parallel	2 Hrs
Problems in the above Topics.	6 Hrs

UNIT - II
CIRCUIT THEOREMS   **18 Hrs**

Definitions of Node, Branch and Network	1 Hr
Mesh Equations	2 Hrs
Nodal Equations	2 Hrs
Star / Delta Transformations	2 Hrs
Superposition Theorem	2 Hrs
Thevenin's Theorem	2 Hrs
Norton's Theorem	2 Hrs
Maximum Power Transfer Theorem	1 Hr
Problems in DC Circuits only	4 Hrs

UNIT - III
SINGLE PHASE CIRCUITS   **18 Hrs**

Definitions of Sinusoidal Voltage and Current– Instantaneous, Peak, Average and Effective Values - Form Factor and Peak Factor (Derivation for Sine Wave)	1 Hr
Pure Resistive, Inductive and Capacitive Circuits	1 Hr
RL, RC and RLC Series Circuits	2 Hrs
Impedance -Phase Angle — Use of 'J' Notations–Rectangular and Polar Coordinates - Phasor Diagram	1 Hr
Power and Power Factor – Power Triangle – Apparent Power, Active and Reactive Power - Parallel Circuits (Two Branches Only) - Conductance, Susceptance and Admittance	2 Hrs
Problems in all above topics.	3 Hrs
RESONANCE: Concept of Series Resonance	2 Hrs
Parallel Resonance (R, L & C)	2 Hrs
Applications, Q Factor	2 Hrs
Band width, Comparison of series and parallel resonance (No Problems)	2 Hrs

UNIT - IV
THREE PHASE AC CIRCUITS   **17 Hrs**

Three Phase AC Systems-Phase Sequence –Necessity of Three Phase System	2 Hrs
Concept of Balanced and Unbalanced Load Balanced Star & Delta Connected Loads	2 Hrs
Relation between Lineand Phase Voltages and Currents	2 Hrs
Phasor Diagram	2 Hrs
Three Phase Power — Power Factor — Three Phase Power and	2 Hrs
Power Factor Measurement by Single Wattmeter and	
Two Wattmeter Methods	2 Hrs
Problems in all Topics	5 Hrs

UNIT - V
STORAGE BATTERIES   **16 Hrs**

Classification of cells – Construction, Chemical action and physical changes during charging and discharging of Lead Acid	2 Hrs
Nickel Ironand Nickel Cadmium Cells	2 Hrs
Advantages and Disadvantages of Nickel Ion and Nickel Cadmium Cells over Lead Acid Cell	1 Hr
indication of fully charged and discharged battery – defects and their remedies	2 Hrs
capacity - AH efficiency and WH efficiency (no problems)	1 Hr
methods of charging	2 Hrs
care and maintenance — applications	1 Hr
maintenance free batteries	1 Hr
Lithium Cells, Lithium - Ion Cells and Mercury Cells	2 Hrs
Concept of Recharged Cell.	2 Hrs
Test & Model Exam	**9 Hrs**

TEXT BOOK

S.NO	TITLE	AUTHOR	PUBLISHER WITH EDITION
1	Electric Circuit Theory	Dr.M.Arumugam	Khanna Publishers

REFERENCE BOOKS

S.NO	TITLE	AUTHOR	PUBLISHER WITH EDITION
1	Circuits and Networks Analysis and Synthesis	A Sudhakar Shyammohan S Palli	Tata McGraw Hill Education Private Ltd.
2	Electric Circuits	Mahamood Nahvi Joseph A Edminister	Schaum Publishing Company, Newyork

LEARNING WEBSITES

1. https://byjus.com › Physics › Physics Article

2. https://circuitglobe.com/dc-circuit.html

3. https://www.elprocus.com/basics-of-network-theorems-in-electrical-engineering/

4. https://nptel.ac.in/courses/108106025/Chapter%201.pdf

5. https://www.electronics-tutorials.ws/accircuits/parallel-resonance.html

6. https://www.electrical4u.com/three-phase-circuit-star-and-delta-system/

CONTINUOUS INTERNAL ASSESSMENT

 The Internal Assessment marks for a total of 25 marks, which are to be distributed as follows:

i)	Attendance	-	5 Marks
ii)	Test	-	10 Marks
iii)	Assignment	-	5 Marks
iv)	Seminar	-	5 Marks

	Total	**-**	**25 Marks**

CO- POs & PSOs MAPPING MATRIX

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
D320.1	3	3	3	-	2	2	3	3	2	3
D320.2	3	3	3	-	2	2	3	3	2	3
D320.3	3	3	3	-	2	2	3	3	2	3
D320.4	3	3	3	-	2	2	3	3	2	3
D320.5	3	3	3	-	2	2	3	3	2	3
Total	15	15	15	-	10	10	15	15	10	15
Correlation level	3	3	3	-	2	2	3	3	2	3

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

QUESTION PAPER SETTING

The teaching learning process and assessment are being carried out in accordance with the revised Bloom's 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.

Bloom's Taxonomy	Lower Order Thinking Skills (LOTs)	Higher Order Thinking Skills (HOTs)
Level	R-Remember, U-Understand , Ap-Apply	An-Analyze, E-Evaluate, C-Create
% to be included	90%	10%

****

EED330 ELECTRICAL MACHINES - I

TEACHING AND SCHEME OF EXAMINATION:

No of weeks per semester =16 weeks

Course	Instructions		Examination			
	Hrs / Week	Hrs / Semester	Marks			Duration
			Internal Assessment	Autonomous Examinations	Total	
Electrical Machines – I	5	80	25	100*	100	3 Hrs.

*Examinations will be conducted for 100 marks and it will be reduced to 75 marks.

TOPICS AND ALLOCATION OF HOURS:

UNIT	TOPICS	NO. OF HOURS
I	DC Generators	15
II	DC Motors	14
III	Single Phase Transformer	14
IV	Three Phase Transformer	15
V	Maintenance of DC Machines and Transformers	13
	Test & Model Exam	09
	TOTAL	**80**

COURSE DESCRIPTION:

This Course is classified under core technology group which intends to teach the facts, concepts, principles of electrical machines, such as DC generators, DC motors, Brushless DC motor, Single & Three Phase Transformers and DC Electrical Source (battery). Students will be able to analyze the characteristics of DC Generators and Motors, Brushless DC Motor, Single & Three Phase Transformer, Battery & Qualitative Parameters of these Static and Dynamic Machines. These Machines are used in Transmission, Distribution and Utilization Systems. Knowledge gained by students will be helpful in the study of advanced subjects like Utilization of Electrical Energy, Switchgear & Protection, Manufacturing Processes and Maintenance of Electrical Machines.

OBJECTIVES:

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

➢ Explain the concept Electromagnetism and Principles.

➢ Know the constructional details and working principles of DC Machines and Transformers.

➢ Evaluate the performance of DC Generators, Motors and Transformers.

➢ Study the applications of DC Generator, Motor and Transformer for specific fields.

COURSE OUTCOMES

Course	EED330 ELECTRICAL MACHINES - I
After successful completion of this course, the students should be able to	
D330.1	Know the constructional details & working principles of DC generators
D330.2	Evaluate the performance of DC Motors.
D330.3	Decide the suitability of single phase transformer for particular purpose.
D330.4	Decide the suitability of three phase transformer for particular purpose.
D330.5	Know about the maintenance detail of dc machines and transformers

EED330 ELECTRICAL MACHINES - I

UNIT - I
DC GENERATORS   **15 Hrs**

Review of electromagnetic induction — Faraday's laws —Lenz's law - Fleming's right hand rule	2 Hrs
Principle of operation of D.C. generator – Construction of D.C. generator	2 Hrs
Types of armature windings(No Windingdiagram) – EMF equation(Simple problems)	2 Hrs
Types of D.C. generators – No load and load characteristics of DC generators	2 Hrs
Causes of failure to build-up voltage and remedy — armature reaction	2 Hrs
methods of compensating armature reaction – process of commutation	2 Hrs
methods of improving commutation	1 Hr
Load characteristics of DC generators —Applications of DC generators	2 Hrs

UNIT - II
DC MOTORS   **14 Hrs**

Principle of operation of D.C. Motor — Fleming's left-hand rule	2 Hrs
Construction Back EMF – Torque equation	2 Hrs
Types of DC motors –Torque-current, Speed-current, Speed- Torque characteristics of different DC motors	2 Hrs
Speed control of DC motors– Field control and armature control	2 Hrs
necessity of Starters– 3 Point and 4 Point starters	2 Hrs
losses in D.C. Machines – Testing of D.C. Machines	1 Hr
Predetermination of efficiency of motor and generator by Swinburne's test	2 Hrs
Problems in the above topics –Applications of D.C. Motors	1 Hr

UNIT - III
SINGLE PHASE TRANSFORMER   **14 Hrs**

Principle of operation – Constructional details of core and shell type Transformers – EMF Equation	2 Hrs
Voltage ratio –Transformer on No load – Transformer Full load – Current ratio	2 Hrs
Phasor diagram on no load and Fullload at different power factors. O.C. test, S.C. test	2 Hrs
Determination of equivalent circuit constants– Determination of voltage regulation andefficiency	2 Hrs
Condition for maximum efficiency– All day efficiency	1 Hr
Problems on the above topics - polarity test–Parallel operation of Single Phase transformers	2 Hrs
Auto transformer –principle — Applications of transformers	2 Hrs

Energy Efficient Transformer – Dry Type Transformer & Amorphous Core   1 Hr
Transformer

UNIT - IV
THREE PHASE TRANSFORMER   15 Hrs
Three phase Transformer — construction, types of connections of   2 Hrs
transformer
Parallel operation of three phase transformers – grouping of transformers   2 Hrs

phasing out test - Pairing of transformers   2 Hrs

Load sharing of transformers withequal and unequal ratings   2 Hrs

Cooling of transformers – Various cooling arrangements   2 Hrs

Transformer accessories – conservator, breather   2 Hrs

explosion vent, bucholz relay   1 Hr

ON load and OFF load tap changer   2 Hrs

UNIT - V
MAINTENANCE OF DC MACHINES AND TRANSFORMERS   **13 Hrs**
Maintenance – Importance, Preventive and Breakdown maintenance   1 Hr

Advantages of preventive maintenance   1 Hr

Causes of Sparking in Commutators – Defects in Commutators and Remedies   2 Hrs

Resurfacing of Commutators and Brushes – Maintenance of Brush Holder   2 Hrs

Staggering of Brushes, Brush Pressure - Defects in DC Armature winding   2 Hrs

Maintenance of Earthing of DC Machines   2 Hrs

Maintenance of Transformer Oil - Transformer oil tester – Acidity test   2 Hrs

BDV Test - Earthing – Measurement of earth resistance   1 Hr

Test & Model Exam   **09 Hrs**

TEXT BOOKS

S.NO	TITLE	AUTHOR	PUBLISHER WITH EDITION
1	A Text Book of Electrical Technology Volume II	B.L. Theraja	S.Chand & Co. New Delhi
2	Electrical Technology	Edward Hughes	Addision – Wesley International Student Edition

REFERENCE BOOKS

S.NO	TITLE	AUTHOR	PUBLISHER WITH EDITION
1	Elements of Electrical Engineering	Maria Louis	Prentice - Hall of India Pvt Ltd
2	Electrical Machines	Nagarath	TMH Publications
3	Electrical Machines	Bhattacharya	TMH Publications

LEARNING WEBSITES

1. https://www.electrical4u.com/principle-of-dc-generator/

2. https://www.electrical4u.com/dc-motor-or-direct-current-motor/

3. https://www.electronics-tutorials.ws/transformer/transformer-basics.html

4. https://circuitglobe.com/three-phase-transformer-connections.html

5. www.altenergy.org/renewables/battery-storage.html

CONTINUOUS INTERNAL ASSESSMENT

The Internal Assessment marks for a total of 25 marks, which are to be distributed as follows:

i)	Attendance	-	5 Marks
ii)	Test	-	10 Marks
iii)	Assignment	-	5 Marks
iv)	Seminar	-	5 Marks

	Total	**-**	**25 Marks**

CO- POs & PSOs MAPPING MATRIX

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
D330.1	2	2	3	2	2	2	2	3	3	2
D330.2	2	2	3	2	2	2	2	3	3	2
D330.3	2	2	3	2	2	2	2	3	3	2
D330.4	2	2	3	2	2	2	2	3	3	2
D330.5	2	2	3	2	2	2	2	3	3	2
Total	10	10	15	10	10	10	10	15	15	10
Correlation level	2	2	3	2	2	2	2	3	3	2

Correlation level 1- Slight (low)

Correlation level 2- Moderate (Medium)

Correlation level 3- Substantial (high)

QUESTION PAPER SETTING

The teaching learning process and assessment are being carried out in accordance with the revised Bloom's 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.

Bloom's Taxonomy	Lower Order Thinking Skills (LOTs)	Higher Order Thinking Skills (HOTs)
Level	R-Remember, U-Understand , Ap-Apply	An-Analyze, E-Evaluate, C-Create
% to be included	90%	10%

****

EED340 ELECTRONIC DEVICES AND CIRCUITS PRACTICAL

TEACHING AND SCHEME OF EXAMINATION:

Number of Weeks/ Semester: 16 Weeks

Course	Instructions		Examination			
	Hrs / Week	Hrs / Semester	Marks			Duration
			Internal Assessment	Autonomous Examination	Total	
Electronic Devices and Circuits Practical	4	64	25	100*	100	3 Hrs.

*Examinations will be conducted for 100 marks and it will be reduced to 75 marks.

DETAILED ALLOCATION OF MARKS:

SI.NO	NAME OF THE ACTIVITY	MARKS
1	CIRCUIT DIAGRAM	25
2	CONNECTION	25
3	EXECUTION & HANDLING OF EQUIPMENT	25
4	OUTPUT /RESULT	10
5	VIVA–VOCE	5
6	MINI PROJECT	10
	TOTAL	100

Mini Project Evaluation (10 marks)

Breakup Details

1	Project Description	05
2	Project Demo	05
	Total	**10**

COURSE DESCRIPTION:

Every Electronics Engineer should have sound knowledge about the components used in Electronics Industry. This is vital in R &D Department for chip level troubleshooting. To meet the industrial needs, diploma holders must be taught about the most fundamental subject, Electronic devices and Circuits Practical. By doing practical experience in this, they will be skilled in handling all types of electronic circuits and able to apply the skill in electronic systems.

EQUIPMENTS REQUIRED : (For a Batch of 30 Students)

S. No	Name of the Equipments	Range	Required Nos.
1	DC Regulated power supply	0-30V,1A	10
2	High Voltage Power Supply	0-250V,1A	2
3	Signal Generator	1MHz	4
4	Dual trace CRO	20MHz/ 30MHz	5
5	Digital Multimeter	-	10
6	DC Voltmeter(Analog/Digital)	Different Ranges	15
7	DC Ammeter(Analog/Digital)	Different Ranges	15

OBJECTIVES:

On completion of the following experiments, the students must be able to

1) Know the Cold Checking of Active and Passive Components.
2) Find out the Unknown Resistance value of a Resistor using Colour Coding.
3) Find out the Unknown Capacitance value of a Capacitor using Colour Coding.
4) Find out the Unknown Inductance value of an Inductor using Colour Coding.
5) Understand the concept, working principle and applications of PN Junction diode.
6) Understand the concept, working principle and applications of Zener diode.
7) Understand the concept, working principle and applications of BJT and FET.
8) Understand the concept, working principle and applications of UJT.
9) Understand the concept, working principle and applications of SCR.
10) Understand the concept, working principle and applications of DIAC and TRIAC.
11) Understand the concept, working principle and applications of Clippers and Clampers.
12) Understand the concept, working principle and applications of various types of Negative feedback amplifiers.
13) Understand the concept, working principle and applications of Astable Multivibrator.
14) Construct a circuit to glow the different color LED alternatively.
15) Develop the Mini Projects.

COURSE OUTCOMES

Course	EED340 ELECTRONIC DEVICES AND CIRCUITS PRACTICAL
After successful completion of this course, the students should be able to	
D340.1	Construct and test the characteristics of PN junction diode and Zener diode
D340.2	Construct and observe the waveforms of Full wave (centre tapped) rectifier, full wave (Bridge) Rectifier with and without filters.
D340.3	Construct and test the characteristics of Common Emitter Transistor, Common Source Field Effect Transistor, Uni Junction Transistor (UJT) and V-I characteristics of switching devices. (SCR, TRIAC, DIAC).
D340.4	Construct and Test the characteristics of Common Emitter amplifier and switching characteristics of Astable Multivibrator
D340.5	Construct the circuit for glowing LED and develop the mini projects with report.

EED340 ELECTRONIC DEVICES AND CIRCUITS PRACTICAL

Note: At least 5 experiments should be constructed using breadboard/soldering

List of experiments to be conducted

1. Construct a circuit to test the forward and reverse bias characteristics of a PN Junction Silicon diode. Find the value of its cut-in voltage.

2. Construct a circuit to test the forward and reverse bias characteristics of a Zener diode. Find the value of its reverse break down voltage.

3. Construct a Full wave (center tapped) rectifier and test its input and output waveforms with and without Capacitor filter. Find its maximum voltage.

4. Construct a Full wave (Bridge) rectifier and test its input and output waveforms with and without Capacitor filter. Find its maximum voltage.

5. Construct a Common Emitter Transistor circuit and test its input and output characteristic curves.

6. Construct a Common Source Field Effect Transistor circuit and test its drain and transfer characteristic curves.

7. Construct a circuit to test the Turning on and Turning off characteristics of SCR and find out the forward break over voltage, the value of Latching and Holding currents.

8. Construct a circuit to test the bidirectional characteristics of DIAC and plot its switching characteristics.

9. Construct a circuit to test the bidirectional characteristics of TRIAC and plot its switching characteristics.

10. Construct a Common emitter amplifier circuit and test its frequency response characteristics with and without Current series feedback introduced in it.

11. Construct a circuit to test the switching characteristics of Astable Multivibrator

12. Construct a circuit to test the negative resistance Characteristics of UJT.

13. Construct a circuit to glow the different color LED alternatively.

14. Mini Project.

    The mini project is activity based and it may be given to group of maximum of six students for hands on experience and to create scientific temper.

CONTINUOUS INTERNAL ASSESSMENT

The Internal Assessment mark for a total of 25 marks which are to be distributed as follows:

a) Attendance   :   05 Marks
(Award of marks same as theory courses)

b) Procedure/ observation and tabulation/
Other Practical related Work   :   05 Marks

c) Tests   :   10 Marks

d) Student Centered Learning (SCL) work sheet   :   05 Marks

                      TOTAL   25 Marks

LEARNING WEBSITES

1. https://www.quora.com/What-are-some-best-sites-to-learn-the-basic-of-electronics-for-Electronics-engineer

2. https://www.pannam.com/blog/free-resources-to-learn-electrical-engineering/

3. http://vlabs.iitkgp.ernet.in/be/

4. http://www.circuitstoday.com/4-great-books-to-study-basic-electronics

5. https://www.edx.org/course/circuits-and-electronics-1-basic-circuit-

CO- POs & PSOs MAPPING MATRIX

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
D340.1	3	3	3	3	3	3	3	3	2	3
D340.2	3	3	3	3	3	3	3	3	2	3
D340.3	3	3	3	3	3	3	3	3	2	3
D340.4	3	3	3	3	3	3	3	3	2	3
D340.5	3	3	3	3	3	3	3	3	2	3
Total	15	15	15	15	15	15	15	15	10	15
Correlation Level	3	3	3	3	3	3	3	3	2	3

Correlation level 1- Slight (low)

Correlation level 2- Moderate (Medium)

Correlation level 3- Substantial (high)

****

EED340 ELECTRONIC DEVICES AND CIRCUITS PRACTICAL

MODEL QUESTION PAPER

Note: At least 5 experiments should be done using Soldering board / Bread board

S.No	Experiments	CO	PO
1	Construct a circuit to test the forward and reverse bias characteristics of a PN Junction Silicon diode. Find the value of its cut-in voltage.	D340.1	PO1,PO2,PO3,PO4, PO5,PO6,PO7
2	Construct a circuit to test the forward and reverse bias characteristics of a Zener diode. Find the value of its reverse break down voltage.	D340.1	PO1,PO2,PO3,PO4, PO5,PO6,PO7
3	Construct a Full wave (center tapped) rectifier and test its input and output waveforms with and without Capacitor filter. Find its maximum voltage.	D340.2	PO1,PO2,PO3,PO4, PO5,PO6,PO7
4	Construct a Full wave (Bridge) rectifier and test its input and output waveforms with and without Capacitor filter. Find its maximum voltage.	D340.2	PO1,PO2,PO3,PO4, PO5,PO6,PO7
5	Construct a Common Emitter Transistor circuit and test its input and output characteristic curves.	D340.3	PO1,PO2,PO3,PO4, PO5,PO6,PO7
6	Construct a Common Source Field Effect Transistor circuit and test its drain and transfer characteristic curves.	D340.3	PO1,PO2,PO3,PO4, PO5,PO6,PO7
7	Construct a circuit to test the Turning on and Turning off characteristics of SCR and find out the forward break over voltage, the value of Latching and Holding currents.	D340.3	PO1,PO2,PO3,PO4, PO5,PO6,PO7
8	Construct a circuit to test the bidirectional characteristics of DIAC and plot its switching characteristics.	D340.3	PO1,PO2,PO3,PO4, PO5,PO6,PO7
9	Construct a circuit to test the bidirectional characteristics of TRIAC and plot its switching characteristics.	D340.3	PO1,PO2,PO3,PO4, PO5,PO6,PO7
10	Construct a Common emitter amplifier circuit and test its frequency response characteristics with and without Current series feedback introduced in it.	D340.4	PO1,PO2,PO3,PO4, PO5,PO6,PO7
11	Construct a circuit to test the switching characteristics of Astable Multivibrator.	D340.4	PO1,PO2,PO3,PO4, PO5,PO6,PO7
12	Construct a circuit to test negative resistance characteristics of UJT	D340.3	PO1,PO2,PO3,PO4, PO5,PO6,PO7
13	Construct a circuit to glow the different color LED alternatively.	D340.5	PO1,PO2,PO3,PO4, PO5,PO6,PO7
14	**Mini Project**	**D340.5**	**PO1,PO2,PO3,PO4, PO5,PO6,PO7**

EED350 ELECTRICAL CIRCUITS AND MACHINES PRACTICAL

TEACHING AND SCHEME OF EXAMINATION:

No. of weeks/ Semester: 16 weeks

Course	Instructions		Examination			
	Hrs / Week	Hrs / Semester	Marks			Duration
			Internal Assessment	Autonomous Examination	Total	
Electrical Circuits and Machines Practical	4	64	25	100*	100	3 Hrs.

*Examinations will be conducted for 100 marks and it will be reduced to 75 marks.

DETAILED ALLOCATION OF MARKS:

SI. NO	NAME OF THE ACTIVITY	MARKS
1	CIRCUIT DIAGRAM	30
2	CONNECTIONS AND PROCEEDING THE EXPERIMENT	30
3	READING/CALCULATION/GRAPH/RESULT	25
4	VIVA VOCE	05
5	MINI PROJECT	10
	TOTAL	100

Mini Project Evaluation (10 marks)

Breakup Details

1	Project Description	05
2	Project Demo	05
	Total	**10**

COURSE DESCRIPTION:

- To impart Practical Knowledge to the Diploma Students and Practical Courses are introduced for every corresponding Theory Courses.

- This Practical Course supports the aim and objective of Electrical Machines- I and Electrical Circuit Theory Courses.

EQUIPMENTS REQUIRED : (For a Batch of 30 Students)

SI.NO	LIST OF EQUIPMENTS	QUANTITY REQUIRED
1	DC Shunt Motor 3/5 KW (or more) with Loading Arrangement	2
2	DC Series Motor 3/5 KW (or more) with Loading Arrangement	1
3	DC Compound Motor 3/5 KW (or more) with Loading Arrangement	1
4	DC Shunt Generator 3/5 KW (or more) coupled with Prime Mover	1
5	DC Series Generator 3/5 KW (or more) coupled with Prime Mover	1
6	1 Phase Transformer 1KVA (or more) 220V/110V	3
7	3 Phase Transformer 1KVA (or more) 440V/220V	1
8	1 Phase Variac 15 amps	3
9	3 Phase Variac 15 amps	1
10	Dual Regulated Power Supply 0-30V/2A	2
11	Single Regulated Power Supply 0-30V / 2A	2
12	Single Phase Resistive Load 3/5 KW, 220V	2
13	Three Phase Resistive Load 3KW,415V	2
14	Tachometer Analog type	3
15	Rheostat — various ranges 50Ω/5A,100Ω/5A, 300Ω/2A, 600 Ω/2A (or equivalent)	4
16	AC Ammeter – various ranges 0- 500mA,0-1/2A, 0-5/10A,0-10/20A (or equivalent)	8
17	DC Ammeter – various ranges 0-500mA, 0-2A,0-5A,0-10A,0-15/30A (or equivalent)	8
18	DC Voltmeter – 0-5/10V, 0-30V, 0-300V	8
19	AC Voltmeter – 0-75V, 0-150V, 0-300V, 0-600V	8
20	Wattmeter – various ranges LPF 150/300/600V 2.5A/5A,1/2.5A	6
21	Wattmeter – various ranges UPF 75/150/300,5/10A	6
22	Wattmeter – various ranges UPF 150/300/600V 10/20A	6
23	Transformer oil test kit, Acidity test kit	Each 1

OBJECTIVES:

On completion of this Practical Course, the Students will be able to:

- Make the various Circuit connections in Machines Laboratory.
- Practically prove all the Theorems and Principles which are dealing with DC Current.
- Understand the Characteristics of Electrical Machines and to determine the Efficiency of the Machines.
- Test the performance of transformer to find its efficiency, Voltage Regulation and characteristics.
- Study the various speed control methods of DC motor.

COURSE OUTCOMES:

Course	EED350 ELECTRICAL CIRCUITS AND MACHINES PRACTICAL
After successful completion of this course, the students should be able to	
D350.1	Verify the Superposition theorem and Thevenin's theorem with different DC voltages and measure the power using ammeter, voltmeter and wattmeter
D350.2	Conduct suitable experiments to draw and interpret the performance characteristics of DC Machines
D350.3	Interpret and apply the Speed Control methods of a DC Motor.
D350.4	Conduct test on single phase and three phase transformer
D350.5	Test the transformer oil find Breakdown test, dielectric strength and acidity test and develop the mini projects with report.

EED350 ELECTRICAL CIRCUITS AND MACHINES PRACTICAL

List of Experiments

CIRCUITS:

1. Verification of Super Position Theorem with two different DC Voltages for a common load.

2. Verification of Thevenin's Theorem with DC Supply

3. Measurement of Power
   a. using Ammeter and Voltmeter
   b. using Wattmeter for Single Phase Resistive Load.

MACHINES:

4. No load and FULL Load Characteristics of Self Excited DC Shunt Generator.

5. Load Characteristics of Self Excited DC Series Generator.

6. Load Test on DC Shunt Motor and Draw the Performance Curve.

7. Load Test on DC Series Motor and Draw the Performance Curve.

8. Load Test on DC Compound motor and draw its performance curve

9. Predetermine the Efficiency of DC Machines by Swinburne's Test.

10. Speed Control of DC Shunt Motor by
    a. Armature Control Method
    b. Field Control Method

11. Load Test on Single Phase Transformer

12. Load Test on Three Phase Transformer

13. Predetermine the Efficiency and Regulation of Single-Phase Transformer by conducting O.C and S.C Tests.

14. Find the Equivalent Circuit Constants of Single-Phase Transformer by conducting O.C and S.C Tests.

15. Connect two Single Phase Transformers for Parallel Operation.

16. a) Perform Breakdown Test and determine the Dielectric Strength of Transformer Oil
    b) Conduct Acidity Test on Transformer Oil.

17. Mini Project
    The mini project is activity based and it may be given to group of maximum of six students for hands on experience and to create scientific temper.

CONTINUOUS INTERNAL ASSESSMENT

The Internal Assessment mark for a total of 25 marks which are to be distributed as follows:

a) Attendance	:	05 Marks
(Award of marks same as theory courses)		
b) Procedure/ observation and tabulation/ Other Practical related Work	:	05 Marks
c) Tests	:	10 Marks
d) Student Centered Learning (SCL) work sheet	:	05 Marks

TOTAL   25 Marks

LEARNING WEBSITES

1. https://www.allaboutcircuits.com › ... › DC Network Analysis
2. https://www.electrical4u.com/principle-of-dc-generator/
3. https://www.electrical4u.com/dc-motor-or-direct-current-motor/
4. https://www.electrical4u.com/what-is-transformer-definition-working-principle-of-transformer/

CO- POs & PSOs MAPPING MATRIX

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
D350.1	3	3	3	3	3	3	3	3	2	3
D350.2	3	3	3	3	3	3	3	3	2	3
D350.3	3	3	3	3	3	3	3	3	2	3
D350.4	3	3	3	3	3	3	3	3	2	3
D350.5	3	3	3	3	3	3	3	3	2	3
Total	15	15	15	15	15	15	15	15	10	15
Correlation level	3	3	3	3	3	3	3	3	2	3

Correlation level 1 – Slight (Low)
Correlation level 2 – Moderate (Medium)
Correlation level 3 – Substantial (High)

****

EED350 ELECTRICAL CIRCUITS AND MACHINES PRACTICAL

MODEL QUESTION PAPER

Si. No	Name of the Experiments	CO	PO
1	Verification of Super Position Theorem with two different DC Voltages for a common load.	D350.1	PO1, PO2, PO3, PO4, PO5, PO6, PO7
2	Verification of Thevenin's Theorem with DC Supply	D350.1	PO1, PO2, PO3, PO4, PO5, PO6, PO7
3	Measurement of Power a. Using Ammeter and Voltmeter b. Using Wattmeter for Single Phase Resistive Load.	D350.1	PO1, PO2, PO3, PO4, PO5, PO6, PO7
4	No load and Full Load Characteristics of Self Excited DC Shunt Generator.	D350.2	PO1, PO2, PO3, PO4, PO5, PO6, PO7
5	Load Characteristics of Self Excited DC Series Generator.	D350.2	PO1, PO2, PO3, PO4, PO5, PO6, PO7
6	Load Test on DC Shunt Motor and Draw the Performance Curve	D350.2	PO1, PO2, PO3, PO4, PO5, PO6, PO7
7	Load Test on DC Series Motor and Draw the Performance Curve	D350.2	PO1, PO2, PO3, PO4, PO5, PO6, PO7
8	Load Test on DC Compound motor and draw its performance curve	D350.3	PO1, PO2, PO3, PO4, PO5, PO6, PO7
9	Predetermine the Efficiency of DC Machines by Swinburne's Test	D350.3	PO1, PO2, PO3, PO4, PO5, PO6, PO7
10	Speed Control of DC Shunt Motor by a. Armature Control Method b. Field Control Method	D350.3	PO1, PO2, PO3, PO4, PO5, PO6, PO7
11	Load Test on Single Phase Transformer	D350.4	PO1, PO2, PO3, PO4, PO5, PO6, PO7
12	Load Test on Three Phase Transformer	D350.4	PO1, PO2, PO3, PO4, PO5, PO6, PO7
13	Predetermine the Efficiency and Regulation of Single-Phase Transformer by conducting O.Cand S.C Tests	D350.4	PO1, PO2, PO3, PO4, PO5, PO6, PO7
14	Find the Equivalent Circuit Constants of Single-Phase Transformer by conducting O.C and S.CTests	D350.5	PO1, PO2, PO3, PO4, PO5, PO6, PO7
15	Connect two Single Phase Transformers for Parallel Operation	D350.5	PO1, PO2, PO3, PO4, PO5, PO6, PO7
16	a. Perform Breakdown Test and determine the Dielectric Strength of Transformer Oil b. Conduct Acidity Test on Transformer Oil	D350.5	PO1, PO2, PO3, PO4, PO5, PO6, PO7
17	**Mini Project**	**D350.5**	**PO1, PO2, PO3, PO4, PO5, PO6, PO7**

EED360 ELECTRICAL WORKSHOP PRACTICAL

TEACHING AND SCHEME OF EXAMINATION:

No. of weeks/ Semester: 16 weeks

Course	Instructions		Examination			
	Hrs / Week	Hrs / Semester	Marks			Duration
			Internal Assessment	Autonomous Examination	Total	
Electrical Workshop Practical	4	64	25	100*	100	3 Hrs.

*Examinations will be conducted for 100 marks and it will be reduced to 75 marks.

DETAILED ALLOCATION OF MARKS:

SI.NO	NAME OF THE ACTIVITY	MARKS
1	CONNECTION DIAGRAM	20
2	TOOLS REQUIRED	20
3	DISMANTLING AND ASSEMBLING PROCEDURE	25
4	TESTING	20
5	VIVA VOCE	05
6	MINI PROJECT	10
	TOTAL	**100**

Mini Project Evaluation (10 marks)

Breakup Details

1	Project Description	05
2	Project Demo	05
	Total	**10**

COURSE DESCRIPTION:

- To impart practical knowledge to the Diploma Students for servicing of Domestic Appliances.

- This Course is assigned to develop Skill on Assembling and test the Household Electrical Appliances.

EQUIPMENTS REQUIRED : (For a Batch of 30 Students)

S.No	LIST OF EQUIPMENTS	QUANTITY REQUIRED
1	Tools: Screw driver, Cutting pliers, Wire Stripper, Hammer, Spanner set, Line Tester, Nose pliers.	Each 2 Set
2	Personal Protective Equipments: Safety helmet, Goggle, Safety gloves, Nose mask, Ear plug, Safety Belt.	Each 2 Set
3	Automatic Iron Box	2
4	Wet Grinder	2
5	Mixer Grinder	2
6	Ceiling Fan	2
7	LED Light, PCB, Driver Circuit and Outer Cover	10
8	Lead Acid Battery	2
9	Inverter	2
10	Solar Photo Voltaic Module	2
11	Charge controller	2
12	Microwave oven	1
13	Multi meter	8
14	Induction Heater	1

OBJECTIVES:

At the end of the practical the Students will be able to:

➢ Identify and use the tools used in servicing of Electrical Appliances.

➢ Assemble the various parts of Domestic Appliances.

➢ Make the Electrical Connections and test their performance.

COURSE OUTCOMES:

Course	EED360 ELECTRICAL WORKSHOP PRACTICAL
After successful completion of this course, the students should be able to	
D360.1	Identify and use the tools in servicing of electrical appliances
D360.2	Assemble the various parts of domestic appliances
D360.3	Make the electrical connections and test its performance
D360.4	Identify the faults in domestic appliances
D360.5	Test the connections in domestic appliances and develop the mini projects with report.

EED360 ELECTRICAL WORKSHOP PRACTICAL

List of Experiments

1 Familiarization of tools used for Electrical repair works and personal Protection Equipments

2 Dismantling of Electrical Iron Box, identifying the parts, checking the conditions, assembling and testing

3 Dismantling of Mixer Grinder, identifying the parts, checking the conditions, assembling and testing

4 Dismantling of Wet Grinder, identifying the parts, checking the conditions, assembling and testing

5 Assembling the accessories of Ceiling Fan, test the connections of winding & Capacitor and run the Fan with Speed Regulator

6 Connect the Battery and Inverter to supply partial load in a Domestic Wiring during Mains Failure

7 Assembling and testing of 15watts LED Light

8 Battery Charging through Solar Panel. Connect Solar Panel to charge Battery through Charge Controller

9 Dismantling of Induction Heater, identifying the parts, checking the conditions, assembling and testing

10 Dismantling of Microwave Oven, identifying the parts, checking the conditions, assembling and testing

11 Dismantling of Table Fan identifying the parts, checking the conditions, assembling and testing

12 Mini Project

The mini project is activity based and it may be given to group of maximum of six students for hands on experience and to create scientific temper.

CONTINUOUS INTERNAL ASSESSMENT

The Internal Assessment mark for a total of 25 marks which are to be distributed as follows:

a) Attendance   :   05 Marks
(Award of marks same as theory courses)

b) Procedure/ observation and tabulation/
Other Practical related Work   :   05 Marks

c) Tests   :   10 Marks

d) Student Centered Learning (SCL) work sheet   :   05 Marks

TOTAL   25 Marks

LEARNING WEBSITES

1. https://www.thespruce.com/top-electrical-tools-1152575

2. https://home.howstuffworks.com/how-to-repair-major-appliances1.html

3. https://dom-i-remont.info/posts/common-questions/how-to-disassemble-the-iron-careful-handling-of-the-device-and-its-potential-repair/

CO- POs & PSOs MAPPING MATRIX

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
D360.1	3	3	3	3	3	3	3	3	2	3
D360.2	3	3	3	3	3	3	3	3	2	3
D360.3	3	3	3	3	3	3	3	3	2	3
D360.4	3	3	3	3	3	3	3	3	2	3
D360.5	3	3	3	3	3	3	3	3	2	3
Total	15	15	15	15	15	15	15	15	10	15
Correlation level	3	3	3	3	3	3	3	3	2	3

Correlation level 1 – Slight (Low)

Correlation level 2 – Moderate (Medium)

Correlation level 3 – Substantial (High)

****

EED360 ELECTRICAL WORKSHOP PRACTICAL

MODEL QUESTION PAPER

Si.No	List of Experiments	CO	PO
1	Familiarization of tools used for Electrical repair works and personal Protection Equipments	D360.1	PO1, PO2, PO3, PO4, PO5, PO6, PO7
2	Dismantling of Electrical Iron Box, identifying the parts, checking the conditions, assembling and testing	D360.2	PO1, PO2, PO3, PO4, PO5, PO6, PO7
3	Dismantling of Mixer Grinder, identifying the parts, checking the conditions, assembling and testing	D360.2	PO1, PO2, PO3, PO4, PO5, PO6, PO7
4	Dismantling of Wet Grinder, identifying the parts, checking the conditions, assembling and testing	D360.2	PO1, PO2, PO3, PO4, PO5, PO6, PO7
5	Assembling the accessories of Ceiling Fan, test the connections of winding & Capacitor and run the Fan with Speed Regulator	D360.2	PO1, PO2, PO3, PO4, PO5, PO6, PO7
6	Connect the Battery and Inverter to supply partial load in a Domestic Wiring during Mains Failure	D360.3	PO1, PO2, PO3, PO4, PO5, PO6, PO7
7	Assembling and testing of 15watts LED Light	D360.3	PO1, PO2, PO3, PO4, PO5, PO6, PO7
8	Battery Charging through Solar Panel. Connect Solar Panel to charge Battery through Charge Controller	D360.3	PO1, PO2, PO3, PO4, PO5, PO6, PO7
9	Dismantling of Induction Heater, identifying the parts, checking the conditions, assembling and testing	D360.4	PO1, PO2, PO3, PO4, PO5, PO6, PO7
10	Dismantling of Microwave Oven, identifying the parts, checking the conditions, assembling and testing	D360.4	PO1, PO2, PO3, PO4, PO5, PO6, PO7
11	Dismantling of Table Fan identifying the parts, checking the conditions, assembling and testing	D360.5	PO1, PO2, PO3, PO4, PO5, PO6, PO7
12	**Mini Project**	**D360.5**	**PO1, PO2, PO3, PO4, PO5, PO6, PO7**

EED370 WIRING AND WINDING PRACTICAL

TEACHING AND SCHEME OF EXAMINATION:

No of weeks per Semester: 16 weeks

Course	Instructions		Examination			Duration
	Hrs / Week	Hrs / Semester	Marks			
			Internal Assessment	Autonomous Examinations	Total	
Wiring and Winding Practical	4	64	25	100*	100	3 Hrs.

*Examinations will be conducted for 100 marks and it will be reduced to 75 marks.

DETAILED ALLOCATION OF MARKS:

SI.NO	NAME OF THE ACTIVITY	MARKS
1	WIRING DIAGRAM / DESIGN	25
2	EXECUTION	35
3	RESULT	25
4	VIVA-VOCE	05
5	MINI PROJECT	10
	TOTAL	100

Mini Project Evaluation (10 marks)

Breakup Details

1	Project Description	05
2	Project Demo	05
	Total	10

COURSE DESCRIPTION:

To provide concept and hands on experience in Electrical Wiring and Winding including different Wiring Systems, Installation Methods and Basic Winding Preparation. Each topic in the syllabus serves as guide for students to deal with the process of connecting various accessories for the distribution of Electrical Energy from the Meter Board.

EQUIPMENTS REQUIREDs : (For a Batch of 30 Students)

S.NO.	DESCRIPTION	SPECIFICATION	QTY
1	SPST Flush Type Switch	250V/5A	10
2	Intermediate Switch	250V/5A	10
3	Rotary Switches	500V/32A	6
4	Three Phase Control Panel Board	500V/32A	2
5	Batten Lamp Holder	-	10
6	Round Block	-	20
7	Switch Board	20cm*15 cm	4
		10cm*10cm	15
8	M.C.B.	250V/10A ,2 pole	6
		440V/32A	3
9	Push Button Switch	250V/5A	5
10	2 Plate Ceiling Rose	250V/5A	10
11	Electric Bell	250V/5A	3
12	Single Phase D.P.I.C. Main Switch	250V/16A	3
13	Single Phase D.O.L. Starter	250V/10A	1
14	Three Phase T.P.I.C. Main Switch	500V/30A	2
15	Star / Delta Starter	440V/5HP	1
16	E.L.C.B.	30mA/100mA	1
17	Single Phase, Digital Energy Meter	250V/15A,50HZ	1
18	Cut out	16A	1
19	Single Phase, 4 Way Distribution Box	250V/15A	2
20	Mercury Vapour Lamp with accessories		1 Set
21	Sodium Vapour Lamp with accessories		1 Set
22	Fluorescent Tube Light With Electronic Choke and Holder	40W	2 Set
23	Two Way Flush Type Switch	250V/5A	15
24	Wooden Box	30 cm*15cm	4
25	PVC Pipe	¾"/1″	Req.Qty
26	Saddle Clips	¾"/1 ″	Req.Qty
27	Copper Wire	2.5Sq.Mm, 1.5Sq.Mm	Req.Qty
28	1" Junction Box	1 way,2way,3way	Req.Qty

29	Screws		Req.Qty
30	Bare Copper Wire	2.5 Sq.Mm	Req.Qty
31	Lamps (C.F.L. or Incandescent)	Different ratings	Req.Qty
32	EI60 Type Stampings Of 0.35 mm Thickness	-	55
33	Readymade Bobbins (EI60/21)	-	Req.Qty
34	Enameled Copper Wire	26SWG 36SWG 37SWG 38SWG	Req.Qty
35	Varnish	-	Req. Qty
36	Winding Machine	-	1
37	Ceiling Fan	-	2
38	Single Phase Induction Motor	0.5 HP/50HZ,240V	1
39	Three Phase Squirrel Cage Induction Motor	3HP, 500 V, 50 Hz	1
40	Gauge Plate For Measurement of SWG	-	1
41	Winding Study Motor (3Φ Squirrel Cage Type)	-	1

OBJECTIVES:

At the end of this Practical Course the Students should be able to:

➢ Execute the Emergency Alarm Circuit

➢ Execute the wiring for Single Phase Service Connection with necessary items.

➢ Execute the wiring of Three Phase Supply using 3 Rotary Switches, MCB and DB to change the Phases by connecting Single Phase Lamp Load

➢ Execute the wiring to controlling the intensity of Lamp by six places by using two 2-Way Switches and 4 Intermediate Switches.

➢ Execute the wiring to connect a Single Phase Motor with Main Switch, D.O.L Starter and M.C.B

➢ Execute The Wiring To Connect A 3 Phase Induction Motor With Main Switch, Star / Delta Starter and E.L.C.B.

➢ Execute the wiring to control lamps (Sodium Vapour Lamp, Mercury Vapour Lamp, Fluorescent Lamp)

➢ Execute the wiring for Test Board with necessary items.

➢ Execute the Godown /Tunnel wiring

➢ Prepare winding for Transformer and No Volt Coil.

➢ Give end connections for 3 Phase Induction Motor Winding.

➢ Testing of faulty Ceiling Fan.

COURSE OUTCOMES:

Course	EED370 WIRING AND WINDING PRACTICAL
After successful completion of this course, the students should be able to	
D370.1	Acquire knowledge about tools, equipments and instruments required for different types of wiring systems and testing.
D370.2	Acquire skills in house wiring.
D370.3	Acquire skills in Industrial wiring.
D370.4	Understand the various types of wiring systems & to select suitable.
D370.5	Understand domestic wiring procedures practically and winding and develop the mini projects with report.

EED370 WIRING AND WINDING PRACTICAL

List of Experiments
WIRING

1 Emergency alarm wiring with 3 Bells and 3 Pushbuttons

2 House Wiring for a Service Connection with Single Phase Digital Energy meter Cutout, Main Switch, 4 Way D.B, Indicator Lamp

3 Wiring and Testing of 3 Phase Supply using 3 Rotary Switches, MCB and DB to change the Phases by connecting Single Phase Lamp Load

4 Controlling a Lamp by Six Places by using Two, 2-Way Switches& Four Intermediate Switches

5 Wiring of Single Phase Motor using Single Phase Main Switch, D.O.L Starter and MCB

6 Wiring of Three Phase Induction Motor with Main Switch, Star/ Delta Starter and ELCB

7 Wiring of Sodium Vapour and Mercury Vapour Lamp

8 Wiring and Troubleshooting the Fluorescent Tube light

9 Design and implement a Test Board with Indicator Lamp, Fuse Unit to test Electrical Appliances

10 Godown / Tunnel wiring using 4 Lamps

11 Make a switch board to control two lamps and one fan with plug point, provide four switches, one regulator and one 3 pin 5A plug point

WINDING

12 Design, construct and test a 230/12-0-12 Volt, 500mA Transformer

13 Design No Volt Coil for a 230/440 AC Contactor

14 Demonstrate the end connection for a 3 Phase Induction Motor Winding for a 2 Poles / 4 Pole Operations

15 Dismantling a faulty Ceiling Fan and identify the fault, run the fan after rectifying the fault

16 Mini project

The mini project is activity based and it may be given to group of maximum of six students for hands on experience and to create scientific temper.

CONTINUOUS INTERNAL ASSESSMENT

The Internal Assessment mark for a total of 25 marks which are to be distributed as follows:

a) Attendance (Award of marks same as theory courses)	:	05 Marks
b) Procedure/ observation and tabulation/ Other Practical related Work	:	05 Marks
c) Tests	:	10 Marks
d) Student Centered Learning (SCL) work sheet	:	05 Marks

TOTAL		25 Marks

LEARNING WEBSITES

1. https://www.electricaltechnology.org/2012/11/how-to-control-each-lamp-by-separately.html

2. https://matthews.sites.wfu.edu/courses/p230/switches/SwitchesTut.html

3. https://www.electronicshub.org/2-way-switch-wiring/

CO- POs & PSOs MAPPING MATRIX

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
D370.1	3	3	3	3	3	3	3	3	2	3
D370.2	3	3	3	3	3	3	3	3	2	3
D370.3	3	3	3	3	3	3	3	3	2	3
D370.4	3	3	3	3	3	3	3	3	2	3
D370.5	3	3	3	3	3	3	3	3	2	3
Total	15	15	15	15	15	15	15	15	10	15
Correlation level	3	3	3	3	3	3	3	3	2	3

Correlation level 1 – Slight (Low)

Correlation level 2 – Moderate (Medium)

Correlation level 3 – Substantial (High)

****

EED370 WIRING AND WINDING PRACTICAL

MODEL QUESTION PAPER

Si. No	List of Experiments	CO	PO
	WIRING		
1	Emergency alarm wiring with 3 Bells and 3 Pushbuttons	D370.1	PO1, PO2, PO3, PO4, PO5, PO6, PO7
2	House Wiring for a Service Connection with Single Phase Digital Energy meter Cutout, Main Switch, 4 Way D.B, Indicator Lamp	D370.1	PO1, PO2, PO3, PO4, PO5, PO6, PO7
3	Wiring and Testing of 3 Phase Supply using 3 Rotary Switches, MCB and DB to change the Phases by connecting Single Phase Lamp Load	D370.2	PO1, PO2, PO3, PO4, PO5, PO6, PO7
4	Controlling a Lamp by Six Places by using Two, 2-Way Switches& Four Intermediate Switches	D370.2	PO1, PO2, PO3, PO4, PO5, PO6, PO7
5	Wiring of Single Phase Motor using Single Phase Main Switch, D.O.L Starter and MCB	D370.2	PO1, PO2, PO3, PO4, PO5, PO6, PO7
6	Wiring of Three Phase Induction Motor with Main Switch, Star/ Delta Starter and ELCB	D370.3	PO1, PO2, PO3, PO4, PO5, PO6, PO7
7	Wiring of Sodium Vapour and Mercury Vapour Lamp	D370.3	PO1, PO2, PO3, PO4, PO5, PO6, PO7
8	Wiring and Troubleshooting the Fluorescent Tube light	D370.3	PO1, PO2, PO3, PO4, PO5, PO6, PO7
9	Design and implement a Test Autonomous with Indicator Lamp, Fuse Unit to Test Electrical Appliances	D370.3	PO1, PO2, PO3, PO4, PO5, PO6, PO7
10	Godown / Tunnel wiring using 4 Lamps	D370.4	PO1, PO2, PO3, PO4, PO5, PO6, PO7
11	Make a switch board to control two lamps and one fan with plug point, provide four switches, one regulator and one 3 pin 5A plug point	D370.4	PO1, PO2, PO3, PO4, PO5, PO6, PO7
	WINDING		
12	Design, construct and test a 230/12-0-12 Volt, 500mA Transformer	D370.5	PO1, PO2, PO3, PO4, PO5, PO6, PO7
13	Design No Volt Coil for a 230/440 AC Contactor	D370.5	PO1, PO2, PO3, PO4, PO5, PO6, PO7
14	Demonstrate the end connection for a 3 Phase Induction Motor Winding for a 2 Poles / 4Pole Operations	D370.5	PO1, PO2, PO3, PO4, PO5, PO6, PO7
15	Dismantling a faulty Ceiling Fan and identify the fault, run the fan after rectifying the fault	D370.5	PO1, PO2, PO3, PO4, PO5, PO6, PO7
16	**Mini project**	**D370.5**	**PO1, PO2, PO3, PO4, PO5, PO6, PO7**

EED310 ELECTRONIC DEVICES AND CIRCUITS

MODEL QUESTION PAPER

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

PART-A (10 X 3 = 30 Marks)					
Note: Answer all the questions. All questions carry equal marks					
S.No	**Questions**	**Unit**	**Bloom's Level**	**CO**	**PO**
1	Differentiate between Zener breakdown and Avalanche breakdown.	I	An	D310.1	PO1,PO2,PO3
2	Draw the symbol of LED and Photodiode.	I	An	D310.1	PO1,PO2,PO3
3	Compare BJT and FET.	II	E	D310.2	PO1,PO2,PO3
4	Mention the various methods of transistor biasing.	II	R	D310.2	PO1,PO2,PO3
5	What are the various types of negative feedback connections?	III	R	D310.3	PO1,PO2,PO3
6	What are the effects of negative feedback? (any two)	III	U	D310.3	PO1,PO2,PO3
7	Draw the symbol of SCR and TRIAC.	IV	An	D310.4	PO1,PO2,PO3
8	Expand (i) DIAC (ii)TRIAC.	IV	R	D310.4	PO1,PO2,PO3
9	Draw the circuit diagram of biased clipper.	V	An	D310.5	PO1,PO2,PO3
10	State any two applications of Monostable Multivibrator.	V	R	D310.5	PO1,PO2,PO3

PART-B (5 X 14 = 70Marks)					
Note: Answer all questions choosing A or B in each question. All questions carry equal marks					
S.No	**Questions**	**Marks**	**Unit**	**Bloom's Level**	**CO**	**PO**
11	(A) (i) Explain the working of Zener diode in Reverse bias. Draw its VI Characteristics.	07	I	U, An	D310.1	PO1,PO2,PO3
	(ii) Explain the working of LED. Draw its VI characteristics.	07	I	U	D310.1	PO1,PO2,PO3
	(OR)					
	(B) (i) Explain the working of Photo diode and draw its VI characteristics.	07	I	U, An	D310.1	PO1,PO2,PO3
	(ii) Explain the working of Zener diode Voltage regulator.	07	1	U	D310.1	PO1,PO2,PO3
12	(A) (i) Explain the working of Transistor as Switch	07	II	U	D310.2	PO1,PO2,PO3
	(ii) Explain the working of FET and draw its drain characteristics.	07	II	U,An	D310.2	PO1,PO2,PO3
	(OR)					
	(B) (i) Explain the working of UJT relaxation oscillator. Draw its output waveform.	07	II	U, An	D310.2	PO1,PO2,PO3
	(ii) Explain the working of CE Transistor amplifier.	07	II	U	D310.2	PO1,PO2,PO3

	(A).(i) What are the effects of negative feedback?	07	III	R	D310.3	PO1,PO2,PO3
	(ii) Draw the circuit diagram in which current series feedback is introduced and Indicate in which place negative feedback is introduced.	07	III	An	D310.3	PO1,PO2,PO3
13	(OR)					
	(B) (i) Explain the working of RC Phase shift oscillator.	07	III	U	D310.3	PO1,PO2,PO3
	(ii) Draw the circuit diagram and frequency response curve of RC coupled amplifier.	07	III	An	D310.3	PO1,PO2,PO3
	(A) (i) Explain the gate triggering of SCR. Draw its VI characteristics	07	IV	U, An	D310.4	PO1,PO2,PO3
	(ii) Explain the working and draw the Bidirectional characteristics of DIAC.	07	IV	U, An	D310.4	PO1,PO2,PO3
14	(OR)					
	(B) (i) Explain the working of TRIAC. Draw its VI characteristics.	07	IV	U, An	D310.4	PO1,PO2,PO3
	(ii) Explain the construction, working and characteristics of n channel MOSFET.	07	IV	U	D310.4	PO1,PO2,PO3
	(A) (i) Explain the working of Schmitt trigger. Draw its input and output.	07	V	U, An	D310.5	PO1,PO2,PO3
	(ii) Explain the working of Astable Multivibrator.	07	V	U	D310.5	PO1,PO2,PO3
15	(OR)					
	(B) (i) Explain the working of Biased Clipper and draw its output waveforms.	07	V	U, An	D310.5	PO1,PO2,PO3
	(ii) Explain the working of Voltage doubler and draw its output waveform.	07	V	U, An	D310.5	PO1,PO2,PO3

QUESTION PAPER SETTING

The question paper setters are requested to follow the Revised Bloom's Taxonomy levels as Presented below:

Bloom's Taxonomy	Lower Order Thinking Skills (LOTs)	Higher Order Thinking Skills (HOTs)
Level	R-Remember, U-Understand , Ap-Apply	An-Analyze, E-Evaluate, C-Create
% to be included	90%	10%

****

EED320 ELECTRICAL CIRCUIT THEORY

MODEL QUESTION PAPER

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

S. No	Questions	Unit	Bloom's Level	CO	PO
**PART-A (10 X 3 = 30 Marks)**					
**Note: Answer all questions. All questions carry equal marks**					
1	Write the unit of Capacitance.	I	U	D310.1	PO1, PO2
2	Define energy and its unit.	I	R	D310.1	PO1, PO2
3	State Thevenin's Theorem.	II	R	D310.2	PO1, PO2
4	State Maximum Power transfer theorem.	II	R	D310.2	PO1, PO2
5	Define Bandwidth.	III	R	D310.3	PO1, PO2
6	Define admittance and its unit.	III	U	D310.3	PO1, PO2
7	State any two advantages of three phase system over single phase system.	IV	R	D310.4	PO1, PO2
8	What is the relation between phase and line voltages and currents in three phase delta connected system?	IV	R	D310.4	PO1, PO2
9	What are the classifications of cells?	V	R	D310.5	PO1, PO2
10	Explain mercury cell.	V	U	D310.5	PO1, PO2

S. No	Questions	Marks	Unit	Bloom's Level	CO	PO
**PART-B (5 X 14 = 70 Marks)**						
**Note: Answer all questions choosing A or B in each question. All questions carry equal marks**						
11	(a) i) Three Resistors A,B and C are connected in Parallel and takes a total Current of 7.9A. If A=48Ω and takes 2.5A. $I_B=2I_C$. Calculate i) I_B, ii) I_C, iii) Values of B and C.	07	I	Ap	D320.1	PO1, PO2
	ii) State and explain Coulomb's law.	07	I	U	D320.1	PO1, PO2
	(OR)					
	(b) i) Determine the power p in the circuit shown below	07	I	U	D320.1	PO1, PO2
	ii) Derive an expression for the equivalent capacitance of three capacitors connected in parallel.	07	I	U	D320.1	PO1, PO2
12	(a) i) Derive the expression for star connection.	07	II	U	D320.2	PO1, PO2
	ii) State Norton's theorem and write the step by step procedure to find Norton's Equivalent Circuit.	07	II	U	D320.2	PO1, PO2
	(OR)					

65

	(b) i) Derive the expression for delta connection.	07	II	U	D320.2	PO1, PO2
	ii) State and explain Superposition Theorem.	07	II	U	D320.2	PO1, PO2
13	(a) i) A Series Circuit has R=10Ω, L=50mH and C=100μF is supplied with 200V, 50 Hz supply. Find i) Impedance ii) Current iii) Power Factor iv)Power v) Voltage across each element.	07	III	U	D320.3	PO1, PO2
	ii) Derive an expression to find the RMS value of AC Sinusoidal Current.	07	III	U	D320.3	PO1, PO2
	(OR)					
	(b) i) Derive the expression for RL series circuit.	07	III	U	D320.3	PO1, PO2
	ii) Compare Series and Parallel Resonance.	07	III	U	D320.3	PO1, PO2
14	(a) i)Three identical coils each having a Resistance of 10Ω and Inductance of 0.03H are connected in Delta across a Three Phase 400V,50Hz Supply. Calculate Phase Current ii) Line Current iii) Power Factor and iv) Total Power Consumed.	07	IV	Ap	D320.4	PO1, PO2
	(ii) State the advantages of Three Phase Systems.	07	IV	U	D320.4	PO1, PO2
	(OR)					
	(b) i) Derive an expression for measurement of Three Phase Power and Power Factor using Two Wattmeter Method.	07	IV	U	D320.4	PO1, PO2
	ii) The Power input to a 3 Phase Induction Motor is read by Two Wattmeters. The readings are 860 W and 240W. What is the Input Power and Power Factor of The Motor.	07	IV	Ap	D320.4	PO1, PO2
15	(a).i) Explain the indications of fully charged cell.	07	V	U	D320.5	PO1, PO2
	ii) Explain the various defects and their remedies of a lead acid cell.	07	V	U	D320.5	PO1, PO2
	(OR)					
	(b) i). Draw and explain lead acid cell.	07	V	U	D320.5	PO1, PO2
	ii) What are the methods of charging and explain.	07	V	U	D320.5	PO1, PO2

QUESTION PAPER SETTING

The question paper setters are requested to follow the Revised Bloom's Taxonomy levels as Presented below:

Bloom's Taxonomy	Lower Order Thinking Skills (LOTs)	Higher Order Thinking Skills (HOTs)
Level	R-Remember, U-Understand , Ap-Apply	An-Analyze, E-Evaluate, C-Create
% to be included	90%	10%

****

EED330 ELECTRICAL MACHINES - I

MODEL QUESTION PAPER

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

PART-A (10 X 3 = 30Marks)					
Note: Answer all questions. All questions carry equal marks					
S.No	**Questions**	**Unit**	**Bloom's Level**	**CO**	**PO**
1	Define Faraday's Laws of Induction.	I	U	D330.1	PO1, PO2
2	Explain Fleming's Left Hand Rule.	I	U	D330.1	PO1, PO2
3	What are the Types of DC Generator?	II	U	D330.2	PO1, PO2
4	Define Armature Reaction.	II	R	D330.2	PO1, PO2
5	What is the difference between 3 Point and 4 Point Starters?	III	R	D330.3	PO1, PO2
6	Draw the Speed-Torque Characteristics Of DC Shunt Motor	III	U	D330.3	PO1, PO2
7	Write the Advantage of Brushless DC Motor.	IV	R	D330.4	PO1, PO2
8	Explain phasing out test.	IV	R	D330.4	PO1, PO2
9	Mention the Groups of Three Phase Transformers.	V	R	D330.5	PO1, PO2
10	What is All Day Efficiency?	V	U	D330.5	PO1, PO2

PART-B (5 X 14 = 70 Marks)					
Note: Answer all questions choosing A or B in each question. All questions carry equal marks					
S. No	**Questions**	**Marks**	**Unit**	**Bloom's Level**	**CO**	**PO**
11	A.(i) State the Faraday's Laws of Electro Magnetic Induction.	07	I	U	D330.1	PO1, PO2, PO3
	(ii) Explain Lenz's Law.	07	I	U	D330.1	PO1, PO2, PO3
	(OR)					
	B. (i) Write the notes on Hysteresis and Eddy Current Losses	07	I	U	D330.1	PO1, PO2, PO3
	(ii) Explain the Lifting Power of Electromagnet	07	I	U	D330.1	PO1, PO2, PO3
12	A.(i) Explain the Principle of operation of DC Generator	07	II	U	D330.2	PO1, PO2, PO3
	(ii) Explain the Different types of Excitation of DC generator	07	II	U	D330.2	PO1, PO2, PO3
	(OR)					
	B.(i) A Shunt Generator delivers 450A at 230V and the Resistance of the Shunt Field and Armature are 50 Ohm and 0.03 Ohm respectively. Calculate the Generated E.M.F	07	II	Ap	D330.2	PO1, PO2, PO3

	(ii) Write the Applications of DC Generators.	07	II	R	D330.2	PO1, PO2, PO3
13	A.(i) Explain the Principle of operation of DC Motor	07	III	U	D330.3	PO1, PO2, PO3
	(ii) Explain the various types of DC Motors.	07	III	U	D330.3	PO1, PO2, PO3
	(OR)					
	B.(i) 250V DC Shunt Motor has Armature Resistance of 0.25 Ohm on Load it takes an Armature Current of 50A and runs at 750rpm. If the Flux of the Motor is reduced by10% without changing the Load Torque. Find the new Speed of the Motor.	07	III	Ap	D330.3	PO1, PO2, PO3
	(ii) Draw and explain 3 Point Starter	07	III	R	D330.3	PO1, PO2, PO3
14	A.(i) What are the Causes of Sparking in Commutators in DC Machines.	07	IV	R	D330.4	PO1, PO2, PO3
	(ii) Explain the Resurfacing process of Commutators in DC Machines.	07	IV	U	D330.4	PO1, PO2, PO3
	(OR)					
	B.(i) Write the Functions and requirements of Brushes in DC Machines	07	IV	U	D330.4	PO1, PO2, PO3
	(ii) Explain the Principle of Operation of Brushless DC Motor.	07	IV	U	D330.4	PO1, PO2, PO3
15	A.(i) Explain the Constructional Details of Transformers.	07	V	U	D330.5	PO1, PO2, PO3
	(ii) Explain O.C Test and S.C Test in Single Phase Transformers	07	V	U	D330.5	PO1, PO2, PO3
	(OR)					
	B.(i) Explain the Star-Delta Connections in Three Phase Transformer	07	V	U	D330.5	PO1, PO2, PO3
	(ii) Write the notes on Breakdown Test for Three Phase Transformer.	07	V	U	D330.5	PO1, PO2, PO3

QUESTION PAPER SETTING

The question paper setters are requested to follow the Revised Bloom's Taxonomy levels as Presented below:

Bloom's Taxonomy	Lower Order Thinking Skills (LOTs)	Higher Order Thinking Skills (HOTs)
Level	R-Remember, U-Understand , Ap-Apply	An-Analyze, E-Evaluate, C-Create
% to be included	90%	10%

****

TEACHING AND SCHEME OF EXAMINATION:

No of weeks per semester: 16 weeks

Course	Instructions		Examination			
	Hrs / Week	Hrs / Semester	Marks		Total	Duration
			Internal Assessment	Autonomous Examinations		
Electrical Machines - II	5	80	25	100*	100	3 Hrs.

*Examinations will be conducted for 100 marks and it will be reduced to 75 marks.

TOPICS AND ALLOCATION OF HOURS:

UNIT	TOPICS	NO. OF HOURS
I	Alternator Principles and Construction	12
II	Alternator Performance and Testing	16
III	Three Phase Induction Motor	15
IV	Single Phase Induction Motor & Synchronous Motor	14
V	Maintenance of Induction Motors & Starters	14
	Test & Model Exam	09
	Total	**80**

COURSE DESCRIPTION:
- This Course is classified under Core Technology group intended to teach Students about facts, concepts, Principles of Electrical Machines such as Induction Motor, Alternator and Synchronous Motor.

- Students will be able to analyze the characteristics and qualitative parameters of these Machines.

- These Machines are widely used in Industries and for generation of Electricity.

- The knowledge gained by the Student is useful in the study of Technological Courses such as Utilization System, Manufacturing Processes and Testing and Maintenance of Electrical Machines.

- The knowledge and skills obtained will be helpful in discharging Technical Functions such as Supervision, Controlling and as R & D Technicians.

OBJECTIVES:

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

- Alternator Principle, Construction and their Types, EMF Induced and Cooling Techniques of Machines
- Performance of an Alternator, Testing, Characteristics, Parallel Operation, Load Sharing etc.,
- Three Phase Induction Motor, Principle, Construction, Types, Characteristics and Applications, Starting Methods
- Single Phase Motor Types, Construction, Characteristics and Applications, Synchronous Motor, Starting, Construction, Characteristics and Applications
- Maintenance of Induction Motors and Starters.

COURSE OUTCOMES:

Course	EED410 ELECTRICAL MACHINES - II
After successful completion of this course, the students should be able to	
D410.1	Know the constructional details & working principles of Alternators
D410.2	Evaluate the performance of Alternators
D410.3	Understating construction and working principal three phase induction motor
D410.4	Understating construction and working principal single phase induction motor
D410.5	Analyses of special construction DC and AC machines

EED410 ELECTRICAL MACHINES - II

UNIT - I
ALTERNATOR PRINCIPLES AND CONSTRUCTION   12 Hrs

Basic Principle of Alternators – Types of Alternators – Stationary Armature Rotating Field – Advantages of Rotating Field	2 Hrs
Construction Details of Alternator – Salient Pole Rotor – Cylindrical Type Rotor	2 Hrs
Types of A.C. Armature Windings – Types of Slots – Full Pitch and Short Pitched Windings	1 Hr
Phase Spread Angle and Effect of Distribution Factor – Pitch Factor	2 Hrs
Relation between Frequency, Speed and Number of Poles – EMF Equation – Problems	2 Hrs
Methods of obtaining Sine Wave – Critical Speed of Rotor – Ventilation of Turbo Alternators –	2 Hrs
Advantages of Hydrogen Cooling and its Precaution – Excitation and Exciters.	1 Hr

UNIT - II
ALTERNATOR PERFORMANCE AND TESTING   16 Hrs

Load Characteristics of Alternators – Reason for Change in Terminal Voltage	2 Hrs
Qualitative Treatment of Armature Reaction for various Power Factor Loads – Effective Resistance – Leakage Reactance	2 Hrs
Synchronous Reactance, Synchronous Impedance – Voltage Regulation –	1 Hr
Determination of Voltage Regulation o f Alternator By Direct Load Test -	2 Hrs
Pre-Determination of Regulation of Alternator by Indirect Method (EMF, MMF, and ZPF).	2 Hrs
Necessity and conditions for Parallel Operation of Alternators – Synchronizing by Dark Lamp Method	2 Hrs
Bright Lamp Method, Dark - Bright Lamp Method	2 Hrs
Synchroscope Method– Synchronizing Current, Synchronizing Power	2 Hrs
Synchronizing Torque – Load Sharing of Alternators –Infinite Bus Bar - OC and SC test on alternator	1 Hr

UNIT - III
THREE PHASE INDUCTION MOTOR   15 Hrs

Rotating Magnetic Field – Principle of Operation of Three Phase Induction Motors – Slip and Slip Frequency – Comparison between Cage and Slip Ring Induction Motors	2 Hrs
Development of Phasor Diagram – Expression for Torque in Synchronous Watts	2 Hrs

Slip-Torque Characteristics – Stable and Unstable Region – No Load Test and Blocked Rotor Test – Development of Approximate Equivalent Circuit	2 Hrs
Problems on the above Topics – Simplified Circle Diagram.	2 Hrs
Determination of Maximum Torque, Slip (Problems Not Required)	1 Hr
Starting Torque and Starting Current Expression – Relationship between Starting Torque and Full Load Torque – Speed Control of Induction Motors.	2 Hrs
Starters of Induction Motors – Direct on Line Starter and Its Merits for Cage Motors – Star Delta Starter- Auto Transformer Starter	2 Hrs
Rotor Resistance Starter – Cogging –Crawling in Induction Motor– Double Cage Induction Motor-Induction Generator.	2 Hrs

UNIT - IV

SINGLE PHASE INDUCTION MOTOR	**14 Hrs**
Single Phase Induction Motors – Not Self Starting – Methods of Making	1 Hr
itself Starting – Construction, Working Principle – Phasor Diagram-Slip Torque Characteristics-	2 Hrs
Split Phase Motor - Capacitor Motor - Shaded Pole Motor - Repulsion	2 Hrs
Motor - Universal Motor – Operation of Three Phase Motor With Single Phase Supply.	2 Hrs
SYNCHRONOUS MOTOR	**2 Hrs**
Principle of Operation –Not Self Starting – Methods of Starting–	
Effects of Excitation on Armature Current and Power Factor– 'V' Curve and Inverted 'V' Curve of Synchronous Motor	1 Hr
The Phenomenon of Hunting and Prevention of Hunting by Damper Winding	1 Hr
Comparison between Synchronous Motor and Three Phase Induction Motor -	2 Hrs
Applications -Problems on Power Factor Improvement.	1 Hr

UNIT - V

MAINTENANCE OF INDUCTION MOTORS AND STARTERS	**14 Hrs**
BIS Publication Dealing With The Code of Practice of Induction Motors and	2 Hrs
Starters – Classification of Cage Motor – Continuous Rating and Intermittent Rating	2 Hrs
Various Types of Enclosures – Specifications of Motors – Selecting the Cable Rating	1 Hr
Single Phase Prevention using Current Operated Relay – Commissioning – Annual Maintenance	2 Hrs
Selection of Starters of Induction Motor – Common Induction Motor	2 Hrs
Troubles and their Remedies – Causes of Noise and Vibration	2 Hrs
Care of Bearings – Static Balancing – Degreasing	1 Hr
Vacuum Impregnation - Varnishing – Effect of Unbalanced Supply on the Performance of Induction Motor.	2 Hrs
Test and Model Exam	**09 Hrs**

TEXT BOOKS

S.NO	TITLE	AUTHOR	PUBLISHER WITH EDITION
1	A Text Book of Electrical Technology - Volume II	B.L. Theraja	S.Chand & Co. New Delhi
2	Electrical Technology	Edward Hughes	Addision– Wesley International Student Edition

REFERENCE BOOKS

S.NO	TITLE	AUTHOR	PUBLISHER WITH EDITION
1	Performance and Design of AC Machines	M.G.Say	Pitman Publishing Ltd
2	Electrical Machines	Nagarath	TMH Publications
3	Electrical Machines	Bhattacharya	TMH Publications

LEARNING WEBSITES

1. https://www.electrical4u.com/working-principle-of-alternator/

2. https://www.elprocus.com/synchronous-generator-construction-and-working/

3. https://www.electrical4u.com/working-principle-of-three-phase-induction-motor/

4. https://www.electrical4u.com/single-phase-induction-motor/

5. https://www.electrical4u.com/synchronous-motor-working-principle/

6. https://circuitglobe.com/ac-motor.html

CONTINUOUS INTERNAL ASSESSMENT

The Internal Assessment marks for a total of 25 marks, which are to be distributed as follows:

```
        i) Attendance        - 5 Marks
        ii) Test             - 10 Marks
        iii) Assignment      - 5 Marks
        iv) Seminar          - 5 Marks
                             -----------
                Total         25 Marks
                             -----------
```

CO-POs & PSOs MAPPING MATRIX

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
D410.1	3	3	3	3	2	2	3	3	3	3
D410.2	3	3	3	3	2	2	3	3	3	3
D410.3	3	3	3	3	2	2	3	3	3	3
D410.4	3	3	3	3	2	2	3	3	3	3
D410.5	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)

QUESTION PAPER SETTING

The teaching leering process and assessment are being carried out in accordance with the revised Bloom's 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.

Bloom's Taxonomy	Lower Order Thinking Skills (LOTs)	Higher Order Thinking Skills (HOTs)
Level	R-Remember, U-Understand , Ap-Apply	An-Analyze, E-Evaluate, C-Create
% to be included	90%	10%

****

EED420 MEASUREMENTS, INSTRUMENTS AND TRANSDUCERS

TEACHING AND SCHEME OF EXAMINATION:

No. of weeks per Semester: 16 Weeks

Course	Instructions		Examination			
	Hours / Week	Hours / Semester	Marks			Duration
			Internal Assessment	Autonomous Examinations	Total	
Measurements, Instruments and Transducers	5	80	25	100*	100	3 Hrs.

*Examinations will be conducted for 100 marks and it will be reduced to 75 marks.

TOPICS AND ALLOCATION OF HOURS:

UNIT	TOPICS	NO. OF HOURS
I	Classification and Characteristics of Instruments	15
II	Measurement of current Voltage and Resistance	14
III	Measurement of Power, Power Factor and Frequency	14
IV	Measurement of L, C Parameters, Waveforms and Signal Conditioners	13
V	Sensors and Transducers	15
	Test & Model Exam	09
	Total	**80**

COURSE DESCRIPTION:

Measurement is the basic and primary operation, the result of which is used only to describe the system and hence treated as an independent operation. Automation of any kind begins with the measurement of certain system parameters; In fact, Industrial growth moves hand in hand with the growth of the measurement of Science and Technology. Therefore it is highly essential for Electrical

Students to study about the measurement of various Electrical Parameters in a system and the construction and working of different Instruments used in measurement of such parameters.

OBJECTIVES:

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

> ➢ Define basic measurement terms.
> ➢ Learn about various operating Forces and effects used in Instruments.
> ➢ Study the construction and working of Moving coil and Moving Iron instruments, CT and PT and Electrostatic Voltmeter.
> ➢ Understand the measurement of Resistance using different means.
> ➢ Study Single Phase and Three Phase Power Measurement using Wattmeter.
> ➢ Study the construction and working of Single Phase, Three Phase Energy Meter and study about calibrations.
> ➢ Study the construction and working of Power Factor Meters, and Phase Sequence Indicators.
> ➢ Study about the Frequency Measurement using different types of Frequency Meters.
> ➢ Learn about the measurement of Inductance and Capacitance using Bridges.
> ➢ Study about CRO and its applications.

COURSE OUTCOMES:

Course	EED420 MEASUREMENTS, INSTRUMENTS AND TRANSDUCERS
After successful completion of this course, the students should be able to	
D420.1	Analyze the performance characteristics of each instrument
D420.2	Illustrate basic meters such as voltmeters and ammeters.
D420.3	Study Single phase and three phase power measurement using wattmeter and Power factor meters, and phase sequence indicators.
D420.4	Study and measurement of L, C parameters, waveforms and signal conditioners
D420.5	Learn about various active and passive transducers and their applications.

EED420 MEASUREMENTS, INSTRUMENTS AND TRANSDUCERS

UNIT - I

CLASSIFICATION AND CHARACTERISTICS OF INSTRUMENTS	**15 Hrs**
General - Definition of Measurement – Functions of MeasurementSystem (Indicating, Recording and Controlling Function)	2 Hrs
Applications of Measurement Systems	1 Hr
Classification – Absoluteand Secondary Instruments	2 Hrs
Indicating Recording and Integrating Instruments	2 Hrs
Analog and Digital	2 Hrs
Definition of True Value, Accuracy, Precision, Error and Error Correction	1 Hr
Instrument Efficiency	1 Hr
Effects used in Instruments	2 Hrs
Operating Forces — Deflecting, Controlling and Damping Forces. Supports and its types	2 Hrs

UNIT - II

MEASUREMENT OF CURRENT, VOLTAGE AND RESISTANCE	**14 Hrs**
Types of Instruments - Construction, Working and Torque Equation of Moving Coil	2 Hrs
Moving Iron, Dynamometer Type (Shaded Pole) Instruments	2 Hrs
Extension of Instrument Range Using Shunts and Multipliers. (Calculation, Requirements and Simple Problems).	2 Hrs
Tong Tester —— Electrostatic Voltmeter - Rectifier Type Instruments	1 Hr
Instruments Transformers CT and PT – Testing, Errors and Characteristics of CT and PT	2 Hrs
Classification of Resistance – Measurement using Conventional Method — (Ammeter — Voltmeter Method) Measurement of LowResistance using Kelvin's Bridge Ohmmeter	2 Hrs
Measurement of Medium Resistance using Wheatstone Bridge	1 Hr
High Resistance using Megger - Earth Resistance- – Earth Tester – Multimeters.	2 Hrs

UNIT - III

MEASUREMENT OF POWER, POWER FACTOR AND FREQUENCY	**14 Hrs**
Power in D.C and A.C Circuits —— Wattmeters in Power Measurement	2 Hrs
Measurement of Energy in AC Circuits	1 Hr

Single Phase and Three Phase Energy Meters Construction and Operation	2 Hrs
Digital Energy Meter	1 Hr
Power Factor Meters	1 Hr
Single Phase Electro Dynamometer Type – Construction and Working	1 Hr
Phase Sequence Indicator – Phase Difference Measurement using Synchro scope	2 Hrs
Tri-vector Meter –Merz Price Maximum Demand Indicator. Frequency Measurement	2 Hrs
Frequency Meter — Digital Frequency Meter (Simplified Block Diagram)	2 Hrs

UNIT - IV

MEASUREMENT OF L, C PARAMETERS, WAVEFORMS AND SIGNAL CONDITIONERS	**13 Hrs**
Inductance — Maxwell's Inductance Bridge	2 Hrs
Andersons Bridge	2 Hrs
Measurement of Capacitance using Schering Bridge	2 Hrs
CRO — Block Diagram — CRT — Applications	2 Hrs
Measurementsof Voltage, Frequency and Phase Difference Using CRO	2 Hrs
Digital Storage Oscilloscope – Block Diagram.	2 Hrs
SIGNAL CONDITIONER: Basic Components of Signal Conditioning System	1 Hr

UNIT - V

SENSORS AND TRANSDUCERS	**15 Hrs**
Definition – Types of Transducers	2 Hrs
PASSIVE TRANSDUCERS: Resistive Transducer – Strain Gauge	2 Hrs
Capacitive Transducer – Inductive Transducer – Proximity Sensor	2 Hrs
Construction andOperation of LVDT and RVDT	2 Hrs
ACTIVE TRANSDUCERS: RTD – Thermistor - Thermocouple – Synchros	2 Hrs
Piezoelectric Transducer-Measurement of Pressure and Vibration	1 Hr
Hall Effect Transducer	1 Hr
Photovoltaic Transducer — Photo conductive Transducer.	1 Hr
TELEMETRY: Block Diagram and its Applications	2 Hrs
Test & Model Exam	**09 Hrs**

TEXT BOOK

S.NO	TITLE	AUTHOR	PUBLISHER WITH EDITION
1	A Course in Electrical and Electronics Measurements and Instrumentation	A.K. Sawhney	Puneet Sawhney Dhanpat Rai & Co (P)Ltd., New Delhi 1993

REFERENCE BOOKS

S.NO	TITLE	AUTHOR	PUBLISHER WITH EDITION
1	Electronic Instrumentation	HS Kalsi	Tata Mc Graw Hill Publishing Co., Delhi 2010
2	Modern Electronic Instrumentation and Measurement techniques	Albert D. Helfrick William David Cooper	Prentic – Hall of India (P)Ltd., New Delhi 2010
3	Electronics and Instrumentation	Dr.S.K.Battachariya Dr. Renu Vig	S.K. Kataria & Sons, New Delhi
4	A course in Electrical and Electronic Measurement and Instrumentation	Umesh Sinha	Satya Prakashan, New Delhi

LEARNING WEBSITES

1. https://circuitglobe.com/classification-of-measuring-instruments.html

2. https://www.electronics-tutorials.ws/dccircuits/dcp_1.html

3. https://www.electrical4u.com/measurement-of-electrical-energy/

4. https://www.electronics-tutorials.ws/accircuits/phase-difference.html

5. https://myclassbook.org › Basic Electronics

CONTINUOUS INTERNAL ASSESSMENT

The Internal Assessment marks for a total of 25 marks, which are to be distributed as follows:

```
        i) Attendance       - 5 Marks
        ii) Test            - 10 Marks
        iii) Assignment     - 5 Marks
        iv) Seminar         - 5 Marks
                            -----------
                Total        25 Marks
                            -----------
```

CO-POs & PSOs MAPPING MATRIX

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
D420.1	3	3	2	2	2	2	2	3	3	3
D420.2	3	3	2	2	2	2	2	3	3	3
D420.3	3	3	2	2	2	2	2	3	3	3
D420.4	3	3	2	2	2	2	2	3	3	3
D420.5	3	3	2	2	2	2	2	3	3	3
Total	15	15	10	10	10	10	10	15	15	15
Correlation level	3	3	2	2	2	2	2	3	3	3

Correlation level 1- Slight (low)

Correlation level 2- Moderate (Medium)

Correlation level 3- Substantial (high)

QUESTION PAPER SETTING

The teaching leering process and assessment are being carried out in accordance with the revised Bloom's 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.

Bloom's Taxonomy	Lower Order Thinking Skills (LOTs)	Higher Order Thinking Skills (HOTs)
Level	R-Remember, U-Understand , Ap-Apply	An-Analyze, E-Evaluate, C-Create
% to be included	90%	10%

****

EED430 ANALOG AND DIGITAL ELECTRONICS

TEACHING AND SCHEME OF EXAMINATION:

No. of weeks per semester: 16 weeks

Course	Instruction		Examination			
	Hrs/ Week	Hrs / Semester	Marks			Duration
			Internal Assessment	Autonomous Examination	Total	
Analog and Digital Electronics	4	64	25	100*	100	3 Hrs

*Examinations will be conducted for 100 marks and it will be reduced to 75 marks.

TOPICS AND ALLOCATION OF HOURS:

UNIT	TOPIC	NO OF HOURS
I	Linear ICs and OP-amps	10
II	A/D, D/A, Special Function ICs and IC Voltage Regulators	12
III	Boolean Algebra and Arithmetic operations	10
IV	Combinational and Sequential Logic Circuits	11
V	Memories	12
	Test & Model Exam	09
	TOTAL	**64**

COURSE DESCRIPTION:

The Course Analog and Digital Electronics holds applications in all branches of engineering instrumentation and Industrial Automation. This will impart in depth knowledge of Number Systems, Logics of Combinational &Sequential circuits and memories.

OBJECTIVES:

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

> ➢ Understand the basics of operational amplifier.
> ➢ Know the op-amp applications.
> ➢ Know the waveform generator and Active filter.
> ➢ Know the concept of D/A and A/D converters
> ➢ Know the applications of Special function IC, IC 555Timer.
> ➢ Understand various Number Systems used in Digital Circuits
> ➢ Understand basic Boolean postulates and laws.
> ➢ Understand the De-Morgan's theorem.
> ➢ Understand the concept of Karnaugh Map.
> ➢ Learn about Basic logic Gates.
> ➢ Study about Boolean techniques.
> ➢ Learn the different digital logic families
> ➢ Learn arithmetic circuits-Adder/ Subtractor
> ➢ Understand the encoder/decoder & MUX /DEMUX
> ➢ Understand the concept of parity Generator and checker
> ➢ Understand various types of flip-flops.
> ➢ Understand various types of counters
> ➢ Understand various modes of shift registers
> ➢ Understand various types of memories

COURSE OUTCOMES:

Course	EED430 ANALOG AND DIGITAL ELECTRONICS
After successful completion of this course, the students should be able to	
D430.1	Know the concepts of Operational Amplifier, applications of OP-AMP and OP-AM P specifications.
D430.2	Analyze different types of A/D Converter, D/A Converter, special function ICs and IC voltage Regulators.
D430.3	Develop competence in analysis of Boolean algebra and arithmetic operations.
D430.4	Analyze different types of combinational and sequential logic circuits like Parity Generator and checker, Encoder, Decoder, multiplexer, demultiplexer, Counters and Shift Registers.
D430.5	Understand the classification of RAM and ROM Memories.

EED430 ANALOG AND DIGITAL ELECTRONICS

UNIT I

LINEAR ICS AND OP-AMPS   **10Hrs**

1.1: OPERATIONAL AMPLIFIER

Ideal Op-Amp – Block diagram and Characteristics   2 Hrs

Op-amp parameters CMRR – Slew rate –   1 Hr

Concept of Virtual ground   1 Hr

1.2: APPLICATIONS OF OP-AMP

Inverting amplifier –Summing amplifier – Non inverting amplifier   1 Hr

Voltage follower - Comparator – Zero crossing detector   1 Hr

Integrator – Differentiator- waveform generation (Schmitt Trigger only)   1 Hr

RC Low pass Active filter.   1 Hr

1.3: OP-AMP SPECIFICATIONS

OP-amp 741 – Symbol – Pin diagram – Specifications   2 Hrs

UNIT -II

A/D, D/A ,SPECIAL FUNCTION ICs AND IC VOLTAGE REGULATORS   **12 Hrs**

2.1: SAMPLING AND QUANTIZATION   1 Hr

2.2: A/D CONVERTER

Analog to digital conversion using Ramp method   1 Hr

Successive approximation method – Dual slope method   1 Hr

Specifications of A/D converter   1 Hr

2.3: D/A CONVERTER

Basic concepts – Weighted Resistor D/A converter   1 Hr

 R-2R Ladder D/A converter – Specifications of DAC IC   1 Hr

2.4:SPECIAL FUNCTION ICS

2.4.1:IC 555 Timer – Pin diagram - Functional Block diagram of IC 555 in   1 Hr

Astable and Monostable Multivibrator mode - Schmitt trigger using IC 555

2.4.2:IC 565-PLL-Pin diagram-Functional Block diagram of IC 565   1 Hr

2.4.3:IC 566-VCO-Pin diagram-Functional Block diagram of IC 566   1 Hr

2.5.: IC VOLTAGE REGULATORS

Positive IC Voltage Regulators: 78XX   1 Hr

 Negative IC Voltage Regulators: 79XX and General purpose   2 Hrs

IC Voltage Regulators using LM 723.

UNIT- III

BOOLEAN ALGEBRA AND ARITHMETIC OPERATIONS   **10Hrs**

 3.1: NUMBER SYSTEMS

Decimal – Binary – Octal – Hexadecimal – BCD –

Conversion from one number system to other –   1 Hr

Boolean Algebra – Basic laws and Demorgan's Theorems   1 Hr

 3.2: UNIVERSALGATES

Realization of basic logic gates using universal gates NAND and NOR –

Tristate Buffer circuit   2 Hrs

3.3: PROBLEMS USING 2, 3, AND 4 VARIABLES

Boolean expression for outputs –

Simplification of Boolean expression using Karnaugh map (up to 4 variables)-   1 Hr

Constructing logic circuits for the Boolean expressions   1 Hr

3.4: ARITHMETIC OPERATIONS

Binary Addition-Binary Subtraction-

1's compliment and 2's compliment-   1 Hr

Signed binary numbers   1 Hr

3.5: ARITHMETIC CIRCUITS

Half Adder-Full Adder-   1 Hr

Half Subtractor-Full Subtractor   1 Hr

UNIT-IV

COMBINATIONAL AND SEQUENTIALLOGIC CIRCUITS   **11 Hrs**

4.1 PARITY GENERATOR AND CHECKER   1 Hr

4.2 DECIMAL TO BCD ENCODER   1 Hr

4.3 3 to 8 DECODER   1 Hr

4.4 MULTIPLEXER   1 Hr

4 to 1 Multiplexer

4.5 DEMULTIPLEXER   1 Hr

1 to 4 Demultiplexer

4.6: FLIP-FLOPS (FF)   2 Hrs

RS FF– JK FF: Master Slave FF and Edge triggered FF – D and T FF

4.7 COUNTERS

4 bit Asynchronous Up Counter –Mod N counter –   1 Hr

Decade counter –4 bit Synchronous Up counter   1 Hr

4.8 SHIFT REGISTER

4 bit shift register – Serial in Serial out

4 bit Serial in parallel out

4 bit parallel in parallel out

4 bit parallel in serial out   2 Hrs

UNIT -V

MEMORIES   **12 Hrs**

5.1 CLASSIFICATION OF MEMORIES

5.2 RAM

RAM organization-   1 Hr

Address Lines and Memory Size-   1 Hr

Read/write operations-Static RAM-   1 Hr

Bipolar RAM cell- Dynamic RAM-   1 Hr

SD RAM- DDR RAM.   2 Hrs

5.3 ROM

ROM organization-Expanding memory-   2 Hrs

PROM- EPROM- and EEPROM-   2 Hrs

Flash memory- Anti Fuse Technologies.   2 Hrs

Tests & Model Exam   **9 Hrs**

TEXT BOOKS

S.NO	TITLE	AUTHOR	PUBLISHER WITH EDITION
1.	Principles of Digital Electronics	K.Meena	PHI – 2011
2.	Modern Digital Electronics	R.P.Jains	TMH -2003

REFERNCE BOOKS

S.NO	TITLE	AUTHOR	PUBLISHER WITH EDITION
1.	Digital principles & Applications	Albert Paul Malvino & Donald P.Leach	TMH - 4th Edition 2002
2.	Digital Electronics	William H.Gothmann	Prentice Hall of India – 2nd Edition,1995
3.	Linear integrated circuits	B.Suseela&T.R.Ganeshbabu	Scitechpublications-2018
4.	Digital Electronics	Roger L.Tokheim Macmillan	McGraw hill -1994
5.	Integarted circuits	K.R.Botkar	Khanna Publisher's-1996

LEARNING WEBSITES

1. https://www.geeksforgeeks.org/digital-electronics-logic-design-tutorials/

2. https://www.tutorialspoint.com/digital_electronics/index.asp

3. https://en.wikibooks.org/wiki/Digital_Electronics

4. https://www.electrical4u.com/digital-electronics/

5. https://www.factmonster.com/dk/encyclopedia/science/digital-electronics

CONTINUOUS INTERNAL ASSESSMENT

The Internal Assessment marks for a total of 25 marks, which are to be distributed as follows:

```
        i) Attendance          - 5 Marks
        ii) Test              - 10 Marks
        iii) Assignment        - 5 Marks
        iv) Seminar            - 5 Marks
                              -----------
              Total           25 Marks
                              -----------
```

CO-POs &PSOs MAPPING MATRIX

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
D430.1	3	3	3	3	3	2	2	3	2	2
D430.2	3	3	3	3	3	2	2	3	2	2
D430.3	3	3	3	3	3	2	2	3	2	2
D430.4	3	3	3	3	3	2	2	3	2	2
D430.5	3	3	3	3	3	2	2	3	2	2
Total	15	15	15	15	15	10	10	15	10	10
Correlation Level	3	3	3	3	3	2	2	3	2	2

Correlation level 1- Slight (low)

Correlation level 2- Moderate (Medium)

Correlation level 3- Substantial (high)

QUESTION PAPER SETTING

The teaching leering process and assessment are being carried out in accordance with the revised Bloom's 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.

Bloom's Taxonomy	Lower Order Thinking Skills (LOTs)	Higher Order Thinking Skills (HOTs)
Level	R-Remember, U-Understand , Ap-Apply	An-Analyze, E-Evaluate, C-Create
% to be included	90%	10%

****

EED440 E-VEHICLE TECHNOLOGY & POLICY

TEACHING AND SCHEME OF EXAMINATION:

No. of weeks per Semester: 16 Weeks

Course	Instructions		Examination				Duration
			Marks				
	Hrs / Week	Hrs / Semester	Internal Assessment	Autonomous Examinations	Total		Duration
E-Vehicle Technology & Policy	4	64	25	100*	100		3 Hrs.

* Examination will be conducted for 100 marks and it will be reduced to 75 marks for result.

TOPICS AND ALLOCATION OF HOURS:

UNIT	TOPICS	NO. OF HOURS
I	Environmental impact and history & Electric vehicle Types	11
II	Electric vehicle & Drive System	11
III	Energy Storages, Charging System, Effects and Impacts	11
IV	Electric Mobility Policy Frame Work	11
V	Tamil Nadu E-Vehicle Policy 2019	11
	Test & Model Exam	09
	Total	64

COURSE DESCRIPTION:

The world is transitioning to cleaner mobility options with the aim at improving air quality and reducing dependency on fossil fuels. Electric Vehicles (EVs) have emerged a popular clean mobility choice to reduce emissions. EVs are powered fully or partially by batteries, they can help to reduce dependence on fossil fuels also air quality. Tamil Nadu is one of the most advanced states in India. Tamil Nadu has a highly developed industrial eco-system and is very strong in sectors like automobiles and auto-components. Many globally renowned companies have setup their manufacturing facilities in Tamil Nadu. Due the rapid depletion of fossil fuel and increase in fuel cost, environmental pollution, the shift to clean transport is necessary. This Course introduced by keeping all the above factors.

OBJECTIVES:

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

- ➢ To learn the environmental impact and history of Electric Vehicles.
- ➢ To understand the concept of Electric Vehicle and its types.
- ➢ To study the configurations of Electric Vehicles.
- ➢ To acquire knowledge about Energy Storages, Charging System, Effects and Impacts.
- ➢ To appreciate the Electric Mobility Policy Frame work India and EV Policy
  Tamil Nadu 2019.

COURSE OUTCOMES:

Course	EED440 E-VEHICLE TECHNOLOGY & POLICY
After successful completion of this course, the students should be able to	
D440.1	Know the Environmental impact, history and different types of Electric vehicle.
D440.2	Understand the basics of electric vehicles and Electric Propulsion Systems.
D440.3	Analyze the different types of energy storages, chargers for electric vehicles and explain effects and impacts of electric vehicles.
D440.4	Understand the Electric mobility and Policy frame work for Electric Vehicles.
D440.5	Know the Tamil Nadu E-Vehicle Policy 2019.

EED440 E-VEHICLE TECHNOLOGY & POLICY

UNIT I

ENVIRONMENTAL IMPACT AND HISTORY & ELECTRIC VEHICLE TYPES   **11 Hrs**

1.1 ENVIRONMENTAL IMPACT AND HISTORY

Environmental impact of conventional vehicle **-** Air pollution –	1 Hr
Petroleum resources – History of Electric vehicles & Hybrid Electric Vehicles –	1 Hr
Conventional drive train system – Rear Wheel, Front Wheel and All wheel –	1 Hr
Parts of Drive train system	1 Hr

1.2 ELECTRIC VEHICLE TYPES

Introduction to Battery Electric Vehicle (BEV) – Definition BEV –	2 Hrs
Necessity BEV – Different between BEV and Conventional Vehicle –	1 Hr
Advantages of BEV - Block diagram of BEV-	2 Hrs
Hybrid electric Vehicle (HEV) - Plug-in Hybrid Electric Vehicle (PHEV)-	1 Hr
Fuel Cell Electric Vehicle (FCEV) – Description	1 Hr

UNIT II

ELECTRIC VEHICLE & DRIVE SYSTEM   **11 Hrs**

2.1 ELECTRIC VEHICLES

Configurations of Electric Vehicle – Performance of Electric Vehicles –	1 Hr
Tractive Effort in Normal Driving-energy consumption	1 Hr
Hybrid Electric Vehicles Concept of Hybrid electric drive trains	1 Hr
Architecture of Hybrid Electric Drive trains – Series, Parallel and Series & Parallel	2 Hrs

2.2 ELECTRIC PROPULSION SYSTEMS

Types of EV motors - DC motor drives–	2 Hrs
Permanent Magnetic Brush Less DC Motor Drives (BLDC) –	1 Hr
Principles, Construction and Working – Hub motor Drive system –	1Hr
Merits and Demerits of DC motor drive, BLDC motor drive	2 Hrs

UNIT III

ENERGY STORAGES, CHARGING SYSTEM, EFFECTS AND IMPACTS   **11 Hrs**

3.1 ENERGY STORAGES

Electrochemical Batteries – Battery Technologies –	1 Hr
Construction and working of Lead Acid Batteries,	1 Hr
Nickel Based Batteries and Lithium Based Batteries	1 Hr
Role of Battery Management System (BMS)– Battery pack development Technology–	1 Hr

Cell Series and Parallel connection to develop battery pack. 1 Hr

3.2 CHARGING

Battery Charging techniques –Constant current and Constant voltage,

Trickle charging – 1 Hr

 Battery Swapping Techniques – DC charging – 1 Hr

 Wireless charging – Maintenance of Battery pack – 1 Hr

Latest development in battery chemistry 1 Hr

3.3 EFFECTS AND IMPACTS

Effects of EV – Impacts on Power grid – 1 Hr

Impacts on Environment – Impacts on Economy 1 Hr

UNIT IV

ELECTRIC MOBILITY POLICY FRAME WORK **[11 Hrs**

Government of India Electric Mobility Policy Frame work – 1 Hr

 Global Scenario of EV adoption – Electric mobility in India – 2 Hrs

National Electric Mobility Mission Plan 2020 – 1 Hr

Action led by Original Equipment Manufacturers – 1 Hr

 Need of EV Policy-Advantage of EV Eco system – 1 Hr

 Scope and Applicability of EV Policy – 1 Hr

ARAI Standards for Electric Vehicle – AIS 038, AIS 039 &AIS 123- 2 Hrs

Key Performance Indicator-Global impact – Trends and Future Developments 2 Hrs

UNIT V

TAMIL NADU E-VEHICLE POLICY 2019 **11 Hrs**

Tamil Nadu E-vehicle Policy 2019 2 Hrs

Vehicle Population in Tamil Nadu – 1 Hr

Objectives of EV Policy – Policy Measures – 2 Hrs

Demand side incentives – 1 Hr

Supply side incentives to promote EV manufacturing- 1 Hr

Revision of Transport Regulation of EV – 1 Hr

City building codes – Capacity Building and Skilling – 1 Hr

Charging structure – implementing agencies- 1 Hr

R&D and Business Incubation – Recycling Ecosystem – Battery and EVs 1 Hr

Test & Model Exam **9 Hrs**

TEXT BOOKS

S.No	Title	Author	Publisher with Edition
1.	Electric Vehicles - A future Projection	-	CII October 2020 report.
2.	Design and analysis of aluminum/air battery system for electric vehicles,	Shaohua Yang, Harold Knickle,	Elsevier
3.	Propelling Electric Vehicles in India, Technical study of Electric Vehicles and Charging Infrastructure	-	-
4.	Zero emission vehicles (ZEVs): towards a policy framework	-	Nti Aayog
5.	Faster adoption of electric vehicles in India: perspective of consumers and industry,	-	The Energy and Resources Institute, New Delhi.
6.	India EV Story: Emerging Opportunities by Innovation Norway.	-	-
7.	Automotive Industry Standards – AIS 038, AIS 039 & AIS 123 – Manual	-	-

REFERENCE BOOKS

S.No	Title	Author	Publisher with Edition
1.	Modern Electric, Hybrid Electric and Fuel Cell Vehicles	Mehrdad Ehsani, Yimin Gao, Sebastien E.Gay, Ali Emadi,	CR Press, London, NewYork
2.	Comparison of Electric and Conventional Vehicle in Indian Market: Total Cost of Ownership, Consumer Preference and Best Segment for Electric Vehicle (IJSR)	Akshat Bansal, Akriti Agarwal	-
3.	A Comprehensive Study of Key Electric Vehicle (EV) Components, Technologies, Challenges, Impacts, and Future Direction of Development (MDPI),	Fuad Un-Noor, Sanjeevi kumar Padmanaban, Lucian Mihet-Popa, Mohammad Nurunnabi Mollah and EklasHossain.	-

LEARNING WEBSITES

1. https://earthjustice.org/features/electric-vehicles

2. https://onlinecourses.nptel.ac.in/noc20_ee18/preview

3. https://www.edx.org/learn/electric-cars

4. https://www.udemy.com/topic/electric-vehicles/

CONTINUOUS INTERNAL ASSESSMENT

The Internal Assessment marks for a total of 25 marks, which are to be distributed as follows:

i) Attendance	- 5 Marks
ii) Test	- 10 Marks
iii) Assignment	- 5 Marks
iv) Seminar	- 5 Marks

Total	**25 Marks**

CO-POs & PSOs MAPPING MATRIX

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
D440.1	3	3	3	3	3	3	3	3	2	2
D440.2	3	3	3	3	3	3	3	3	2	2
D440.3	3	3	3	3	3	3	3	3	2	2
D440.4	3	3	3	3	3	3	3	3	2	2
D440.5	3	3	3	3	3	3	3	3	2	2
Total	15	15	15	15	15	15	15	15	10	10
Correlation Level	3	3	3	3	3	3	3	3	2	2

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

QUESTION PAPER SETTING

The teaching leering process and assessment are being carried out in accordance with the revised Bloom's 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.

Bloom's Taxonomy	Lower Order Thinking Skills (LOTs)	Higher Order Thinking Skills (HOTs)
Level	R-Remember, U-Understand , Ap-Apply	An-Analyze, E-Evaluate, C-Create
% to be included	90%	10%

****

EED450 ELECTRICAL MACHINES AND INSTRUMENTATION PRACTICAL

TEACHING AND SCHEME OF EXAMINATION:

No. of weeks per Semester: 16 Weeks

Course	Instructions		Examination			
	Hrs / Week	Hrs / Semester	Marks			Duration
			Internal Assessment	Autonomous Examinations	Total	
Electrical Machines and Instrumentation Practical	5	80	25	100*	100	3 Hrs.

*Examinations will be conducted for 100 marks and it will be reduced to 75 marks.

DETAILLED ALLOCATION OF MARKS:

S.NO	NAME OF THE ACTIVITY	MARKS
1	CIRCUIT DIAGRAM	25
2	CONNECTIONS AND CONDUCTION OF THE EXPERIMENT	25
3	READING/CALCULATION	20
4	GRAPH/RESULT	15
5	VIVA VOCE	05
6	MINI PROJECT	10
	TOTAL	100

Mini Project Evaluation (10 marks)

Breakup Details

1	Project Description	05
2	Project Demo	05
	Total	10

COURSE DESCRIPTION:

- To impart practical knowledge to the Diploma Students, Practical's are introduced for every corresponding Theory Courses.

- This Practical Course supports the Aim and Objective of Electrical Machines II and Measurements and Instruments Courses.

EQUIPMENTS REQUIRED: (For a Batch of 30 Students)

S.NO	NAME OF THE EQUIPMENTS	QUANTITY REQUIRED
1	Three Phase Squirrel Cage Induction motor 5 HP, 440V,1440 rpm with starting and loading arrangement	2
2	Three Phase Squirrel Cage Induction motor 5 HP,440V,1440 rpm without starting and loading arrangement	1
3	Three phase Slip ring Induction motor 5HP, 440V, 940/1450 rpm with starting and loading arrangement	1
4	Single phase induction motor with staring and loading arrangement 2HP, 250V, 10A, 1440 rpm.	1
5	Wheatstone bridge.	2
6	Anderson Bridge.	2
7	Schering Bridge.	2
8	1 Phase Energy meter induction type, 250V, 10A.	2
9	3 Phase Energy meter Induction type 440V, 10/20A.	2
10	Earth megger with necessary connecting leads and rods.	1
11	3 phase Alternator with prime mover.	2
12	Synchronizing panel.	1
13	PF meter (power factor meter).	2
14	LVDT trainer.	2
15	3 phase capacitor bank rating of 1KVAR, 400/440 V.	1

OBJECTIVES:

On completion of the following experiments, the students must be able to

- ➢ Understand the characteristics of AC Machines.
- ➢ Make various Electrical Measurements.
- ➢ Use Transducers in Non-Electrical Quantity Measurement

COURSE OUTCOMES:

Course	EED450 ELECTRICAL MACHINES AND INSTRUMENTATION PRACTICAL
After successful completion of this course, the students should be able to	
D450.1	Identify the physical components of transformer, 3 Ph Induction motor, synchronous motor, 1 ph Induction motors and AC motor starters.
D450.2	Identify the physical parts of the AC machines and Alternator.
D450.3	Conduct suitable experiments to draw and interpret the performance characteristics of AC Machines.
D450.4	Understand the characteristics of AC machines.
D450.5	Use transducers in non electrical quantity measurement and develop the mini projects with report

EED 450 ELECTRICAL MACHINES AND INSTRUMENTATION PRACTICAL

List of Experiments

1. Predetermine the Regulation of Alternator.

2. Load test on 3 Phase Alternator.

3. Synchronization of 3 Phase Alternator

4. Load test on Single Phase Induction Motor.

5. Load test on 3 Phase Induction Motor.

6. Determine the Equivalent Circuit Constants of 3 Phase Induction Motor.

7. Predetermine the performance of a 3 Phase Induction Motor.

8. Improvement of Power Factor of an Induction Motor with load.

9. Calibration of given Ammeter and Voltmeter.

10. Calibration of given Wattmeter

11. Calibration of 3 phase Energy meter.

12. Circle diagram of three phase induction motor.

13. Measurement of Alternator Winding Resistance using Wheatstone Bridge

14. Measurement of value of unknown Capacitance using Schering Bridge.

15. Measurement of value of unknown Inductance using Anderson Bridge.

16. Displacement measurement using LVDT.

17. Measurement of earth Resistance by using Megger.

18. Mini Project

   The mini project is activity based and it may be given to group of maximum of six students for hands on experience and to create scientific temper.

CONTINUOUS INTERNAL ASSESSMENT

The Internal Assessment mark for a total of 25 marks which are to be distributed as follows:

a) Attendance (Award of marks same as theory courses)	:	05 Marks
b) Procedure/ observation and tabulation/ Other Practical related Work	:	05 Marks
c) Tests	:	10 Marks
d) Student Centered Learning (SCL) work sheet	:	05 Marks
TOTAL		25 Marks

LEARNING WEBSITES

1. http://www.directindustry.com/industrial-manufacturer/three-phase-alternator-81713.html

2. https://www.electrical4u.com/induction-motor-types-of-induction-motor/

3. https://www.brighthubengineering.com/hvac/50002-calibration-of-the-measuring-instruments/

4. https://www.emerson.com/en-in/automation/measurement-instrumentation

CO-POs & PSOs MAPPING MATRIX

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
D450.1	3	3	3	3	3	3	3	3	3	3
D450.2	3	3	3	3	3	3	3	3	3	3
D450.3	3	3	3	3	3	3	3	3	3	3
D450.4	3	3	3	3	3	3	3	3	3	3
D450.5	3	3	3	3	3	3	3	3	3	3
Total	15	15	15	15	15	15	15	15	15	15
Correlation level	3	3	3	3	3	3	3	3	3	3

Correlation level 1 – Slight (Low)
Correlation level 2 – Moderate (Medium)
Correlation level 3 – Substantial (High)

EED450 ELECTRICAL MACHINES AND INSTRUMENTATION PRACTICAL

MODEL QUESTION PAPER

Si. No	Name of the Experiments	CO	PO
1	Predetermine the Regulation of Alternator	D450.1	PO1, PO2, PO3, PO4, PO5, PO6, PO7
2	Load test on 3 Phase Alternator	D450.1	PO1, PO2, PO3, PO4, PO5, PO6, PO7
3	Synchronization of 3 Phase Alternator	D450.1	PO1, PO2, PO3, PO4, PO5, PO6, PO7
4	Load test on Single Phase Induction Motor	D450.2	PO1, PO2, PO3, PO4, PO5, PO6, PO7
5	Load test on 3 Phase Induction Motor	D450.2	PO1, PO2, PO3, PO4, PO5, PO6, PO7
6	Determine the Equivalent Circuit Constants of 3 Phase Induction Motor	D450.2	PO1, PO2, PO3, PO4, PO5, PO6, PO7
7	Predetermine the performance of a 3 Phase Induction Motor	D450.2	PO1, PO2, PO3, PO4, PO5, PO6, PO7
8	Improvement of Power Factor of an Induction Motor with load	D450.3	PO1, PO2, PO3, PO4, PO5, PO6, PO7
9	Calibration of given Ammeter and Voltmeter	D450.3	PO1, PO2, PO3, PO4, PO5, PO6, PO7
10	Calibration of given Wattmeter	D450.3	PO1, PO2, PO3, PO4, PO5, PO6, PO7
11	Calibration of given 3 phase Energy meter	D450.3	PO1, PO2, PO3, PO4, PO5, PO6, PO7
12	Circle diagram of three phase induction motor	D450.4	PO1, PO2, PO3, PO4, PO5, PO6, PO7
13	Measurement of Alternator Winding Resistance using Wheatstone Bridge	D450.4	PO1, PO2, PO3, PO4, PO5, PO6, PO7
14	Measurement of value of unknown Capacitance using Schering Bridge	D450.4	PO1, PO2, PO3, PO4, PO5, PO6, PO7
15	Measurement of value of unknown Inductance using Anderson Bridge	D450.4	PO1, PO2, PO3, PO4, PO5, PO6, PO7
16	Displacement measurement using LVDT	D450.5	PO1, PO2, PO3, PO4, PO5, PO6, PO7
17	Measurement of earth Resistance by using Megger	D450.5	PO1, PO2, PO3, PO4, PO5, PO6, PO7
18	**Mini Project**	D450.5	**PO1, PO2, PO3, PO4, PO5, PO6, PO7**

EED460 ANALOG AND DIGITAL ELECTRONICS PRACTICAL

TEACHING AND SCHEME OF EXAMINATION:

No. of weeks per semester : 16 weeks

Course	Instruction		Examination			Duration
	Hrs/ Week	Hrs / Semester	Marks			
			Internal Assessment	Autonomous Examination	Total	
Analog and Digital Electronics Practical	5	80	25	100*	100	3 Hrs

Examinations will be conducted for 100 marks and it will be reduced to 75 marks.

DETAILED ALLOCATION OF MARKS:

SI.NO	NAME OF THE ACTIVITY	MARKS
1	CIRCUITDIAGRAM	25
2	CONNECTION	25
3	EXECUTION & HANDLING OF EQUIPMENT	25
4	OUTPUT /RESULT	10
5	VIVA–VOCE	5
6	MINI PROJECT	10
	TOTAL	100

Mini Project Evaluation (10 marks)

Breakup Details

1	Project Description	05
2	Project Demo	05
	Total	**10**

COURSE DESCRIPTION:

Every Electronic Engineer should have sound knowledge about the ICs used in Electronics Industry. This is vital in R&D Department for Chip level troubleshooting. To meet the industrial needs, diploma holders must be taught about the most fundamental Course, Analog and Digital Electronics Practical. By doing practical experience in this, they will be skilled in handling all types of ICs and able to apply the skill in electronic system design and the designing of PCBs

EQUIPMENTS REQUIRED: (For a Batch of 30 Students)

Si. No	Name of the Equipments	Range	Required Nos
1	DC Regulated power supply	0-30V,1A	5
2	IC Voltage Power Supply	0-5V,1A 15-0-15V, 1A	5 5
3	Signal Generator	1MHz	4
4	Dual trace CRO	20MHz/ 30MHz	5
5	Digital Trainer	-	10
6	DC Voltmeter (Analog/Digital)	Different Ranges	5
7	DC Ammeter(Analog/Digital)	Different Range	5
8	Desk Top Computer	-	5
9	Simulation Tool	Multisim/OrCAD/ Lab view	1

OBJECTIVES:

On completion of the following experiments, the students must be able to

- Know the Verification of truth table of OR, AND, NOT, NOR, NAND, EX-OR gates
- Know the Realization of basic gates using NAND &NOR gates.
- Know the verification of Half Adder and Full Adder using IC's.
- Know the verification of Half Subtract and Full Subtractor using IC's.
- Know the Verification of Truth Table for Decoder/Encoder.
- Know the Verification of truth table for RS, D, T & JK flip-flop.
- Test Inverting Amplifier and Non inverting amplifier using Op-amp
- Test Summing Amplifier, Difference Amplifier and Voltage Comparator using Op-amp.
- Test Integrator and Differentiator
- Test Astable multivibrator using IC555
- Design IC Voltage Regulator Power Supplies using IC 7805, IC7912
- Design the PCB of 4- bit ripple counter using FF

COURSE OUTCOMES:

Course	EED460 ANALOG AND DIGITAL ELECTRONICS PRACTICAL
After successful completion of this course, the students should be able to	
D460.1	Construct and Realize the basic gates using NAND and NOR gates, logic circuit for De-Morgan's theorems and test the performance of RS ,D,T and JK flip flop.
D460.2	Construct and test the performance of half adder, full adder, half subtractor, full subtractor Decoder/Encoder ,parity generator / checker and MUX/DEMUX
D460.3	Construct and test the performance of inverting /non inverting amplifier using OP-AMP, summing amplifier, Difference amplifier , Zero crossing detector and voltage comparator.
D460.4	Construct and test the performance of integrator and differentiator, Astable Multivibrator using IC and IC Voltage regulator using IC7805 and IC 7912.
D460.5	Practice the software tools for designing PCB of 4 bit ripple counter using FF ,construct shift registers and develop the mini project with report.

EED460 ANALOG AND DIGITAL ELECTRONICS PRACTICAL

1. Realization of basic gates using NAND & NOR gates.

2. Realization of logic circuit for De-Morgan's Theorems

3. Test the performance of Half Adder and Full Adder.

4. Test the performance of Half Subtractor and Full Subtractor.

5. Test the performance of Decoder/Encoder.

6. Test the performance of RS, D, T & JK flip-flops.

7. Test the performance of Parity generator and checker using parity checker/ generator IC's.

8. Test the performance of Multiplexer/De-multiplexer using IC4051

9. Test the performance of Inverting Amplifier and Non inverting amplifier using Op-amp IC 741.

10. Test the performance of Summing Amplifier, Difference Amplifier.

11. Test the performance of Zero Crossing Detector and Voltage Comparator using Op- amp IC 741.

12. Test the performance of Integrator and Differentiator using Op-amp IC741.

13. Test the performance of Astable multivibrator using IC555.

14. Test the performance of IC Voltage Regulator Power Supplies using IC 7805, IC 7912.

15. Design the PCB of 4- bit ripple counter using FF using Software tool Multisim / OrCAD, Lab view

16. Construct a 4 bit Serial in Serial out shift register and verify its functionality using simulation tools.

17. Mini Project

The mini project is activity based and it may be given to group of maximum of six students for hands on experience and to create scientific temper

CONTINUOUS INTERNAL ASSESSMENT

The Internal Assessment mark for a total of 25 marks which are to be distributed as follows:

a) Attendance (Award of marks same as theory courses)	:	05 Marks
b) Procedure/ observation and tabulation/ Other Practical related Work	:	05 Marks
c) Tests	:	10 Marks
d) Student Centered Learning (SCL) work sheet	:	05 Marks

```
                                                      -------------
                    TOTAL                              25 Marks
                                                      -------------
```

LEARNING WEBSITES

1. https://tint.edu.in/tict-ece-laboratories-ece-department/tict-ece-analog-and-digital-electronics-lab.

2. https://www.allaboutcircuits.com/video-tutorials/analog-and-digital-electronics

3. https://ldce.ac.in/labs/analog-digital-electronics-lab

4. https://www.vlab.co.in/broad-area-electronics-and-communications

CO- POs & PSOs MAPPING MATRIX

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
D460.1	3	3	3	3	3	3	3	3	3	3
D460.2	3	3	3	3	3	3	3	3	3	3
D460.3	3	3	3	3	3	3	3	3	3	3
D460.4	3	3	3	3	3	3	3	3	3	3
D460.5	3	3	3	3	3	3	3	3	3	3
Total	15	15	15	15	15	15	15	15	15	15
Correlation Level	3	3	3	3	3	3	3	3	3	3

Correlation level 1- Slight (low)

Correlation level 2- Moderate (Medium)

Correlation level 3- Substantial (high)

EED460 ANALOG AND DIGITAL ELECTRONICS PRACTICAL

MODEL QUESTION PAPER

S.No	Experiments	CO	PO
1	Realization of basic gates using NAND & NOR gates.	D460.1	PO1,PO2,PO3,PO4, PO5,PO6,PO7
2	Realization of logic circuit for De-Morgans Theorems.	D460.1	PO1,PO2,PO3,PO4, PO5,PO6,PO7
3	Test the performance of Half Adder and Full Adder.	D460.2	PO1,PO2,PO3,PO4, PO5,PO6,PO7
4	Test the performance of Half Subtractor and Full Subtractor.	D460.2	PO1,PO2,PO3,PO4, PO5,PO6,PO7
5	Test the performance of Decoder/Encoder.	D460.2	PO1,PO2,PO3,PO4, PO5,PO6,PO7
6	Test the performance of RS, D, T & JK flip-flops.	D460.1	PO1,PO2,PO3,PO4, PO5,PO6,PO7
7	Test the performance of Parity generator and checker using parity checker/ generator IC's.	D460.2	PO1,PO2,PO3,PO4, PO5,PO6,PO7
8	Test the performance of Multiplexer/De-multiplexer using IC4051.	D460.2	PO1,PO2,PO3,PO4, PO5,PO6,PO7
9	Test the performance of Inverting Amplifier and Non inverting amplifier using Op- amp IC741.	D460.3	PO1,PO2,PO3,PO4, PO5,PO6,PO7
10	Test the performance of Summing Amplifier, Difference Amplifier.	D460.3	PO1,PO2,PO3,PO4, PO5,PO6,PO7
11	Test the performance of Zero Crossing Detector and Voltage Comparator using Op-amp IC741.	D460.3	PO1,PO2,PO3,PO4, PO5,PO6,PO7
12	Test the performance of Integrator and Differentiator using Op-amp IC741.	D460.4	PO1,PO2,PO3,PO4, PO5,PO6,PO7
13	Test the performance of Astable multivibrator using IC555.	D460.4	PO1,PO2,PO3,PO4, PO5,PO6,PO7
14	Test the performance of IC Voltage Regulator Power Supplies using IC 7805, IC 7912.	D460.4	PO1,PO2,PO3,PO4, PO5,PO6,PO7
15	Design the PCB of 4- bit ripple counter using FF using Software tool Multisim /OrCAD /Labview.	D460.5	PO1,PO2,PO3,PO4, PO5,PO6,PO7
16	Construct a 4 bit Serial in Serial out shift register and verify its functionality using simulation tools.	D460.5	PO1,PO2,PO3,PO4, PO5,PO6,PO7
17	**Mini Project**	**D460.5**	**PO1,PO2,PO3,PO4, PO5,PO6,PO7**

EED470 ELECTRICAL CIRCUITS AND SIMULATION PRACTICAL

TEACHING AND SCHEME OF EXAMINATION:

No of weeks per semester: 16 weeks

Course	Instructions		Examination			
	Hrs /Week	Hrs / Semester	Marks			Duration
			Internal Assessment	Autonomous Examinations	Total	
Electrical Circuits and Simulation Practical	4	64	25	100*	100	3 Hrs.

*Examinations will be conducted for 100 marks and it will be reduced to 75 marks.

DETAILED ALLOCATION OF MARKS:

SI.NO	NAME OF THE ACTIVITY	MARKS
1	CIRCUIT DIAGRAM (MANUAL DIAGRAM)	30
2	DEVELOPMENT OF CIRCUIT DIAGRAM	25
3	SIMULATION PERFORMANCE & PRINT OUT	30
4	VIVA VOCE	05
5	MINI PROJECT	10
	TOTAL	100

Mini Project Evaluation (10 marks)

Breakup Details

1	Project Description	05
2	Project Demo	05
	Total	**10**

COURSE DESCRIPTION:

All the Engineering applications are simulated through Computers. They are tested and then built using real components for commercial implementation. Simulation Software is available for all Engineering Fields. Hers is an attempt to impart the knowledge of using Simulation Software for realizing some of the Electrical and Electronics Circuits for the Diploma students.

EQUIPMENTS REQUIRED: (For a Batch of 30 Students)

S.No.	LIST OF EQUIPMENTS	QUANTITY REQUIRED
1	PC with any suitable simulation software	30
2	UPS 5KVA with half an hour battery back up	1
3	Printer	1

OBJECTIVES:

On Completion of this Practical course, the Students will be able to

- ✓ Know the Various Aspects of Simulation Software
- ✓ Simulate and Test the Simple Electrical and Electronics Circuits
- ✓ Simulate and Test the Wave Generating Circuits
- ✓ Simulate and Prove the Simple Theorems
- ✓ Simulate and Test the Performance Characteristics of Converters
- ✓ Design and Verify the Results of Various Electric Circuits Using Simulation Software

COURSE OUTCOMES:

Course	EED470 ELECTRICAL CIRCUITS AND SIMULATION PRACTICAL
After successful completion of this course, the students should be able to	
D470.1	Apply working knowledge of MATLAB package to simulate and solve electrical circuits.
D470.2	Solve, Simulate and prove the simple theorems.
D470.3	Simulate and test the wave generating circuits.
D470.4	Simulate and test the performance characteristics of converters
D470.5	Design and verify the results of various electric circuits using simulation software and develop the mini projects with report

EED470 ELECTRICAL CIRCUITS AND SIMULATION PRACTICAL

List of experiments

1. Generate the following wave forms

    (i) Sinusoidal waveform of Fundamental Frequency (50Hz)

    (ii) 3rd Order, 5th Order and 7th Order Harmonics for the Fundamental frequency.

2. Simulation of RLC series and RLC Parallel Response Circuits.

3. Step Response of RL and RC Series Circuit.

4. Simulation of Mesh and Nodal analysis for DC Circuits.

5. Verification of Superposition Theorem.

6. Verification of Thevenin's and Norton's Theorem.

7. Verification of Maximum Power Transfer Theorem.

8. Simulation of Full Wave Rectifier (Center Tapped and Bridge) with RL load.

9. Simulation of Single Phase Half Wave Controlled Converter with RL Load and Free Wheeling Diode.

10. Simulation of Single Phase Full Wave Controlled Converter with RL Load and Free Wheeling Diode.

11. Simulation of Three Phase Star Connected Balanced and Unbalanced Load

12. Simulation of Three Phase Delta Connected Balanced and Unbalanced Load

13. Simulation of Three Phase Non Linear Star Connected Load with Three Phase 3 Wire System.

14. Simulation of Three Phase Non-Linear Star Connected Load with Three Phase 4 Wire System.

15. Simulation basic Logic Gates, Universal Logic Gates and Realization of Logic Gates using Universal Logic Gates.

16. Simulation of Half Adder and Full Adder.

17. Simulation of square wave and saw tooth wave generation.

18. Mini Project

The mini project is activity based and it may be given to group of maximum of six students for hands on experience and to create scientific temper

CONTINUOUS INTERNAL ASSESSMENT

The Internal Assessment mark for a total of 25 marks which are to be distributed as follows:

a) Attendance (Award of marks same as theory courses)	:	05 Marks
b) Procedure/ observation and tabulation/ Other Practical related Work	:	05 Marks
c) Tests	:	10 Marks
d) Student Centered Learning (SCL) work sheet	:	05 Marks

```
                                          -------------
              TOTAL                         25 Marks
                                          -------------
```

LEARNING WEBSITES

1. https://www.iare.ac.in/sites/default/files/lab1/Electrical%20Circuits%20Laboratary.pdf

2. http://docplayer.net/42468651-Electrical-circuits-simulation-lab.html

3. https://www.asti.edu.in/images/pdf/departments/eee-downloads/academic-manuals/lab-manual/ecsl/electrical-circuit%20-simulation-lab.pdf

4. http://kgr.ac.in/beta/wp-content/uploads/2018/09/Basic-Electrical-Simulation.pdf

CO-POs & PSOs MAPPING MATRIX

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
D470.1	3	3	3	3	3	3	3	3	3	3
D470.2	3	3	3	3	3	3	3	3	3	3
D470.3	3	3	3	3	3	3	3	3	3	3
D470.4	3	3	3	3	3	3	3	3	3	3
D470.5	3	3	3	3	3	3	3	3	3	3
Total	15	15	15	15	15	15	15	15	15	15
Correlation level	3	3	3	3	3	3	3	3	3	3

Correlation level 1 – Slight (Low)
Correlation level 2 – Moderate (Medium)
Correlation level 3 – Substantial (High)

EED470 ELECTRICAL CIRCUITS AND SIMULATION PRACTICAL

MODEL QUESTION PAPER

Si. No	Name of the Experiments	CO	PO
1	Generate the following waveforms (i). Sinusoidal waveform ofFundamental Frequency (50Hz) (ii). 3rd Order, 5th Order and 7th Order Harmonics for the Fundamental frequency	D470.1	PO1, PO2, PO3, PO4, PO5, PO6, PO7
2	Simulation of RLC series and RLC Parallel Response Circuits	D470.1	PO1, PO2, PO3, PO4, PO5, PO6, PO7
3	Step Response of RL and RC Series Circuit	D470.1	PO1, PO2, PO3, PO4, PO5, PO6, PO7
4	Simulation of Mesh and Nodal analysis for DC Circuits	D470.2	PO1, PO2, PO3, PO4, PO5, PO6, PO7
5	Verification of Superposition Theorem	D470.2	PO1, PO2, PO3, PO4, PO5, PO6, PO7
6	Verification of Thevenin's and Norton's Theorem	D470.2	PO1, PO2, PO3, PO4, PO5, PO6, PO7
7	Verification of Maximum Power Transfer Theorem	D470.2	PO1, PO2, PO3, PO4, PO5, PO6, PO7
8	Simulation of Full Wave Rectifier (Center Tapped and Bridge) with RL load	D470.2	PO1, PO2, PO3, PO4, PO5, PO6, PO7
9	Simulation of Single Phase Half Wave Controlled Converter with RL Load and Free Wheeling Diode	D470.2	PO1, PO2, PO3, PO4, PO5, PO6, PO7
10	Simulation of Single Phase Full Wave Controlled Converter with RL Load and Free Wheeling Diode	D470.3	PO1, PO2, PO3, PO4, PO5, PO6, PO7
11	Simulation of Three Phase Star Connected Balanced and Unbalanced Loa	D470.4	PO1, PO2, PO3, PO4, PO5, PO6, PO7
12	Simulation of Three Phase Delta Connected Balanced and Unbalanced Load	D470.4	PO1, PO2, PO3, PO4, PO5, PO6, PO7
13	Simulation of Three Phase Non Linear Star Connected Load with Three Phase 3 Wire System	D470.4	PO1, PO2, PO3, PO4, PO5, PO6, PO7
14	Simulation of Three Phase Non-Linear Star Connected Load with Three Phase 4 Wire System	D470.4	PO1, PO2, PO3, PO4, PO5, PO6, PO7
15	Simulation basic Logic Gates, Universal Logic Gates and Realization of Logic Gates using Universal Logic Gates	D470.4	PO1, PO2, PO3, PO4, PO5, PO6, PO7
16	Simulation of Half Adder and Full Adder	D470.5	PO1, PO2, PO3, PO4, PO5, PO6, PO7
17	Simulation of square wave and saw tooth wave generation	D470.5	PO1, PO2, PO3, PO4, PO5, PO6, PO7
18	**Mini Project**	**D470.5**	**PO1, PO2, PO3, PO4, PO5, PO6, PO7**

MODEL QUESTION PAPER

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

PART-A (10 X 3 = 30Marks)					
Note: Answer all questions. All questions carry equal marks					
S. No	Questions	Unit	Bloom's Level	CO	PO
1	Compare Salient Pole Rotor and Cylindrical Rotor.	I	R	D410.1	PO1, PO2
2	Mention the advantages of Hydrogen Cooling of Alternator.	I	U	D410.1	PO1, PO2
3	Explain OC and SC test.	II	R	D410.2	PO1, PO2
4	Write short notes on Synchronous Reactance of an Alternator.	II	R	D410.2	PO1, PO2
5	Compare Squirrel Cage Induction Motor and Slip Ring Induction Motor.	III	R	D410.3	PO1, PO2
6	What is meant by Cogging in Three Phase Induction Motor and how it is prevented	III	R	D410.3	PO1, PO2
7	State the applications of Synchronous Motor.	IV	R	D410.4	PO1, PO2
8	Draw the V Curve and Inverted V Curve of a Synchronous Motor.	IV	R	D410.4	PO1, PO2
9	What are the various types of Enclosures used for Motors?	V	R	D410.5	PO1, PO2
10	What are the points to be remembered while selecting the Cable Rating for a Motor?	V	R	D410.5	PO1, PO2

PART-B (5 X 14 = 70 Marks)					
Note: Answer all questions choosing A or B in each question. All questions carry equal marks					
S. No	Questions	Marks	Unit	Bloom's Level	CO	PO
11	(a) (i) Explain with neat sketch the constructional details of Turbo Alternator.	07	I	U	D410.1	PO1,PO2, PO3
	(ii) Describe Hydrogen Cooling of Alternators. Also discuss the precautions to be followed and its advantages.	07	I	R	D410.1	PO1,PO2, PO3
	(OR)					
	(b) (i) Compare Squirrel Cage Salient Pole Rotor with Non-Salient Pole Rotor with diagram.	07	I	R	D410.1	PO1,PO2, PO3
	(ii) Explain the methods of obtaining Sine Wave in an Alternator with neat sketches.	07	I	U	D410.1	PO1,PO2, PO3
12	(a). (i) Explain Armature Reaction of Alternator on load at Lagging Power Factor.	07	II	U	D410.2	PO1,PO2, PO3
	(ii) Explain the ZPF method of predetermining the Voltage Regulation of an Alternator.	07	II	U	D410.2	PO1,PO2, PO3
	(OR)					
	(b).(i) With a neat diagram explain Synchronization of Three Phase Alternators using	07	II	U	D410.2	PO1,PO2, PO3

111

	Bright Lamp Method.					
	(ii) With a neat diagram explain Synchronization of Three Phase Alternators using Synchroscope Method.	07	II	U	D410.2	PO1,PO2, PO3
13	(a).(i) Explain how a Rotating Magnetic Field is established in Three Phase Induction Motor draw the Vector Diagram	07	III	U	D410.3	PO1,PO2, PO3
	(ii) With neat diagram explain the working of DOL Starter of an Induction Motor.	07	III	U	D410.3	PO1,PO2, PO3
	(OR)					
	(b) i) Explain any four methods of Speed Control of Induction Motor with neat sketches.	07	III	U	D410.3	PO1,PO2, PO3
	(ii) Derive the expression for Starting Torque and Starting Current of a Three Phase Induction Motor.	07	III	R	D410.3	PO1,PO2, PO3
14	(a).(i) Explain the construction, working of Split Phase Induction Motor with neat sketches.	07	IV	U	D410.4	PO1,PO2, PO3
	(ii) With neat diagram explain the operation of Single Phase Capacitor Start Induction Motor.	07	IV	U	D410.4	PO1,PO2, PO3
	(OR)					
	i) Explain any two methods of starting of Synchronous Motor.	07	IV	U	D410.4	PO1,PO2, PO3
	(ii) With neat Vector Diagrams and Graph explain the effect of changing field excitation of Synchronous Motor.	07	IV	U	D410.4	PO1,PO2, PO3
15	(a).(i) What are the common troubles and their remedies for induction motor starters.	07	V	U	D410.5	PO1,PO2, PO3
	(ii) Explain various types of enclosures for a cage motor.	07	V	U	D410.5	PO1,PO2, PO3
	(OR)					
	(b).(i) What is Vacuum Impregnation and Explain how is it done?	07	V	U	D410.5	PO1,PO2, PO3
	(ii) What is Balancing? Explain the two methods of Balancing.	07	V	U	D410.5	PO1,PO2, PO3

QUESTION PAPER SETTING

The question paper setters are requested to follow the Revised Bloom's Taxonomy levels as Presented below:

Bloom's Taxonomy	Lower Order Thinking Skills (LOTs)	Higher Order Thinking Skills (HOTs)
Level	R-Remember, U-Understand , Ap-Apply	An-Analyze, E-Evaluate, C-Create
% to be included	90%	10%

****

EED420 MEASUREMENTS, INSTRUMENTS AND TRANSDUCERS

MODEL QUESTION PAPER

Time: 3 Hrs   Max. Marks: 100

PART-A	(10 X 3 = 30 Marks)				
Note: Answer all questions. All questions carry equal marks					
S. No	**Questions**	**Unit**	**Bloom's Level**	**CO**	**PO**
1	Define Precision and Accuracy	I	U	D420.1	PO1,PO2, PO3
2	What are the different types of supports?	I	R	D420.1	PO1,PO2, PO3
3	What is the use of Megger?	II	R	D420.2	PO1,PO2, PO3
4	What is Shunt?	II	R	D420.2	PO1,PO2, PO3
5	Write any two types of Power Factor Meters	III	R	D420.3	PO1,PO2, PO3
6	Name the two coils in a Wattmeter?	III	R	D420.3	PO1,PO2, PO3
7	What is the use of Schering Bridge?	IV	R	D420.4	PO1,PO2, PO3
8	What is the use of Maxwell's Bridge?	IV	R	D420.4	PO1,PO2, PO3
9	What is Hall Effect Transducer?	V	R	D420.5	PO1,PO2, PO3
10	What is Photo Conductive Cell?	V	U	D420.5	PO1,PO2, PO3

PART-B	(5 X 14 = 70Marks)					
Note: Answer all questions choosing A or B in each question. All questions carry equal marks						
S. No	**Questions**	**Marks**	**Unit**	**Bloom's Level**	**CO**	**PO**
11	a) i) With the diagram explain the various methods of Damping	07	I	U	D420.1	PO1,PO2, PO3
	ii) Explain the classification of Measurement Systems	07	I	U	D420.1	PO1,PO2, PO3
	(OR)					
	b) i) State and explain the classification of Instruments and give one example for each	07	I	U	D420.1	PO1,PO2, PO3
	ii) Explain the various types of supports used in measurement system	07	I	U	D420.1	PO1,PO2, PO3
12	a) i) Explain the construction and working of Permanent Magnet Moving Coil Instruments.	07	II	R	D420.2	PO1,PO2, PO3
	ii) Explain the construction and working of Dynamometer Type Instruments	07	II	U	D420.2	PO1,PO2, PO3
	(OR)					
	b) i) Explain with neat sketch the working and Torque Equation of Attraction type moving iron meter	07	II	R	D420.2	PO1,PO2, PO3
	ii) Explain how the range of Ammeter can be extended	07	II	U	D420.2	PO1,PO2, PO3
13	a) i) Describe about phase difference measurement using Synchroscope	07	III	R	D420.3	PO1,PO2, PO3
	ii) Explain the working of 3 Phase Induction Type Energy Meter with sketch	07	III	U	D420.3	PO1,PO2, PO3
	(OR)					

	b) i) Explain with a neat sketch, the construction and working of a Single Phase Dynamometer Power Factor Meter	07	III	R	D420.3	PO1,PO2, PO3
	ii) With neat diagram, explain the construction and working of Merz – Prize Maximum	07	III	U	D420.3	PO1,PO2, PO3
14	a) i) Explain the operation of CRO with neat diagram	07	IV	U	D420.4	PO1,PO2, PO3
	ii) Explain the operation of CRT with neat diagram	07	IV	U	D420.4	PO1,PO2, PO3
	(OR)					
	b) i) Explain about Anderson Bridge with neat diagram	07	IV	U	D420.4	PO1,PO2, PO3
	ii) Explain about Digital Storage Oscilloscope with neat diagram	07	IV	U	D420.4	PO1,PO2, PO3
15	(a) i) Explain with a diagram, the working of RVDT	07	V	U	D420.5	PO1,PO2, PO3
	ii) With a diagram explain Inductive Transducer for measuring Pressure	07	V	U	D420.5	PO1,PO2, PO3
	(OR)					
	(b) i) Explain with a sketch the working of Capacitive Transducers	07	V	U	D420.5	PO1,PO2, PO3
	ii) Explain Proximity Sensor with a diagram	07	V	U	D420.5	PO1,PO2, PO3

QUESTION PAPER SETTING

The question paper setters are requested to follow the Revised Bloom's Taxonomy levels as Presented below:

Bloom's Taxonomy	Lower Order Thinking Skills (LOTs)	Higher Order Thinking Skills (HOTs)
Level	R-Remember, U-Understand , Ap-Apply	An-Analyze, E-Evaluate, C-Create
% to be included	90%	10%

******

EED430 ANALOG AND DIGITAL ELECTRONICS

MODEL QUESTION PAPER

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

S.No	Questions	Unit	Bloom's Level	CO	PO
PART-A (10 X 3 = 30Marks)					
Note: Answer all the questions. All questions carry equal marks					
1	Define: CMRR.	I	R	D430.1	PO1,PO2
2	Draw the PIN diagram of OP-Amp IC 741.	I	U	D430.1	PO1,PO2
3	Differentiate between A/D Converter and D/A Converter.	II	U	D430.2	PO1,PO2
4	What are the applications of IC555?	II	U	D430.2	PO1,PO2
5	Draw the Symbol and Truth table of NOT Gate.	III	U	D430.3	PO1,PO2
6	State De-Morgan's theorems.	III	R	D430.3	PO1,PO2
7	Draw the circuit diagram of Multiplexer.	IV	U	D430.4	PO1,PO2
8	Differentiate between Encoder and Decoder.	IV	U	D430.4	PO1,PO2
9	List the various types of memories.	V	R	D430.5	PO1,PO2
10	What is flash memory?	V	R	D430.5	PO1,PO2

S.No	Questions	Marks	Unit	Bloom's Level	CO	PO
PART-B (5 X 14 = 70 Marks)						
Note: Answer all questions choosing A or B in each question. All questions carry equal marks						
11	A.(i). Explain the working of Op-Amp Inverting Amplifier.	07	I	U	D430.1	PO1,PO2,PO3
	(ii). Explain the working of Zero Cross Detector.	07	I	U	D430.1	PO1,PO2,PO3
	(OR)					
	B. (i). Explain the working of Schmitt Trigger.	07	I	U	D430.1	PO1,PO2,PO3
	(ii). Draw the block diagram of Op-Amp and Draw the Symbol of Op-Amp.	07	1	U	D430.1	PO1,PO2,PO3
12	A. (i). Explain the working of IC 555 in Astable Multivibrator mode.	07	II	U	D430.2	PO1,PO2,PO3
	(ii). Explain the working of IC Voltage Regulator 78XX. What will be the values of XX.?	07	II	U	D430.2	PO1,PO2,PO3
	(OR)					

	B. (i). Explain the working of Weighted Resistor D/A Converter.	07	II	U	D430.2	PO1,PO2,PO3
	(ii) Explain the working Dual Slope A/D Converter.	07	II	U	D430.2	PO1,PO2,PO3
13	A. (i). Simplify the following logic function using K- Map f=∑(0,2,4,6,9,12).	07	III	An	D430.3	PO1,PO2,PO3
	(ii). Construct AND, NOR and EX-OR Gates using NAND Gate.	07	III	Ap	D430.3	PO1,PO2,PO3
	(OR)					
	B.(i). Reduce the following logic using K-Map. Y=ABC+ABC+ABC+ABC.	07	III	Ap	D430.3	PO1,PO2,PO3
	(ii). Convert the binary number 11001.011 into its equivalent decimal number.	07	III	Ap	D430.3	PO1,PO2,PO3
14	A.(i) Explain the working of D Flip-Flop.	07	IV	R	D430.4	PO1,PO2,PO3
	(ii) Explain the working of Serial –in –Parallel out Shift register.	07	IV	R	D430.4	PO1,PO2,PO3
	(OR)					
	B.(i). Explain the working of 3 to 8 Decoder.	07	IV	U	D430.4	PO1,PO2,PO3
	(ii).Explain the working of 8 to 1 Multiplexer.	07	IV	U	D430.4	PO1,PO2,PO3
15	A.(i).Explain RAM organization in detail with diagram.	07	V	U	D430.5	PO1,PO2,PO3
	(ii).Explain SDRAM in detail.	07	V	U	D430.5	PO1,PO2,PO3
	(OR)					
	B. (i). Explain ROM organization in detail with diagram.	07	V	U	D430.5	PO1,PO2,PO3
	(ii). Explain anti fuse technologies.	07	V	U	D430.5	PO1,PO2,PO3

QUESTION PAPER SETTING

The question paper setters are requested to follow the Revised Bloom's Taxonomy levels as Presented below:

Bloom's Taxonomy	Lower Order Thinking Skills (LOTs)	Higher Order Thinking Skills (HOTs)
Level	R-Remember, U-Understand , Ap-Apply	An-Analyze, E-Evaluate, C-Create
% to be included	90%	10%

****

EED 440 E-VEHICLE TECHNOLOGY & POLICY

MODEL QUESTION PAPER

Time: 3 Hrs   Max. Marks: 100

PART-A			(10 X 3 = 30Marks)			
Note: Answer all the questions. All questions carry equal marks						
S.No	Questions	Unit	Bloom's Level	CO	PO	
1	What is the Parts of Drive train system?	I	R	D440.1	PO1,PO2	
2	Draw the block diagram of BEV.	I	U	D440.1	PO1,PO2	
3	Define energy consumption.	II	R	D440.2	PO1,PO2	
4	What are the types of EV motors?	II	R	D440.2	PO1,PO2	
5	What is Electrochemical Batteries?	III	R	D440.3	PO1,PO2	
6	Explain Nickel Based Batteries.	III	U	D440.3	PO1,PO2	
7	What is Global Scenario of EV adoption?	IV	R	D440.4	PO1,PO2	
8	Explain about AIS 038.	IV	U	D440.4	PO1,PO2	
9	What is Policy Measures?	V	R	D440.5	PO1,PO2	
10	Explain Recycling Ecosystem.	V	U	D440.5	PO1,PO2	

PART-B				(5 X 14 = 70 Marks)		
Note: Answer all questions choosing A or B in each question. All questions carry equal marks						
S.No	Questions	Marks	Unit	Bloom's Level	CO	PO
11	(A) (i) Explain about Rear Wheel, Front Wheel and All wheel.	07	I	U	D440.1	PO1,PO2,PO3,PO4,PO5
	(ii) Explain about the Parts of Drive train system.	07	I	U	D440.1	PO1,PO2,PO3,PO4,PO5
	(OR)					
	(B) (i) Explain about Hybrid electric Vehicle (HEV).	07	I	U	D440.1	PO1,PO2,PO3,PO4,PO5
	(ii) Explain about Plug-in Hybrid Electric Vehicle (PHEV).	07	1	U	D440.1	PO1,PO2,PO3,PO4,PO5
12	(A) (i) What is the Concept of Hybrid electric drive trains?	07	II	U	D440.2	PO1,PO2,PO3,PO4,PO5
	(ii) Explain Series, Parallel and Series & Parallel.	07	II	U	D440.2	PO1,PO2,PO3
	(OR)					
	(B) (i) Briefly explain about Permanent Magnetic Brush Less DC Motor Drives (BLDC).	07	II	U	D440.2	PO1,PO2,PO3
	(ii) What are the Merits and Demerits of DC	07	II	U	D440.2	PO1,PO2,PO3

	motor drive?					
13	(A).(i) Explain the Construction and working of Lead Acid Batteries.	07	III	U	D440.3	PO1,PO2,PO3
	(ii) Explain the Lithium Based Batteries Role of Battery Management System (BMS).	07	III	U	D440.3	PO1,PO2,PO3
	(OR)					
	(B) (i) Explain the Latest development in battery chemistry.	07	III	U	D440.3	PO1,PO2,PO3
	(ii) Explain the Impacts on Environment –Impacts on Economy.	07	III	U	D440.3	PO1,PO2,PO3
14	(A) (i) Explain about Government of India Electric Mobility Policy Frame work.	07	IV	U	D440.4	PO1,PO3,PO5
	(ii) Explain the National Electric Mobility Mission Plan 2020.	07	IV	U	D440.4	PO1,PO3,PO5
	(OR)					
	(B) (i) Explain the Scope and Applicability of EV Policy.	07	IV	U	D440.4	PO1,PO3,PO5
	(ii) Explain the ARAI Standards for Electric Vehicle.	07	IV	U	D440.4	PO1,PO3,PO5
15	(A) (i) Briefly explain about Tamil Nadu E-vehicle Policy 2019.	07	V	U	D440.5	PO1,PO3,PO5
	(ii) Explain Demand side incentives.	07	V	U	D440.5	PO1,PO3,PO5
	(OR)					
	(B) (i) Explain the Revision of Transport Regulation of EV.	07	V	U	D440.5	PO1,PO3,PO5
	(ii) Explain and details of R&D and Business Incubation.	07	V	U	D440.5	PO1,PO3,PO5

QUESTION PAPER SETTING

The question paper setters are requested to follow the Revised Bloom's Taxonomy levels as Presented below:

Bloom's Taxonomy	Lower Order Thinking Skills (LOTs)	Higher Order Thinking Skills (HOTs)
Level	R-Remember, U-Understand , Ap-Apply	An-Analyze, E-Evaluate, C-Create
% to be included	90%	10%

****

118

EED510 GENERATION TRANSMISSION AND SWITCH GEAR

TEACHING AND SCHEME OF EXAMINATION:

No. of weeks/ Semester: 16 weeks

| Course | Instructions | | Examination | | | | Duration |
| | Hrs / Week | Hrs / Semester | Marks | | | | |
			Internal Assessment	Autonomous Examinations	Total		
Generation Transmission and Switchgear	5	80	25	100*	100		3 Hrs.

*Examinations will be conducted for 100 marks and it will be reduced to 75 marks.

TOPICS AND ALLOCATION OF HOURS:

UNIT	TOPICS	NO. OF HOURS
I	Generation of Electrical Power	15
II	A.C. And H.V.D.C Transmission	14
III	FACTS, Line Insulators and Underground Cables	14
IV	Circuit Breakers and Over Voltage Protection	14
V	Protective Relays and Grounding	14
	Test & Model Exam	09
	Total	**80**

COURSE DESCRIPTION:

Energy is the basic necessity for the Economic Development of a Country and also there is a growing impulse towards green and reduction in the use of Fossil Fuels. As a matter of fact, there is a close relationship between the Energy used per person and his standard of living. The Modern Society is so much dependent upon the use of Electrical Energy that it has become a part of our life. So to have adequate knowledge in Electrical Power Generation and Transmission, Switch Gear and efficiency associated with them, it becomes necessary to include this Course.

OBJECTIVES:

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

- ➢ Conventional Power Plants-Layout and choice of site
- ➢ Renewable Energy Sources and Power Generation
- ➢ A.C Transmission-Supports, Conductors, Effects, Regulation and Efficiency
- ➢ H.V.D.C Transmission
- ➢ FACTS, Line Insulators and Underground Cables
- ➢ Circuit Breakers, Protective Relay and Lightning Arresters

COURSE OUTCOMES:

Course	EED510 GENERATION TRANSMISSION AND SWITCH GEAR
After successful completion of this course, the students should be able to	
D510.1	Understand the source of power and units.
D510.2	Describe about the transmission of power
D510.3	Select appropriate insulators and cables.
D510.4	Apply Provide the circuit breakers and protection.
D510.5	Understand about the relays and grounding.

EED510 GENERATION TRANSMISSION AND SWITCH GEAR

UNIT - I

GENERATION OF ELECTRICAL POWER	**15 Hrs**
Introduction- Conventional methods of power generations - schematic arrangement and choice of site for Hydro Power Plant	1 Hr
Thermal Power Plant	1 Hr
Nuclear Power Plant	1 Hr
Advantages and Disadvantages-comparison of these power plants - Principle and types of co-generation	1 Hr
Schematic arrangement of Diesel, Gas, Pumped storage schemes- Advantages and Disadvantages	2 Hrs
Grid or Inter connected system-Advantages of Inter connected systems- Load Transfer through Inter connector-Load curves and Load duration curves	2 Hrs
connected load-Average load-Maximum Demand Factor- Plant capacity factor-Load factor and its significance- Diversity factor	2 Hrs
Simple problems	2 Hrs
Load sharing between base load and peak load plants. Renewable Energy sources-Basic principle of Solar Energy, Wind Power Generation	2 Hrs
Hybrid Renewable Energy Systems	1 Hr

UNIT - II

A.C. AND H.V.D.C TRANSMISSION	**14 Hrs**
A.C. Transmission:	
Introduction-Typical Layout of A.C. Power supply scheme -Advantages and Disadvantages of A.C Transmission - High Transmission Voltage- Advantages	1 Hr
Economic choice of Transmission voltage-Elements of a Transmission Line-over Head Line	1 Hr
Conductor materials and their properties	1 Hr
Line supports-its properties-Types of supports and their applications-spacing between conductors-length of span-Sag in overhead lines-Calculation of Sag-When the supports are at equal and unequal levels	2 Hrs
Problems-Effect of wind and ice loading over the line conductor (Qualitative treatment only)	2 Hrs

constants of a Transmission line- Transposition of Transmission lines-Skin Effect-Ferranti Effect-Corona formation and corona loss-Factors affecting corona-Advantages and Disadvantages	1 Hr
Classification of O.H Transmission lines-Performance of single phase short transmission line voltage regulation and Transmission Efficiency	1 Hr
Problems.	1 Hr

H.V.D.C Transmission:

Advantages and Disadvantages of D.C Transmission- Layout Scheme and principle of High Voltage D.C Transmission	1 Hr
D.C link configurations (Monopolar, Bipolar and Homopolar)-HVDC convertor Station (Schematic diagram only)	2 Hrs
Recent trends in wireless transmission of electrical power	1 Hr

UNIT - III

FACTS,LINE INSULATORS AND UNDERGROUND CABLES	**14 Hrs**
FACTS:	2 Hrs
Definition-Need for FACTS controllers- types of FACTS controllers-SVS-STATCOM -UPFC (block diagram explanation only)	
Line Insulators: Introduction - Line Insulator materials-Properties of Insulators-Types & causes of failure of Insulators	1 Hr
Testing of Insulators	1 Hr
Potential Distribution over suspension Insulator string-String Efficiency- Methods of improving string efficiency	2 Hrs
Problems	1 Hr
Underground cables: Introduction-Advantages and requirement of cables-construction of a three core cable-Insulating materials for cables - properties of Insulating materials used in cables	2 Hrs
classification of cables- cables for three phase service- construction of Belted cable, screened cable, Pressure cables	2 Hrs
Laying of underground cables-Direct laying, Drawing system, Advantages and Disadvantages	2 Hrs
Grading of UG cables and its methods	1 Hr

UNIT - IV

CIRCUIT BREAKERS AND OVER VOLTAGE PROTECTION	**14 Hrs**
Switch gear-Essential features of Switch gear-faults in a Power system (definition	1 Hr

only).

Circuit Breakers	2 Hrs

Basic principle of circuit Breaker -Arc Phenomenon- methods of Arc extinction-Arc voltage –Re-striking voltage and recovery voltage-Rate of rise of re-striking voltage C.B ratings – Breaking capacity, making capacity, short time rating - Auto reclosing in circuit Breakers

Classification of Circuit Breakers – Construction and Working principle of Air 2 Hrs

Circuit Breakers , E.L.C.B

Residual current circuit breaker SF6 and vacuum Circuit Breaker 2 Hrs

Maintenance of circuit breakers – rupturing capacity of circuit breaker- conditions 2 Hrs

to trip – Auto reclose breaker – Fault clearance time – Inverse time overload relay

– Maintenance requirement for oil circuit breakers – SF6 circuit breakers.

FUSES:L.V fuses- Re-wirable fuse, HRC fuse-H.V. fuses & cartridge type, liquid 1 Hr

type and metal clad-fuses

Over voltage protection: 2 Hrs

Voltage surge- causes of over voltage-Lightning-Types of lightning strokes-

Direct stroke, indirect stroke-Harmful Effects of lightning Protection against

lightning

Earthing screen, overhead ground Wires, Lightning arresters- Expulsion type, Gapless 2 Hrs

arrester.

UNIT - V

PROTECTIVE RELAYS AND GROUNDING	**14 Hrs**

Protective relays: Basic principle-Fundamental requirements of protective relaying- 2 Hrs
Primary and back up Protection-relay characteristics-relay timing - Instantaneous
relay -Inverse time relay and Definite time lag relay- Inverse definite minimum time
relay

classification of relays-Construction, Principle of operation and applications of 3 Hrs

Induction type over current relay(Directional and Non-directional)

Differential relay 2 Hrs

Static relays - Basic elements of static relay-Over current-Distance relay (Block 2 Hrs

diagram explanation only).

Grounding: Introduction-Equipment grounding- system grounding 1 Hr

ungrounded neutral system-Necessity of Neutral grounding 2 Hrs

Methods- solid grounding Resistance grounding, Reactance grounding, 2 Hrs
Resonant grounding

Test & Model Exam	**09 Hrs**

TEXT BOOK

S.NO	TITLE	AUTHOR	PUBLISHER WITH EDITION
1	Principles of Power System	V.K.Metha	S.Chand & Company, 4th Edition Reprint 2007 New Delhi

REFERENCE BOOKS

S.NO	TITLE	AUTHOR	PUBLISHER WITH EDITION
1	Electrical Power System	CLWadhawa	New Age International, Fourth Edition, 2009 New Delhi
2	A Course in Electrical Power	Soni, Gupta	Dhanpath Rai & Co (P)Ltd, New Delhi
3	Electrical Power	S.L Uppal	Khanna Publishers New Delhi
4	A Course in Electrical Power	J.B. Gupta	Kaison Publishing House Reprint 2004
5	HVDC Power Transmission System & Technology	KR. Padiyar	New Age International, Reprint 2005 New Delhi
6	Digital Protection – Protective Relaying from Electromechanical to Microprocessor	LP Singh	New Age International Second Edition 1997
7	Power System Protection and Switchgear	B Ram & DN Viswakarma	TMH 1995 Reprint 2000
8	Thyristor-Based Facts Controllers for Electrical Transmission Systems	Mohan Mathur.R., Rajiv. K.Varma,	IEEE press and John Wiley & Sons, Inc., 2005 New Delhi
9	Understanding FACTS - Concepts and Technology of Flexible AC Transmission Systems	Narain G. Hingorani, Laszio. Gyugyi	Standards publishers, 2001 New Delhi

LEARNING WEBSITES

1. https://www.electrical4u.com/electric-power-generation\
2. https://www.elp.com/articles/print/volume.../primer-on-transmission-ac-vs-dc.html
3. https://www.amprion.net/.../Underground-cable/Structure-of-an-underground-cable
4. https://ieeexplore.ieee.org/document/7845829/

CONTINUOUS INTERNAL ASSESSMENT

The Internal Assessment marks for a total of 25 marks, which are to be distributed as follows:

i) Attendance	- 5 Marks
ii) Test	- 10 Marks
iii) Assignment	- 5 Marks
iv) Seminar	- 5 Marks

Total	**25 Marks**

CO-POs & PSOs MAPPING MATRIX

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
D510.1	3	3	3	2	3	2	3	3	3	3
D510.2	3	3	3	2	3	2	3	3	3	3
D510.3	3	3	3	2	3	2	3	3	3	3
D510.4	3	3	3	2	3	2	3	3	3	3
D510.5	3	3	3	2	3	2	3	3	3	3
Total	15	15	15	10	15	10	15	15	15	15
Correlation level	3	3	3	2	3	2	3	3	3	3

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

QUESTION PAPER SETTING

The teaching learning process and assessment are being carried out in accordance with the revised Bloom's 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.

Bloom's Taxonomy	Lower Order Thinking Skills (LOTs)	Higher Order Thinking Skills (HOTs)
Level	R-Remember, U-Understand , Ap-Apply	An-Analyze, E-Evaluate, C-Create
% to be included	90%	10%

****

EED520 MICROCONTROLLER AND ITS APPLICATIONS

TEACHING AND SCHEME OF EXAMINATION:

Number of Weeks/ Semester: 16 weeks

Course	Instruction		Examination			
			Marks			
	Hrs/ Week	Hrs/ Semester	Internal Assessment	Autonomous Examination	Total	Duration
Microcontroller and its Applications	5	80	25	100*	100	3 Hrs

*Examinations will be conducted for 100 marks and it will be reduced to 75 marks.

TOPICS AND ALLOCATION OF HOURS:

UNIT	TOPICS	NO. OF HOURS
I	Architecture of 8051 Microcontroller	15
II	8051 Instruction set and Programming	15
III	Peripherals of 8051	15
IV	Interfacing techniques	15
V	Advanced Microcontrollers	11
	Test & Model Exam	09
	TOTAL	**80**

COURSE DESCRIPTION:

The introduction of this Course will enable the students to learn about microcontroller 8051 architecture, Pin details, Instruction sets, Programming and interfacing. This Course enables the students to do the project effectively. It also helps the students to choose the field of interest. If the student is aiming for higher studies, this course is foundation

OBJECTIVES:

On successful completion of the course, the students must be able to

- ➢ Know the difference between microprocessor and microcontroller.
- ➢ Understand the architecture of 8051.
- ➢ Write programs using 8051 ALP.
- ➢ Understand the programming of I/O ports, Timer, Interrupt and Serial Programming.
- ➢ Use the interfacing techniques.
- ➢ Know the types of microcontrollers.
- ➢ Explain IoT.

COURSE OUTCOMES:

Course	EED520 MICROCONTROLLER AND ITS APPLICATIONS
After successful completion of this course, the students should be able to	
D520.1	Understand the architecture of microcontroller 8051.
D520.2	Analyze the instruction set of 8051 microcontroller and write assembly language programs.
D520.3	Understand I/O ports, Timer and Counter programming, serial communication and Interrupts.
D520.4	Familiarize about the interfacing techniques of 8051 with 8255.
D520.5	Understand the types of microcontroller and IoT.

EED520 MICROCONTROLLER AND ITS APPLICATIONS

UNIT I

ARCHITECTURE OF 8051 MICROCONTROLLER   **15 Hrs**

ARCHITECTURE:

Microprocessor-Microcontroller	1 Hr
Comparison of microprocessor and microcontroller	1 Hr
Architecture diagram of microcontroller 8051	1 Hr
Functions of each block-	1 Hr
Pin details of 8051-ALU- ROM-RAM-	1 Hr
Memory organization of 8051-	1 Hr
Special function registers-Program counter-	2 Hrs
PSW register-Stack- I/O ports-Timer	1 Hr
Interrupt-serial port-External memory-	1 Hr
Oscillator and Clock-Reset-Power on reset-	2 Hrs
Clock cycle-machine cycle-Instruction cycle-	2 Hrs
Overview of 8051 family.	1 Hr

UNIT II

8051 INSTRUCTION SET AND PROGRAMMING   **15 Hrs**

2.1 INSTRUCTION SET OF 8051

Instruction set of 8051-	1 Hr
Classification of 8051 instructions-data transfer instructions-	1 Hr
Arithmetic instructions-Logical instructions-Branching instructions	2 Hrs
-Bit manipulation instructions-	1 Hr
Assembling and running an 8051 program-	1 Hr
Structure of Assembly language-Assembler directives-	1 Hr
Different Addressing modes of 8051-Time delay routines.	1 Hr

2.2 ASSEMBLY LANGUAGE PROGRAMS:

16 bit addition and 16 bit subtraction-	2 Hrs
8 bit multiplication and 8 bit division	2 Hrs

BCD to HEX code conversion-HEX to BCD code conversion.	2 Hrs
Smallest number/ Biggest number.	1 Hr

UNIT III

PERIPHERALS OF 8051   **15 Hrs**

3.1 I/O PORTS:

Bit addresses for I/O ports-I/O port programming-	2 Hrs
I/O bit manipulation programming.	2 Hrs

3.2 TIMER/COUNTER :

SFRS for Timer- Modes of Timers/counters	2 Hrs
Programming 8051 Timer(Simple programs)	2 Hrs

3.3 SERIAL COMMUNICATION:

Basics of serial communication-	1 Hr
SFRs for serial communication-RS232 standard-	2 Hrs
8051 connection to RS 232-8051 serial port programming.	2 Hrs
Interrupts: 8051 interrupts- SFRs for interrupt-Interrupt priority.	2 Hrs

UNIT IV

INTERFACING TECHNIQUES   **15 Hrs**

4.1 IC 8255:

IC 8255-Block diagram-	2 Hrs
Modes of 8255-8051 interfacing with 8255	1 Hr

4.2 INTERFACING:

Interfacing external memory to 8051-	1 Hr
Relay interfacing Sensor interfacing	2 Hrs
Seven segment LED display interfacing-	2 Hrs
Keyboard interfacing-Stepper motor interfacing-	2 Hrs
ADC Interfacing-	2 Hrs
DAC interfacing-	2 Hrs
DC motor interfacing using PWM-LCD interfacing	1 Hr

UNIT V

ADVANCED MICROCONTROLLERS : **11 Hrs**

5.1 TYPES OF MICROCONTROLLERS:

PIC microcontroller-General Block diagram-Features-Applications- 2 Hrs

Arduino- General Block diagram-Variants-Features-Applications- 2 Hrs

Raspberry pi-General Block diagram-Features-Applications- 2 Hrs

Comparison of microcontrollers. 2 Hrs

5.2 IoT:

Introduction to IoT- Block diagram of home automation using IoT- 2 Hrs

IoT applications 1 Hr

Test and Model Exams **9 Hrs**

TEXT BOOKS

S.NO	TITLE	AUTHOR	PUBLISHER WITH EDITION
1.	Microcontrollers, Principles and Applications	Ajit pal	PHI Ltd,-2011
2.	8051 Microcontroller and Embedded Systems using Assembly and C	Mazidi and D.MacKinlay	Pearson Education-2006

REFERENCE BOOKS

S.NO	TITLE	AUTHOR	PUBLISHER WITH EDITION
1	"Microprocessor and Microcontroller"	"R. Theagarajan"	Sci Tech Publication, Chennai.
2	"Design with PIC micro controllers"	"J.B. Peatman"	Pearson Education India
3	"beginning Arduino"	"Michael McRoberts"	Apress
4	"Getting started with Raspberry Pi"	"Matt Richardson"	Maker media incorporated
5	"The Internet of Things"	"Samuel Greengard"	MIT Press

LEARNING WEBSITES

1. https://www.electronicshub.org/microcontrollers/

2. https://www.electricaltechnology.org/2020/05/types-of-microcontrollers.html

3. https://www.codrey.com/learn/microcontroller-basics/

CONTINUOUS INTERNAL ASSESSMENT

The Internal Assessment marks for a total of 25 marks, which are to be distributed as follows:

i)	Attendance	-	5 Marks
ii)	Test	-	10 Marks
iii)	Assignment	-	5 Marks
iv)	Seminar	-	5 Marks
	Total	**-**	**25 Marks**

CO- POs & PSOs MAPPING MATRIX

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
D520.1	3	3	2	2	2	2	2	3	2	2
D520.2	3	3	2	2	2	2	2	3	2	2
D520.3	3	3	2	2	2	2	2	3	2	2
D520.4	3	3	2	2	2	2	2	3	2	2
D520.5	3	3	2	2	2	2	2	3	2	2
Total	15	15	10	10	10	10	10	15	10	10
Correlation Level	3	3	2	2	2	2	2	3	2	2

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

QUESTION PAPER SETTING

The teaching learning process and assessment are being carried out in accordance with the revised Bloom's 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.

Bloom's Taxonomy	Lower Order Thinking Skills (LOTs)	Higher Order Thinking Skills (HOTs)
Level	R-Remember, U-Understand , Ap-Apply	An-Analyze, E-Evaluate, C-Create
% to be included	90%	10%

****

EED531 CONTROL OF ELECTRICAL MACHINES

TEACHING AND SCHEME OF EXAMINATION:

No of weeks per semester: 16 weeks

Course	Instructions		Examination				Duration
	Hrs /Week	Hrs / Semester	Marks				
			Internal Assessment	Autonomous Examinations	Total		
Control of Electrical Machines	5	80	25	100*	100		3 Hrs.

*Examinations will be conducted for 100 marks and it will be reduced to 75 marks.

TOPICS AND ALLOCATION OF HOURS:

UNIT	TOPICS	NO OF HOURS
I	Control Circuit Components	15
II	Motor Control Circuits	14
III	Industrial Control Circuits	14
IV	Programmable Logic Controller	14
V	PLC Programming and SCADA	14
	Test & Model Exam	09
	Total	**80**

COURSE DESCRIPTION:

The Energy Conversion between Electrical and Mechanical Systems is performed by the Control of Electrical Machines in both directions. Various Control Operations are to be performed on the Electrical Machines to meet the Industrial requirements. Especially Technicians are mainly employed to look after the control Panels. To make our students Employable, they have to be trained in using various Control Components and Circuits. This Course fulfills the requirement.

OBJECTIVES:

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

➤ Electrical Control Circuit Elements including Various Types of Industrial Switches, Relays, Timers, Solenoids, Contactors and Interlocking arrangements.

➤ DC Motor and AC Motor Control Circuits for Acceleration Control, Speed Control, Direction Control, Braking Control and jogging using Contactors.

➤ Different Control Circuits for Industrial Applications.

➤ Basics of Programmable Logic Controllers.

➤ PLC Programming and SCADA.

COURSE OUTCOMES:

Course	EED531 CONTROL OF ELECTRICAL MACHINES
After successful completion of this course, the students should be able to	
D531.1	Describe about basic electrical control circuit elements used in industrial sectors
D531.2	Acquire knowledge about AC motor control circuits using contactors
D531.3	Analyze different control circuits for industrial applications
D531.4	Understand the basics of programmable logic controller
D531.5	Develop the programs using PLC programming and SCADA

EED531 CONTROL OF ELECTRICAL MACHINES

UNIT - I

CONTROL CIRCUIT COMPONENTS	15 Hrs
Switches – Push Button, Selector, Drum, Limit, Pressure,	2 Hrs
Temperature (Thermostat), Float, Zero Speed and Proximity Switches.	1 Hr
Relays – Voltage Relay, DC Series Current Relay, Frequency Response	2 Hrs
Relay, Latching Relay and Phase Failure Relay (Single Phasing Preventer).	2 Hrs
Over Current Relay – Bimetallic Thermal Over Load Relay and	2 Hrs
Magnetic Dash Pot Oil Filled Relay.	1 Hr
Timer – Thermal Pneumatic and Electronic Timer. Solenoid Valve,	2 Hrs
Solenoid Type Contactor (Air Break Contactor), Solid State Relay,	1 Hr
Simple ON-OFF Motor Control Circuit,	1 Hr
Remote Control Operation and Interlocking of Drives.	1 Hr

UNIT - II

MOTOR CONTROL CIRCUITS	14 Hrs
DC MOTOR CONTROL CIRCUITS	1 Hr
Series Relay and Counter EMF Starters	
Field Failure Protection – Jogging Control, Dynamic Braking	2 Hrs
AC MOTOR CONTROL CIRCUITS	
DOL Starter – Automatic Auto Transformer Starter (Open Circuit and Closed Circuit Transition)	2 Hrs
Star/Delta Starter (Semi Automatic and Automatic)	2 Hrs
Starter for Two Speed Two Winding Motor	2 Hrs
Reversing the Direction of Rotation of Induction Motor	2 Hrs
Dynamic Braking – Three Step Rotor Resistance Starter for Wound	2 Hrs
Induction Motor –Secondary Frequency Acceleration Starter.	1 Hr

UNIT - III

INDUSTRIAL CONTROL CIRCUITS	14 Hrs
Planner Machine Control – Skip Hoist Control	2 Hrs
Automatic Control of a Water Pump	2 Hrs
Control of Electric Oven – Control of Air Compressor	2 Hrs
– Control of Over Head Crane	1 Hr
Control of Battery Operated Truck – Control of Conveyor System	2 Hrs
Control of Elevator - Trouble Spots in Control Circuits	2 Hrs
General Procedure for Trouble Shooting.	1 Hr
Aerospace system motors, controllers drive circuits	2 Hrs

UNIT - IV

PROGRAMMABLE LOGIC CONTROLLER   **14 Hrs**

Automation – Types of Automation (Manufacturing and Non-Manufacturing)	2 Hrs
Advantages of Automation	1 Hr
PLC Introduction – Block Diagram of PLC–Principle of Operation	2 Hrs
Modes of Operation– PLC Scan–Memory Organization–Input Module (Schematic and Wiring Diagram) – Output Module (Schematic and Wiring Diagram).	2 Hrs
Types of Programming Devices	1 Hr
Comparison between Hardwire Control System and PLC System	2 Hrs
PLC Types (Fixed and Modular) – Input Types – Output Types	2 Hrs
Criteria for Selection of Suitable PLC – List of Various PLCs available.	2 Hrs

UNIT - V

PLC PROGRAMMING AND SCADA   **14 Hrs**

Different Programming Languages – Ladder Diagram	2 Hrs
Relay Type Instruction	1 Hr
Timer Instruction – ON Delay and OFF Delay Timer	2 Hrs
– Retentive Timer Instruction – Cascading Timers – Counter Instruction	2 Hrs
UP Counter – Down Counter – UP/DOWN Counter - Ladder Logic Diagram for DOL Starter,	2 Hrs
Automatic STAR-DELTA Starter	1 Hr
Rotor Resistance Starter and EB to Generator Change over System.	2 Hrs
Supervisory Control Data Acquisition System (SCADA) – Block Diagram of SCADA, Features and Functions of SCADA. Introduction to DCS.	2 Hrs
Test and Model Exam	**09 Hrs**

TEXT BOOK

S.NO	TITLE	AUTHOR	PUBLISHER WITH EDITION
1	Control of Electrical Machines.	S.K. Bhattacharya	New Age International Publishers, New Delhi

REFERENCE BOOKS

S.NO	TITLE	AUTHOR	PUBLISHER WITH EDITION
1	Exposing Programmable Logic controllers with Application.	Pradeep Kumar Srivastava.	BPB Publications
2	Industrial motor control.	Stephen Herman	6th Edition, Cengage Learning.
3	Practical SCADA for industry	David Bailey Edwin Wright	Newnes Publishers

LEARNING WEBSITE

1. www.industrial-electronics.com/elec-mach-drvs-pwr-syst_20-0.html

2. https://www.allaboutcircuits.com › Worksheets › AC Electric Circuits

3. https://www.industrialcontroldirect.com/motor-control-247/

4. https://unitronicsplc.com/what-is-plc-programmable-logic-controller/

5. www.plcmanual.com/plc-programming

CONTINUOUS INTERNAL ASSESSMENT

The Internal Assessment marks for a total of 25 marks, which are to be distributed as follows:

i)	Attendance	-	5 Marks
ii)	Test	-	10 Marks
iii)	Assignment	-	5 Marks
iv)	Seminar	-	5 Marks

	Total	**-**	**25 Marks**

CO-POs & PSOs MAPPING MATRIX

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
D531.1	3	3	2	2	2	2	2	3	3	3
D531.2	3	3	2	2	2	2	2	3	3	3
D531.3	3	3	2	2	2	2	2	3	3	3
D531.4	3	3	2	2	2	2	2	3	3	3
D531.5	3	3	2	2	2	2	2	3	3	3
Total	15	15	10	10	10	10	10	15	15	15
Correlation level	3	3	2	2	2	2	2	3	3	3

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

QUESTION PAPER SETTING
The teaching learning process and assessment are being carried out in accordance with the revised Bloom's 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.

Bloom's Taxonomy	Lower Order Thinking Skills (LOTs)	Higher Order Thinking Skills (HOTs)
Level	R-Remember, U-Understand , Ap-Apply	An-Analyze, E-Evaluate, C-Create
% to be included	90%	10%

****

EED532 PROGRAMMABLE LOGIC CONTROLLER

TEACHING AND SCHEME OF EXAMINATION:

No of weeks per semester: 16 weeks

Course	Instructions		Examination			
	Hrs/ Week	Hrs / Semester	Marks			Duration
			Internal Assessment	Autonomous Examinations	Total	
Programmable Logic Controller	5	80	25	100*	100	3 Hrs.

*Examinations will be conducted for 100 marks and it will be reduced to 75 marks.

TOPICS AND ALLOCATION OF HOURS:

UNIT	TOPICS	NO. OF HOURS
I	Introduction to PLC	15
II	Input / Output Modules	14
III	PLC Programming	14
IV	Networking	14
V	Data Acquisition Systems	14
	Test & Model Exam	09
	Total	**80**

COURSE DESCRIPTION:

Various control operations are to be performed automatically and sequentially on the electrical machines to suit the industrial requirements. Programmable controllers are mainly employed to control the process in industries. In order to impart knowledge on programmable Logic Controller this theory Course is introduced

OBJECTIVES:

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

- ✓ Explain the meaning of automation and List the types of automation
- ✓ Define PLC and Explain why their use is valuable
- ✓ Explain what PLC can do
- ✓ Compare fixed and modular PLC
- ✓ Explain the advantages of PLC
- ✓ Explain the functions of various elements of power supply unit
- ✓ Know the difference between digital and analog input and output signals
- ✓ Observe how digital field device information gets into a PLC
- ✓ Observe how analog field device information gets into a PLC
- ✓ Understand I/O addresses and how they are used in a PLC
- ✓ Describe PLC timer instruction and differentiate between a non-retentive and retentive timer
- ✓ Program the control of outputs using the timer instruction
- ✓ List and describe the functions of PLC counter instructions
- ✓ Create PLC programs involving program control instructions, math instructions
- ✓ Explain the functionality of different levels of industrial network
- ✓ Explain the concept of network topology and network protocols
- ✓ Explain the concept of I/O bus networks etc.,
- ✓ Describe the computer control of process
- ✓ Explain the operation of SCADA
- ✓ Explain the functions of the major components of a process control system
- ✓ Explain how on/off control and PID control work.

COURSE OUTCOMES:

Course	EED532 PROGRAMMABLE LOGIC CONTROLLER
After successful completion of this course, the students should be able to	
D532.1	Explain the meaning of automation and List the types of automation
D532.2	Know the difference between digital and analog input and output signals
D532.3	Describe PLC timer instruction and differentiate between a non-retentive and retentive timer
D532.4	Explain the functionality of different levels of industrial network
D532.5	Describe the computer control of process

EED532 PROGRAMMABLE LOGIC CONTROLLER

UNIT - I
INTRODUCTION TO PLC: **15 Hrs**

Automation – Types of Automation (Manufacturing and Non-Manufacturing)	2 Hrs
Advantages of Automation	1 Hr
PLC Introduction -Definition — Block diagram of PLC — Principle of Operation — Modes of Operating System	2 Hrs
PLC Scan -Hardwire Control System compared with PLC System - Advantages and Disadvantages of PLCs.	2 Hrs
Criteria for selection of suitable PLC –Memory Organization	2 Hrs
Input Types — Discrete input — Analog in/out	2 Hrs
Elements of Power Supply Unit – PLC Types (Fixed I/O and Modular I/O) –	2 Hrs
List of various PLCs available –Applications of PLC	2 Hrs

UNIT - II
INPUT/OUTPUT MODULES   **14 Hrs**

The I/O Section - Discrete I/O Modules (DC and AC) – Analog I/O Modules	2 Hrs
Special I/O Modules– I/O Module Specification - TypicalDiscrete	2 Hrs
Analog I/O field Devices –Sensors – Limit Switch– Reed Switch	2 Hrs
Proximity Sensor (Inductive and Capacitive).	1 Hr
Types of Photo Electric Sensor - Sinking and Sourcing I/O Modules	2 Hrs
TTL Output Module —— Relay Output Module	2 Hrs
Isolated Output Module –Input /Output	2 Hrs
Addressing Scheme in important commercial PLCs.	1 Hr

UNIT - III
PLC PROGRAMMING   **14 Hrs**

Types of Programming Methods – Types of Programming Devices – Logic Functions – AND Logic – OR Logic – NOT Logic –	2 Hrs
RelayType instructions –Timer Instructions – ON Delay and OFF Delay Timer	2 Hrs
Retentive Timer Instruction —— Cascading Timers	1 Hr
CounterInstruction — UP Counter — DOWN Counter — UP/DOWN Counter — Cascading Counters	2 Hrs
Program Control Instructions –Data Manipulation Instruction – Data CompareInstructions – Math Instructions –	2 Hrs
Sequencer Instructions - PID Instruction – PWM Function – Simple programs using above instructions.	1 Hr

Develop ladder logic for: Bottle Filling System – Automatic Car Parking System –	2 Hrs
EB To Generator Changeover System – Batch Process – Elevator System – DOL Starter- Automatic Star-Delta Starter – Traffic Light Control.	2 Hrs

UNIT - IV

NETWORKING	**14 Hrs**
Levels of Industrial Network — Network Topology	1 Hr
Network Protocol — OSI Reference Model - Networking with TCP / IP Protocol	2 Hrs
I/O Bus networks – Block diagram of I/O Bus networks	2 Hrs
Types of I/O Bus networks. Protocol standards — Advantages of I/O Bus networks -	2 Hrs
Gateway — Token passing — Data Highway — Serial Communication	2 Hrs
Device Net — Control Net — Ethernet	2 Hrs
Mod bus – Field bus – Profi bus- Sub Netting	2 Hrs
Subnet mask -File transfer protocol.	1 Hr

UNIT - V

DATA ACQUISITION SYSTEMS	**14 Hrs**
Computers in Process Control – Types of Processes	2 Hrs
Structureof Control system — ON/OFF Control	2 Hrs
Closed loop Control - PID Control — Motion Control	2 Hrs
Block diagram of Direct Digital Control.	1 Hr
Supervisory Control and Data Acquisition (SCADA)– Block diagram of SCADA –	2 Hrs
Features of SCADA – Functions of SCADA - SCADA software	2 Hrs
Data Loggers — Tags — Alarms	2 Hrs
Landlines for SCADA – use of modems in SCADA.	1 Hr

Test and Model Exam	**09 Hrs**

TEXT BOOKS

S. NO	TITLE	AUTHOR	PUBLISHER WITH EDITION
1	Introduction to Programmable Logic Controllers	Gary Dunning	Cengage LearningIndia Pvt Ltd Third Edition 2011
2	Technician's Guide to Programmable Logic Controllers	Richard A. Cox	Delmer Sixth Edition 2011
3	Programmable Logic Controllers – Principle and Applications	John W. Webb	Prentice Hall
4	Programmable Logic Controllers — Programming Methods and Applications	John R Hackworth and Fredrick D. Hackworth	Pearson Education
5	Programmable Logic Controllers	W. Bolton	Newness
6	Programmable Controller Theory and Implementation	L.A.Bryan E.A.Bryan	An Industrial Text Company Publication – Second Edition 1997

REFERENCE BOOKS

S.NO	TITLE	AUTHOR	PUBLISHER WITH EDITION
1	Programmable Logic Controllers	Frank D.Petruzella	Tata McGraw Hill Edition- Fourth Edition 2011
2	Practical SCADA for industry	David Bailey Edwin Wright	Newnes

LEARNING WEBSITES

1. www.industrial-electronics.com/elec-mach-drvs-pwr-syst_20-0.html

2. https://www.allaboutcircuits.com › Worksheets › AC Electric Circuits

3. https://www.industrialcontroldirect.com/motor-control-247/

4. https://unitronicsplc.com/what-is-plc-programmable-logic-controller/

5. www.plcmanual.com/plc-programming

CONTINUOUS INTERNAL ASSESSMENT

The Internal Assessment marks for a total of 25 marks, which are to be distributed as follows:

         i) Attendance   - 5 Marks
         ii) Test   - 10 Marks
         iii) Assignment   - 5 Marks
         iv) Seminar   - 5 Marks

                 Total   **25 Marks**

CO-POs & PSOs MAPPING MATRIX

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
D532.1	3	3	3	2	3	3	3	3	3	3
D532.2	3	3	3	2	3	3	3	3	3	3
D532.3	3	3	3	2	3	3	3	3	3	3
D532.4	3	3	3	2	3	3	3	3	3	3
D532.5	3	3	3	2	3	3	3	3	3	3
Total	15	15	15	10	15	15	15	15	15	15
Correlation level	3	3	3	2	3	3	3	3	3	3

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

QUESTION PAPER SETTING
The teaching learning process and assessment are being carried out in accordance with the revised Bloom's 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.

Bloom's Taxonomy	Lower Order Thinking Skills (LOTs)	Higher Order Thinking Skills (HOTs)
Level	R-Remember, U-Understand , Ap-Apply	An-Analyze, E-Evaluate, C-Create
% to be included	90%	10%

****

EED533 RENEWABLE ENERGY SOURCES

TEACHING AND SCHEME OF EXAMINATION:

No of weeks per semester: 16 weeks

Course	Instructions		Examination			
	Hrs / Week	Hrs / Semester	Marks			Duration
			Internal Assessment	Autonomous Examinations	Total	
Renewable Energy Sources	5	80	25	100*	100	3 Hrs.

*Examinations will be conducted for 100 marks and it will be reduced to 75 marks.

TOPICS AND ALLOCATION OF HOURS:

UNIT	TOPICS	NO. OF HOURS
I	Fundamentals of Energy Systems and Solar Radiation	15
II	Solar Thermal Conversion and Solar PV Systems	14
III	Wind, Tidal and Wave Energy	14
IV	Bio – Energy	14
V	Geothermal and Oceanic Energy	14
	Test & Model Exam	09
	Total	80

COURSE DESCRIPTION:

Electrical Energy requirement is the major crisis and hence any saving in Electrical energy is equivalent to production of Electrical Energy. Saving can be achieved by the utilization of Renewable Energy Sources.

OBJECTIVES:

After completing this course, students should able to:

➢ Study about the fundamentals of Energy
➢ Study the applications of solar energy for thermal and power generation.
➢ Understand the concept of wind, tidal and wave energies and applications.
➢ Understand the Bio energy sources and energy conversion technologies.
➢ Understand the development of geothermal energy and OTEC principle.

COURSE OUTCOMES:

Course	EED533 RENEWABLE ENERGY SOURCES
After successful completion of this course, the students should be able to	
D533.1	Study about the fundamentals of Energy
D533.2	Study the applications of solar energy for thermal and power generation
D533.3	Understand the concept of wind, tidal and wave energies and applications
D533.4	Understand the Bio energy sources and energy conversion technologies
D533.5	Understand the development of geothermal energy and OTEC principle

EED533 RENEWABLE ENERGY SOURCES

UNIT - I

FUNDAMENTALS OF ENERGY SYSTEMS AND SOLAR   **15 Hrs**
RADIATION

FUNDAMENTALS OF ENERGY SYSTEMS:

Introduction to Energy - Energy consumption and standard of living	2 Hrs
classification of Energy Resources-	2 Hrs
consumption trend of Primary Energy Resources	1 Hr
importance of Renewable Energy Sources-	2 Hrs
Energy for Sustainable Development. – Various Forms of Renewable Energy	2 Hrs

SOLAR RADIATION

Outside Earth's Atmosphere – Earth Surface	2 Hrs
Analysis of Solar Radiation Data – Geometry	2 Hrs
Measurement of Solar Radiation – Solar Radiation Data in India.	2 Hrs

UNIT - II

SOLAR THERMAL CONVERSION AND SOLAR PV SYSTEMS   **14 Hrs**

SOLAR THERMAL APPLICATIONS:

Solar Collectors - Flat Plate Collectors- Concentrating Collectors	2 Hrs
Comparison of Collectors - Selection of Collector for Various Applications	2 Hrs
Solar Water Heaters - Solar Industrial Heating System —— Solar Cookers	2 Hrs
Solar Pond Electric Power Plant.	1 Hr

SOLAR PV SYSTEMS:

A Brief History of PV, PV in Silicon: Basic Principle, Classification of PV Cells - Equivalent Circuit and Electrical Characteristics of Silicon PV Cells	2 Hrs
Series Parallel Connections of Solar Cells - Solar PV Array and Solar Panel – Solar Panel Applications	2 Hrs
Grid Connected PV System — Stand Alone Solar PV Power Plant	2 Hrs
Hybrid Solar PV System.	1 Hr

UNIT - III

WIND, TIDAL & WAVE ENERGY	**14 Hrs**
WIND ENERGY: Introduction-Basic Principles of Wind Energy Conversion: Nature of the Wind,	2 Hrs
Power in the Wind, Forces on the Blades and Wind Energy Conversion-Wind Data and Energy Estimation-Site	2 Hrs
Selection-Classification of Wind EnergyConversion Systems	1 Hr
Types of Wind Machines-Horizontal Axis Wind Turbine(HAWT) – Vertical Axis Wind Turbine (VAWT) ⸺ Comparison Between HAWT & VAWT	2 Hrs
Generating System - Energy Storage ⸺ Applications of Wind Energy	2 Hrs
Power Generation – Pumping Station -Safety and Environmental Aspects.	1 Hr
TIDAL & WAVE ENERGY:	2 Hrs
Basic Principle of Tidal Power – Components and Operation of Tidal Power Plant – Wave Energy- Wave Energy Conversion Devices.	2 Hrs

UNIT - IV

BIO – ENERGY	**14 Hrs**
BIOMASS RESOURCES: Introduction – Photo Synthesis – Usable Forms of Bio Mass,	2 Hrs
Their Composition and FuelProperties - Biomass Resources.	2 Hrs
BIOMASS ENERGY CONVERSION:	2 Hrs
Biomass Conversion Technologies ⸺ Urban Waste to Energy Conversion	
Biomass Gasification ⸺ Biomass Liquification	2 Hrs
Biomass to Ethanol Production	1 Hr
Biogas Production from WasteBiomass	2 Hrs
Types of Bio Gas Plants - Applications ⸺ Bio Diesel Production	2 Hrs
Biomass Energy Scenario in India.	1 Hr

UNIT - V   **14 Hrs**

GEOTHERMAL AND OCEANIC ENERGY

GEO THERMAL ENERGY:

Energy inside the Earth — Uses of Geothermal Energy   2 Hrs

Geothermal Wells — Potential in India   1 Hr

Types of Geothermal Heat Pump Systems   2 Hrs

Types of Geothermal Power Plants.   2 Hrs

OCEANIC ENERGY:

Ocean Energy Resources   1 Hr

Principle of Ocean Thermal Energy Conversion (OTEC)   2 Hrs

Method of Ocean   2 Hrs

Thermal Electric Power Generation.   2 Hrs

Test and Model Exam   **09 Hrs**

TEXT BOOK

S.NO	TITLE	AUTHOR	PUBLISHER WITH EDITION
1	Non-Conventional Energy Sources	G.D. Rai	Khanna Publishers, 1999 New Delhi

REFERENCE BOOKS

S.NO	TITLE	AUTHOR	PUBLISHER WITH EDITION
1	Non-Conventional Energy Sources and Utilization	R.K. Rajput	S.Chand & Company Ltd. 2012
2	Renewable Energy Sources	Twidell J.W. and Weir A	EFN Spon Ltd. 1986
3	Non-Conventional Energy Resources	B.H.Khan	Tata Mc Graw Hill., 2nd Edn, 2009 New Delhi.

LEARNING WEBSITES

1. http://www.eolss.net/sample-chapters/c08/e6-106-01-00.pdf

2. https://www.nrel.gov/docs/legosti/old/1846.pdf

3. https://www.mdpi.com/journal/energies/sections/wind_wave_tidal_energy

4. https://www.energy.gov/eere/bioenergy/bioenergy-basics

5. https://mnre.gov.in/img/documents/uploads/file_s-1582544175017.pdf

CONTINUOUS INTERNAL ASSESSMENT

The Internal Assessment marks for a total of 25 marks, which are to be distributed as follows:

i) Attendance	- 5 Marks
ii) Test	- 10 Marks
iii) Assignment	- 5 Marks
iv) Seminar	- 5 Marks

Total	**25 Marks**

CO-POs & PSOs MAPPING MATRIX

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
D533.1	3	3	3	2	2	3	3	3	3	3
D533.2	3	3	3	2	2	3	3	3	3	3
D533.3	3	3	3	2	2	3	3	3	3	3
D533.4	3	3	3	2	2	3	3	3	3	3
D533.5	3	3	3	2	2	3	3	3	3	3
Total	15	15	15	10	10	15	15	15	15	15
Correlation level	3	3	3	2	2	3	3	3	3	3

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

QUESTION PAPER SETTING

The teaching leering process and assessment are being carried out in accordance with the revised Bloom's 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.

Bloom's Taxonomy	Lower Order Thinking Skills (LOTs)	Higher Order Thinking Skills (HOTs)
Level	R-Remember, U-Understand , Ap-Apply	An-Analyze, E-Evaluate, C-Create
% to be included	90%	10%

****

EED540 COMPUTER AIDED ELECTRICAL DRAWING PRACTICAL

TEACHING AND SCHEME OF EXAMINATION:

No of weeks per semester: 16 weeks

Course	Instructions		Examination			
	Hrs / Week	Hrs / Semester	Marks			Duration
			Internal Assessment	Autonomous Examinations	Total	
Computer Aided Electrical Drawing Practical	4	64	25	100*	100	3 Hrs.

*Examinations will be conducted for 100 marks and it will be reduced to 75 marks.

DETAILED ALLOCATION OF MARKS:

SI.NO	NAME OF THE ACTIVITY	MARKS
1	SYMBOLS IN CAD	20
2	MANUAL DRAWING OF ELECTRICAL CONNECTION DIAGRAM	20
3	ELECTRICAL CONNECTION DIAGRAM IN CAD	35
4	PRINT OUT	10
5	VIVA VOCE	05
6	MINI PROJECT	10
	TOTAL	100

Mini Project Evaluation (10 marks)

Breakup Details

1	Project Description	05
2	Project Demo	05
	Total	**10**

COURSE DESCRIPTION:

This course is introduced in order to impart skill of making Computer Aided Electrical Drawing.

EQUIPMENTS REQUIRED: (For a Batch of 30 Students)

S.No	NAME OF THE EQUIPMENT	QUANTITY REQUIRED
1.	PC – Pentium Dual Core	30
2.	Electrical CAD Software multi user	01
3.	UPS – 5KVA with half an hour battery backup	01

OBJECTIVES:

At the end of the semester the students must be able to draw:

- 2D Diagrams using Auto CAD
- Symbols widely used in Electrical and Electronics Circuits
- Single Line Diagram of different types of Panels.
- Single Line Diagrams of Substation Layout.
- Winding Diagrams
- Line Diagram of Distribution Panels

COURSE OUTCOMES:

Course	EED540 COMPUTER AIDED ELECTRICAL DRAWING PRACTICAL
After successful completion of this course, the students should be able to	
D540.1	Symbols widely used in Electrical and Electronics circuits
D540.2	Understand CAD Application package for Electrical Drawing.
D540.3	Develop winding diagrams of Electrical Machines
D540.4	Understand and Draw Electrical Wiring, Single line diagrams
D540.5	Understand and Draw Line diagram of distribution panels and develop the mini projects with report.

EED540 COMPUTER AIDED ELECTRICAL DRAWING PRACTICAL

Sl. No	List of Experiments
	ELECTRICAL SYMBOLS-DRAWING
1	Draw the symbols for Components: Resistor, Capacitor, Inductor, Diode, Transistor, FET, SCR, UJT, TRIAC, DIAC, and Gates AND, OR, NOT, NAND,NOR, EXOR.
2	Draw the Symbols used in Electrical Wiring: Relays, Contactors, Fuses, Main Switch, Electric Bell, Earth, DPST, DPDT, TPST, and Neutral Link
3	Draw the Symbols for Instruments: Ammeter, Voltmeter, Wattmeter, Energy Meter, Frequency Meter, Power Factor Meter, Timer and Buzzers
4	Draw the Symbols for Machines: Armatures, Alternators, Field winding (Shunt,Series and Compound) Transformer and Autotransformer
	ELECTRICAL CONNECTION DIAGRAMS- DRAWING
5	Draw the Single Line diagram of Single phase MCB Distribution board.
6	Draw the Single Line diagram of three phase MCB Distribution board.
7	Draw the Single Line diagram of typical MV Panel.
8	Draw the Single Line Diagram of Motor Control Centre (MCC) Panel
9	Draw the Single Line Diagram of Fire Alarm Riser Arrangement in Multi-Storey Building
10	Draw the Single Line Diagram of Intercom Arrangement in Multi Storey Building
11	Draw the Front-End Schematic Diagram of typical Sub Switch Board (SSB)
12	Draw the Winding Diagram of Lap Connected DC Armature with Commutators Connections and Brush Positions
13	Draw the Control and Main Circuit of Automatic Star Delta Starter
14	Draw the Mush Winding Diagram of a Three Phase Induction Motor
15	Draw the Concentric Winding Diagram of a Single-Phase Induction Motor
16	Draw the single line diagram of DOL starter
17	Mini Project

The mini project is activity based and it may be given to group of maximum of six students for hands on experience and to create scientific temper**.**

CONTINUOUS INTERNAL ASSESSMENT

The Internal Assessment mark for a total of 25 marks which are to be distributed as follows:

a) Attendance   :   05 Marks
(Award of marks same as theory courses)

b) Procedure/ observation and tabulation/
Other Practical related Work   :   05 Marks

c) Tests   :   10 Marks

d) Student Centered Learning (SCL) work sheet   :   05 Marks

                      TOTAL   25 Marks

LEARNING WEBSITES

1.https://www.academia.edu/25581894/Subject_Computer_Aided_Electrical_drawing_CAED_Subject_Code_10EE65

2. https://sites.google.com/a/cmrit.ac.in/kashifahmed786/courses/caed---computer-aided-electrical-drawing-10ee65

3. https://www.scribd.com/document/58518215/1-Computer-Aided-Electrical-Drawing-Syllabus

4. https://www.youtube.com/watch?v=q3wa6ZPVWd8

CO-POs & PSOs MAPPING MATRIX

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
D540.1	3	3	3	3	3	3	3	3	3	3
D540.2	3	3	3	3	3	3	3	3	3	3
D540.3	3	3	3	3	3	3	3	3	3	3
D540.4	3	3	3	3	3	3	3	3	3	3
D540.5	3	3	3	3	3	3	3	3	3	3
Total	15	15	15	15	15	15	15	15	15	15
Correlation level	3	3	3	3	3	3	3	3	3	3

Correlation level 1 – Slight (Low)

Correlation level 2 – Moderate (Medium)

Correlation level 3 – Substantial (High)

EED540 COMPUTER AIDED ELECTRICAL DRAWING PRACTICAL

MODEL QUESTION PAPER

Si. No	List of Experiments	CO	PO
	ELECTRICAL SYMBOLS-DRAWING		
1	Draw the symbols for Components: Resistor, Capacitor, Inductor, Diode, Transistor, FET, SCR, UJT, TRIAC, DIAC, and Gates AND, OR, NOT, NAND,NOR, EXOR.	D540.1	PO1, PO2, PO3, PO4, PO5, PO6, PO7
2	Draw the Symbols used in Electrical Wiring: Relays, Contactors, Fuses, Main Switch, Electric Bell, Earth, DPST, DPDT, TPST, and Neutral Link	D540.1	PO1, PO2, PO3, PO4, PO5, PO6, PO7
3	Draw the Symbols for Instruments: Ammeter, Voltmeter, Wattmeter, Energy Meter, Frequency Meter, Power Factor Meter, Timer and Buzzers	D540.1	PO1, PO2, PO3, PO4, PO5, PO6, PO7
4	Draw the Symbols for Machines: Armatures, Alternators, Field winding (Shunt,Series and Compound) Transformer and Autotransformer	D540.1	PO1, PO2, PO3, PO4, PO5, PO6, PO7
	ELECTRICAL CONNECTION DIAGRAMS-DRAWING		
5	Draw the Single Line diagram of Single phase MCB Distribution board.	D540.5	PO1, PO2, PO3, PO4, PO5, PO6, PO7
6	Draw the Single Line diagram of three phase MCB Distribution board.	D540.5	PO1, PO2, PO3, PO4, PO5, PO6, PO7
7	Draw the Single Line diagram of typical MV Panel.	D540.2	PO1, PO2, PO3, PO4, PO5, PO6, PO7
8	Draw the Single Line Diagram of Motor Control Centre (MCC) Panel	D540.2	PO1, PO2, PO3, PO4, PO5, PO6, PO7
9	Draw the Single Line Diagram of Fire Alarm Riser Arrangement in Multi-Storey Building	D540.2	PO1, PO2, PO3, PO4, PO5, PO6, PO7
10	Draw the Single Line Diagram of Intercom Arrangement in Multi Storey Building	D540.4	PO1, PO2, PO3, PO4, PO5, PO6, PO7
11	Draw the Front-End Schematic Diagram of typical Sub Switch Board (SSB)	D540.4	PO1, PO2, PO3, PO4, PO5, PO6, PO7
12	Draw the Winding Diagram of Lap Connected DC Armature with Commutators Connections and Brush Positions	D540.4	PO1, PO2, PO3, PO4, PO5, PO6, PO7
13	Draw the Control and Main Circuit of Automatic Star Delta Starter	D540.4	PO1, PO2, PO3, PO4, PO5, PO6, PO7
14	Draw the Mush Winding Diagram of a Three Phase Induction Motor	D540.3	PO1, PO2, PO3, PO4, PO5, PO6, PO7
15	Draw the Concentric Winding Diagram of a Single-Phase Induction Motor	D540.3	PO1, PO2, PO3, PO4, PO5, PO6, PO7
16	Draw the single line diagram of DOL starter	D540.3	PO1, PO2, PO3, PO4, PO5, PO6, PO7
17	**Mini Project**	**D540.5**	**PO1, PO2, PO3, PO4, PO5, PO6, PO7**

EED550 MICROCONTROLLER PRACTICAL

TEACHING AND SCHEME OF EXAMINATION:

Number of Weeks/ Semester: 16 Weeks

Course	Instructions		Examination			
			Marks			
	Hrs / Week	Hrs / Semester	Internal Assessment	Autonomous Examinations	Total	Duration
Microcontroller Practical	4	64	25	100*	100	3 Hrs.

*Examinations will be conducted for 100 marks and it will be reduced to 75 marks.

DETAILED ALLOCATION OF MARKS:

SI.NO	NAME OF THE ACTIVITY	MARKS
1	ALGORITHM/FLOW CHART	20
2	PROGRAM	30
3	EXECUTION	30
4	RESULT	05
5	VIVA–VOCE	05
6	MINI PROJECT	10
	TOTAL	100

Mini Project Evaluation (10 marks)

Breakup Details

1	Project Description	05
2	Project Demo	05
	Total	**10**

COURSE DESCRIPTION:

The introduction of this course will enable the students to have hands on experience in using 8051 trainer kit. The students are exposed to learn simple programs using assembly language. They can also get familiar with the C compiler platform. They also gain knowledge by using application specific interfacing boards

EQUIPMENTS REQUIRED: (For a Batch of 30 Students)

S. No	Name of the Equipments	Required Nos
1.	8051 Microcontroller kit	14
2.	Digital I/O Interface board	2
3.	Seven segment LED display interface board	2
4.	8 bit DAC interface board	2
5.	Stepper motor control interface board	2
6.	DC motor control interface board	2
7.	RS 232 serial port cable	2
8.	LCD interface board	2
9.	Laptop / Desktop Computer	6

OBJECTIVES:

The students are able to

➢ Understand the use of instruction set by writing and executing simple ALP.

➢ Know the connection details between microcontroller and peripherals.

➢ Develop the mini projects.

COURSE OUTCOMES:

Course	EED550 MICROCONTROLLER PRACTICAL
After successful completion of this course, the students should be able to	
D550.1	Write and execute the assembly language program for addition, subtraction, multiplication and division of numbers.
D550.2	Write and verify the outputs of LEDS, DAC interface, LCD interface and digital I/O interface stepper motor and timer/counter.
D550.3	Write and convert ALP for converting numbers from BCD to hexadecimal, hexadecimal to BCD and finding smallest number.
D550.4	Write and perform serial communication between two 8051 microcontrollers, interface seven segment display and interface DC motor
D550.5	Write a ALP for generating square wave and develop mini project with report.

EED550 MICROCONTROLLER PRACTICAL

Part A

The following experiments should be written using 8051 assembly language program and should be executed in 8051 microcontroller kit.

1. 8 / 16 bit addition
2. 8 / 16 bit subtraction
3. 8 bit multiplication
4. 8 bit division
5. BCD to Hex code conversion
6. Hex to BCD code conversion
7. Smallest/Biggest number
8. Time delay routine (Demonstrate by Blinking LEDS).
9. Using Timer/counter of 8051.

Part B (Interfacing Application Boards)

The following experiments can be written using C compiler or 8051 assembly language and to be executed.

10. Interfacing Digital I/O board
11. Interfacing DAC
12. Interfacing Stepper motor
13. Interfacing Seven segment LED display or LCD
14. Sending data through the serial port between microcontroller kits
15. Interfacing DC motor using PWM.
16. Write assembly language programme to generate 10 Khz square wave.
17. Mini Project

The mini project is activity based and it may be given to group of maximum of six students for hands on experience and to create scientific temper.

CONTINUOUS INTERNAL ASSESSMENT

The Internal Assessment mark for a total of 25 marks which are to be distributed as follows:

a) Attendance (Award of marks same as theory courses)	:	05 Marks
b) Procedure/ observation and tabulation/ Other Practical related Work	:	05 Marks
c) Tests	:	10 Marks
d) Student Centered Learning (SCL) work sheet	:	05 Marks

TOTAL		25 Marks

LEARNING WEBSITES

1. https://www.udemy.com/course/pic-microcontroller-learn-by-building-practical-projects/

2. http://vlabs.iitb.ac.in/vlabs-dev/labs/8051-Microcontroller-

3. https://www.youtube.com/watch?v=2tzxm2Kbrg8

4. http://www.msajce-edu.in/images/Departments/ECE/Virtual-Lab-Microprocessors.pdf

CO- POs & PSOs MAPPING MATRIX

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
D550.1	3	3	3	3	3	3	3	3	3	3
D550.2	3	3	3	3	3	3	3	3	3	3
D550.3	3	3	3	3	3	3	3	3	3	3
D550.4	3	3	3	3	3	3	3	3	3	3
D550.5	3	3	3	3	3	3	3	3	3	3
Total	15	15	15	15	15	15	15	15	15	15
Correlation level	3	3	3	3	3	3	3	3	3	3

Correlation level 1- Slight (low)

Correlation level 2- Moderate (Medium)

Correlation level 3- Substantial (high)

EED550 MICROCONTROLLER PRACTICAL

MODEL QUESTION PAPER

S.No	Experiments	CO	PO
1	Write an assembly language program for adding two 8 bit / 16 bit numbers and execute the same using 8051 trainer kit. Store the output result in memory. Input numbers can be given as immediate data or can be stored in the memory.	D550.1	PO1,PO2,PO3,PO4, PO5,PO6,PO7
2	Write a program to interface stepper motor with microcontroller 8051 and execute. Check the execution for varying the speed of the motor and also the forward/reverse rotation of the motor.	D550.2	PO1,PO2,PO3,PO4, PO5,PO6,PO7
3	Write a 8051 Assembly Language program to use Timer/ Counter of 8051 microcontroller to generate time delay and observe the output.	D550.2	PO1,PO2,PO3,PO4, PO5,PO6,PO7
4	Write a 8051 Assembly language program to generate 1 second time delay using Time delay routine and verify the output at LEDS.	D550.2	PO1,PO2,PO3,PO4, PO5,PO6,PO7
5	Write a program to interface DAC interface board with microcontroller and verify the analog output.	D550.2	PO1,PO2,PO3,PO4, PO5,PO6,PO7
6	Write a program to interface LCD interface board with microcontroller and observe the output at LCD.	D550.2	PO1,PO2,PO3,PO4, PO5,PO6,PO7
7	Write a program to interface Digital I /O board with microcontroller and verify all input and output operations.	D550.2	PO1,PO2,PO3,PO4, PO5,PO6,PO7
8	Write an assembly language program using 8051 to convert the given BCD number to hexadecimal number and store the result in memory. The input can be given as an immediate data or can be stored in the memory.	D550.3	PO1,PO2,PO3,PO4, PO5,PO6,PO7
9	Write an assembly language program using 8051 to convert the given hexadecimal number to BCD number and store the result in memory. The input can be given as an immediate data or can be stored in the memory.	D550.3	PO1,PO2,PO3,PO4, PO5,PO6,PO7
10	Write an assembly language program using 8051 to find the smallest number of the array of given numbers and store the result in the memory. The size of the array and the input numbers can be stored in the memory.	D550.3	PO1,PO2,PO3,PO4, PO5,PO6,PO7
11	Write an assembly language program using 8051 to	D550.1	PO1,PO2,PO3,PO4,

	perform 8 bit multiplication and store the result in the memory. The input numbers can be given as immediate data or can be stored in the memory.		PO5,PO6,PO7
12	Write an assembly language program for subtracting two 8 bit / 16 bit numbers and execute the same using 8051 trainer kit. Store the output result in memory. Input numbers can be given as immediate data or can be stored in the memory.	D550.1	PO1,PO2,PO3,PO4, PO5,PO6,PO7
13	Write an assembly language program using 8051 to perform 8 bit division and store the result in the memory. The input numbers can be given as immediate data or can be stored in the memory.	D550.1	PO1,PO2,PO3,PO4, PO5,PO6,PO7
14	Write a program to perform serial communication between two 8051 microcontroller kits and verify the output.	D550.4	PO1,PO2,PO3,PO4, PO5,PO6,PO7
15	Write a program to interface seven segment LED interface with microcontroller and verify the output at seven segment display.	D550.4	PO1,PO2,PO3,PO4, PO5,PO6,PO7
16	Write a program to interface a DC motor with microcontroller and verify the rotation of motor in both directions using PWM method.	D550.4	PO1,PO2,PO3,PO4, PO5,PO6,PO7
17	Write assembly language program to generate 10KHz square wave.	D550.5	PO1,PO2,PO3,PO4, PO5,PO6,PO7
18.	**Mini Project**	**D550.5**	**PO1,PO2,PO3,PO4, PO5,PO6,PO7**

EED561 CONTROL OF ELECTRICAL MACHINES PRACTICAL

TEACHING AND SCHEME OF EXAMINATION:

No of weeks per semester: 16 weeks

Course	Instructions		Examination			
	Hrs / Week	Hrs / Semester	Marks		Total	Duration
			Internal Assessment	Autonomous Examinations		
Control of Electrical Machines Practical	5	80	25	100*	100	3 Hrs.

*Examinations will be conducted for 100 marks and it will be reduced to 75 marks.

DETAILED ALLOCATION OF MARKS:

S. No	NAME OF ACTIVITY	MARKS
1	Drawing Connection/Ladder Diagram and Writing Details of the Components/Equipment/Machines used	20
2	Making the correct circuit connections	20
3	Conducting the Experiment - Following the correct procedure - Verifying the operation / appropriate readings - Following the appropriate safety procedure	25
4	Tabulation of Readings / Interpretation of Results Graphical Representation (If required)	20
5	Viva-Voce	05
6	Mini Project	10
	Total	**100**

Mini Project Evaluation (10 marks)

Breakup Details

1	Project Description	05
2	Project Demo	05
	Total	**10**

COURSE DESCRIPTION:

The controlling techniques of various types of AC and DC Electrical Machines are to be practically learned to meet the present industrial requirements. The Controlling Process is mainly to be known to Diploma Engineer and become a successful Employee or Technician. This course will make our students with knowledge of application-oriented skills in Industrially Operated Machines.

EQUIPMENTS REQUIRED: (For a Batch of 30 Students)

S. NO	LIST OF EQUIPMENTS	QUANTITY REQUIRED
1	Transformer oil Test Kit, Acidity Test kit	Each 1
2	Thermal Overload Relay	3
3	AC Contactor 230v/440v, 16A	26
4	Push Button With NO/NC Elements	30
5	Induction Motor 440 V, 1440 rpm, any HP rating (apart from EM- II lab)	3
6	Proximity Switch	2
7	PLC (any brand) suitable for above experiments	5
8	Solenoid Valve	2
9.	Three Stage Lift Model, Conveyor Model	Each 1
10.	Forward, Reverse and Jogging (Forward and Reverse) Operation Model	1

OBJECTIVES:

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

➢ Make use of various types of control circuit elements like industrial switches, relays, timers, solenoids, contactors and inter locking arrangement.

➢ Construct various types of automatic starters for electrical motors.

➢ Construct control circuits for braking, jogging, reversing operations.

➢ Make use of PLCs for control applications.

➢ Program PLCs for controlling the motor.

COURSE OUTCOMES:

Course	EED561 CONTROL OF ELECTRICAL MACHINES PRACTICAL
After successful completion of this course, the students should be able to	
D561.1	Make use of various types of control circuit elements like industrial switches, relays, timers, solenoids, contactors and interlocking arrangement.
D561.2	Construct various types of automatic starters for electrical motors.
D561.3	Construct control circuits for braking, jogging, reversing operations.
D561.4	To make use of PLCs for control applications.
D561.5	To program PLCs for controlling the motor and develop the mini projects with report.

EED561 CONTROL OF ELECTRICAL MACHINES PRACTICAL

Si.No	List of Experiments
1	Wire and Test the Control Circuit for Jogging in Cage Induction Motor
2	Wire and Test the Control Circuit for Semi-Automatic Star –Delta Starter
3	Wire and Test the Control Circuit for Automatic Star –Delta Starter
4	Wire and Test the Control Circuit for Dynamic Braking of Cage Motor
5	Wire and Test the Control Circuit for Two Speed Pole Changing Motor
6	Wire and Test the Control Circuit for Forward and Reverse Operation
7	Wire and Test the Control Circuit for Automatic Rotor Resistance Starter
8	Wire and Test the DOL Starter with Single Phase Preventer using PLC
9	Wire and Test the Star –Delta Starter using PLC.
10	Wire and Test the Control Circuit for Automatic Rotor Resistance Starter using PLC
11	Develop and execute the Ladder Logic Diagram in PLC for 3 Stage Lift Operation
12	Wire and Test the Sequential Operation of Solenoid Valve and a Motor for Tank Filling Operation using PLC
13	Develop and execute the Ladder Logic to Interface PLC with Conveyor Model for counting the object moving in the Conveyer.
14	Wire and Test the Control Circuit for Jog Forward, Jog Reverse, Forward and Reverse Operations using PLC
15	Test the timing characteristics of thermal over load relay
16	Mini project

The mini project is activity based and it may be given to group of maximum of six students for hands on experience and to create scientific temper

CONTINUOUS INTERNAL ASSESSMENT

The Internal Assessment mark for a total of 25 marks which are to be distributed as follows:

a) Attendance	:	05 Marks
(Award of marks same as theory courses)		
b) Procedure/ observation and tabulation/ Other Practical related Work	:	05 Marks
c) Tests	:	10 Marks
d) Student Centered Learning (SCL) work sheet	:	05 Marks

TOTAL		25 Marks

LEARNING WEBSITES

1. https://www.slideshare.net/venkatdon/control-of-electrical-machines

2. http://www.alecop.com/wp-content/uploads/2015/07/8-ELECTRONIC-CONTROL-OF-

ELECTRICAL-MACHINES.pdf

3. https://lecturenotes.in/practicals/13630-lab-manuals-for-electrical-machine-1-em1-by-nihar-ranjan-rout

CO-POs & PSOs MAPPING MATRIX

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
D561.1	3	3	3	3	3	3	3	3	3	3
D561.2	3	3	3	3	3	3	3	3	3	3
D561.3	3	3	3	3	3	3	3	3	3	3
D561.4	3	3	3	3	3	3	3	3	3	3
D561.5	3	3	3	3	3	3	3	3	3	3
Total	15	15	15	15	15	15	15	15	15	15
Correlation level	3	3	3	3	3	3	3	3	3	3

Correlation level 1 – Slight (Low)

Correlation level 2 – Moderate (Medium)

Correlation level 3 – Substantial (High)

EED561 CONTROL OF ELECTRICAL MACHINES PRACTICAL

MODEL QUESTION PAPER

Si.No	List of Experiments	CO	PO
1	Wire and Test the Control Circuit for Jogging in Cage Induction Motor	D561.1	PO1, PO2, PO3, PO4, PO5, PO6, PO7
2	Wire and Test the Control Circuit for Semi-Automatic Star –Delta Starter	D561.1	PO1, PO2, PO3, PO4, PO5, PO6, PO7
3	Wire and Test the Control Circuit for Automatic Star – Delta Starter	D561.1	PO1, PO2, PO3, PO4, PO5, PO6, PO7
4	Wire and Test the Control Circuit for Dynamic Braking of Cage Motor	D561.2	PO1, PO2, PO3, PO4, PO5, PO6, PO7
5	Wire and Test the Control Circuit for Two Speed Pole Changing Motor	D561.2	PO1, PO2, PO3, PO4, PO5, PO6, PO7
6	Wire and Test the Control Circuit for Forward and Reverse Operation	D561.2	PO1, PO2, PO3, PO4, PO5, PO6, PO7
7	Wire and Test the Control Circuit for Automatic Rotor Resistance Starter	D561.3	PO1, PO2, PO3, PO4, PO5, PO6, PO7
8	Wire and Test the DOL Starter with Single Phase Preventer using PLC	D561.3	PO1, PO2, PO3, PO4, PO5, PO6, PO7
9	Wire and Test the Star –Delta Starter using PLC.	D561.3	PO1, PO2, PO3, PO4, PO5, PO6, PO7
10	Wire and Test the Control Circuit for Automatic Rotor Resistance Starter using PLC	D561.4	PO1, PO2, PO3, PO4, PO5, PO6, PO7
11	Develop and execute the Ladder Logic Diagram in PLC for 3 Stage Lift Operation	D561.4	PO1, PO2, PO3, PO4, PO5, PO6, PO7
12	Wire and Test the Sequential Operation of Solenoid Valve and a Motor for Tank Filling Operation using PLC	D561.4	PO1, PO2, PO3, PO4, PO5, PO6, PO7
13	Develop and execute the Ladder Logic to Interface PLC with Conveyor Model for counting the object moving in the Conveyer.	D561.5	PO1, PO2, PO3, PO4, PO5, PO6, PO7
14	Wire and Test the Control Circuit for Jog Forward, Jog Reverse, Forward and Reverse Operations using PLC	D561.5	PO1, PO2, PO3, PO4, PO5, PO6, PO7
15	Test the timing characteristics of thermal over load relay	D561.5	PO1, PO2, PO3, PO4, PO5, PO6, PO7
16	**Mini project**	**D561.5**	**PO1, PO2, PO3, PO4, PO5, PO6, PO7**

EED562 PROGRAMMABLE LOGIC CONTROLLER PRACTICAL

TEACHING AND SCHEME OF EXAMINATION:

No of weeks per semester: 16 weeks

Course	Instructions		Examination			
	Hrs / Week	Hrs / Semester	Marks			Duration
			Internal Assessment	Autonomous Examinations	Total	
Programmable Logic Controller Practical	5	80	25	100*	100	3 Hrs.

*Examinations will be conducted for 100 marks and it will be reduced to 75 marks.

DETAILED ALLOCATION OF MARKS:

S.No.	NAME OF THE ACTIVITY	MARKS
1	Drawing Connection/Ladder Diagram and Writing Details of the Components/Equipments/Machines used	20
2	Making the correct circuit connections	20
3	Conducting the Experiment - Following the correct procedure - Verifying the operation / appropriate readings - Following the appropriate safety procedure	25
4	Tabulation of Readings / Interpretation of Results Graphical Representation (If required)	20
5	Viva-Voce	05
6	Mini Project	10
	Total	**100**

Mini Project Evaluation (10 marks)
Breakup Details

1	Project Description	05
2	Project Demo	05
	Total	**10**

COURSE DESCRIPTION:

Various control operations are to be performed automatically and sequentially on the electrical machines to suit the industrial requirements. Programmable controllers are mainly employed to control the process in industries. In order to train our students on handling of programmable controllers this practical course is introduced.

EQUIPMENTS REQUIRED: (For a Batch of 30 Students)

S.NO	LIST OF EQUIPMENTS	QUANTITY REQUIRED
1	PLC suitable to conduct above experiments	3
2	Limit switch	1
3	Reed switch	1
4	Inductive proximity sensor	1
5	Capacitive proximity sensor	1
6	PC (or) laptop	3

OBJECTIVES:

On completion of this practical Course the students will be able to

➢ Develop ladder logic for different types of starters.

➢ Develop ladder logic for EB to Generator changeover.

➢ Develop ladder logic for Automatic load transfer.

➢ Develop ladder logic for sequential control process likewater filling, fire alarm and conveyor sorting etc.,

➢ Program PLCs for controlling Heater and motors.

COURSE OUTCOMES:

Course	EED562 PROGRAMMABLE LOGIC CONTROLLER PRACTICAL
After successful completion of this course, the students should be able to	
D562.1	Develop ladder logic for different types of starters
D562.2	Develop ladder logic for EB to Generator changeover
D562.3	Develop ladder logic for Automatic load transfer
D562.4	Develop ladder logic for sequential control process like water filling, fire alarm and conveyor sorting etc
D562.5	Program PLCs for controlling Heater and motors and develop the mini projects with report.

EED562 PROGRAMMABLE LOGIC CONTROLLER PRACTICAL

Sl.No   **List of Experiments**
1   Interfacing of Limit switch, Reed switch and Proximity switch with PLC.
2   DOL starter with single phase prevention.
3   EB to Generator Change over switch implementation with interlocking
4   Star Delta starter
      a) Single phasing prevention
      b) Adjustable star-delta transfer time
      c) Pre-settable overload trip time
5   Automatic load transfer
      a) Transfers load from one phase to another when one phase in a three phase system fails
      b) Automatically restores when power is resumed
      c) Time delays are effected to prevent action during short time failure
6   Fill the water in water tank and maintain the water level.
      a) When water level comes below lower level switch ON the pump
      b) When water level reaches the high level switch OFF the pump
      c) Include manual switch to operate the pump at any level of water.
7   Fire alarm
      a) Multiple alarms
      b) Sound alarm
      c) If not acknowledged, Sound alarms 1 and 2
      d) Similarly go up to 4 alarm conveyor belt sorting
8   Three floor Lift control
9   Traffic light control
10   Automatic operation of double acting pneumatic cylinder – Multi cycle
11   Sequential operation of two Double Acting Cylinders for the sequence A+,B+, B-,A-
12   Analog input to PLC as a set of valve for a comparator function block
      a) The input is multilevel illumination control. The input is setting is by means of a potentiometer in an analog input to the PLC. The outputs turn on several groups of lamps to obtain desired level illumination.
13   Heater control with PID function of the PLC
      a) A 1000 W water heater is controlled using the PID function of the PLC. The temperature transducer is a temperature transmitter with 4 to 20 mA output and Pt 100 Probe.
14   Round table liquid filling system
      a) Dropping of Reagents into test tubes. The feedback is from potentiometer. The program must ensure that the end limits of the pot are never reached by carefully balancing the clockwise and anti-clockwise revolution.
15   Slow speed motor control using PWM function of the PLC
      a) Slow speed 12V DC 18W permanent magnet motor with fly wheel is controlled with the PWM output and feedback from a low resolution encoder.
16   Mini Project
    The mini project is activity based and it may be given to group of maximum of six students for hands on experience and to create scientific temper

CONTINUOUS INTERNAL ASSESSMENT

The Internal Assessment mark for a total of 25 marks which are to be distributed as follows:

a) Attendance	:	05 Marks
(Award of marks same as theory courses)		
b) Procedure/ observation and tabulation/ Other Practical related Work	:	05 Marks
c) Tests	:	10 Marks
d) Student Centered Learning (SCL) work sheet	:	05 Marks

TOTAL		25 Marks

LEARNING WEBSITES

1. https://en.wikipedia.org/wiki/Programmable_logic_controller

2. https://unitronicsplc.com/what-is-plc-programmable-logic-controller/

3. https://www.amci.com/industrial-automation-resources/plc-automation-tutorials/what-plc/

4. https://www.allaboutcircuits.com/textbook/digital/chpt-6/programmable-logic-controllers-plc/

5. https://www.allaboutcircuits.com/technical-articles/what-is-a-plc-introduction-to-programmable-logic-controllers/

CO-POs & PSOs MAPPING MATRIX

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
D562.1	3	3	3	3	3	3	3	3	3	3
D562.2	3	3	3	3	3	3	3	3	3	3
D562.3	3	3	3	3	3	3	3	3	3	3
D562.4	3	3	3	3	3	3	3	3	3	3
D562.5	3	3	3	3	3	3	3	3	3	3
Total	15	15	15	15	15	15	15	15	15	15
Correlation level	3	3	3	3	3	3	3	3	3	3

Correlation level 1 – Slight (Low)

Correlation level 2 – Moderate (Medium)

Correlation level 3 – Substantial (High)

EED562 PROGRAMMABLE LOGIC CONTROLLER PRACTICAL

MODEL QUESTION PAPER

Si.No	List of Experiments	CO	PO
1	Interfacing of Limit switch, Reed switch and Proximity switch with PLC.	D562.1	PO1, PO2, PO3, PO4, PO5, PO6, PO7
2	DOL starter with single phase prevention.	D562.1	PO1, PO2, PO3, PO4, PO5, PO6, PO7
3	EB to Generator Change over switch implementation with interlocking	D562.1	PO1, PO2, PO3, PO4, PO5, PO6, PO7
4	Star Delta starter a). Single phasing prevention b). Adjustable star-delta transfer time c). Pre-settable overload trip time	D562.2	PO1, PO2, PO3, PO4, PO5, PO6, PO7
5	Automatic load transfer a). Transfers load from one phase to another when one phase in a three phase system fails b). Automatically restores when power is resumed c). Time delays are effected to prevent action during short time failure	D562.2	PO1, PO2, PO3, PO4, PO5, PO6, PO7
6	Fill the water in water tank and maintain the water level. a). When water level comes below lower level switch ON the pump b). When water level reaches the high level switch OFF the pump c). Include manual switch to operate the pump at any level of water.	D562.2	PO1, PO2, PO3, PO4, PO5, PO6, PO7
7	Fire alarm a). Multiple alarms b). Sound alarm c). If not acknowledged, Sound alarms 1 and 2 d). Similarly go up to 4 alarm conveyor belt sorting	D562.2	PO1, PO2, PO3, PO4, PO5, PO6, PO7
8	Three floor Lift control	D562.3	PO1, PO2, PO3, PO4, PO5, PO6, PO7
9	Traffic light control	D562.3	PO1, PO2, PO3, PO4, PO5, PO6, PO7
10	Automatic operation of double acting pneumatic cylinder – Multi cycle	D562.3	PO1, PO2, PO3, PO4, PO5, PO6, PO7
11	Sequential operation of two Double Acting Cylinders for the sequence A+,B+, B-,A-	D562.4	PO1, PO2, PO3, PO4, PO5, PO6, PO7
12	Analog input to PLC as a set of valve for a comparator function block a).The input is multilevel illumination control. The input is setting is by means of a potentiometer in an analog input to the PLC. The outputs turn on several groups of lamps to obtain desired level illumination.	D562.4	PO1, PO2, PO3, PO4, PO5, PO6, PO7
13	Heater control with PID function of the PLC	D562.4	PO1, PO2, PO3, PO4,

	a). A 1000 W water heater is controlled using the PID function of the PLC. The temperature transducer is a temperature transmitter with 4 to 20 mA output and Pt 100 Probe.		PO5, PO6, PO7
14	Round table liquid filling system a). Dropping of Reagents into test tubes. The feedback is from potentiometer. The program must ensure that the end limits of the pot are never reached by carefully balancing the clockwise and anti-clockwise revolution.	D562.5	PO1, PO2, PO3, PO4, PO5, PO6, PO7
15	Slow speed motor control using PWM function of the PLC a). Slow speed 12V DC 18W permanent magnet motor with fly wheel is controlled with the PWM output and feedback from a low resolution encoder.	D562.5	PO1, PO2, PO3, PO4, PO5, PO6, PO7
16	**Mini Project**	**D562.5**	**PO1, PO2, PO3, PO4, PO5, PO6, PO7**

EED563 RENEWABLE ENERGY SOURCES PRACTICAL

TEACHING AND SCHEME OF EXAMINATION:

No of weeks per semester: 16 weeks

Course	Instructions		Examination			
	Hrs / Week	Hrs / Semester	Marks			Duration
			Internal Assessment	Autonomous Examinations	Total	
Renewable Energy Sources Practical	5	80	25	100*	100	3 Hrs.

*Examinations will be conducted for 100 marks and it will be reduced to 75 marks.

DETAILED ALLOCATION OF MARKS:

S.NO.	NAME OF THE ACTIVITY	MARKS
1	PROCEDURE	20
2	SKETCHES/CIRCUIT DIAGRAM	20
3	TABULATION	15
4	CALCULATION/GRAPH	15
5	RESULT	15
6	VIVA – VOCE	05
7	MINI PROJECT	10
	TOTAL	100

Mini Project Evaluation (10 marks)

Breakup Details

1	Project Description	05
2	Project Demo	05
	Total	10

COURSE DESCRIPTION:

Modern world aims to tap and utilize the Renewable Energy Sources as they are available almost at free of cost and eco-friendly nature. Our government also promotes the utilization of Renewable Energy Sources in full mind.

EQUIPMENTS REQUIRED: (For a Batch of 30 Students)

Ex. No	Equipments	Quantity
1	Solar panel PV Training Kit	6
2	Infra-red Thermometer	1
3	Lux Meter	2
4	Solar Power Meter	1
5	Solar Panel 100 Watts (Mono -1, Poly – 2)	3
6	Inverter (PWM, MPPT – 1 no. Each)	2
7	Battery 12V, 13 AH	1
8	Charge Controller 12V/10A	2
9	MC Voltmeter (0 – 100V)	6
10	MC Ammeter (0 – 15A)	6
11	AC/DC Digital Tong Tester	2
12	Rheostat 50 Ohm	1
13	Direct type Solar Dryer Kit	1
14	Indirect type Solar Dryer Kit	1
15	Solar Water Heater Kit	1
16	Solar Cooker Kit	1
17	Solar Air Heater Kit	1
18	Model Wind Mill	1

OBJECTIVES:

On completion of this practical course the students will be able to

- ➢ Measure the Solar Radiation

- ➢ Study the I-V and P-V Characteristics of PV Modules

- ➢ Measure Power flow of standalone PV System

- ➢ Study the Solar Thermal Equipments

COURSE OUTCOMES:

Course	EED563 PROGRAMMABLE LOGIC CONTROLLER PRACTICAL
After successful completion of this course, the students should be able to	
D563.1	Measure the solar radiation
D563.2	Calculate the power flow calculations in PV system
D563.3	Conversion methods of solar thermal
D563.4	Prepare model of Wind mill
D563.5	Understand about the solar appliances and develop the mini projects with report

EED563 RENEWABLE ENERGY SOURCES PRACTICAL

Sl.No	List of Experiments
	Solar PV Module
1	Measurement of Solar Radiation
2	I-V and P-V Characteristics of PV Module
3	I-V and P-V Characteristics of PV Modules in Series
4	I-V and P-V Characteristics of PV Modules in Parallel
5	Effect of Tilt Angle on PV Module power
6	Effect of shading on output of Solar Panel
7	Working of Blocking Diode
	Power Flow Calculation
8	Power flow calculation of standalone PV System for AC Load
9	Power flow calculation of standalone PV system for DC Load
10	Calculation of Maximum Power Point
	Solar Thermal Conversion
11	Direct type Solar Dryer
12	Indirect type Solar Dryer
13	Solar Water Heater
14	Solar Cooker
15	Solar Air Heater
	Wind mill
16	Demo model of Wind Mill
17	Mini Project

The mini project is activity based and it may be given to group of maximum of six students for hands on experience and to create scientific temper

CONTINUOUS INTERNAL ASSESSMENT

The Internal Assessment mark for a total of 25 marks which are to be distributed as follows:

a) Attendance	:	05 Marks
(Award of marks same as theory courses)		
b) Procedure/ observation and tabulation/ Other Practical related Work	:	05 Marks
c) Tests	:	10 Marks
d) Student Centered Learning (SCL) work sheet	:	05 Marks

TOTAL		25 Marks

LEARNING WEBSITES

1. http://www.eppleylab.com/introduction-to-solar-radiation-measurements/

2. https://www.alternative-energy-tutorials.com/photovoltaics/solar-cell-i-v-characteristic.html

3. https://www.lrc.rpi.edu/programs/nlpip/lightinganswers/photovoltaic/14-photovoltaic-tilt-angle.asp

4. https://esc.fsu.edu/documents/lectures/ECSI/SolarThermal.pdf

5. https://www.education.com/science-fair/article/engineering_windmill/

CO-POs & PSOs MAPPING MATRIX

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
D563.1	3	3	3	3	3	3	3	3	3	3
D563.2	3	3	3	3	3	3	3	3	3	3
D563.3	3	3	3	3	3	3	3	3	3	3
D563.4	3	3	3	3	3	3	3	3	3	3
D563.5	3	3	3	3	3	3	3	3	3	3
Total	15	15	15	15	15	15	15	15	15	15
Correlation level	3	3	3	3	3	3	3	3	3	3

Correlation level 1 – Slight (Low)

Correlation level 2 – Moderate (Medium)

Correlation level 3 – Substantial (High)

EED563 RENEWABLE ENERGY SOURCES PRACTICAL

MODEL QUESTION PAPER

Si.No	List of Experiments	CO	PO
	Solar PV Module		
1	Measurement of Solar Radiation	D563.1	PO1, PO2, PO3, PO4, PO5, PO6, PO7
2	I-V and P-V Characteristics of PV Module	D563.1	PO1, PO2, PO3, PO4, PO5, PO6, PO7
3	I-V and P-V Characteristics of PV Modules in Series	D563.1	PO1, PO2, PO3, PO4, PO5, PO6, PO7
4	I-V and P-V Characteristics of PV Modules in Parallel	D563.2	PO1, PO2, PO3, PO4, PO5, PO6, PO7
5	Effect of Tilt Angle on PV Module power	D563.2	PO1, PO2, PO3, PO4, PO5, PO6, PO7
6	Effect of shading on output of Solar Panel	D563.2	PO1, PO2, PO3, PO4, PO5, PO6, PO7
7	Working of Blocking Diode	D563.2	PO1, PO2, PO3, PO4, PO5, PO6, PO7
	Power Flow Calculation		
8	Power flow calculation of standalone PV System for AC Load	D563.3	PO1, PO2, PO3, PO4, PO5, PO6, PO7
9	Power flow calculation of standalone PV system for DC Load	D563.3	PO1, PO2, PO3, PO4, PO5, PO6, PO7
10	Calculation of Maximum Power Point	D563.3	PO1, PO2, PO3, PO4, PO5, PO6, PO7
	Solar Thermal Conversion		
11	Direct type Solar Dryer	D563.4	PO1, PO2, PO3, PO4, PO5, PO6, PO7
12	Indirect type Solar Dryer	D563.4	PO1, PO2, PO3, PO4, PO5, PO6, PO7
13	Solar Water Heater	D563.4	PO1, PO2, PO3, PO4, PO5, PO6, PO7
14	Solar Cooker	D563.4	PO1, PO2, PO3, PO4, PO5, PO6, PO7
15	Solar Air Heater	D563.5	PO1, PO2, PO3, PO4, PO5, PO6, PO7
	Wind mill		
16	Demo model of Wind Mill	D563.5	PO1, PO2, PO3, PO4, PO5, PO6, PO7
17	**Mini Project**	**D563.5**	**PO1, PO2, PO3, PO4, PO5, PO6, PO7**

EED 570 ENTREPRENEURSHIP AND START-UPS

TEACHING AND SCHEME OF EXAMINATION:

Number of Weeks/ Semester   : 16 weeks

Course	Instructions		Examination			
	Hrs / Week	Hrs / Semester	Marks			Duration
			Internal Assessment	Autonomous Examinations	Total	
Entrepreneurship and Start-Ups	4	64	25	100*	100	3 Hrs.

*Examinations will be conducted for 100 marks and it will be reduced to 75 marks.

TOPICS AND ALLOCATION:

UNIT	TOPICS	NO. OF HOURS
I	Entrepreneurship – Introduction and Process	10
II	Business Idea and Banking	10
III	Start ups, E-cell and Success Stories	10
IV	Pricing and Cost Analysis	10
V	Business Plan Preparation	10
	Field Visit and preparation of case study report	14
	TOTAL	**64**

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.

OBJECTIVES:

At the end of the study of 5th semester the students will be able to

- ➢ Excite the students about entrepreneurship
- ➢ Acquiring Entrepreneurial spirit and resource fullness
- ➢ Understanding the concept and process of entrepreneurship
- ➢ Acquiring entrepreneurial quality, competency and motivation
- ➢ Learning the   process and skills of creation and management of entrepreneurial venture
- ➢ Familiarization with various uses of human resource for earning dignified means of living
- ➢ Know its contribution in and role in the growth and development of individual and the nation
- ➢ Understand the formation of E-cell
- ➢ Survey and analyze the market to understand customer needs
- ➢ Understand the importance of generation of ideas and product selection
- ➢ Learn the preparation of project feasibility report
- ➢ Understand the importance of sales and turnover
- ➢ Familiarization of various financial and non financial schemes
- ➢ Aware the concept of incubation and start ups

COURSE OUTCOMES:

Course	EED570 ENTERPRENEURSHIP AND START-UPS
After successful completion of this course, the students should be able to	
D570.1	Understand the concept and process of Entrepreneurship.
D570.2	Familiarize about business idea and banking.
D570.3	Understand the formation of E-Cell, start-ups and success stories.
D570.4	Aware about pricing and cost analysis
D570.5	Learn about the business plan preparation

EED570 ENTREPRENEURSHIP AND START-UPS

UNIT I

ENTREPRENEURSHIP – INTRODUCTION AND PROCESS   **10 Hrs**

Concept, Functions and Importance

Myths about Entrepreneurship

Pros and Cons of Entrepreneurship

Process of Entrepreneurship

Benefits of Entrepreneur

Competencies and characteristics

Ethical Entrepreneurship

Entrepreneurial Values and Attitudes

Motivation

Creativity

Innovation

Entrepreneurs - as problem solvers

Mindset of an employee and an entrepreneur Business Failure – causes and remedies

Role of Networking in entrepreneurship

UNIT   II

BUSINESS IDEA AND BANKING   **10 Hrs**

Types of Business: Manufacturing, Trading and Services

Stakeholders: Sellers, Vendors and Consumers

E-Commerce Business Models

Types of Resources-Human, Capital and Entrepreneurial tools

Goals of Business and Goal Setting

Patent, copyright and intellectual Property Rights

Negotiations- Importance and methods

Customer Relations and Vendor Management

Size and Capital based classification of business enterprises

Role of Financial Institutions

Role of Government Policy

Entrepreneurial support systems

Incentive schemes for State Government

Incentive Schemes for Central Government

UNIT   III

START UPS, E-CELL AND SUCCESS STORIES   10 Hrs

Concept of Incubation centre's

Activities of DIC, financial institutions and other relevance institutions

Success stories of Indian and global business legends

Field Visit to MSME's

Various sources of Information

Learn to earn

Startup and its stages

Role of Technology-E-commerce and Social Media

Role of E-Cell

E-Cell to Entrepreneurship

UNIT   IV

PRICING AND COST ANALYSIS   10 Hrs

Calculation of Unit of Sale, Unit Price and Unit Cost

Types of Costs - Variable and Fixed, Operational Costs

Break Even Analysis

Understand the meaning and concept of the term Cash Inflow and Cash Outflow

Prepare a Cash Flow Projection

Pricing and Factors affecting pricing

Understand the importance and preparation of Income Statement

Launch Strategies after pricing and proof of concept

Branding-Business name, logo,tag line

Promotion strategy

UNIT   V

BUSINESS PLAN PREPARATION   10 Hrs

Generation of Ideas

Business Ideas vs. Business Opportunities

Selecting the Right Opportunity

Product selection

New product development and analysis

Feasibility Study Report – Technical analysis, financial analysis and commercial analysis

Market Research - Concept, Importance and Process

Marketing and Sales strategy

Digital marketing

Social Entrepreneurship

Risk Taking-Concept

Types of business risks

Field Visit and preparation of case study report   **14 Hrs**

TEXT BOOKS

S.NO	TITLE	AUTHOR	PUBLISHER WITH EDITION
1.	Fundamentals of Entrepreneurship	Dr. G.K. Varshney	Sahitya Bhawan Publications, Agra - 282002
2.	Business Regulatory Framework	Dr. G.K. Varshney	Sahitya Bhawan Publications, Agra - 282002

REFERENCE BOOKS

S.NO	TITLE	AUTHOR	PUBLISHER WITH EDITION
1.	Entrepreneurship	Robert D. Hisrich, Michael P. Peters, Dean A. Shepherd	McGraw Hill (India) Private Limited, Noida - 201301
2.	Essentials of Entrepreneurship and small business management	M.Scarborough, R.Cornwell	Pearson Education India, Noida -201301
3.	Entrepreneurship Development and Small Business Enterprises	Charantimath Poornima M	Pearson Education, Noida -201301
4.	Innovation Management and New Product Development	Trott	Pearson Education, Noida -201301
5.	A Textbook of Cost and Management Accounting	M N Arora	Vikas Publishing House Pvt. Ltd., NewDelhi-110044
6.	Financial Management	Prasanna Chandra	Tata McGraw Hill education private limited, New Delhi
7.	Indian Banking System	I.V.Trivedi, Renu Jatana	RBSA Publishers, Rajasthan
8.	How to Start a Business in India	Simon Daniel	BUUKS, Chennai - 600018
9.	The Business Plan Write-Up Simplified	Ramani Sarada	A practitioners guide to writing the business plan, Notion press media Pvt.Ltd.,Chennai-600095

LEARNING WEBSITES

1. https://www.startupindia.gov.in/
2. https://www.startupcommons.org/what-is-a-startup.html
3. https://www.forbes.com/sites/allbusiness/2018/07/15/35-step-guide-entrepreneurs-starting-a-business/
4. https://www.entrepreneur.com/topic/startups
5. https://www.investopedia.com/terms/s/startup.asp

CONTINUOUS INTERNAL ASSESSMENT

The Internal Assessment marks for a total of 25 marks, which are to be distributed as follows:

i)	Attendance	-	5 Marks
ii)	Test	-	10 Marks
iii)	Assignment	-	5 Marks
iv)	Seminar	-	5 Marks

Total   -   25 Marks

Note: Two assignments should be submitted. The same must be evaluated and converted to 5 marks

Guidelines for assignment:

First assignment – Unit I

Second assignment – Unit II

Guidelines for Seminar presentation – Unit III

Each assignment should have five three marks questions and two five marks questions.

AUTONOMOUS EXAMINATION

Note

1. The students should be taught all units and proper exposure and filed visit also arranged. All the portions should be completed before examinations

2. The students should maintain theory assignment and seminar presentation. The assignment and seminar presentation should be submitted during the Autonomous Practical Examinations.

3. The question paper consists of theory and practical portions .All students should write the answers for theory questions (45 marks) and practical portions (55 marks) should be completed for Autonomous examinations

4. All exercises should be given in the question paper and students are allowed to select by lot. If required the dimension for the exercise may be varied for every batch. No fixed time allotted for each portion and students have the liberty to do the examinations for 3Hrs.

5. For Written Examination: theory question and answer: 45 Marks

Ten questions will be asked for 3 marks each. Five questions from each unit 1 & 2   (10*3=30)

Three questions will be asked for 5 marks each. One questions from each unit 1, 2 & 3 (3*5=15)

6. For Practical Examination: The business plan/Feasibility report or Report on Unit 4&5 should be submitted during the Autonomous Practical Examinations. The same have to be evaluated for the report submission (40 marks)

DETAILED ALLOCATION OF MARKS

S.NO	DESCRIPTION	MARKS
PART-A	Written Examination- Theory Question and answer (10 questions x 3marks:30marks) & (3questions x 5 marks:15marks)	45
PART B	Practical examination – submission on business plan/ feasibility report or report on unit 4&5	40
PART C	Viva voce	15
	Total	**100**

CO- POs & PSOs MAPPING MATRIX

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
D570.1	3	3	2	2	2	2	2	3	2	2
D570.2	3	3	2	2	2	2	2	3	2	2
D570.3	3	3	2	2	2	2	2	3	2	2
D570.4	3	3	2	2	2	2	2	3	2	2
D570.5	3	3	2	2	2	2	2	3	2	2
Total	15	15	10	10	10	10	10	15	10	10
Correlation Level	3	3	2	2	2	2	2	3	2	2

Correlation level 1- Slight (low)

Correlation level 2- Moderate (Medium)

Correlation level 3- Substantial (high)

QUESTION PAPER SETTING

The teaching leering process and assessment are being carried out in accordance with the revised Bloom's 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.

Bloom's Taxonomy	Lower Order Thinking Skills (LOTs)	Higher Order Thinking Skills (HOTs)
Level	R-Remember, U-Understand , Ap-Apply	An-Analyze, E-Evaluate, C-Create
% to be included	90%	10%

****

EED570 ENTREPRENEURSHIP AND START-UPS

MODEL QUESTION PAPER

TIME: 3 Hrs   MARKS: 100

PART-I (10 X 3= 30 Marks)					
Note: Answer all questions. All questions carry equal marks					
S.No	Questions	Unit	Bloom's Level	CO	PO
1	Define entrepreneurship.	I	R	D570.1	POI,PO2,PO3
2	State the process of entrepreneurship.	I	R	D570.1	POI,PO2,PO3
3	What are the benefits of being an entrepreneur?	I	R	D570.1	POI,PO2,PO3
4	How do entrepreneurs act as problem solvers?	I	U	D570.1	POI,PO2,PO3
5	Outline the role of networking in entrepreneurship.	I	U	D570.1	POI,PO2,PO3
6	List the various types of business.	II	R	D570.2	POI,PO2,PO3
7	Outline the business model.	II	U	D570.2	POI,PO2,PO3
8	Suggest the various goals of business.	II	U	D570.2	POI,PO2,PO3
9	How selection of human resources is carried out?	II	U	D570.2	POI,PO2,PO3
10	Specify the role of government policy on entrepreneurship.	II	U	D570.2	POI,PO2,PO3

PART-II (3 X 5 = 15 Marks)					
Note: Answer all questions. All questions carry equal marks					
S.No	Questions	Unit	Bloom's Level	CO	PO
11	Describe the importance of innovation on entrepreneurship.	I	An	D570.1	POI,PO2,PO3
12	Enumerate the various incentive schemes for the central government.	II	U	D570.2	POI,PO2,PO3
13	How technology will play a major role in E-commerce?	III	An	D570.3	POI,PO2,PO3

QUESTION PAPER SETTING

The question paper setters are requested to follow the Revised Bloom's Taxonomy levels as Presented below:

Bloom's Taxonomy	Lower Order Thinking Skills (LOTs)	Higher Order Thinking Skills (HOTs)
Level	R-Remember, U-Understand , Ap-Apply	An-Analyze, E-Evaluate, C-Create
% to be included	90%	10%

****

EED510 GENERATION TRANSMISSION AND SWITCH GEAR

MODEL QUESTION PAPER

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

PART-A (10 X 3 = 30Marks)					
Note: Answer all questions. All questions carry equal marks					
S. No	Questions	Unit	Bloom's Level	CO	PO
1.	State the advantages of Grid System.	I	R	D510.1	PO1,PO2
2.	Explain wireless transmission system.	I	R	D510.1	PO1,PO2
3.	Write a short note on Properties of Line supports.	II	U	D510.2	PO1,PO2
4.	Define Span and sag.	II	R	D510.2	PO1,PO2
5.	Classify the methods used for improving String Efficiency.	III	R	D510.3	PO1,PO2
6.	Define grading of UG Cable.	III	U	D510.3	PO1,PO2
7.	What are the essential features of Switch Gear?	IV	R	D510.4	PO1,PO2
8.	List out the Desirable characteristics of Fuse Element.	IV	R	D510.4	PO1,PO2
9.	Define Inverse Time Relay.	V	R	D510.5	PO1,PO2
10.	Define resonant grounding.	V	R	D510.5	PO1,PO2

PART-B (5 X 14 = 70 Marks)					
Note: Answer all questions choosing A or B in each question. All questions carry equal marks					
S. No	Questions	Marks	Unit	Bloom's Level	CO	PO
11	A.(i) Explain the Schematic Diagram of Nuclear Power Plant with neat sketches.	07	I	U	D510.1	PO1,PO2,PO3
	(ii) Discuss in details about the working of hydro Power Plant.	07	I	U	D510.1	PO1,PO2,PO3
	(OR)					
	B.(i) Briefly explain the Load Sharing between the Base Load and Peak Load Plants.	07	I	U	D510.1	PO1,PO2,PO3
	(ii) Draw and explain the block diagram of Hybrid Renewable Energy System.	07	I	U	D510.1	PO1,PO2,PO3
12	A.(i) Sketch the typical layout of AC Power Supply Scheme.	07	II	U	D510.2	PO1,PO2,PO3
	(ii) Derive an expression for the Sag in a Transmission Line at equal level supports.	07	II	U	D510.2	PO1,PO2,PO3
	(OR)					
	B.(i) Write a short note on Factors Affecting Corona	07	II	R	D510.2	PO1,PO2,PO3
	(ii) Draw the schematic layout of HVDC System and Explain briefly	07	II	U	D510.2	PO1,PO2,PO3

	A.(i) With neat block diagram, explain STATCOM	07	III	U	D510.3	PO1,PO2,PO3
	(ii) Mention the types of UG Cable and explain about belted cable	07	III	U	D510.3	PO1,PO2,PO3
13	(OR)					
	B.(i) List out and explain the need of insulating materials used in UG Cable	07	III	U	D510.3	PO1,PO2,PO3
	(ii) Describe the causes of failure of Insulators	07	III	R	D510.3	PO1,PO2,PO3
	A.(i) State the basic principle of Circuit Breaker and methods of Arc Extinction	07	IV	U	D510.4	PO1,PO2,PO3
	(ii) Explain the construction and working principle of SF6 Circuit Breaker with neat sketch	07	IV	U	D510.4	PO1,PO2,PO3
14	(OR)					
	B.(i) What is the purpose of Fuse? Explain about the Current Rating of Fuse Element	07	IV	R	D510.4	PO1,PO2,PO3
	(ii) How the Lightning Strokes are formed? Describe Direct And Indirect Stroke of Lightning	07	IV	U	D510.4	PO1,PO2,PO3
	A.(i) Explain the working principle of Differential Relay	07	V	U	D510.5	PO1,PO2,PO3
	(ii) What is Neutral Grounding? Explain any one method	07	V	U	D510.5	PO1,PO2,PO3
15	(OR)					
	B.(i) With neat circuit diagram explain the working of Induction Type over Current Relay	07	V	U	D510.5	PO1,PO2,PO3
	(ii) Explain the principle of Reactance Grounding with neat sketch	07	V	U	D510.5	PO1,PO2,PO3

QUESTION PAPER SETTING

The question paper setters are requested to follow the Revised Bloom's Taxonomy levels as Presented below:

Bloom's Taxonomy	Lower Order Thinking Skills (LOTs)	Higher Order Thinking Skills (HOTs)
Level	R-Remember, U-Understand , Ap-Apply	An-Analyze, E-Evaluate, C-Create
% to be included	90%	10%

****

EED520 MICROCONTROLLER AND ITS APPLICATIONS

MODEL QUESTION PAPER

Time: 3 Hrs   Max.Marks:100

PART-A	(10 X 3 = 30 Marks)				
Note: Answer all questions. All questions carry equal marks					
S.No	Questions	Unit	Bloom's Level	CO	PO
1	Write the comparison between microprocessor and microcontroller.	I	U	D520.1	PO1,PO2,PO3
2	Explain RESET.	I	U	D520.1	PO1,PO2,PO3
3	Give the classification of instruction set of 8051.	II	R	D520.2	PO1,PO2,PO3
4	List the addressing modes of 8051.	II	R	D520.2	PO1,PO2,PO3
5	Draw the bit configuration of TMOD register.	III	R	D520.3	PO1,PO2,PO3
6	Write down the interrupts of 8051.	III	U	D520.3	PO1,PO2,PO3
7	Define Interfacing.	IV	R	D520.4	PO1,PO2,PO3
8	How to interface relay with 8051?	IV	R	D520.4	PO1,PO2,PO3
9	Write down the features of Arduino.	V	R	D520.5	PO1,PO2,PO3
10	Explain about IoT applications.	V	U	D520.5	PO1,PO2,PO3

PART-B	(5 X 14 = 70 Marks)				
Note: Answer all questions choosing A or B in each question. All questions carry equal marks					
S.No	Questions	Marks	Unit	Bloom's Level	CO	PO
11	A. (i). Draw the Architecture diagram of 8051 Microcontroller.	07	I	U	D520.1	PO1,PO2,PO3
	(ii). Draw the pin configuration of 8051 and Explain in brief about each pin.	07	I	U	D520.1	PO1,PO2,PO3
	(OR)					
	B. (i). Explain the memory organization of 8051.	07	I	U	D520.1	PO1,PO2,PO3
	(ii). Explain about SFRs in brief.	07	1	U	D520.1	PO1,PO2,PO3
12	A. (i). Explain data transfer instructions of 8051with examples.	07	II	U	D520.2	PO1,PO2,PO3
	(ii). Write a 8051 Assembly language program for 8 bit multiplication.	07	II	U	D520.2	PO1,PO2,PO3,PO4
	(OR)					
	B. (i). List the addressing modes of 8051and explain any two modes in detail.	07	II	U	D520.2	PO1,PO2,PO3

	(ii) Write a 8051 Assembly language program for 16 bit addition.	07	II	U	D520.2	PO1,PO2,PO3,PO4
13	A. (i). Explain the modes of timer of 8051 with diagram.	07	III	U	D520.3	PO1,PO2,PO3
	(ii). Explain about RS232 standard in detail.	07	III	U	D520.3	PO1,PO2,PO3
	(OR)					
	B.(i). Explain the steps to program 8051 to transfer and receive data serially.	07	III	U	D520.3	PO1,PO2,PO3,PO4
	(ii). Explain about 8051 interrupts and priority in detail.	07	III	U	D520.3	PO1,PO2,PO3
14	A.(i) Draw the block diagram of 8255 and explain the function in detail.	07	IV	U	D520.4	PO1,PO2,PO3
	(ii) Draw the interfacing of 8255 with microcontroller and explain.	07	IV	U	D520.4	PO1,PO2,PO3
	(OR)					
	B.(i). Explain the interfacing of seven segment LED display with 8051 microcontroller with diagram	07	IV	U	D520.4	PO1,PO2,PO3
	(ii). Explain the interfacing of DAC with 8051 microcontroller and explain.	07	IV	U	D520.4	PO1,PO2,PO3
15	A.(i). Draw the block diagram of PIC microcontroller and explain.	07	V	U	D520.5	PO1,PO2,PO3
	(ii). Draw the block diagram of Arduino and explain.	07	V	U	D520.5	PO1,PO2,PO3
	(OR)					
	B. (i). Draw the block diagram of home automation using IoT and explain.	07	V	U	D520.5	PO1,PO2,PO3,PO4,PO5
	(ii). Draw the block diagram of Raspberry Pi and explain.	07	V	U	D520.5	PO1,PO2,PO3,PO4,PO5

QUESTION PAPER SETTING

The question paper setters are requested to follow the Revised Bloom's Taxonomy levels as Presented below:

Bloom's Taxonomy	Lower Order Thinking Skills (LOTs)	Higher Order Thinking Skills (HOTs)
Level	R-Remember, U-Understand , Ap-Apply	An-Analyze, E-Evaluate, C-Create
% to be included	90%	10%

****

EED531 CONTROL OF ELECTRICAL MACHINES

MODEL QUESTION PAPER

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

PART-A (10 X 3 = 30 Marks)					
Note: Answer all questions. All questions carry equal marks					
S. No	**Questions**	**Unit**	**Bloom's Level**	**CO**	**PO**
1	Write the purpose of Timers and state its types.	I	U	D531.1	PO1,PO2
2	Mention any four advantages of Solid State Relay.	I	R	D531.1	PO1,PO2
3	State the purpose of Series Relay in DC Motor Control.	II	R	D531.2	PO1,PO2
4	Name the types of Rotor Resistance Starters.	II	R	D531.2	PO1,PO2
5	List out the components used in Water Pump Controller.	III	R	D531.3	PO1,PO2
6	Explain aerospace system?	III	U	D531.3	PO1,PO2
7	Define Automation and PLC Scan.	IV	U	D531.4	PO1,PO2
8	List any four PLC's available in the market.	IV	R	D531.4	PO1,PO2
9	What is Examine ON Instruction?	V	U	D531.5	PO1,PO2
10	Mention the main functions of SCADA.	V	R	D531.5	PO1,PO2

PART-B (5 X 14 = 70 Marks)						
Note: Answer all questions choosing A or B in each question. All questions carry equal marks						
S. No	**Questions**	**Marks**	**Unit**	**Bloom's Level**	**CO**	**PO**
11	(A)i)What is Frequency Response Relay? Explain in brief.	07	I	R	D531.1	PO1,PO2,PO3
	ii) With necessary diagram, explain the working of Electronic Timer.	07	I	U	D531.1	PO1,PO2,PO3
	(OR)					
	B.i) Describe the working of maintained Contact Type Push Button Switch.	07	I	U	D531.1	PO1,PO2,PO3
	ii) Explain the working of Solid State Relay.	07	I	U	D531.1	PO1,PO2,PO3
12	A .i). Explain the necessity of Field Failure Protection for DC Motors.	07	II	U	D531.2	PO1,PO2,PO3
	ii). Draw and Explain the Control Circuit of DOL Starter.	07	II	U	D531.2	PO1,PO2,PO3
	(OR)					
	B.i). With the aid of Control Circuit, Explain Jogging in DC motor.	07	II	U	D531.2	PO1,PO2,PO3
	ii). Explain any one type of Wound Rotor Starter with its Control Circuit.	07	II	U	D531.2	PO1,PO2,PO3
13	A.i). Explain the Control Circuit of Electric	07	III	U	D531.3	PO1,PO2,PO3

	Oven.					
	ii). Explain about the general procedures to be carried out for Trouble Shooting.	07	III	U	D531.3	PO1,PO2,PO3
	(OR)					
	B.i). How skip hoist control is carried out? Explain with neat control circuit.	07	III	U	D531.3	PO1,PO2,PO3
	ii). Draw the control circuit of conveyor system and explain in detail.	07	III	U	D531.3	PO1,PO2,PO3
14	A.i). Draw and explain the block diagram of PLC	07	IV	U	D531.4	PO1,PO2,PO3
	ii). Explain the working of PLC Input Module with neat sketch.	07	IV	U	D531.4	PO1,PO2,PO3
	(OR)					
	B.i). Describe the different modes of operation of PLC.	07	IV	U	D531.4	PO1,PO2,PO3
	ii). Compare Hardwire Control system and PLC System.	07	IV	U	D531.4	PO1,PO2,PO3
15	A.i). Explain the working of ON Delay Timer with a sample Timing Diagram.	07	V	U	D531.5	PO1,PO2,PO3
	ii). How to develop a Ladder Diagram? Explain	07	V	U	D531.5	PO1,PO2,PO3
	(OR)					
	B.i). Explain the working of UP Counter with Timing Diagram.	07	V	U	D531.5	PO1,PO2,PO3
	ii). Draw and explain the Block Diagram of SCADA.	07	V	U	D531.5	PO1,PO2,PO3

QUESTION PAPER SETTING

The question paper setters are requested to follow the Revised Bloom's Taxonomy levels as Presented below:

Bloom's Taxonomy	Lower Order Thinking Skills (LOTs)	Higher Order Thinking Skills (HOTs)
Level	R-Remember, U-Understand , Ap-Apply	An-Analyze, E-Evaluate, C-Create
% to be included	90%	10%

****

EED532 PROGRAMMABLE LOGIC CONTROLLER

MODEL QUESTION PAPER

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

S. No	Questions	Unit	Bloom's Level	CO	PO
PART-A (10 X 3 = 30Marks)					
Note: Answer all questions. All questions carry equal marks					
1	Define PLC & List the major parts of PLC?	I	R	D532.1	PO1,PO2,PO3
2	Write short notes on Memory Organization.	I	U	D532.1	PO1,PO2,PO3
3	List the types of Photo Electric Sensors	II	R	D532.2	PO1,PO2,PO3
4	Write short notes on Reed Switch.	II	R	D532.2	PO1,PO2,PO3
5	List the types of Counter	III	R	D532.3	PO1,PO2,PO3
6	How Retentive Timer differs from Normal Timer	III	U	D532.3	PO1,PO2,PO3
7	What is Token Passing?	IV	U	D532.4	PO1,PO2,PO3
8	List the advantages of I/O Bus Network	IV	U	D532.4	PO1,PO2,PO3
9	List the types of Processes	V	U	D532.5	PO1,PO2,PO3
10	Write short notes on PID Controller?	V	R	D532.5	PO1,PO2,PO3

S. No	Questions	Marks	Unit	Bloom's Level	CO	PO
PART-B (5 X 14= 70 Marks)						
Note: Answer all questions choosing A or B in each question. All questions carry equal marks						
11	a) i) With neat block diagram of PLC explain the principle and operation of PLC.	07	I	U	D532.1	PO1,PO2,PO3
	ii) Compare Hardwire Control System with PLC System	07	I	R	D532.1	PO1,PO2,PO3
	(OR)					
	(b) i) Explain Manufacturing and Non - Manufacturing Automation.	07	I	U	D532.1	PO1,PO2,PO3
	ii) List out the criteria for selection of suitable PLC.	07	I	U	D532.1	PO1,PO2,PO3
12	(a) i) Explain Discrete I/O Modules and Analog I/O Modules	07	II	U	D532.2	PO1,PO2,PO3
	ii) List the Discrete and Analog I/O Field Devices.(7)	07	II	U	D532.2	PO1,PO2,PO3
	(OR)					
	(b)I) With neat diagram explain Relay Output Module. ii)Explain the Input/output Addressing scheme in PLCs	07	II	U	D532.2	PO1,PO2,PO3
	(b)I) With neat diagram explain Relay Output Module. ii)Explain the Input/output Addressing scheme in PLCs	07	II	U	D532.2	PO1,PO2,PO3
13	.(a) i) Explain all types of PLC Programming	07	III	U	D532.3	PO1,PO2,PO3

	ii) Draw and explain Cascading Timers.	07	III	U	D532.3	PO1,PO2,PO3
	(OR)					
	(b) i) Draw and explain ON Delay and OFF Delay Timer Instructions.	07	III	U	D532.3	PO1,PO2,PO3
	II) Draw and explain Ladder Logic Diagram for Star- Delta Starter	07	III	U	D532.3	PO1,PO2,PO3
14	a) i) Explain Network Topology	07	IV	U	D532.4	PO1,PO2,PO3
	ii) With a diagram explain I/O Bus Networking	07	IV	U	D532.4	PO1,PO2,PO3
	(OR)					
	(b) i)Write short notes on 1.Gate way 2.Serial Communication Device Net	07	IV	U	D532.4	PO1,PO2,PO3
	ii) Explain File Transfer Protocol	07	IV	U	D532.4	PO1,PO2,PO3
15	(a)i)Explain role of Computers in Process Control.	07	V	U	D532.5	PO1,PO2,PO3
	ii) List the Features of SCADA.	07	V	U	D532.5	PO1,PO2,PO3
	(OR)					
	(b) i) With the block diagram explain SCADA	07	V	U	D532.5	PO1,PO2,PO3
	ii) Write Short notes on 1) PID Control 2) Motion Control	07	V	U	D532.5	PO1,PO2,PO3

QUESTION PAPER SETTING

The question paper setters are requested to follow the Revised Bloom's Taxonomy levels as Presented below:

Bloom's Taxonomy	Lower Order Thinking Skills (LOTs)	Higher Order Thinking Skills (HOTs)
Level	R-Remember, U-Understand , Ap-Apply	An-Analyze, E-Evaluate, C-Create
% to be included	90%	10%

****

EED533 RENEWABLE ENERGY SOURCES

MODEL QUESTION PAPER

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

PART-A	(10 X 3 = 30Marks)				
Note: Answer all questions. All questions carry equal marks					
S. No	Questions	Unit	Bloom's Level	CO	PO
1	Distinguish between Primary and Secondary Energy Resources.	I	U	D533.1	PO1, PO2
2	Define (i) Commercial Energy and (ii) Non – Commercial Energy	I	R	D533.1	PO1, PO2
3	Draw the equivalent circuit of a Solar Cell.	II	R	D533.2	PO1, PO2
4	Distinguish between On Grid and Off Grid Solar Power.	II	R	D533.2	PO1, PO2
5	What are the Environmental impacts of Wind Turbine?	III	R	D533.3	PO1, PO2
6	What are the components of Tidal Power Plant?	III	U	D533.3	PO1, PO2
7	List the various types of Bio Mass Conversion Techniques.	IV	U	D533.4	PO1, PO2
8	What are the factors that affect the production rate of Bio Gas?	IV	U	D533.4	PO1, PO2
9	State the advantages of Geothermal Energy.	V	U	D533.5	PO1, PO2
10	What are types of Geothermal Power Plants?	V	U	D533.5	PO1, PO2

PART-B	(5 X 14 = 70Marks)					
Note: Answer all questions choosing A or B in each question. All questions carry equal marks						
S. No	Questions	Marks	Unit	Bloom's Level	CO	PO
11	a) (i) Explain the technologies available for Sustainable Energy Development.	07	I	U	D533.1	PO1, PO2
	(ii) Discuss briefly about various Non-Conventional Energy Sources.	07	I	U	D533.1	PO1, PO2
	(OR)					
	(b) (i) Explain the measurement of Solar Radiation by Pyranometer.	07	I	U	D533.1	PO1, PO2
	(ii) Explain about the Direct and Diffuse Solar Radiation.	07	I	U	D533.1	PO1, PO2
12	(a) (i) Explain in detail about the Flat Plate Collector.	07	II	U	D533.2	PO1, PO2
	(ii) Explain about the Concentrating Collector.	07	II	U	D533.2	PO1, PO2
	(OR)					
	(b) (i) Explain with neat sketch the construction and working of PV Cell.	07	II	U	D533.2	PO1, PO2

	(ii) Explain about the Grid Connected PV System.	07	II	U	D533.2	PO1, PO2
13	(a) (i) Explain with a neat sketch the working of Horizontal Axis Wind Turbine.	07	III	U	D533.3	PO1, PO2
	(ii) Explain the operation of Tidal Power Plant.	07	III	U	D533.3	PO1, PO2
	(OR)					
	(b) (i) Explain with a neat sketch the working of Vertical Axis Wind Turbine.	07	III	U	D533.3	PO1, PO2
	(ii) Explain the operation of Dolphin Type Wave Power Machine.	07	III	U	D533.3	PO1, PO2
14	(a) (i) Explain with neat sketch the working of Fixed Dome Type Bio Gas Plant.	07	IV	U	D533.4	PO1, PO2
	(ii) Explain the steps involved in the preparation of Bio Diesel from Waste Oil.	8	IV	U	D533.4	PO1, PO2
	(OR)					
	(b) (i) Explain with neat sketch the working of Updraft Gasifier.	07	IV	U	D533.4	PO1, PO2
	(ii) Explain with neat sketch the working of Floating Gas Holder Type Biogas Plant.	07	IV	U	D533.4	PO1, PO2
15	(a) (i) Discuss any one type of Geothermal Heat Pumping Systems.	07	V	U	D533.5	PO1, PO2
	(ii) Explain the operation of Dry Steam Geothermal Power Plant.	07	V	U	D533.5	PO1, PO2
	(OR)					
	(i) Explain the open cycle Ocean Thermal Energy Conversion System.	07	V	U	D533.5	PO1, PO2
	(ii)Draw the diagram and explain the Power Generation by OT EC Principle	07	V	U	D533.5	PO1, PO2

QUESTION PAPER SETTING

The question paper setters are requested to follow the Revised Bloom's Taxonomy levels as Presented below:

Bloom's Taxonomy	Lower Order Thinking Skills (LOTs)	Higher Order Thinking Skills (HOTs)
Level	R-Remember, U-Understand , Ap-Apply	An-Analyze, E-Evaluate, C-Create
% to be included	90%	10%

****

EED610 DISTRIBUTION AND UTILIZATION

TEACHING AND SCHEME OF EXAMINATION:

No of Weeks per Semester: 16 Weeks

Course	Instructions		Examination			
	Hrs / Week	Hrs / Semester	Marks			Duration
			Internal Assessment	Autonomous Examinations	Total	
Distribution and Utilization	6	96	25	100*	100	3 Hrs.

*Examinations will be conducted for 100 marks and it will be reduced to 75 marks.

TOPICS AND ALLOCATION OF HOURS:

Unit	Topics	Hours
I	Distribution	20
II	Industrial Drives	17
III	Electric Traction	17
IV	Illumination	17
V	Electric Heating and Welding	16
	Test & Model Exam	09
	Total	96

COURSE DESCRIPTION:

Electrical Energy requirement is the major crisis and hence any saving in Electrical energy is equivalent to production of Electrical Energy. Saving can be achieved by the utilization of Renewable Energy Sources.

OBJECTIVES:

At the end of the Semester, Students will be able to understand the concepts of

- Substation arrangements.
- Distribution of Power.
- Industrial Drives - Suitability for different applications.
- Track Electrification-Traction Mechanics – Traction Motor Controls
- Illumination – Design of Lighting Schemes – Sources of Light.
- Electric Heating – Methods – Electric Furnace – Temperature Control.
- Electric Welding and Welding Equipments.

COURSE OUTCOMES:

Course	EED610 DISTRIBUTION AND UTILIZATION
After successful completion of this course, the students should be able to	
D610.1	Identify different types of distribution and substations
D610.2	Select suitable motors for driving specific applications in the industry
D610.3	Describe electrical traction system
D610.4	Explain Illumination terms, sources of light and recommend illumination levels for specific application
D610.5	Describe types of Electric heating and welding

EED610 DISTRIBUTION AND UTILIZATION

UNIT - I

DISTRIBUTION	**20 Hrs**
Substation: Introduction-Sub Stations- Substation symbols and their functions - Classification of Sub Stations	2 Hrs
Indoor and Outdoor S.S – Gas Insulated S.S- Comparisons	2 Hrs
Layout 110/11KV Substation and 11KV/400V Distribution Substation- Substation Equipments	2 Hrs
Bus Bar- Types of Bus Bar Arrangement -Advantages and Disadvantages	2 Hrs
Distribution: Distribution System-Requirements of a Distribution System Part of Distribution System	2 Hrs
Classification of Distribution Systems-Comparison of Different Distribution Systems (A.C And D.C) - A.C Distribution -Types-Connection Schemes of Distribution System- A. C Distribution Calculations	2 Hrs
Calculation of Voltage At Load Points on Single Phase Distribution Systems (With Concentrated Load Only)- Distribution Fed At One End, Both Ends and Ring Mains	2 Hrs
Problems	2 Hrs
Three Phase, Four Wire, Star Connected Unbalanced Load Circuit-	1 Hr
Problems	2 Hrs
Consequence of Disconnection of Neutral in Three Phase Four Wire System (Illustration with an Example)	1 Hr

UNIT - II

INDUSTRIAL DRIVES	**17 Hrs**
Introduction to Electric Drive – Advantages of Electric Drives – Transmission of Power -Types of Electric Drives	2 Hrs
-Individual, Group and Multi Motor Drives - Advantages and Disadvantages of Individual and Group Drive	2 Hrs
Factors Governing The Selection of Motors-Nature and Classification of Load Torque	2 Hrs

Matching of Speed Torque Characteristics of Load and Motor	2 Hrs
Standard Ratings of Motor- Classes of Load Duty Cycles	2 Hrs
Selection of Motors for Different Duty Cycles	2 Hrs
Selection of Motors for Specific Application	1 Hr
Braking- Features of Good Braking System- Types of Braking- Advantages of Electric Braking	1 Hr
Plugging, Dynamic and Regenerative Braking – As Applied to Various Motors.	3 Hrs

UNIT - III

ELECTRIC TRACTION	**17 Hrs**
Introduction To Traction Systems - Advantages and Disadvantages of Electric Traction	1 Hr
System of Track Electrification - Methods of Supplying Power-Rail Connected System and Over Head System	2 Hrs
O.H. Equipments-Contact Wire, Catenary and Droppers	1 Hr
Current Collection Gear For OHE – Bow and Pantograph Collector-Different Systems of Track Electrification	2 Hrs
Advantages of Single Phase Low Frequency A.C. System- Booster Transformer-Necessity- Methods of Connecting B.T-Neutral Sectioning	2 Hrs
Traction Mechanics: Units and Notations used in Traction Mechanics-Speed Time Curve for Different Services - Simplified Speed Time Curve-Derivation of Maximum Speed-Crest Speed, Average Speed, Schedule Speed (Definitions Only)	2 Hrs
Tractive Effort and Power Requirement- Specific Energy Output- Specific Energy Consumption	2 Hrs
Traction Motors and Control: Desirable Characteristics of Traction Motors-Motors used for Traction Purpose-Methods of Starting and Speed Control of D.C Traction Motors	2 Hrs
Rheostatic Control-Energy Saving with Plain Rheostatic Control Series-Parallel Control- Energy Saving with Series Parallel Starting - Shunt Transition -Bridge- Transition-	2 Hrs
Multiple Unit Control –Regenerative Braking - Recent Trends in Electric Traction-Magnetic Levitation (MEGLEV) — Suspension Systems	1 Hr

UNIT - IV

ILLUMINATION	**17 Hrs**
Introduction - Definition and Units of Different Terms used in Illumination- Plane Angle, Solids Angle, Light, Luminous Flux, Luminous Intensity, Luminous Efficacy Candle Power, Lumen, Illumination, M.S.C.P, M.H.C.P, M.H.S.C.P	2 Hrs
Reduction Factor, Luminance, Glare Lamp Efficiency. Space-Height Ratio, Depreciation Factor Utilization Factor Waste Light Factor, Absorption Factor, Beam Factor, Reflection Factor. Requirements of Good Lighting System	2 Hrs
Laws of Illumination- Problems	2 Hrs
Types of Lighting Scheme- Factors to be Considered while Designing Lighting Scheme- Design of Lighting Scheme (Indoor And Outdoor)- Problems- Lighting Systems- Factory Lighting, Flood Lighting, Street Lighting	2 Hrs
Sources of Light: Arc Lamp, Incandescent Lamp, Halogen Lamp	2 Hrs
Sodium Vapour Lamp, High Pressure Mercury Vapour Lamp	2 Hrs
Fluorescent Tube	1 Hr
Induction Lamp- Energy Saving Lamps (C.F.L And L.E.D Lamps)-Limitation and Disposal of C.F.L	1 Hr
Benefits of LED Lamps-Comparison of Lumen Output for LED, CFL and Incandescent Lamp	1 Hr
Earthing and Maintenance of Lighting: Fluorescent Lamp Disposal – Precautions in erecting lighting installations – Symptoms to identify the end of the useful life of lamp- causes for lowering the illumination level.	2 Hrs

UNIT - V

ELECTRIC HEATING AND WELDING	**16 Hrs**
Electric Heating: Introduction – Advantages of Electric Heating – Modes of Heat Transfer - Classification of Electric Heating Power Frequency Electric Heating — Direct and Indirect Resistance Heating	2 Hrs
Infrared Heating-Arc Heating –High Frequency Electric Heating – Induction Heating-Induction Stove –Eddy Current Heating And Dielectric Heating	2 Hrs

			2 Hrs

Electric Furnaces: Resistance Furnace-Requirements of Heating Elements-Commonly used Heating Element Materials- Resistance Furnace for Special Purposes-Temperature Control of Resistance Furnace — 2 Hrs

Arc Furnace -Direct and Indirect Arc Furnace- Temperature Control of Arc Furnace-Reasons For Employing Low Voltage and High Current Supply - Induction Furnace — 2 Hrs

Direct and Indirect Core Type Induction Furnace- Coreless Induction Furnace-Power Supply For Coreless Induction Furnace — 2 Hrs

Electric Welding: Introduction-Types of Electric Welding- Requirements of Good Weld- Preparation of Work -Resistance Welding- Butt Welding, Spot Welding, Seam Welding, Projection Welding and Flash Welding — 2 Hrs

Arc Welding-Carbon Arc Welding, Metal Arc Welding, Atomic Hydrogen Arc Welding Inert Gas Metal Arc Welding- Comparison between Resistance and Arc Welding — 2 Hrs

Radiation Welding - Ultrasonic Welding, Electron Beam Welding, Laser Beam Welding-Electric Welding Equipments (A.C. And D.C). — 2 Hrs

Test and Model Exam — **09 Hrs**

TEXT BOOK

S.NO	TITLE	AUTHOR	PUBLISHER WITH EDITION
1	A Course in Electrical Power	Soni & Gupta	Dhanpat Rai & Sons, New Delhi

REFERENCE BOOKS

S.NO	TITLE	AUTHOR	PUBLISHER WITH EDITION
1	Electric Power	SL Uppal	Khanna Publishers, New Delhi
2	Modern Electric Traction	H Partab	Dhanpat Rai & sons, New Delhi
3	Electrical Power Distribution System	AS Pabla	Tata McGraw Hill Publishing Co, New Delhi
4	Utilization of Electric Power	NV Suryanarayana	Tata McGraw Hill Publishing Co, New Delhi

LEARNING WEBSITES

1. https://www.electricaleasy.com/2018/01/electric-power-distribution-system.html
2. https://nptel.ac.in/courses/108108077/ 4.
3. https://www.slideshare.net/zunaibali/elec-traction-2
4. https://mysite.du.edu/~jcalvert/optics/lumens.html
5. https://www.coursehero.com › ... › ELECTRONICS › ELECTRONICS 101

CONTINUOUS INTERNAL ASSESSMENT

The Internal Assessment marks for a total of 25 marks, which are to be distributed as follows:

i) Attendance	- 5 Marks
ii) Test	- 10 Marks
iii) Assignment	- 5 Marks
iv) Seminar	- 5 Marks

Total	**25 Marks**

CO-POs & PSOs MAPPING MATRIX

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
D610.1	3	3	3	2	2	2	3	3	3	3
D610.2	3	3	3	2	2	2	3	3	3	3
D610.3	3	3	3	2	2	2	3	3	3	3
D610.4	3	3	3	2	2	2	3	3	3	3
D610.5	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)

QUESTION PAPER SETTING

The teaching learning process and assessment are being carried out in accordance with the revised Bloom's 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.

Bloom's Taxonomy	Lower Order Thinking Skills (LOTs)	Higher Order Thinking Skills (HOTs)
Level	R-Remember, U-Understand , Ap-Apply	An-Analyze, E-Evaluate, C-Create
% to be included	90%	10%

****

EED620 ENERGY CONSERVATION AND AUDIT

TEACHING AND SCHEME OF EXAMINATION:

No of Weeks per Semester: 16 Weeks

Course	Instructions		Examination			
	Hrs / Week	Hrs / Semester	Marks			Duration
			Internal Assessment	Autonomous Examinations	Total	
Energy Conservation and Audit	4	64	25	100*	100	3 Hrs.

*Examinations will be conducted for 100 marks and it will be reduced to 75 marks.

TOPICS AND ALLOCATION OF HOURS:

UNIT	TOPICS	NO.OF HOURS
I	Energy Conservation and its Importance	11
II	Energy Conservation in Electrical Machines	11
III	Energy Conservation in Electrical Installation Systems	11
IV	Energy Audit and Instruments	11
V	Energy Costs and Energy Audit Report	11
	Test & Model Exam	09
	Total	**64**

COURSE DESCRIPTION:

Energy conservation is the effort made to reduce the consumption of energy by using less of an energy service. Energy can be conserved by reducing wastage and losses, improving efficiency through technological upgrades and improved operation and maintenance. Energy Audit is the key to a systematic approach for decision-making in the area of energy management. The effective use of energy to maximize profits (minimize costs) and enhance competitive positions, it is necessary to conserve energy. Hence it is necessary to study energy auditing methods and energy saving opportunities in electrical system

OBJECTIVES:

At the end of the Semester, Students will be able to:

➢ Explain necessity and importance of Energy Conservation

➢ Explain the goal with energy conservation techniques is to reduce demand, protect supplies, develop and use Alternative Energy Sources.

➢ Explain the energy efficient technologies in Electrical System

➢ Explain the Periodic maintenance of Electrical Systems.

➢ Explain Technical losses and commercial losses in installation Systems.

➢ Explain How to product output or to lower operating costs.

➢ Discuss about Energy Conservation Equipment

➢ Explain Energy Conservation in Lighting System

➢ Identify where and how energy and factors affecting consumption consumed.

➢ Explain Energy Costs.

➢ Explain how to Detect and improving energy Efficiency.

➢ Explain the concept and types of Energy of Energy Audit.

➢ Explain the importance of Energy Audit

➢ List the Instruments for Audit and Monitoring Energy and Energy Savings

➢ Explain Energy cost in Indian Scenario.

➢ Draw the Energy Audit Report Format

COURSE OUTCOMES:

Course	EED620 ENERGY CONSERVATION AND AUDIT
After successful completion of this course, the students should be able to	
D620.1	Learn about the energy conservation techniques and its importance
D620.2	Understand about the energy conservation in electrical machines
D620.3	Learn about the energy conservation in electrical installations systems
D620.4	Understand about the energy audit instruments
D620.5	Learn about the energy cost and energy audit report

EED620 ENERGY CONSERVATION AND AUDIT

UNIT - I

ENERGY CONSERVATION AND ITS IMPORTANCE   **11 Hrs**

Definition - Need for and importance of Energy Conservation - Primary and Secondary Energy - Energy Demand and Supply	2 Hrs
Energy Conservation in Household, Industries and Community Level - Energy for sustainable Development - Energy Conservation in India - Energy Conservation Approaches	2 Hrs
Safe working of Electrical Equipments and Electrical Safety	1 Hr
Energy Conservation Techniques - Principles of Energy Conservation Methods - Difference between Energy conservation and Energy audit	2 Hrs
Relevant clauses of Energy Conservation - BEE and its Roles - MEDA and its Roles - Energy Audit in Energy Conservation Star Labeling	2 Hrs
Need and its benefits — Role of Tamilnadu Energy Development Agency (TEDA) – Introduction to ISO 50001 – Energy Audit Certificate	2 Hrs

UNIT - II

ENERGY CONSERVATION IN ELECTRICAL MACHINES   **11 Hrs**

Need for Energy Conservation in Induction Motor and Transformer - Methods of Energy Conservation in Induction Motor - Energy Saving Opportunities with Energy Efficient Motors	2 Hrs
Energy Conservation Techniques in Induction Motor By: Improving Power Quality - Variation in Efficiency and Power Factor with Loading Motor Survey Matching Motor Rating with Load	2 Hrs
Minimizing the idle and Redundant Running of Motor Operating in Star Mode - Rewinding of Motor - Replacement by Energy Efficient Motor Periodic Maintenance	2 Hrs
Energy Conservation Techniques in Transformer. Loading Sharing Parallel Operation Isolating Techniques - Replacement by Energy Efficient Transformers - Periodic Maintenance	2 Hrs
Energy Conservation Equipment: Soft Starters, Automatic Star Delta Convertor, Variable Frequency Drives, Automatic P. F. Controller (APFC), Intelligent P. F. Controller (IPFC) Energy Efficient Motor	2 Hrs
Significant Features, Advantages, Applications and Limitations.	1 Hr

UNIT - III

ENERGY CONSERVATION IN ELECTRICAL INSTALLATION SYSTEMS	11 Hrs
Aggregated Technical and commercial losses (ATC); Power system at state, regional, national and global level	2 Hrs
Technical losses; causes and measures to reduce by - Controlling I2R losses. Optimizing distribution voltage	2 Hrs
Balancing phase currents Compensating reactive power flow Commercial losses: pilferage causes and remedies	2 Hrs
Energy conservation equipment: Maximum Demand Controller, KVAR Controller, Automatic Power Factor controller (APFC) Energy Conservation in Lighting System Replacing Lamp sources	2 Hrs
Using energy efficient luminaries. Using light-controlled gears. Installation of separate transformer / servo stabilizer for lighting	2 Hrs
Periodic survey and adequate maintenance programs. Energy Conservation techniques in fans, electronic regulators.	1 Hr

UNIT - IV

ENERGY AUDIT AND INSTRUMENTS	11 Hrs
Definition, objective and principles of Energy Management, Need of Energy Audit and Management, types of Energy Audit	1 Hr
Audit Process,Energy Audit of Building System, Lighting System, HVAC System, Water Heating System	2 Hrs
Heat Recovery opportunities during Energy Audit, Industrial Audit Opportunities	1 Hr
Energy Flow Diagram (Sankey Diagram)Simple Payback Period, Energy Audit Procedure (walk through audit and detailed audit)	2 Hrs
Instruments for Audit and Monitoring Energy and Energy Savings Energy Audit Instruments	1 Hr
Basic Measurements —— Electrical Measurements, Light, Pressure, Temperature and Heat Flux, Velocity and Flow Rate, Vibrations, etc	2 Hrs
Instruments Used in Energy systems: Load and Power Factor Measuring Equipments	1 Hr
Wattmeter, Flue Gas Analysis, Temperature and Thermal Loss Measurements, Air Quality Analysis etc.	1 Hr

UNIT - V

ENERGY COSTS AND ENERGY AUDIT REPORT 11 Hrs

Understanding Energy Costs Energy Cost in Indian Scenario - Co- generation and Tariff	1 Hr
Concept, Significance for Energy Conservation - Co-generation - Types of Cogenerations on basis of sequence of Energy use (Topping cycle, bottoming cycle)	2 Hrs
Types of Co-generation basis of Technology (Steam Turbine Co-generation, Gas Turbine Co-generation, Reciprocating Engine Co-generation)	2 Hrs
Factors governing the selection of Co-generation System. Advantages of Co-generation	1 Hr
Tariff: Types of Tariff Structure: Special Tariffs; Time-Off- Day Tariff, Peak-Off-Day Tariff, Power Factor Tariff, Maximum Demand Tariff, Load Factor Tariff	2 Hrs
Application of Tariff System to reduce Energy bill. Benchmarking and Energy Performance	1 Hr
Energy Audit Report Format - Guidelines for writing Energy Audit Report - Data presentation in Report.	2 Hrs

Test and Model Exam 09 Hrs

TEXT BOOKS

S.NO	TITLE	AUTHOR	PUBLISHER WITH EDITION
1	Energy Conservation & Audit	M A Chaudhari, S M Chaudhari & S A Asarkar	Nirali Prakashan Publication
2	Energy Conservation and Audit	Y. B. Mandake Pankaj Mohan Dr. D.B. Talange	Tech — Neo Publications

REFERENCE BOOKS

S.NO	TITLE	AUTHOR	PUBLISHER WITH EDITION
1	Electrical Energy Conservation & Auditing	Er. Udit Mamodiya	Ashirwad Publications
2	Energy Technology	O.P. Gupta	Khanna Publishing House, New Delhi

LEARNING WEBSITES

1. https://vikaspedia.in/energy/energy-conservation/energy-conservation

2. https://www.eeeguide.com/energy-conservation-in-electrical-drives/

3. http://www.ensaveindia.com/Instrument_list.pdf

4. https://www.beeindia.gov.in/sites/default/files/3Ch10.pdf

5. https://beeindia.gov.in/sites/default/files/1Ch3.pdf

CONTINUOUS INTERNAL ASSESSMENT

The Internal Assessment marks for a total of 25 marks, which are to be distributed as follows:

```
        i) Attendance          - 5 Marks
        ii) Test               - 10 Marks
        iii) Assignment        - 5 Marks
        iv) Seminar            - 5 Marks
                               -----------
              Total            25 Marks
                               -----------
```

CO-POs & PSOs MAPPING MATRIX

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
D620.1	3	3	3	3	3	2	3	3	3	3
D620.2	3	3	3	3	3	2	3	3	3	3
D620.3	3	3	3	3	3	2	3	3	3	3
D620.4	3	3	3	3	3	2	3	3	3	3
D620.5	3	3	3	3	3	2	3	3	3	3
Total	15	15	15	15	15	10	15	15	15	15
Correlation level	3	3	3	3	3	2	3	3	3	3

Correlation level 1 – Slight (Low)

Correlation level 2 – Moderate (Medium)

Correlation level 3 – Substantial (High)

QUESTION PAPER SETTING

The teaching learning process and assessment are being carried out in accordance with the revised Bloom's 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.

Bloom's Taxonomy	Lower Order Thinking Skills (LOTs)	Higher Order Thinking Skills (HOTs)
Level	R-Remember, U-Understand , Ap-Apply	An-Analyze, E-Evaluate, C-Create
% to be included	90%	10%

****

EED631 POWER ELECTRONICS

TEACHING AND SCHEME OF EXAMINATION:

No of Weeks per Semester: 16 Weeks

Course	Instructions		Examination				
	Hrs / Week	Hrs / Semester	Marks				Duration
			Internal Assessment	Autonomous Examinations	Total		
Power Electronics	5	80	25	100*	100		3 Hrs.

*Examinations will be conducted for 100 marks and it will be reduced to 75 marks.

TOPICS AND ALLOCATION OF HOURS:

UNIT	TOPICS	NO.OF HOURS
I	Thyristor Family, Trigger and Commutation Circuits	13
II	Phase Controlled Rectifiers	14
III	Choppers and Inverters	14
IV	Control of DC Drives	15
V	Control of AC Drives	15
	Test & Model Exam	09
	Total	**80**

COURSE DESCRIPTION:

Developments in Electronics have their own impact in other fields of Engineering. Today all the Controls and Drives for the Electrical Machines are formed by Electronic Components and there are many Electronic Devices available to handle Electric Power in terms Kilo-Amps and Kilo-Volts. This course gives a comprehensive knowledge base about the devices and circuits used in Electrical Power Control.

OBJECTIVES:

On completion of these units, the student should be able to:

- Explain the scope and application of Power Electronics

- Explain the operating region and working of Thyristor family devices.

- Explain and state the application for Commutation Circuits and Trigger Circuits of SCR.

- Familiarize the Phase Controlled Rectifier for different kinds of Loads.

- Study the complete protection of Converter Circuits.

- Understand the working and applications of different types of Choppers and Inverters.

- Understand the application of Power Electronics devices as UPS, SMPS.

- Understand the control of DC Drives.

- Know the various methods of Speed Control of DC Drives.

- Familiarize the Control of AC Drives.

- Study the Speed Control of Three Phase Induction Motor using PWM and Slip Power Recovery Scheme.

- Understand the Closed Loop Control Of DC Drive and AC Drive.

- Know the operation of Single Phase and Three Phase Cyclo Converter.

- Study the need of Microcomputer Based Motor Control.

COURSE OUTCOMES:

Course	EED631 POWER ELECTRONICS
After successful completion of this course, the students should be able to	
D631.1	Describe basic operation of various power semiconductor devices, passive components and switching circuits.
D631.2	Analyze the converters and design the components of them under various load types.
D631.3	Analyze power converter circuits and inverter circuits learn to select suitable power electronics devices by assessing the requirements of application fields
D631.4	Understand the use of power control dc drives in commercial and industrial applications.
D631.5	Understand the use of power control ac drives in commercial and industrial applications.

EED 631 POWER ELECTRONICS

UNIT - I

THYRISTOR FAMILY, TRIGGER AND COMMUTATION CIRCUITS	**13 Hrs**
Power Electronics definition and its applications and switch specifications	1 Hr
Thyristor Family (Review) –SCS, SUS, SBS, LASCR and GTO. Symbol,	1 Hr
Circuit, Working, Characteristics and Applications - UJT, SCR, DIAC,	2 Hrs
TRIAC, IGBT, GTO and MOSFET. Gate Triggering Circuits	2 Hrs
Requirements, Types. Circuit, Working of – R, RC, Synchronized UJT	1 Hr
Triggering Circuits. Pulse Transformer In Trigger Circuits –— IC based	2 Hrs
Advance Triggering Circuits for SCR & TRIAC (Using IC TCA 785)	2 Hrs
Commutation Circuits – SCR Turn Off Methods – Natural Commutation - Forced Commutation – Class A, Class B, Class C, Class D, Class E and Class F. SCR rating and their importance	2 Hrs

UNIT - II

PHASE CONTROLLED RECTIFIERS	**14 Hrs**
Introduction – Phase Controlled Rectifiers. Circuit Diagram, Working and Waveform	2 Hrs
Half Wave, Full Wave Controlled Rectifier with Resistive,	2 Hrs
Inductive Loads and Free Wheeling Diode - Single Phase Fully Controlled	2 Hrs
Bridge, Single Phase Dual Converter with R Load, RL Load -	2 Hrs
Single Phase Semi Converter with Continuous and Discontinuous Load Current.AC-AC Convertor	2 Hrs
Three Phase Half Controlled Bridge, Fully Controlled Bridge With RL Load -	2 Hrs
Complete Protection of Thyristors against Surge Current, Surge Voltage, Dv/Dt, Di/Dt Protection.	2 Hrs

UNIT - III

CHOPPERS AND INVERTERS	**14 Hrs**
Choppers – Introduction, Principle of Chopper Operation. Control Strategies – Constant Frequency System and Variable Frequency	2 Hrs
System. Chopper Circuit Classification – Step Up Chopper, Step Down	1 Hr
Chopper, Voltage, Current, Load Commutated Chopper, First Quadrant, Second Quadrant, Two Quadrant and Four Quadrant Choppers. Circuit	2 Hrs
Diagram, Working and Waveform – Step Up Chopper, Morgan Chopper,	1 Hr
Jones Chopper. Applications of Choppers – SMPS	1 Hr

Inverters – Introduction, Classification of Inverter. Circuit Diagram, Working and Waveform Parallel Inverter, Half Bridge Inverter, Full Bridge	2 Hrs
Inverter, Modified MC Murray Full Bridge Inverter, MC Murray Bedford Full Bridge Inverter.	2 Hrs
Three Phase Bridge Inverter Under 180° Mode,120° Mode Operations	2 Hrs
Pulse Width Modulated Inverters, (Single Pulse, Multiple Pulse, Sinusoidal Pulse) Applications of Inverters – UPS - Online, Offline.	1 Hr

UNIT - IV
CONTROL OF DC DRIVES   **15 Hrs**

Introduction – DC Drive. Basic DC Motor Speed Equation – Operating Region	2 Hrs
Armature Voltage Control, Field Current Control, Constant Torque	2 Hrs
Constant HP Regions - Circuit Diagram, Output Waveforms and	2 Hrs
Output Equation of – Separately Excited DC Motor in – A) Single	1 Hr
Phase Full Converter Drives B) Single Phase Dual Converter Drives C) Three Phase Semi Converter Drives.	2 Hrs
DC Chopper for Series Motor Drive – Four Quadrant Control of DC Motor	2 Hrs
DC to DC Converter using MOSFET and IGBT - Block Diagram,	2 Hrs
Explanations of Closed Loop Control of DC Drives, Phase Locked Loop Control of DC Drives - Microprocessor Based Closed Loop Control of DC Drives.	2 Hrs

UNIT - V
CONTROL OF AC DRIVES   **15 Hrs**

Introduction AC Drive - Torque Speed Characteristics of Three Phase Induction Motor	2 Hrs
Speed Control of Induction Motor, Stator Voltage Control	2 Hrs
Variable Frequency Control, Necessity of Maintaining V/F Ratio.	2 Hrs
Rotor Resistance Control Inverters for Variable Voltage and Variable Frequency Control.-Static VAR compensation	2 Hrs
Speed Control by Rotor Resistance for Slip Ring Induction Motors	2 Hrs
Static Scherbius Drive (Slip Power Recovery Scheme) - Closed Loop Control of AC Drive Block Diagram	1 Hr
Micro Computer based PWM Control of Induction Motor	2 Hrs
Introduction to Cyclo Converter with Simple Circuit – Single Phase and Three Phase.	2 Hrs
Test & Model Exam	**09 Hrs**

TEXT BOOK

S.NO	TITLE	AUTHOR	PUBLISHER WITH EDITION
1	Power Electronics	MD Singh, KB Khanchandani	McGraw Hill Publishing Company Third reprint 2008 New Delhi

REFERENCE BOOKS

S.NO	TITLE	AUTHOR	PUBLISHER WITH EDITION
1.	Power Electronics	Mohammed H.Rashid	New Age Publication. Third Edition, 2004
2.	Power Electronics	Mohan, Undeland, Robbins.	Wiley India Edition. Media Enhanced Third Edition
3.	Power Electronics	Dr.P.S.Bimbhra	Khanna Publishers. Fourth Edition, 2011.
4.	Power Electronics	M.S.Jamil Asghar	PHI Learning Private Limited Eastern Economy Edition, 2010

LEARNING WEBSITES

1. https://www.sciencedirect.com/topics/engineering/power-electronics

2. www.idc-online.com/technical_references/pdfs/.../Types_of_Power_Converters_I.pdf

3. https://www.pantechsolutions.net/introduction-of-forced-commutation-class-a-b-c-d-e

4. https://www.electrical4u.com/application-of-power-electronics/

5. https://www.semikron.com/applications/motor-drives/application-examples.html

CONTINUOUS INTERNAL ASSESSMENT

The Internal Assessment marks for a total of 25 marks, which are to be distributed as follows:

i) Attendance	- 5 Marks
ii) Test	- 10 Marks
iii) Assignment	- 5 Marks
iv) Seminar	- 5 Marks

         Total   **25 Marks**

CO-POs & PSOs MAPPING MATRIX

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
D631.1	3	2	2	2	2	2	2	3	2	2
D631.2	3	2	2	2	2	2	2	3	2	2
D631.3	3	2	2	2	2	2	2	3	2	2
D631.4	3	2	2	2	2	2	2	3	2	2
D631.5	3	2	2	2	2	2	2	3	2	2
Total	15	10	10	10	10	10	10	15	10	10
Correlation level	3	2	2	2	2	2	2	3	2	2

Correlation level 1 – Slight (Low)
Correlation level 2 – Moderate (Medium)
Correlation level 3 – Substantial (High)

QUESTION PAPER SETTING

The teaching learning process and assessment are being carried out in accordance with the revised Bloom's 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.

Bloom's Taxonomy	Lower Order Thinking Skills (LOTs)	Higher Order Thinking Skills (HOTs)
Level	R-Remember, U-Understand , Ap-Apply	An-Analyze, E-Evaluate, C-Create
% to be included	90%	10%

****

EED632 BIO MEDICAL INSTRUMENTATION

TEACHING AND SCHEME OF EXAMINATION:

Number of Weeks per Semester: 16 weeks

Course	Instruction		Examination			
	Hrs / Week	Hrs/ Semester	Marks			Duration
			Internal Assessment	Autonomous Examination	Total	
Bio Medical Instrumentation	5	80	25	100*	100	3 Hrs

*Examinations will be conducted for 100 marks and it will be reduced to 75 marks.

TOPICS AND ALLOCATION OF HOURS:

UNIT	TOPICS	NO. OF HOURS
I	Bio - Electric Signals, Electrodes and Clinical Measurement	13
II	Bio - Medical Recorders	15
III	Therapeutic Instruments	15
IV	Biotelemetry and Patient Safety	14
V	Modern Imaging Techniques	14
	Test & Model Exam	09
	TOTAL	**80**

COURSE DESCRIPTION:

Bio Medical Engineering Education is in the growing stage. But every year, there is a tremendous increase in the use of Modern Medical Equipment in the Hospital and Health Care Industry therefore it is necessary for every Student to understand the functioning of various Medical Equipments. This course to enable the Students to learn the basic principles of different Biomedical Instruments viz Clinical Measurement, Bio - Medical Recorders, Therapeutic Instruments, Biotelemetry and Modern Imaging Techniques Instruments.

OBJECTIVES:

After learning this course the Student will be able to understand the about:

- The generation of Bio-Potential and its measurement using various Electrodes.

- The measurement of Blood Pressure.

- The measurement of Lung Volume.

- The measurement of Respiration Rate.

- The measurement of Body Temperature and Skin Temperature.

- The principles of operations of ECG Recorder.

- The principles of operations of EEG Recorder.

- The principles of operations of ENG Recorder.

- The working principles of Audio Meter.

- The principles of operations of Pacemaker.

- The basic principle of Dialysis.

- The basic principle of Short Wave Diathermy.

- The basic principle of Ventilators.

- The working principles of Telemetry.

- The basic principle of Telemedicine.

- To learn about Patient Safety.

- The various methods of Accident Prevention.

- The basic principle of various types of Lasers.

- The basic principle of CT and MRI Scanner.

- The principle of operation of various Imaging Techniques

COURSE OUTCOMES:

Course	EED632 BIO-MEDICAL INSTRUMENTATION
After successful completion of this course, the students should be able to	
D632.1	Measure the clinical measurement
D632.2	Measure the bio medical recorders such as ECG, Blood pressure, etc.,
D632.3	Working principles of operations of pacemaker
D632.4	Learn about patient safety
D632.5	Working principle of operation of various imaging techniques

EED632 BIO MEDICAL INSTRUMENTATION

UNIT - I

BIO-ELECTRIC SIGNALS AND ELECTRODES   **13 Hrs**

Bio – Potential and Their Generation – Resting and Action Potential	1 Hr
Propagation of Action Potential. Electrodes – Micro – Skin Surface – Needle Electrodes.	2 Hrs

CLINICAL MEASUREMENT   1 Hr

Measurement of Blood Pressure (Direct, Indirect)	
Blood Flow Meter (Electro Magnetic& Ultrasonic Blood Flow Meter)	2 Hrs
Blood PH Measurement - Measurement of Respiration Rate	2 Hrs
Measurement of Lung Volume – Heart Rate Measurement	2 Hrs
Measurement of Body and Skin Temperature - Chromatography	2 Hrs
Photometry, Flurometry.	1 Hr

UNIT - II

BIO - MEDICAL RECORDERS   **15 Hrs**

Electro Cardiograph (ECG) – Lead System – ECG Electrodes	2 Hrs
ECG Amplifiers – ECG Recording Units – Analysis of ECG Curves.	2 Hrs
Electroencephalograph (EEG) – 10-20 Lead System – EEG Recording Units	2 Hrs
EEG Wave Types – Clinical use of EEG Brain Tumor.	2 Hrs
Electro Myograph (EMG) – EMG Waves	2 Hrs
Measurement of Conduction Velocity - EMG Recording Units	2 Hrs
Electro Retino Graph (ERG)- ERG Recording Units, Audiometer	2 Hrs
Principle – Types-Basics Audiometer Working.	1 Hr

UNIT - III

THERAPEUTIC INSTRUMENTS   **15 Hrs**

Cardiac Pacemaker – Classification – External Pace Makers	2 Hrs
Implantable Pacemaker – Programmable Pacemaker – Cardiac Defibrillators	2 Hrs
Types – AC and DC Defibrillators	2 Hrs
Heart Lung Machine With Block Diagram. Dialysis – Hemo Dialysis	2 Hrs

Peritoneal Dialysis. Endoscopes Endoscopic Laser Coagulator and Applications	2 Hrs
Physiotherapy Equipment – Short Wave Diathermy	2 Hrs
Micro Wave Diathermy	1 Hr
Ultrasonic Therapy Unit (Block / Circuit) – Ventilators – Types – Modern Ventilator Block Diagram.	2 Hrs

UNIT - IV

BIOTELEMETRY AND PATIENT SAFETY	**14 Hrs**
Introduction to Biotelemetry – Physiological – Adaptable to Biotelemetry Components of a Biotelemetry System	2 Hrs
Application of Telemetry -Tele-medicine - Introduction, Working, Applications.	2 Hrs
Patient Safety: Physiological effects of Electric Current – Micro and Macro Shock	2 Hrs
Leakage Current – Shock Hazards from Electrical Equipment.	2 Hrs
Methods of Accident Prevention – Grounding – Double Insulation – Protection By Low Voltage –Ground Fault Circuit Interrupter –	2 Hrs
Isolation of Patient Connected Parts – Isolated Power Distribution System.	2 Hrs
Safety Aspects in Electro Surgical Units – Burns, High Frequency Current Hazards, Explosion Hazards.	2 Hrs

UNIT - V

MODERN IMAGING TECHNIQUES	**14 Hrs**
LASER Beam Properties – Block Diagram	2 Hrs
Operation of CO_2 And Ndyag LASER – Applications of LASER In Medicine.	2 Hrs
X Ray Apparatus – Block Diagram – Operation	2 Hrs
Special Techniques in X-Ray Imaging	1 Hr
Tomogram – Computerized Axial Tomography	2 Hrs
CT Scanner – Ultrasonic Imaging Techniques	2 Hrs
Echo Cardiograph – Angiography	2 Hrs
Magnetic Resonance Imaging Techniques.	1 Hr
Test and Model Exam	**09 Hrs**

TEXT BOOK

S.NO	TITLE	AUTHOR	PUBLISHER WITH EDITION
1	Biomedical Instrumentation	Dr.M. Arumugam	Anuradha publications, chennai

REFERENCE BOOKS

S.NO	TITLE	AUTHOR	PUBLISHER WITH EDITION
1	Bio medical Instrumentation and measurements	Leslie Cromwell – Fred j. Wibell, Erich A.P Feither	II Edition
2	Medicine and Clinical Engineering	Jacobson and Webstar	--
3	Hand Book of Bio Medical Instrumentation	R.S. Khandpur	--
4	Medical Electronics	Kumara Doss	--
5	Introduction to Medical Electronics	B.R.Klin	--
6	Introduction to Biomedical Instrumentation	Mandeep Singh	Printice Hall India 2010

LEARNING WEBSITES

1. https://www.sciencedirect.com/topics/engineering/biomedical instrumentation

2. https://www.eecs.umich.edu/courses/bme458/download/bme458_notes1.pdf

3. https://www.electrical4u.com/introduction-to-biomedical-instrumentation/

4. https://www.slideshare.net/PrincyRandhawa/biomedical-instrumentation-60215990

5. https://en.wikipedia.org/wiki/Bioinstrumentation

CONTINUOUS INTERNAL ASSESSMENT

The Internal Assessment marks for a total of 25 marks, which are to be distributed as follows:

```
        i) Attendance        - 5 Marks
        ii) Test             - 10 Marks
        iii) Assignment      - 5 Marks
        iv) Seminar          - 5 Marks
                             -----------
              Total          25 Marks
                             -----------
```

CO-POs & PSOs MAPPING MATRIX

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
D632.1	3	3	2	3	3	3	3	3	2	2
D632.2	3	3	2	3	3	3	3	3	2	3
D632.3	3	3	2	3	3	3	3	3	2	2
D632.4	3	3	2	3	3	3	3	3	2	2
D632.5	3	3	2	3	3	3	3	3	2	2
Total	15	15	10	15	15	15	15	15	10	11
Correlation level	3	3	2	3	3	3	3	3	2	2

Correlation level 1 – Slight (Low)
Correlation level 2 – Moderate (Medium)
Correlation level 3 – Substantial (High)

QUESTION PAPER SETTING

The teaching learning process and assessment are being carried out in accordance with the revised Bloom's 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.

Bloom's Taxonomy	Lower Order Thinking Skills (LOTs)	Higher Order Thinking Skills (HOTs)
Level	R-Remember, U-Understand , Ap-Apply	An-Analyze, E-Evaluate, C-Create
% to be included	90%	10%

****

EED633 COMPUTER HARDWARE AND NETWORKS

TEACHING AND SCHEME OF EXAMINATION:

Number of Weeks per Semester: 16 weeks

Course	Instruction		Examination			
	Hrs / Week	Hrs/ Semester	Marks			Duration
			Internal Assessment	Autonomous Examination	Total	
Computer Hardware and Networks	5	80	25	100*	100	3 Hrs

*Examinations will be conducted for 100 marks and it will be reduced to 75 marks.

TOPICS AND ALLOCATION OF HOURS:

UNIT	TOPICS	NO. OF HOURS
I	Mother Board Components and Memory Storage Devices	13
II	I/O Devices and Interface	15
III	Maintenance and Trouble Shooting of Desk top and Mobile Phones	14
IV	Computer Network Devices and OSI Layers	14
V	802.X and TCP/IP Protocols	15
	Test & Model Exam	09
	TOTAL	**80**

COURSE DESCRIPTION:

Maintaining and servicing the computers, laptops and peripherals are essential requirements of the computer students. The clear understanding of computer network devices and protocols are also taught in this course.

OBJECTIVES:

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

➢ Identify the major components that make up the system unit.

➢ Understand the principle of operations of Key Board, mouse and Displays.

➢ Study about the specification of I/O Ports of all I/O devices like serial, parallel, USB – Game port, Blue tooth and IP Connectors

➢ Understand the technology of high quality multiple color graphic output devices like Dot matrix, Inkjet, Laser, Line, MFP and computer system.

➢ Understand the operations to Power Supply devices. Know the use of diagnostic Software. Identify the major components of Laptop. Troubles shoot the problems in Laptop

➢ Understand the concept of data communication.

➢ Discuss the advantages and disadvantages of different network topologies. Compare different network classifications based on different category.

➢ Know the use of different network devices.

➢ Understand the different layers of OSI and their functions. Compare different LAN protocols. Identify the protocols used in TCP /IP and compare with OSI model. Understand IP address concepts and TCP/IP suite.

COURSE OUTCOMES:

Course	EED633 COMPUTER HARDWARE AND NETWORKS
After successful completion of this course, the students should be able to	
D633.1	Understand the principle of operations of Keyboard, mouse and Displays
D633.2	Study about the specification of I/O Ports of all I/O devices like serial, parallel, USB –Game Blue tooth and IP Connectors
D633.3	Understand the technology of high quality multiple color graphic output devices like Dot matrix, Inkjet, Laser, Line, MFP and computer system
D633.4	Know the use of different network devices.
D633.5	Understand IP address concepts and TCP/IP suite.

EED633 COMPUTER HARDWARE AND NETWORKS

UNIT I

MOTHERBOARD COMPONENTS AND MEMORY STORAGE DEVICES   **13 HOURS**

Introduction: Parts - Mother board, sockets, expansion slots, memory, power supply, drives and front panel and rear panel connectors ―	2 Hrs
Hardware, Software and Firmware.	1 Hrs
Processors: Architecture and block diagram of multi core Processor (any one), Features of new processor Definition only chipsets (Concepts only)	2 Hrs
Bus Standards Overview and features of PCI, AGP, USB, PCMCIA,Processor BUS - High	2 Hrs
Primary Memory: Introduction-Main Memory, Cache memory –DDR2- DDR3, RAM versions – 1TB RAM – Direct RDRAM	1 Hrs
Secondary Storage: Hard Disk – Construction – Working Principle – Specification of IDE, Ultra ATA, Serial ATA;	2 Hrs
HDDPartition - Formatting. Troubleshooting hard disk drives.	1 Hrs
Removable Storage: CD&DVD construction – reading & writing operations; CD-R, CD- RW; DVD-ROM, DVD-RW; construction andworking of DVD Reader / Writer.	2 Hrs
Blue-ray: Introduction – Disc Parameters – Recording and Playback Principles – Solid state memory devices.	

UNIT II

I/O DEVICES AND INTERFACE   **15 HOURS**

Keyboard and Mouse: Keyboard: Signals – operation of membrane and mechanical keyboards–troubleshooting; wireless	2 Hrs
Keyboard**.** Mouse- types, connectors, operation of Optical mouseand Troubleshooting.	1 Hr
Printers: Introduction – Types of printers– Dot Matrix, Laser, lineprinter,	2 Hrs
MFP (Multi-Function Printer), Thermal printer - Operation –Construction – Features andTroubleshooting	2 Hrs
I/O Ports: Serial, Parallel, USB, Game Port, Bluetooth interface,IR connector, fire ware,	2 Hrs

Signal specification problems with interfaces.	1 Hr
Displays and Graphic Cards: Panel Displays– Principles of LED, LCD and TFT Displays. SVGA Port signals	2 Hrs
common problems and solutions	1 Hr
Power Supply: SMPS: Principles of Operation and BlockDiagram of ATX Power Supply, connector specifications	2 Hrs

 UNIT III

MAINTENANCE AND TROUBLE SHOOTING OF DESK TOP AND MOBILE PHONES	**14 HOURS**
BIOS: Standard CMOS setup, Advanced BIOS setup, Power management, advanced chipset features,	2 Hrs
PC Bios communication– upgrading BIOS, Flash BIOS - setup.	1 Hr
POST: Definition — IPL hardware — POST Test sequence —beep codes and error messages.	2 Hrs
Mobile phone components: Basics of mobile communication. Components - battery- antenna-ear piece- microphone -speaker- buzzer-LCD- keyboard.	2 Hrs
Basic circuit board components ──Names and functions of different ICs used in mobile phones.	1 Hr
Tools & Instruments used in mobile servicing: Mobile servicingkit – soldering and de-soldering components using different soldering tools - Use of multi- meter and battery booster.	2 Hrs
Installation & Troubleshooting: Assembling and disassembling of different types of mobile phones – Installation of OS - Fault finding & troubleshooting-Jumpering techniques and solutions.	2 Hrs
Software and Antivirus: Flashing- Formatting- Unlocking -Use of secret codes-Downloading- Routing; Mobile Viruses –Precautions – Antivirus Software.	2 Hrs

UNIT – IV

COMPUTER NETWORK DEVICES AND OSI LAYERS	**14 HOURS**
Data Communication: Components of a data communication –Data flow: simplex – half duplex – full duplex; Networks – Definition - Network criteria – Types of Connections: Point to point – multipoint;	2 Hrs
Topologies: Star, Bus, Ring, Mesh, Hybrid – Advantages and Disadvantages of	1 Hr

each topology.

Types of Networks: LAN – MAN – WAN – CAN – HAN –Internet – Intranet –Extranet,	2 Hrs
Client-Server, Peer to Peer Networks.	1 Hr
Transmission Media: Classification of transmission media -Guided – Twisted pair, Coaxial, Fiber optics; Unguided –	2 Hrs
Radio waves – Infrared – LOS – VSAT – cabling and standards.	1 Hr
Network devices: Features and concepts of Switches –Routers (Wired and Wireless) – Gateways.	2 Hrs
Network Models: Protocol definition - standards - OSI Model –	2 Hrs
Layered architecture – functions of all layers.	1 Hr

UNIT V	
802.X AND TCP/IP PROTOCOLS	**15 HOURS**
Overview of TCP / IP: OSI & TCP/IP – Transport Layers Protocol – connection oriented and connectionless Services	2 Hrs
Sockets – TCP & UDP.	1 Hr
802.X Protocols: Concepts and PDU format of CSMA/CD (802.3) –Token bus (802.4) – Token ring (802.5) – Ethernet –	2 Hrs
type of Ethernet (Fast Ethernet, gigabit Ethernet) –Comparison between 802.3, 802.4 and 802.5	1 Hr
Network Layers Protocol: IP –Interior Gateway Protocols(IGMP, ICMP, ARP, RARP Concept only).	2 Hrs
IP Addressing: Dotted Decimal Notation –Sub netting &	2 Hrs
Super netting – VLSM Technique-IPv6 (concepts only)	2 Hrs
Application Layer Protocols: FTP– Telnet – SMTP– HTTP –	2 Hrs
DNS – POP	1 Hr
Test and Model Exam	**9 Hrs**

TEXT BOOKS

S.NO	TITLE	AUTHOR	PUBLISHER WITH EDITION
1	Computer Installation and Servicing	D.Balasubramanian	Arasan Ganesan Institute of Technology 1993
2	The complete PC upgrade and Maintenance	Mark Minasi	BPB Publication 1997
3	Troubleshooting, Maintaining and Repairing PCs	Stephen J Bigelow	Tata Mc-Graw Hill Publication 2004
4	Computer Networks	Andrew S.Tanenbaum	Prentice-Hall of India, 2004 New Delhi
5	Data Communication and networking	Behrouz A.Forouzan	Tata Mc-Graw Hill, 2006 New Delhi
6	Data and Computer Communications	William Stallings	Prentice-Hall of India Eighth Edition 2007

REFERENCE BOOKS

S.NO	TITLE	AUTHOR	PUBLISHER WITH EDITION
1.	Computer Networks	Achyut Godbole	Tata Mc-Graw Hill - New Delhi
2.	Principles of Wireless Networks– A unified Approach	Kaveh Pahlavan and Prashant krishnamoorthy	Pearson Education 2002

LEARNING WEBSITES

1. https://www.sarvgyan.com/courses/computer-hardware-networking

2. https://www.jetking.com/blog/guide-for-computer-hardware-and-networking-courses/

3. http://www.indiaeducation.net/careercenter/computers-it/hardwareandnetworking/

4. https://en.wikipedia.org/wiki/Networking_hardware

5. https://www.educba.com/computer-hardware-vs-networking/

CONTINUOUS INTERNAL ASSESSMENT

The Internal Assessment marks for a total of 25 marks, which are to be distributed as follows:

        i) Attendance -   5 Marks
        ii)Test   -   10 Marks
        iii)Assignment-   5 Marks
        iv)Seminar   -   5 Marks

        Total   -   **25 Marks**

CO-POs & PSOs MAPPING MATRIX

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
D633.1	3	3	2	2	2	2	2	2	2	2
D633.2	3	3	2	2	2	2	2	2	2	3
D633.3	3	3	2	2	2	2	2	2	2	2
D633.4	3	3	2	2	2	2	2	2	2	2
D633.5	3	3	2	2	2	2	2	2	2	2
Total	15	15	10	10	10	10	10	10	10	11
Correlation level	3	3	2	2	2	2	2	2	2	2

Correlation level 1 – Slight (Low)
Correlation level 2 – Moderate (Medium)
Correlation level 3 – Substantial (High)

QUESTION PAPER SETTING

The teaching learning process and assessment are being carried out in accordance with the revised Bloom's 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.

Bloom's Taxonomy	Lower Order Thinking Skills (LOTs)	Higher Order Thinking Skills (HOTs)
Level	R-Remember, U-Understand , Ap-Apply	An-Analyze, E-Evaluate, C-Create
% to be included	90%	10%

****

EED640 ELECTRICAL ESTIMATION AND COSTING PRACTICAL

TEACHING AND SCHEME OF EXAMINATION

Number of Weeks per Semester: 16 weeks

Course	Instruction		Examination			
	Hrs / Week	Hrs/ Semester	Marks			Duration
			Internal Assessment	Autonomous Examination	Total	
Electrical Estimation and Costing Practical	5	80	25	100*	100	3 Hrs

*Examinations will be conducted for 100 marks and it will be reduced to 75 marks.

DETAILED ALLOCATION OF MARKS:

Sl. NO	NAME OF ACTIVITY	MARK ALLOCATION
1	LAYOUT / DETAILS OF FITTING	20
2	LOAD CALCULATION	20
3	MATERIAL CALCULATION	25
4	MATERIAL SCHEDULE AND APPROXIMATE COST	20
5	VIVA-VOCE	05
6	MINI PROJECT	10
	TOTAL	100

Mini Project Evaluation (10 marks)

Breakup Details

1	Project Description	05
2	Project Demo	05
	Total	**10**

COURSE DESCRIPTION:

To enable the Students to prepare the schedule of materials with specification and estimate the cost for different types of Electrical Installations. This will empower the Students with the necessary principles of Planning, Electrical Rules and Method of Installations.

OBJECTIVES:

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

- Draw the Conventional Symbols for various Electrical Installations.
- Quote the relevant IE Rules for a given Electrical Installation, Earthing and clearance of Service Lines.
- Familiarize the types of Wiring.
- Explain the necessity and types of Earthing.
- Estimate the quantity of materials and cost required for Domestic and Industrial Wiring.

COURSE OUTCOMES:

Course	EED640 ELECTRICAL ESTIMATION AND COSTING PRACTICAL
After successful completion of this course, the students should be able to	
D640.1	Identify the types of wiring and earthing and able to know the IE rules
D640.2	Prepare the wiring diagram required for the domestic & industrial
D640.3	Prepare the estimate required for the domestic & industrial
D640.4	Prepare the material required for the domestic & industrial
D640.5	Prepare the Cost required for the domestic & industrial and develop the mini projects with report.

EED640 ELECTRICAL ESTIMATION AND COSTING PRACTICAL

Si.No	List of Experiments
1	To study the various Electrical Symbols, IE Rules 28, IE Rules 30, IE Rules 31, IE Rules 54, IE Rules 56, IE Rules 87
2	To study the various types of Earthing
3	To study the various types of Electrical Wiring Methods
4	Estimate the quantity of material and cost required for Residential Building (1BHK)
5	Estimate the quantity of material and cost required for Computer Centre having 10 Computers, AC Unit, UPS, Light and Fan
6	Estimate the quantity of material and cost required for Industrial Power Wiring having 4 Machines
7	Estimate the quantity of material and cost required for street light service having 12 Lamps Light Fitting
8	Estimate the quantity of material and cost required for 3 Phase Service connections to a building having 5KW Load.
9	Estimate the quantity of material and cost required for Irrigation Pump Wiring (5HP)
10	Estimate the quantity of material and cost required for School Building having 3 Class Rooms
11	Estimate the quantity of material and cost required for erection of a 15HP Induction Motor in a Saw Mill/Flour Mill
12	Mini Project

The mini project is activity based and it may be given to group of maximum of six students for hands on experience and to create scientific temper

REFERENCE BOOKS

S.NO	TITLE	AUTHOR	PUBLISHER WITH EDITION
1	Electrical Design Estimating and Costing.	K.B.Raina & K.Battacharya.	Khanna Publications.
2	Electrical Installation Estimating and Costing.	J.B.Gupta	S.K.Kataria and Sons
3	Electrical Wiring, Estimating and Costing.	Dr.S.L.Uppal	New age international (P) limited
4	Electrical Estimating and Costing.	Surjit Singh	Dhanpat Rai company.
5	Electrical wiring, Estimating and costing	B.D.Arora	R.B. Publication.

CONTINUOUS INTERNAL ASSESSMENT

The Internal Assessment mark for a total of 25 marks which are to be distributed as follows:

a) Attendance (Award of marks same as theory courses)	:	05 Marks
b) Procedure/ observation and tabulation/ Other Practical related Work	:	05 Marks
c) Tests	:	10 Marks
d) Student Centered Learning (SCL) work sheet	:	05 Marks
TOTAL		25 Marks

LEARNING WEBSITES

1. https://en.wikipedia.org/wiki/Programmable_logic_controller

2. https://unitronicsplc.com

3. https://www.amci.com/industrial-automation-resources/

4. https://www.allaboutcircuits.com/textbook/digital/chpt-6/

5. https://www.allaboutcircuits.com/technical-articles/

CO-POs & PSOs MAPPING MATRIX

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
D640.1	3	3	3	3	3	3	3	3	3	3
D640.2	3	3	3	3	3	3	3	3	3	3
D640.3	3	3	3	3	3	3	3	3	3	3
D640.4	3	3	3	3	3	3	3	3	3	3
D640.5	3	3	3	3	3	3	3	3	3	3
Total	15	15	15	15	15	15	15	15	15	15
Correlation level	3	3	3	3	3	3	3	3	3	3

Correlation level 1 – Slight (Low)

Correlation level 2 – Moderate (Medium)

Correlation level 3 – Substantial (High)

EED640 ELECTRICAL ESTIMATION AND COSTING PRACTICAL

MODEL QUESTION PAPER

Si.No	List of Experiments	CO	PO
1	To study the various Electrical Symbols, IE Rules 28, IE Rules 30, IE Rules 31, IE Rules54, IE Rules 56, IE Rules 87	D640.1	PO1, PO2, PO3, PO4, PO5, PO6, PO7
2	To study the various types of Earthing	D640.1	PO1, PO2, PO3, PO4, PO5, PO6, PO7
3	To study the various types of Electrical Wiring Methods	D640.1	PO1, PO2, PO3, PO4, PO5, PO6, PO7
4	Estimate the quantity of material and cost required for Residential Building (1BHK)	D640.2	PO1, PO2, PO3, PO4, PO5, PO6, PO7
5	Estimate the quantity of material and cost required for Computer Centre having 10 Computers, AC Unit, UPS, Light and Fan	D640.3	PO1, PO2, PO3, PO4, PO5, PO6, PO7
6	Estimate the quantity of material and cost required for Industrial Power Wiring having 4 Machines	D640.3	PO1, PO2, PO3, PO4, PO5, PO6, PO7
7	Estimate the quantity of material and cost required for street light service having 12 Lamps Light Fitting	D640.4	PO1, PO2, PO3, PO4, PO5, PO6, PO7
8	Estimate the quantity of material and cost required for 3 Phase Service connections to a building having 5KW Load.	D640.4	PO1, PO2, PO3, PO4, PO5, PO6, PO7
9	Estimate the quantity of material and cost required for Irrigation Pump Wiring (5HP)	D640.4	PO1, PO2, PO3, PO4, PO5, PO6, PO7
10	Estimate the quantity of material and cost required for School Building having 3 Class Rooms	D640.4	PO1, PO2, PO3, PO4, PO5, PO6, PO7
11	Estimate the quantity of material and cost required for erection of a 15HP Induction Motor in a Saw Mill/Flour Mill	D640.5	PO1, PO2, PO3, PO4, PO5, PO6, PO7
12	**Mini Project**	**D640.5**	**PO1, PO2, PO3, PO4, PO5, PO6, PO7**

EED651 POWER ELECTRONICS PRACTICAL

TEACHING AND SCHEME OF EXAMINATION:

Number of Weeks per Semester: 16 weeks

Course	Instruction		Examination			
	Hrs / Week	Hrs/ Semester	Marks			Duration
			Internal Assessment	Autonomous Examination	Total	
Power Electronics Practical	6	96	25	100*	100	3 Hrs

*Examinations will be conducted for 100 marks and it will be reduced to 75 marks.

DETAILED ALLOCATION OF MARKS:

S.NO	NAME OF THE ACTIVITY	MARKS
1	CIRCUIT DIAGRAM	25
2	CONNECTIONS	20
3	PROCEDURE	20
4	READING/GRAPH/RESULT	20
5	VIVA VOCE	05
6	MINI PROJECT	10
	TOTAL	**100**

Mini Project Evaluation (10 marks)

Breakup Details

1	Project Description	05
2	Project Demo	05
	Total	**10**

COURSE DESCRIPTION:

- The advent of Thyristors has revolutionized art of Electric Power Conversation and its Control.

- The use of the Power Electronic Devices has pervaded the Industrial Applications relatingto the field of Electrical, Electronics, Instrumentation and Control Engineering.

- This course is introduced to impart practical skills to the students in using some important Power Electronic Devices and Circuits.

EQUIPMENTS REQUIRED: (For a Batch of 30 Students)

S.NO	NAME OF THE EQUIPMENT	NO OF QUANTITY
1.	Line Synchronized Ramp Trigger Circuit Using UJT TrainerKit.	1
2.	Lamp Control Circuit Using DIAC – TRIAC Trainer Kit.	1
3.	SCR Commutation Circuits (Class B & Class D)	1
4.	Half Wave Controlled Rectifier with R- Load & RL Load Trainer Kit.	1
5.	Single Phase Fully Controlled Bridge with RL- Load And Freewheeling Diode Trainer Kit.	1
6.	Single Phase Semi Controlled Bridge with R- Load Trainer Kit.	1
7.	Construct and Test the DC Chopper Control Circuit using Thyristor (Any Class) Trainer Kit.	1
8.	Step Up Chopper Trainer Kit.	1
9.	PWM Based Step Down DC Chopper using MOSFET/IGBT Trainer Kit.	1
10.	Single Phase Single Pulse / Sinusoidal PWM Inverter using MOSFET/IGBT Trainer Kit.	1
11.	SMPS using MOSFET/IGBT Trainer Kit.	1
12.	Open Loop Speed Control Circuit for DC Shunt Motor and Single-Phase AC Motor Trainer Kit	1
13.	Control Circuit Using TRIAC for Universal Motor Trainer Kit.	1
14.	Closed Loop Speed Control of DC and AC Motor Trainer Kit.	1
15.	Single Phase Parallel Inverter using MOSFET/IGBT Trainer Kit	1
16.	Single Phase to Single Phase Cyclo Converter Trainer Kit.	1
17.	CRO With Power Probe	4
18.	Multi Meter	5

OBJECTIVES:

At the end of the Course, Students will be able to

➢ Construct and test various Triggering Circuits for SCR.

➢ Construct and test different types of Phases Controlled Converters in various configurations at different load conditions.

➢ Construct and observe the performance of different types of Chopperand Inverters.

➢ Construct and test the performance of Open Loop and Closed Loop Control of DC and AC drives.

➢ Construct and test the performance of Single Phase Cyclo Converter.

COURSE OUTCOMES:

Course	EED651 POWER ELECTRONICS PRACTICAL
After successful completion of this course, the students should be able to	
D651.1	Demonstrate the characteristics of power semiconductor devices.
D651.2	Analyze the operation of converters.
D651.3	Develop power semiconductor circuits to electrical power system
D651.4	Construct power semiconductor circuits for industrial applications
D651 .5	Analyze power semiconductor circuits for domestic applications and develop the mini projects with report.

EED651 POWER ELECTRONICS PRACTICAL

Sl.No	List of Experiments
1	Construct the Line synchronized Ramp trigger circuit using UJT with AC Load to measure Firing Angles
2	Construct Lamp control circuit using DIAC TRIAC to measure various output voltage for Firing Angles.
3	Construct and test the SCR Commutation Circuits (Class B & Class D)
4	Construct and test the Half Wave Controlled Rectifier with R- Load, RL Load
5	Construct and test the Single Phase Fully Controlled Bridge with RL- Load and Free Wheeling Diode
6	Construct and test the Single-Phase Semi Controlled Bridge with R- Load
7	Construct and test the DC Chopper Control Circuit using Thyristor (any class).
8	Construct and test the Step-Up Chopper.
9	Construct PWM based Step Down DC Chopper using MOSFET / IGBT.
10	Construct and test the Single-Phase Single Pulse / Sinusoidal PWM Inverter using MOSFET/IGBT.
11	Construct and test the SMPS using MOSFET/IGBT.
12	Construct and test the Open Loop Speed Control Circuit for DC Shunt Motor and Single-Phase AC Motor.
13	Construct and test the Control Circuit using TRIAC for Universal Motor.
14	Construct and test the Closed Loop Speed Control for a DC and AC Motor.
15	Construct and test the Single-Phase Parallel Inverter using MOSFET/IGBT
16	Construct and test the Single Phase to Single Phase Cyclo Converter.
17	Microcomputer based PWM control of induction motor
18	Mini Project

The mini project is activity based and it may be given to group of maximum of six students for hands on experience and to create scientific temper.

CONTINUOUS INTERNAL ASSESSMENT

The Internal Assessment mark for a total of 25 marks which are to be distributed as follows:

a) Attendance (Award of marks same as theory courses)	:	05 Marks
b) Procedure/ observation and tabulation/ Other Practical related Work	:	05 Marks
c) Tests	:	10 Marks
d) Student Centered Learning (SCL) work sheet	:	05 Marks

TOTAL   25 Marks

LEARNING WEBSITES

1. https://www.iitk.ac.in/new/power-electronics-laboratory

2. https://www.bits-pilani.ac.in/hyderabad/EEE/PowerElectronicsLab

3. https://www.scientechworld.com/education-software-training-and-skill-development /

power-electronics/power-electronics-lab

4. https://www.scientechworld.com/education-software-training-and-skill-development /

power-electronics/high-voltage-power-electronics-lab

5. https://www.ee.iitb.ac.in/~apel/

CO-POs & PSOs MAPPING MATRIX

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
D651.1	3	3	3	3	3	3	3	3	3	3
D651.2	3	3	3	3	3	3	3	3	3	3
D651.3	3	3	3	3	3	3	3	3	3	3
D651.4	3	3	3	3	3	3	3	3	3	3
D651.5	3	3	3	3	3	3	3	3	3	3
Total	15	15	15	15	15	15	15	15	15	15
Correlation level	3	3	3	3	3	3	3	3	3	3

Correlation level 1 – Slight (Low)
Correlation level 2 – Moderate (Medium)
Correlation level 3 – Substantial (High)

EED651 POWER ELECTRONICS PRACTICAL

MODEL QUESTION PAPER

Si.No	List of Experiments	CO	PO
1	Construct the Line synchronized Ramp trigger circuit using UJT withAC Load to measure Firing Angles	D651.1	PO1, PO2, PO3, PO4, PO5, PO6, PO7
2	Construct Lamp control circuit using DIAC TRIAC to measure variousoutput voltage for Firing Angles.	D651.1	PO1, PO2, PO3, PO4, PO5, PO6, PO7
3	Construct and test the SCR Commutation Circuits (Class B & Class D)	D651.1	PO1, PO2, PO3, PO4, PO5, PO6, PO7
4	Construct and test the Half Wave Controlled Rectifier with R- Load, RL Load	D651.2	PO1, PO2, PO3, PO4, PO5, PO6, PO7
5	Construct and test the Single Phase Fully Controlled Bridge with RL- Loadand Free Wheeling Diode	D651.2	PO1, PO2, PO3, PO4, PO5, PO6, PO7
6	Construct and test the Single-Phase Semi Controlled Bridge with R- Load	D651.2	PO1, PO2, PO3, PO4, PO5, PO6, PO7
7	Construct and test the DC Chopper Control Circuit using Thyristor (any class).	D651.3	PO1, PO2, PO3, PO4, PO5, PO6, PO7
8	Construct and test the Step-Up Chopper.	D651.3	PO1, PO2, PO3, PO4, PO5, PO6, PO7
9	Construct PWM based Step Down DC Chopper using MOSFET/IGBT.	D651.3	PO1, PO2, PO3, PO4, PO5, PO6, PO7
10	Construct and test the Single-Phase Single Pulse / Sinusoidal PWM Inverter usingMOSFET/IGBT.	D651.3	PO1, PO2, PO3, PO4, PO5, PO6, PO7
11	Construct and test the SMPS using MOSFET/IGBT.	D651.4	PO1, PO2, PO3, PO4, PO5, PO6, PO7
12	Construct and test the Open Loop Speed Control Circuit for DC Shunt Motorand Single-Phase AC Motor.	D651.5	PO1, PO2, PO3, PO4, PO5, PO6, PO7
13	Construct and test the Control Circuit using TRIAC for Universal Motor.	D651.1	PO1, PO2, PO3, PO4, PO5, PO6, PO7
14	Construct and test the Closed Loop Speed Control for a DC and AC Motor.	D651.4	PO1, PO2, PO3, PO4, PO5, PO6, PO7
15	Construct and test the Single-Phase Parallel Inverter using MOSFET/IGBT	D651.3	PO1, PO2, PO3, PO4, PO5, PO6, PO7
16	Construct and test the Single Phase to Single Phase Cyclo Converter.	D651.5	PO1, PO2, PO3, PO4, PO5, PO6, PO7
17	Microcomputer based PWM control of induction motor	D651.5	PO1, PO2, PO3, PO4, PO5, PO6, PO7
18	**Mini project**	**D651.5**	**PO1, PO2, PO3, PO4, PO5, PO6, PO7**

EED652 BIO MEDICAL INSTRUMENTATION PRACTICAL

TEACHING AND SCHEME OF EXAMINATION

Number of Weeks per Semester: 16 weeks

Course	Instruction		Examination			
	Hrs / Week	Hrs/ Semester	Marks			Duration
			Internal Assessment	Autonomous Examination	Total	
Bio Medical Instrumentation Practical	6	96	25	100*	100	3 Hrs

*Examinations will be conducted for 100 marks and it will be reduced to 75 marks.

DETAILED ALLOCATION OF MARKS:

S.NO	NAME OF THE ACTIVITY	MARKS
1	CIRCUIT DIAGRAM / CONNECTION DIAGRAM / BLOCK DIAGRAM	35
2	CONNECTIONS AND PROCEEDING THE EXPERIMENT	30
3	READING/CALCULATION/GRAPH/RESULT	20
4	VIVA VOCE	05
5	MINI PROJECT	10
	TOTAL	100

Mini Project Evaluation (10 marks)

Breakup Details

1	Project Description	05
2	Project Demo	05
	Total	**10**

COURSE DESCRIPTION:

Recent advances in Medical Field have been fueled by the Instruments developed by the Electronics and Instrumentation Engineers. Pacemakers, Ultrasound Machine CAT, Medical Diagnostic Systems are few names which have been contributed by Engineers. Now Health Care Industry uses many Instruments which are to be looked after by Instrumentation Engineers.

EQUIPMENTS REQUIRED: (For a Batch of 30 Students)

S.No	LIST OF EQUIPMENTS	QUANTITY REQUIRED
1	pH meter and conductivity meter	1
2	Photo transducer for pulse measurement	1
3	Sphygmomanometer and Stethoscope	1
4	Blood flow measurement system	1
5	Multi parameter (ECG, EMG, EEG) Simulator	1
6	GSR measurement setup.	1
7	Function generator	8
8	DSO	8
9	Regulated Power supplies	8
10	Bread Board	8

OBJECTIVES:

At the end of the Course, Students will be able to:

➢ Learn the basic principles of different Instruments/Equipment used in the Health Care Industry.

➢ The practical work done in this area will impart skill in the use, Servicing and Maintenance of this Instruments/Equipment.

➢ Proficiency in this area will widen the knowledge and skill of Diploma Holders in the field of Biomedical Instrumentation

COURSE OUTCOMES:

Course	EED652 BIO MEDICAL INSTRUMENTATION PRACTICAL
After successful completion of this course, the students should be able to	
D652.1	Know the instrumentation amplifiers
D652.2	Measure the bio medical recorders such as ECG, Blood pressure, etc.
D652.3	Working principles of operations of pacemaker
D652.4	Learn about patient safety
D652.5	Working principle of operation of various imaging techniques and develop the mini projects with report.

EED652 BIO MEDICAL INSTRUMENTATION PRACTICAL

List of Experiments

1   Construction and Testing of Differential amplifier

2   Construction and Testing of Instrumentation amplifier

3   Measurement of pH of given solution

4   Measurement of Blood pressure

5   Measurement of ECG waveform

6   Construction and verification of pacemaker circuit

7   Construction and testing of high gain amplifier

8   Measurement of Body and Skin temperature

9   Study, handle and use the following Instruments/Equipments:

   a.   Cardiac monitor.

   b.   ECG stimulator.

   c.   Muscle stimulator.

   d.   Vascular Doppler recorder.

   e.   Pressure plethysmograph.

   f.   Skin sympathetic response meter.

10   Mini Project

The mini project is activity based and it may be given to group of maximum of six students for hands on experience and to create scientific temper.

CONTINUOUS INTERNAL ASSESSMENT

The Internal Assessment mark for a total of 25 marks which are to be distributed as follows:

a) Attendance	:	05 Marks
(Award of marks same as theory courses)		
b) Procedure/ observation and tabulation/ Other Practical related Work	:	05 Marks
c) Tests	:	10 Marks
d) Student Centered Learning (SCL) work sheet	:	05 Marks

TOTAL		25 Marks

LEARNING WEBSITES

1. https://www.sciencedirect.com/topics/engineering/biomedical instrumentation

2. https://www.eecs.umich.edu/courses/bme458/download/bme458_notes1.pdf

3. https://www.electrical4u.com/introduction-to-biomedical-instrumentation/

4. https://www.slideshare.net/PrincyRandhawa/biomedical-instrumentation-60215990

5. https://en.wikipedia.org/wiki/Bioinstrumentation

CO-POs & PSOs MAPPING MATRIX

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
D652.1	3	3	3	3	3	3	3	3	3	3
D652.2	3	3	3	3	3	3	3	3	3	3
D652.3	3	3	3	3	3	3	3	3	3	3
D652.4	3	3	3	3	3	3	3	3	3	3
D652.5	3	3	3	3	3	3	3	3	3	3
Total	15	15	15	15	15	15	15	15	15	15
Correlation level	3	3	3	3	3	3	3	3	3	3

Correlation level 1 – Slight (Low)

Correlation level 2 – Moderate (Medium)

Correlation level 3 – Substantial (High)

EED652 BIO MEDICAL INSTRUMENTATION PRACTICAL

MODEL QUESTION PAPER

Si.No	List of Experiments	CO	PO
1	Construction and Testing of Differential amplifier	D652.1	PO1,PO2,PO3,PO4, PO5,PO6,PO7
2	Construction and Testing of Instrumentation amplifier	D652.1	PO1,PO2,PO3,PO4, PO5,PO6,PO7
3	Measurement of pH of given solution	D652.2	PO1,PO2,PO3,PO4, PO5,PO6,PO7
4	Measurement of Blood pressure	D652.2	PO1,PO2,PO3,PO4, PO5,PO6,PO7
5	Measurement of ECG waveform	D652.2	PO1,PO2,PO3,PO4, PO5,PO6,PO7
6	Construction and verification of pacemaker circuit	D652.3	PO1,PO2,PO3,PO4, PO5,PO6,PO7
7	Construction and testing of high gain amplifier	D652.1	PO1,PO2,PO3,PO4, PO5,PO6,PO7
8	Measurement of Body and Skin temperature	D652.4	PO1,PO2,PO3,PO4, PO5,PO6,PO7
9	Study, handle and use the following Instruments/Equipments: a. Cardiac monitor. b. ECG stimulator. c. Muscle stimulator. d. Vascular Doppler recorder. e. Pressure plethysmograph. f. Skin sympathetic response meter.	D652.5	PO1,PO2,PO3,PO4, PO5,PO6,PO7
10	**Mini Project**	**D652.5**	**PO1,PO2,PO3,PO4, PO5,PO6,PO7**

EED653 COMPUTER HARDWARE AND NETWORKS PRACTICAL

TEACHING AND SCHEME OF EXAMINATION:

Number of Weeks per Semester: 16 weeks

Course	Instruction		Examination			
	Hrs / Week	Hrs/ Semester	Marks			Duration
			Internal Assessment	Autonomous Examination	Total	
Computer Hardware and Networks Practical	6	96	25	100*	100	3 Hrs

*Examinations will be conducted for 100 marks and it will be reduced to 75 marks.

DETAILED ALLOCATION OF MARKS:

S.NO	NAME OF THE ACTIVITY	MARKS
1	Procedure Writing – One Question from PART – A	15
2	Procedure Writing – One Question from PART – B	20
3	Executing Exercise (PART – A)	20
4	Executing Exercise (PART – B)	20
5	Result (PART – A)	5
6	Result (PART – B)	5
7	Viva – Voce	5
8	Mini Project	10
	TOTAL	**100**

Mini Project Evaluation (10 marks)

Breakup Details

1	Project Description	05
2	Project Demo	05
	Total	**10**

COURSE DESCRIPTION:

The course aims at making the students familiar with various parts of computers and laptops and how to assemble them and the different types of peripherals desired. In addition, the course will provide the students with necessary knowledge and skills in computer and laptop software installation and maintenance and to make him diagnose the software faults. This course also gives the knowledge and competency to diagnose the problems in computer hardware and peripherals and also gives the knowledge for trouble shooting for systematic repair and maintenance of computers and laptops.

EQUIPMENTS REQUIRED: (For a Batch of 30 Students)

Hardware Requirements :	Quantity required :
Desktop Systems	30 Nos
Hard disk drive	06 Nos
DVD, Blu-ray Drive	06 Nos
Blank DVD , Blu-ray Disc	20 Nos
Head cleaning CD	--
Dot matrix Printer	02 Nos
Laser Printer	02 Nos
Server	01 No
Mobile phones	06 Nos
Network Requirements:	
Crimping Tool	06 Nos
Screwdriver set	06 Nos
Network Cables	--
Modem	02 Nos
Hub	01 No
Router	01 No
Switch	02 Nos
Software Requirements:	
Windows OS	--
Windows Server 2008 / 2013 and LINUX.	--
Antivirus Software.	--
DVD and Blu-Ray Burning S/W.	--
Mobile Phone Flashing S/W	--

OBJECTIVES:

On completion of the following exercises, the students must be able to

- ➢ Know the various indicators, switches and connectors used in Computers.
- ➢ Familiarize the layout of SMPS, mother board and various Disk Drives.
- ➢ Configure Bios set up options.
- ➢ Install various secondary storage devices with memory partition and formatting.
- ➢ Know the various types of printer installation and to handle the troubleshooting
- ➢ Assemble PC system and checking the working condition.
- ➢ Installation of Dual OS in a system.
- ➢ Identify the problems in Computer systems, software installation and rectification
- ➢ Assembling and disassembling of Laptop to identify the parts and to install OS and configure it.
- ➢ Enable to perform different cabling in a network.
- ➢ Configure Internet connection and use utilities to debug the network issues.
- ➢ Configure router for any topology
- ➢ Install and configure Windows 2008 / 2013 Server
- ➢ Design Windows server Active directory Services.
- ➢ Install and configure server hardware devices.

COURSE OUTCOMES:

Course	EED653 COMPUTER HARDWARE AND NETWORKS PRACTICAL
After successful completion of this course, the students should be able to	
D653.1	Know the various indicators, switches and connectors used in Computers
D653.2	Install various secondary storage devices with memory partition and formatting
D653.3	Identify the problems in Computer systems, software installation and rectification
D653.4	Assembling and disassembling of Laptop to identify the parts and to install OS and configure it
D653.5	Design Windows server Active directory Services and develop the mini projects with report.

EED653 COMPUTER HARDWARE AND NETWORKS PRACTICAL

Sl.No　　　　　　　　　　**List of Experiments**

1　Identification of system layout (Study Exercise)

　　a). Front panel indicators & switches and front side & rear side connectors.

　　b). Familiarize the computer system Layout: Marking positions of

　　SMPS, Mother Board, HDD, and DVD and add on cards.

　　c). Configure bios setup program and troubleshoot the typical problems using BIOS utility.

2　HARD DISK

　　a) Install Hard Disk.

　　b) Configure CMOS-Setup.

　　c) Partition and Format Hard Disk.

　　d) Identify Master /Slave / IDE Devices.

　　e) Practice with scan disk, disk cleanup, disk De-fragmentation, Virus Detecting and Rectifying Software.

3　a) Install and Configure a DVD Writer & Blu-ray Disc Writer.

　　b) Recording a Blank DVD & Blu-ray Disc.

4　Assemble a system with add on cards and check the working condition of the system and install Dual OS.

5　Identification of mobile phone components (Study Exercise)

　　a) Basic mobile phone components.

　　b) Familiarizing the basic circuit board components: Marking position of different IC and Switches in the Network and Power sections of the PCB.

6　Flashing, Unlocking and Formatting memory cards in Mobile phones.

7　Do the following cabling works in a network

　　a) Cable Crimpling

　　b) Standard Cabling

　　c) Cross Cabling

　　d) I/O Connector Crimping

　　e) Testing the Crimped cable using a Cable tester

8　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 Net stat utilities to Debug the Network issues.

9　Transfer files between systems in LAN using FTP Configuration. Install a printer in LAN and share it in the network

10　Installation of Windows 2008 / 2013 Server.

11	Installation and configuration of DHCP Server.
12	Installation and configuration of Mail Server.
13	a) Installation of Red Hat Linux using Graphical mode.
	b) Installation of Red Hat Linux using VMware.
14	a) Creating a user in Linux Server and assigning rights.
	b) Configuring and troubleshooting.
15	a) Configuring and troubleshooting of /etc/grub.conf
	b) Configuring and trouble shooting of /etc/passwd
16	Mini Project

The mini project is activity based and it may be given to group of maximum of six students for hands on experience and to create scientific temper

CONTINUOUS INTERNAL ASSESSMENT

The Internal Assessment mark for a total of 25 marks which are to be distributed as follows:

a) Attendance (Award of marks same as theory courses)	:	05 Marks
b) Procedure/ observation and tabulation/ Other Practical related Work	:	05 Marks
c) Tests	:	10 Marks
d) Student Centered Learning (SCL) work sheet	:	05 Marks

            TOTAL   25 Marks

LEARNING WEBSITES

1. https://www.sarvgyan.com/courses/computer-hardware-networking

2. https://www.jetking.com/blog/guide-for-computer-hardware-and-networking-courses/

3. http://www.indiaeducation.net/careercenter/computers-it/hardwareandnetworking/

4. https://en.wikipedia.org/wiki/Networking_hardware

5. https://www.educba.com/computer-hardware-vs-networking/

CO-POs & PSOs MAPPING MATRIX

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
D653.1	3	3	3	3	3	3	3	3	3	3
D653.2	3	3	3	3	3	3	3	3	3	3
D653.3	3	3	3	3	3	3	3	3	3	3
D653.4	3	3	3	3	3	3	3	3	3	3
D653.5	3	3	3	3	3	3	3	3	3	3
Total	15	15	15	15	15	15	15	15	15	15
Correlation level	3	3	3	3	3	3	3	3	3	3

Correlation level 1 – Slight (Low)
Correlation level 2 – Moderate (Medium)
Correlation level 3 – Substantial (High)

EED653 COMPUTER HARDWARE AND NETWORKS PRACTICAL

MODEL QUESTION PAPER

Si.No	List of Experiments	CO	PO
1	Identification of system layout (Study Exercise) a). Front panel indicators & switches and front side & rear side connectors. b). Familiarize the computer system Layout: Marking positions of SMPS, Mother Board, HDD, and DVD and add on cards. c). Configure bios setup program and troubleshoot the typical problems using BIOS utility.	D653.1	PO1,PO2,PO3,PO4, PO5,PO6,PO7
2	HARD DISK a). Install Hard Disk. b). Configure CMOS-Setup. c). Partition and Format Hard Disk. d). Identify Master /Slave / IDE Devices. e). Practice with scan disk, disk cleanup, disk De-fragmentation, Virus Detecting and Rectifying Software.	D653.1	PO1,PO2,PO3,PO4, PO5,PO6,PO7
3	a). Install and Configure a DVD Writer & Blu-ray Disc Writer. b). Recording a Blank DVD & Blu-ray Disc.	D653.4	PO1,PO2,PO3,PO4, PO5,PO6,PO7
4	Assemble a system with add on cards and check the working condition of the system and install Dual OS.	D653.2	PO1,PO2,PO3,PO4, PO5,PO6,PO7
5	Identification of mobile phone components (Study Exercise) a). Basic mobile phone components. b). Familiarizing the basic circuit Autonomous components: Marking position of different IC and Switches in the Network and Power sections of the PCB.	D653.2	PO1,PO2,PO3,PO4, PO5,PO6,PO7
6	Flashing, Unlocking and Formatting memory cards in Mobile phones.	D653.3	PO1,PO2,PO3,PO4, PO5,PO6,PO7
7	Do the following cabling works in a network a). Cable Crimpling b). Standard Cabling c). Cross Cabling d). I/O Connector Crimping e). Testing the Crimped cable using a Cable tester	D653.3	PO1,PO2,PO3,PO4, PO5,PO6,PO7
8	a). Configure Host IP, Subnet Mask and Default Gateway in a system in LAN(TCP/IP Configuration). b). Configure Internet connection and use	D653.4	PO1,PO2,PO3,PO4, PO5,PO6,PO7

	IPCONFIG, PING / Tracert and Net stat utilities to Debug the Network issues.		
9	Transfer files between systems in LAN using FTP Configuration. Install a printer in LAN and share it in the network	D653.4	PO1,PO2,PO3,PO4, PO5,PO6,PO7
10	Installation of Windows 2008 / 2013 Server.	D653.5	PO1,PO2,PO3,PO4, PO5,PO6,PO7
11	Installation and configuration of DHCP Server.	D653.5	PO1,PO2,PO3,PO4, PO5,PO6,PO7
12	Installation and configuration of Mail Server.	D653.4	PO1,PO2,PO3,PO4, PO5,PO6,PO7
13	a) Installation of Red Hat Linux using Graphical mode. b) Installation of Red Hat Linux using VMware.	D653.4	PO1,PO2,PO3,PO4, PO5,PO6,PO7
14	a) Creating a user in Linux Server and assigning rights. b) Configuring and troubleshooting	D653.5	PO1,PO2,PO3,PO4, PO5,PO6,PO7
15	a) Configuring and troubleshooting of / etc / grub .conf b) Configuring and trouble shooting of /etc/password	D653.5	PO1,PO2,PO3,PO4, PO5,PO6,PO7
16	**Mini Project**	**D653.5**	**PO1,PO2,PO3,PO4, PO5,PO6,PO7**

EED660 PROJECT WORK & INTERNSHIP

TEACHING AND SCHEME OF EXAMINATION:

No. of weeks per semester: 16 weeks

Course	Instruction		Examination			
	Hrs/Week	Hrs / Semester	Marks		Total	Duration
			Internal Assessment	Autonomous Examination		
Project Work & Internship	6	96	25	100*	100	3 Hrs

*Examination will be conducted for 100 marks and it will be reduced 75 marks.

Minimum Marks for Pass is 50 out of which minimum 50 marks should be obtained out of 100 marks in the Autonomous Examination alone.

OBJECTIVES

- The project work and internship is aimed to assemble test a photo type model of any one item/gadget.
- Real time application problems if any may be identified from any industry and may be chosen.
- The knowledge and the skill so far acquired may be made use of.
- The team spirit may be motivated.
- The entrepreneurship ideas may be motivated by conducting a career guidance programme.
- Learn and understand the gap between the technical knowledge acquired through curriculum and the actual industrial need through internship and to compensate it by acquiring additional knowledge as required

COURSE OUTCOMES:

Course	EED660 PROJECT WORK & INTERNSHIP
After successful completion of this course, the students should be able to	
D660.1	Identify Real time application problems and apply the acquired knowledge and skills to solve it.
D660.2	Assemble and test a proto type model.
D660.3	Understand the team spirit and get motivated.
D660.4	Get the entrepreneurship ideas through career guidance programme.
D660.5	Learn and understand the gap between the technological knowledge acquired through curriculum and the actual industrial needs through internship and to compensate it by acquiring additional knowledge as required.

CONTINUOUS INTERNAL ASSESSMENT

The internal assessment should be calculated based on the review of the progress of the work done by the student periodically as follows.

Detail of assessment	Period of assessment	Max. Marks
First Review	6thweek	10
Second Review	12th week	10
Attendance	Entire semester	5
Total		**25**

EVALUATION FOR AUTONOMOUS EXAMINATION

Details of Mark allocation	Max Marks
Demonstration/Presentation	25
Report	25
Viva Voce	30
Internship report	20
Total	**100**

****

EED610 DISTRIBUTION AND UTILIZATION

MODEL QUESTION PAPER

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

PART-A		(10 X 3 = 30Marks)				
Note: Answer all questions. All questions carry equal marks						
S. No	**Questions**		**Unit**	**Bloom's Level**	**CO**	**PO**
1	What are the two types of AC Distribution System?		I	R	D610.1	PO1, PO2, PO3
2	Draw any three symbols used in substation		I	U	D610.1	PO1, PO2, PO3
3	Give two advantages of Group Drive.		II	R	D610.2	PO1, PO2, PO3
4	Define Braking		II	R	D610.2	PO1, PO2, PO3
5	What are the types of Electric Traction Services?		III	R	D610.3	PO1, PO2, PO3
6	What is Regenerating Braking?		III	U	D610.3	PO1, PO2, PO3
7	What are the purposes of Flood Lighting?		IV	R	D610.4	PO1, PO2, PO3
8	Define Stroboscopic Effect		IV	R	D610.4	PO1, PO2, PO3
9	What are the types of Induction Furnaces?		V	R	D610.5	PO1, PO2, PO3
10	What are the Electric Welding Equipments?		V	U	D610.5	PO1, PO2, PO3

PART-B		(5 X 14 = 70 Marks)				
Note: Answer all questions choosing A or B in each question. All questions carry equal marks						
S. No	**Questions**	**Marks**	**Unit**	**Bloom's Level**	**CO**	**PO**
11	(a) (i)Discuss the different types of Bus Bar arrangements	07	I	U	D610.1	PO1,PO2,PO3
	(ii) Explain various connection schemes of Distribution System	07	I	U	D610.1	PO1,PO2,PO3
	(OR)					
	(b) (i) Explain the major Equipments used in Substation	07	I	U	D610.1	PO1,PO2,PO3
	(ii) Explain about AC Distribution calculation considering the Power Factor referred to receiving end Voltage	07	I	U	D610.1	PO1,PO2,PO3
12	(a) (i) Explain the different types of Electric Drives used in Industrial Loads	07	II	U	D610.2	PO1,PO2,PO3
	(ii) Explain the factors governing the selection of Motors	07	II	U	D610.2	PO1,PO2,PO3
	(OR)					
	(b) (i) Explain Plugging and how it is carried out in a 3-Pahse Induction Motor	07	II	U	D610.2	PO1,PO2,PO3
	(ii) Explain how dynamic braking is applied to DC Shunt Motor	07	II	U	D610.2	PO1,PO2,PO3
13	(a) (i) Explain different current collectors usedin Electric Traction	07	III	U	D610.3	PO1,PO2,PO3

	(ii) Draw the typical Speed Time Curve and explain each constituent of it	07	III	U	D610.3	PO1,PO2,PO3
	(OR)					
	(b) (i) Explain in detail Series - Parallel method of starting of Traction Motors	07	III	U	D610.3	PO1,PO2,PO3
	(ii) Explain in detail Bridge Transition Controller	07	III	U	D610.3	PO1,PO2,PO3
14	(a) (i) State and explain the Inverse Square Law of Illumination	07	IV	U	D610.4	PO1,PO2,PO3
	(ii) Explain with a sketch the working of High Pressure Mercury Vapour Lamp	07	IV	U	D610.4	PO1,PO2,PO3
	(OR)					
	(b) (i) Explain with a sketch the working of Sodium Vapour Lamp	07	IV	U	D610.4	PO1,PO2,PO3
	(ii) Explain the working principle of Induction Lamp	07	IV	U	D610.4	PO1,PO2,PO3
15	(a) (i) Draw and explain Direct Resistance Heating	07	V	U	D610.5	PO1,PO2,PO3
	(ii) With a neat sketch explain the Function of Indirect Arc Furnace	07	V	U	D610.5	PO1,PO2,PO3
	(OR)					
	(b) (i) Draw the diagram and explain Atomic Hydrogen Arc Welding	07	V	U	D610.5	PO1,PO2,PO3
	(ii) Explain LASER Beam Welding with a sketch	07	V	U	D610.5	PO1,PO2,PO3

QUESTION PAPER SETTING

The question paper setters are requested to follow the Revised Bloom's Taxonomy levels as Presented below:

Bloom's Taxonomy	Lower Order Thinking Skills (LOTs)	Higher Order Thinking Skills (HOTs)
Level	R-Remember, U-Understand , Ap-Apply	An-Analyze, E-Evaluate, C-Create
% to be included	90%	10%

******

EED620 ENERGY CONSERVATION AND AUDIT

MODEL QUESTION PAPER

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

PART-A (10 X 3 = 30Marks)					
Note: Answer any TEN questions. All questions carry equal marks					
S. No	Questions	Unit	Bloom's Level	CO	PO
1	What are the Energy Conservation Techniques?	I	U	D620.1	PO1, PO2,PO3
2	Explain the Energy for Sustainable Development.	I	R	D620.1	PO1, PO2,PO3
3	What are the methods of Energy Conservation in Induction Motor?	II	R	D620.2	PO1, PO2,PO3
4	Explain the Periodic maintenance of Energy Efficient Transformers.	II	R	D620.2	PO1, PO2,PO3
5	List out the Energy conservation equipment in Installation Systems.	III	R	D620.3	PO1, PO2,PO3
6	Explain Energy Conservation techniques in Electronic Regulators.	III	U	D620.3	PO1, PO2,PO3
7	Define Energy Audit &What is the need of Energy Audit?	IV	R	D620.4	PO1, PO2,PO3
8	List out the Instruments for Energy Audit.	IV	R	D620.4	PO1, PO2,PO3
9	Define Co-generation and write its Advantages.	V	R	D620.5	PO1, PO2,PO3
10	Define Tariff and write its Types.	V	R	D620.5	PO1, PO2,PO3

PART-B (5 X 14 = 70 Marks)						
Note: Answer all questions choosing A or B in each question. All questions carry equal marks						
S. No	Questions	Marks	Unit	Bloom's Level	CO	PO
11	A (i) Explain the Principle and Methods of Energy conservation.	07	I	U	D620.1	PO1, PO2,PO3
	(ii) How Energy Audit helps in Energy Conservation?	07	I	U	D620.1	PO1, PO2,PO3
	(OR)					
	B (i) What are the Relevant clauses of Energy conservation BEE and its roles MEDA and its roles?	07	I	U	D620.1	PO1, PO2,PO3
	(ii) Distinguish between Energy Conservation and Energy Audit.	07	I	R	D620.1	PO1, PO2,PO3
12	A (i) Explain the Methods of Energy Conservation in Induction Motor.	07	II	U	D620.2	PO1, PO2,PO3
	(ii)Describe the Periodic Maintenance of Induction motor.	07	II	U	D620.2	PO1, PO2,PO3
	(OR)					

	B (i) Explain the Energy Conservation Techniques in Transformer.	07	II	R	D620.2	PO1, PO2,PO3
	(ii) Describe the Energy Conservation Equipment.	07	II	U	D620.2	PO1, PO2,PO3
13	A (i) Explain the Technical Losses in Installation systems by Controlling I^2R losses.	07	III	R	D620.3	PO1, PO2,PO3
	(ii)Explain the Commercial losses in Installation Systems.	07	III	U	D620.3	PO1, PO2,PO3
	(OR)					
	B (i) Describe about Energy Conservation Equipment in Installation systems.	07	III	R	D620.3	PO1, PO2,PO3
	(ii) Explain Energy Conservation Techniques in Fans, Electronic Regulators.	07	III	U	D620.3	PO1, PO2,PO3
14	A (i) What is mean by Energy Management and its importance.	07	IV	U	D620.4	PO1, PO2,PO3
	(ii) Explain in detail Process of Energy Audit and its types.	07	IV	U	D620.4	PO1, PO2,PO3
	(OR)					
	B (i) Explain the Energy Audit Instruments in Detail.	07	IV	U	D620.4	PO1, PO2,PO3
	(ii) Draw the Energy Flow Diagram in Audit process.	07	IV	U	D620.4	PO1, PO2,PO3
15	A (i)Explain the Energy cost in Indian Scenario	07	V	U	D620.5	PO1, PO2,PO3
	(ii) Explain the Types of Co-generation on basis of sequence of Energy used.	07	V	U	D620.5	PO1, PO2,PO3
	(OR)					
	B (i) Explain the types of Tariff Structure.	07	V	U	D620.5	PO1, PO2,PO3
	(ii) Draw the Energy Audit Report Format carried out in College.	07	V	R	D620.5	PO1, PO2,PO3

QUESTION PAPER SETTING

The question paper setters are requested to follow the Revised Bloom's Taxonomy levels as Presented below:

Bloom's Taxonomy	Lower Order Thinking Skills (LOTs)	Higher Order Thinking Skills (HOTs)
Level	R-Remember, U-Understand , Ap-Apply	An-Analyze, E-Evaluate, C-Create
% to be included	90%	10%

****

EED631 POWER ELECTRONICS

MODEL QUESTION PAPER

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

PART-A (10 X 3 = 30 Marks)					
Note: Answer all questions. All questions carry equal marks					
S. No	**Questions**	**Unit**	**Bloom's Level**	**CO**	**PO**
1	Define Power Electronics and its applications	I	R	D631.1	PO1,PO2
2	What is the necessity of Pulse Transformer in a Triggering Circuit?	I	R	D631.1	PO1,PO2
3	Draw the circuit of Half Wave Controlled Converter.	II	R	D631.2	PO1,PO2
4	Write short notes on Surge Current Protection in a Converter Circuit.	II	U	D631.2	PO1,PO2
5	List the types of Chopper.	III	R	D631.3	PO1,PO2
6	Draw Half Bridge Inverter Circuit.	III	U	D631.3	PO1,PO2
7	Draw the simple circuit of Chopper Fed DC Drives.	IV	R	D631.4	PO1,PO2
8	Write short notes on PLL Control of DC Drives.	IV	R	D631.4	PO1,PO2
9	List the various methods of Speed Control of AC Motor.	V	R	D631.5	PO1,PO2
10	Write short notes on Slip Power Recovery Scheme.	V	R	D631.5	PO1,PO2

PART-B (5 X 14 = 70 Marks)					
Note: Answer all questions choosing A or B in each question. All questions carry equal marks					
S. No	**Questions**	**Marks**	**Unit**	**Bloom's Level**	**CO**	**PO**
11	A.(i) With the neat diagram and waveform explain RC Trigger Circuit.	07	I	U	D631.1	PO1, PO2, PO3
	(ii) Explain the following SCR commutation methods Class A, Class B and Class C.	07	I	U	D631.1	PO1, PO2, PO3
	(OR)					
	B .(i) With the neat diagram and clear waveform explain the operation of Ramp and Pedestal Trigger Circuit.	07	I	U	D631.1	PO1, PO2, PO3
	(ii) With the symbol, constructional diagram and characteristics explain the working of IGBT.	07	I	U	D631.1	PO1, PO2, PO3
12	A . (i) Explain with the necessary waveform and circuit the operation of Half Wave Controlled Converter with RL load.	07	II	U	D631.2	PO1, PO2, PO3
	(ii) Explain with the necessary waveform and circuit the operation of Single Phase Semi Converter with continuous and discontinuous load current.	07	II	U	D631.2	PO1, PO2, PO3
	(OR)					

	B. (i) Explain with the necessary waveform and circuit the operation of fully Controlled Bridge with RL load.	07	II	U	D631.2	PO1, PO2, PO3
	(ii) Explain Complete Converter Protection.	07	II	U	D631.2	PO1, PO2, PO3
13	A. (i) With the neat diagram and waveform explain the operation of Morgan Chopper.	07	III	U	D631.3	PO1, PO2, PO3
	(ii) With the neat diagram and necessary waveform explain the operation of Single Phase Series Inverter.	07	III	U	D631.3	PO1, PO2, PO3
	(OR)					
	B. (i) With the complete block diagram explain the working of SMPS.	07	III	U	D631.3	PO1, PO2, PO3
	(ii) With the complete block diagram explain the working of On-line UPS.	07	III	U	D631.3	PO1, PO2, PO3
14	A. (i) With the neat diagram explain four quadrant DC-DC Converter Drive using IGBT.	07	IV	U	D631.4	PO1, PO2, PO3
	(ii) With the block diagram explain the operation of Microprocessor based Closed Loop Control of DC Drive.	07	IV	U	D631.4	PO1, PO2, PO3
	(OR)					
	B. (i) With the block diagram explain the operation of PLL Control of DC Drives.	07	IV	U	D631.4	PO1, PO2, PO3
	(ii) With the neat diagram explain the operation of Single Phase Dual Converter Drive for a separately Excited Dc Motor.	07	IV	U	D631.4	PO1, PO2, PO3
15	A(i) With the neat diagram explain the operation of Single Phase Cyclo Converter with Necessary waveforms.	07	V	U	D631.5	PO1, PO2, PO3
	(ii) Explain Static Scherbius Drive using Slip Power Recovery Scheme with necessary diagrams.	07	V	U	D631.5	PO1, PO2, PO3
	(OR)					
	B.(i) With the block diagram explain the operation of Closed Loop Control of AC Drive.	07	V	R	D631.5	PO1, PO2, PO3
	(ii) Explain Variable Voltage and Variable Frequency Control of Induction Motor.	07	V	U	D631.5	PO1, PO2, PO3

QUESTION PAPER SETTING

The question paper setters are requested to follow the Revised Bloom's Taxonomy levels as Presented below:

Bloom's Taxonomy	Lower Order Thinking Skills (LOTs)	Higher Order Thinking Skills (HOTs)
Level	R-Remember, U-Understand , Ap-Apply	An-Analyze, E-Evaluate, C-Create
% to be included	90%	10%

****

EED632 BIO MEDICAL INSTRUMENTATION

MODEL QUESTION PAPER

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

PART-A	(10 X 3= 30Marks)				
Note: Answer all questions. All questions carry equal marks					
S. No	Questions	Unit	Bloom's Level	CO	PO
1	What is a micro and Skin Electrode?	I	U	D632.1	PO1, PO2, PO3
2	What is resting and Action Potential?	I	R	D632.1	PO1, PO2, PO3
3	Draw ECG Waveform.	II	R	D632.2	PO1, PO2, PO3
4	What is Pure Tone Audiometer and Speed Audiometer?	II	R	D632.2	PO1, PO2, PO3
5	What are the types of Pacemaker?	III	R	D632.3	PO1, PO2, PO3
6	Explain about Short Wave Diathermy.	III	R	D632.3	PO1, PO2, PO3
7	Explain Micro Shock and Macro Shock.	IV	R	D632.4	PO1, PO2, PO3
8	Explain the three types of Leakage Current.	IV	R	D632.4	PO1, PO2, PO3
9	State the application of Laser in Medicine.	V	R	D632.5	PO1, PO2, PO3
10	Expand NDYAG and CAT.	V	U	D632.5	PO1, PO2, PO3

PART-B	(5 X 14 = 70 Marks)					
Note: Answer all questions choosing A or B in each question. All questions carry equal marks						
S. No	Questions	Marks	Unit	Bloom's Level	CO	PO
11	A) i) With the diagram explain Indirect Measurement of Blood Pressure.	07	I	U	D632.1	PO1, PO2, PO3
	ii) Describe with neat diagram about Ultrasonic Blood Flow Meter?	07	I	U	D632.1	PO1, PO2, PO3
	(OR)					
	B) i) Explain the measurement of Blood PH.	07	I	U	D632.1	PO1, PO2, PO3
	ii) Explain impedance Pneumography with diagram.	07	I	U	D632.1	PO1, PO2, PO3
12	A) i) Describe with neat diagram about Electro cardiograph (ECG).	07	II	U	D632.2	PO1, PO2, PO3
	ii) Describe with neat diagram about Electroencephalograph (EEG).	07	II	U	D632.2	PO1, PO2, PO3
	(OR)					
	B) i) Describe with neat diagram about Electro Retino Graph (ERG).	07	II	U	D632.2	PO1, PO2, PO3
	ii) Describe with neat diagram about Basic Audiometer.	07	II	U	D632.2	PO1, PO2, PO3
13	A) i) Explain the block diagram of Heart Lung Machine.	07	III	U	D632.3	PO1, PO2, PO3
	ii) Explain the operation of AC Defibrillator with circuit diagram.	07	III	U	D632.3	PO1, PO2, PO3
	(OR)					

	B) i) Describe about the working of Endoscope with diagram.	07	III	U	D632.3	PO1, PO2, PO3
	ii) Draw and explain the block diagram of Modern Ventilator.	07	III	U	D632.3	PO1, PO2, PO3
14	A) i) With the neat diagram explain Telemedicine.	07	IV	U	D632.4	PO1, PO2, PO3
	ii) Explain physiological efforts of Electric Current.	07	IV	U	D632.4	PO1, PO2, PO3
	(OR)					
	B) i) Explain the shock hazards from Electrical Equipment.	07	IV	U	D632.4	PO1, PO2, PO3
	ii) Explain two method of Accident Prevention.	07	IV	U	D632.4	PO1, PO2, PO3
15	A) i) Explain the operation of NDYAG LASER with neat diagram.	07	V	U	D632.5	PO1, PO2, PO3
	ii) Explain the operation of an X Ray Machine with neat diagram.	07	V	U	D632.5	PO1, PO2, PO3
	(OR)					
	B) i) Discuss the principle of Angiography in detail.	07	V	U	D632.5	PO1, PO2, PO3
	ii) Explain the working of CT Scanner with its diagram.	07	V	U	D632.5	PO1, PO2, PO3

QUESTION PAPER SETTING

The question paper setters are requested to follow the Revised Bloom's Taxonomy levels as Presented below:

Bloom's Taxonomy	Lower Order Thinking Skills (LOTs)	Higher Order Thinking Skills (HOTs)
Level	R-Remember, U-Understand , Ap-Apply	An-Analyze, E-Evaluate, C-Create
% to be included	90%	10%

****

EED633 COMPUTER HARDWARE AND NETWORKS

MODEL QUESTION PAPER

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

PART-A (10 X 3 = 30Marks)					
Note: Answer all questions. All questions carry equal marks					
S. No	Questions	Unit	Bloom's Level	CO	PO
1	What are the various formats of CD-ROM?	I	U	D633.1	PO1, PO2
2	Write short notes on Flash drive?	I	R	D633.1	PO1, PO2
3	Explain DOT matrix printer in detail?	II	R	D633.2	PO1, PO2
4	What are the features of thermal printer?	II	R	D633.2	PO1, PO2
5	What Is CMOS?	III	R	D633.3	PO1, PO2
6	What Is battery booster?	III	U	D633.3	PO1, PO2
7	What are the types of topology?	IV	R	D633.4	PO1, PO2
8	What are the network types?	IV	R	D633.4	PO1, PO2
9	Write short notes on Chipset?	V	R	D633.5	PO1, PO2
10	Write short notes on MIDI?	V	U	D633.5	PO1, PO2

PART-B (5 X 14 = 70 Marks)						
Note: Answer all questions choosing A or B in each question. All questions carry equal marks						
S. No	Questions	Marks	Unit	Bloom's Level	CO	PO
11	A.i). Explain the various types of processor and compare with each other?	07	I	U	D633.1	PO1, PO2
	ii). Explain the DVD-RW; construction and working of DVD Reader / Writer.	07	I	U	D633.1	PO1, PO2
	(OR)					
	B i). What are the types of bus standard? Explain any two in detail?	07	I	U	D633.1	PO1, PO2
	ii) Explain the various CD&DVD construction – reading & writing operations	07	I	U	D633.1	PO1, PO2
12	A i). Explain the Keyboard: Signals – operation of membrane and mechanical keyboards	07	II	R	D633.2	PO1, PO2
	ii). Explain Thermal printer - Operation and Construction	07	II	U	D633.2	PO1, PO2
	(OR)					
	B. i) Explain the Dot Matrix, Laser, line printer	07	II	R	D633.2	PO1, PO2
	ii). Principles of Operation and BlockDiagram of ATX Power Supply	07	II	U	D633.2	PO1, PO2
13	A i).Define POST explain in detail about the POST Test Sequence?	07	III	R	D633.3	PO1, PO2
	ii). Explain in detail about antivirus software	07	III	U	D633.3	PO1, PO2

	(OR)					
	B i). Explain the Assembling and disassembling of different types of mobile phones	07	III	R	D633.3	PO1, PO2
	ii). State and explain the names and functions of different ICs used in mobile phones	07	III	R	D633.3	PO1, PO2
14	A i). Explain the half duplex.	07	IV	U	D633.4	PO1, PO2
	ii). Explain Features and concepts of Switches	07	IV	U	D633.4	PO1, PO2
	(OR)					
	B i). State Advantages and Disadvantages of each topology	07	IV	U	D633.4	PO1, PO2
	ii). Explain the OSI layer model in detail	07	IV	U	D633.4	PO1, PO2
15	A i). What is the Transport Layers explain it?	07	V	U	D633.5	PO1, PO2
	ii). Explain Interior Gateway Protocols	07	V	U	D633.5	PO1, PO2
	(OR)					
	B i). Explain the sub netting and supper netting	07	V	U	D633.5	PO1, PO2
	ii). Comparison between 802.3, 802.4 and 802.5	07	V	U	D633.5	PO1, PO2

QUESTION PAPER SETTING

The question paper setters are requested to follow the Revised Bloom's Taxonomy levels as Presented below:

Bloom's Taxonomy	Lower Order Thinking Skills (LOTs)	Higher Order Thinking Skills (HOTs)
Level	R-Remember, U-Understand , Ap-Apply	An-Analyze, E-Evaluate, C-Create
% to be included	90%	10%

****