CURRICULUM C-23

DEPARTMENT OF TECHNICAL EDUCATION
STATE BOARD OF TECHNICAL EDUCATION & TRAINING

DIPLOMA IN
ELECTRICAL & ELECTRONICS ENGINEERING

1. PREAMBLE

The world is constantly evolving, and so must our approach to education. Our curriculum has been designed with this in mind, with a focus on practical skills, critical thinking, and problem-solving. We believe that these skills are essential for success in both academic and professional spheres.

At the heart of our curriculum is the belief that education should be student-centered, empowering learners to take ownership of their learning and pursue their passions. We aim to create a learning environment that is safe, supportive, and nurturing, where every student has the opportunity to reach his/her full potential. We acknowledge that learning is a lifelong journey, and our curriculum is designed to provide a solid foundation for continued growth and development. We hope that our students will not only leave with a diploma but with employability and passion for learning

The State Board of Technical Education and Training, (SBTET) AP, has been offering Diploma programmes to meet the above said aspirations of the stake holders: students, parents, industries, academia, and the society at large. As such, it has been the practice of SBTET, A.P., to keep the curriculum abreast with the advances in technology through systematic and scientific analysis of current curriculum and bring out an updated revised version at regular intervals. Accordingly the SBTET, AP under the aegis of the Department of Technical Education, Andhra Pradesh in its 57th Board Meeting held on 05-02-2019 (vide item no: 18) resolved to update the Polytechnic Curriculum C-20, to be implemented with effect from the academic year 2023-24.

Analysis of Curriculum C-20 was started in the month of January-2023. Feedback was collected from all stakeholders: Students, Lecturers, Senior Lecturers, Heads of Sections and Principals for all programmes for this purpose.

A Meeting was convened on 15th February 2023, from 10:00 A.M. onwards, by Smt. C. Naga Rani, I.A.S, Director of Technical Education & Chairperson, SBTET to discuss on revamping of C-20 curriculum to meet the needs of industries and for improvement of placements.

The meeting was attended by Sri Saurab Gaur, I.A.S, Principal Secretary, Skill Development & Training, Smt. Lavanya Veni, I.A.S, Director, Employment & Training. Thirteen Representatives from Industries and 14 Academicians from Higher level institutions and Officials of ITI, Skill Development, CTE and BTET attended the workshop.

Smt. C Naga Rani, I.A.S., Commissioner of Technical Education while addressing in the workshop, the necessity of industrial training and on hand experience, emphasised that the students need to undergo to support the industries. The gaps in the Curriculum need to be fixed to make the students passionate to work in the industry in order to support economy of the country.

The committees of each branch constituted with experts from industry, higher level Institutions and faculty of Polytechnics are informed to study the possibility of incorporating the following while preparing the curriculum so as to improve employability.

- IOT for all branches
- Theoretical & Practical subjects 50 : 50 Ratio
- Industry 4.0 concepts

- 5G Technology
- Critical Thinking (Quantitative Aptitude, Data Interpretation, Quantitative reasoning etc) to face the written tests conducted by the industries during placements.
- Internships after 1st Year, 3rd Sem (2 to 3 weeks)

A series of workshops with subject experts followed in the subsequent weeks for thorough perusal and critique of draft curricula; and the suggestions thus received from Industrialists and academia have been recorded, validated by another set of experienced subject teachers from the Department of Technical education for incorporation into the Curriculum C-23.

Finally, the draft curriculum was sent to academicians of higher-level institutions, industrial experts and NITTTR (ECV) for wetting.

The design of new Curricula for the different diploma programmes has thus been finalised with the active participation of the members of the faculty teaching in the Polytechnics of Andhra Pradesh, and duly reviewed by Expert Committee constituted of academicians and representatives from industries. Thus, the primary objective of the curriculum change is to produce employable diploma holders in the country by correlating the growing needs of the industries with relevant academic input.

The outcome-based approach as given by NBA guidelines has been followed throughout the designing of this curriculum to meet the requirements of NBA Accreditation, too.

The revised New Curriculum i.e., Curriculum–2023 (C-23) is approved by Board of Governors of SBTET for its implementation with effect from the academic year 2023-24.

2. HIGHLIGHTS OF CURRICULUM C-23:

1. Duration of course for regular Diploma is 3 years.
2. The Curriculum is prepared in Semester Pattern. However, First Year is maintained as Year-wise pattern.
3. 6 Months Industrial training has been introduced for 3 years Diploma Courses in VI semester.
4. Updated subjects/topics relevant to the industry are introduced in all courses at appropriate places.
5. The policy decisions taken at the State and Central level with regard to environmental science are implemented by including relevant topics in Chemistry. This is also in accordance with the Supreme Court guidelines issued in Sri Mehta's case.
6. Keeping in view the increased need of communication skills which is playing a major role in the success of Diploma Level students in the industries, emphasis is given for learning and acquiring listening, speaking, reading and writing skills in English. Further as emphasized in the meetings, Communication Skills lab and Life Skills lab are continuing for all the branches.
7. CAD specific to the branch has been given emphasis in the curriculum. Preparing drawings using CAD software has been given more importance.
8. Upon reviewing the existing C-20 curriculum, it is found that the theory content is found to have more weightage than the Practical content. In C-23 curriculum, more emphasis is given

to the practical content in Laboratories and Workshops, thus strengthening the practical skills. The ratio of Theory & Practicals is 50:50.

9. With increased emphasis for the student to acquire Practical skills, the course content in all the subjects is thoroughly reviewed and structured as outcome based than the conventional procedure based.
10. Curriculum of Laboratory and Workshops have been thoroughly revised based on the suggestions received from the industry and faculty, for better utilization of the equipment available in the Polytechnics. The experiments /exercises that are chosen for the practical sessions are identified to confirm to the field requirements of industry.
11. The theory and practical subjects are restructured to find room for new theory and practical subjects to meet the present the industrial needs.
12. As electric vehicles are the key technology to decarbonise road transport, it is important to learn about EV Technology. Hence, to meet the need of present technology a new subject titled "ELECTRIC VEHICLE TECHNOLOGY" is introduced in V semester.
13. A new laboratory titled "HYBRID POWER SYSTEMS LABORATORY" is introduced in IV semester in which industrial visits are made compulsory to bridge the gap between classroom learning and real-world circumstances and to aware the latest trends in industries which facilitates the students for better understanding of power system concepts.
14. To make the students effective and efficient in all aspects, three periods per week are allotted in every year/semester for STUDENT CENTRIC ACTIVITY in which student will be trained for placements or make use of library or participate in sports & games/clean & green etc.

3. ACKNOWLEDGEMENTS

The Members of the working group are grateful to Smt C. Naga Rani I.A.S., Commissioner of Technical Education & Chairman of SBTET, and Sri. Saurab Gaur,I.A.S, Principal Secretary, Skill Development & Training for their guidance and valuable inputs during process of revising, modifying and updating the Curriculum C-20 to Curriculum C-23.

It is pertinent to acknowledge the support of the following in the making of Curriculum C-23. A series of workshops in different phases were conducted by SBTET, AP, Mangaglagiri involving faculty from Polytechnics, Premier Engineering Colleges (List of Colleges) & Industries (List of Industries) to analyse the Previous C-20 Curriculum and to design C-23 Curriculum is highly appreciated and gratefully acknowledged.

The invaluable contribution of Sri K. Vijaya Bhaskar, Secretary, SBTET, Andhra Pradesh, Sri V. Padma Rao, Joint Director of Technical Education, officials of Directorate of Technical Education and the State Board of Technical Education, Andhra Pradesh and all teaching fraternity from the Polytechnics who are directly or indirectly involved in preparation of the curriculum C-23 are much appreciable and indebted.

4. RULES AND REGULATIONS OF C-23 CURRICULUM

4.1 Duration and pattern of the courses

All the Diploma programs run at various institutions are of AICTE approved 3 years or 3½ years duration of academic instruction. All the Diploma courses are run on year wise pattern in the first year, and the remaining two or two & half years are run in the semester pattern. In respect of few courses like Diploma in Bio-Medical course, the training will be in the seventh semester. Run-through system is adopted for all the Diploma Courses, subject to eligibility conditions.

4.2 Procedure for Admission into the Diploma Courses:

Selection of candidates is governed by the Rules and Regulations laid down in this regard from time to time.

a. Candidates who wish to seek admission in any of the Diploma courses will have to appear for the Common Entrance Test for admissions into Polytechnics (POLYCET) conducted by the State Board of Technical Education and Training, Andhra Pradesh, Mangalagiri. Only the candidates satisfying the following requirements will be eligible to appear for the Common Entrance Test for admissions into Polytechnics (POLYCET).
b. The candidates seeking admission should have appeared for S.S.C examination, conducted by the Board of Secondary Education, Andhra Pradesh or equivalent examination thereto, at the time of applying for the Common Entrance Test for admissions into Polytechnics (POLYCET). In case of candidates whose results of their Qualifying Examinations is pending, their selection shall be subject to production of proof of their passing the qualifying examination in one attempt or compartmentally at the time of admission.
c. Admissions are made based on the merit obtained in the Common Entrance Test (POLYCET) and the reservation rules stipulated by the Government of Andhra Pradesh from time to time.
d. For admission into the following Diploma Courses for which entry qualification is 10+2, candidates need not appear for POLYCET. A separate notification will be issued for admission into these courses.
    i) D.HMCT ii) D. Pharmacy

4.3 Medium of Instruction

The medium of instruction and examination shall be in English.

4.4 Permanent Identification Number (PIN)

A cumulative / academic record is to be maintained of the Marks secured in sessional work and end examination of each year for determining the eligibility for promotion etc., A Permanent Identification Number (PIN) will be allotted to each admitted candidate to maintain academic records.

4.5 Number of Working Days per Semester / Year:

a) The Academic year for all the Courses shall be in accordance with the Academic Calendar.
b) The Working days in a week shall be from Monday to Saturday
c) There shall be 7 periods of 50 minutes duration each on all working days.

d) The minimum number of working days for each semester / year shall be 90 / 180 days excluding examination days. If this prescribed minimum is not achieved due to any reason, special arrangements shall be made to conduct classes to complete the syllabus.

6 Eligibility (Attendance to Appear for the End Examination)

a) A candidate shall be permitted to appear for the end examination in all subjects, if he or she has attended a minimum of 75% of working days during the year/Semester.

b) Condonation of shortage of attendance in aggregate up to 10% (65% and above and below 75%) in each semester or 1st year may be granted on medical grounds.

c) A stipulated fee shall be payable towards condonation for shortage of attendance.

d) Candidates having less than 65% attendance shall be detained.

e) Students whose shortage of attendance is not condoned in any semester / year and not paid the condonation fee in time are not eligible to take their end examination of that class and their admissions shall stand cancelled. They may seek re-admission for that semester / year when offered in the next subsequent academic semester/year.

f) For INDUSTRIAL TRAINING:

i) During Industrial Training the candidate shall put in a minimum of 90% attendance.

ii) If the student fails to secure 90% attendance during industrial training, the student shall reappear for 6 months industrial training at his own expenses.

4.7 Readmission

Readmission shall be granted to eligible candidates by the respective Principal/ Regional Joint Director.

a) (i) Within 15 days after commencement of class work in any semester (Except Industrial Training).

(ii) For Industrial Training: before commencement of the Industrial training.

b) Within 30 days after commencement of class work in any year (including D. Pharmacy course or first year course in Engineering and Non-Engineering Diploma streams). Otherwise, such cases shall not be considered for readmission for that semester / year and are advised to seek readmission in the next subsequent eligible academic year.

c) The percentage of attendance of the readmitted candidates shall be calculated from the first day of beginning of the regular class work for that year / Semester, as officially announced by CTE/SBTET but not from the day on which he/she has actually reported to the class work.

4.8 Scheme of Evaluation

a) First Year

Theory Courses: Each Course carries Maximum marks of 80 with examination of 3 hours duration, along with internal assessment for Maximum of 20 marks. (Sessional marks). However, there are no minimum marks prescribed for sessionals.

Laboratory Courses: There shall be 40 Marks for internal assessment i.e. sessional marks for each practical Course with an end examination of 3 hours duration carrying 60 marks. However, there are no minimum marks prescribed for sessionals.

b) III, IV, V, VI and VII Semesters:

Theory Courses: End semester evaluation shall be of 3 hours duration and for a maximum of 80 marks.

Laboratory Courses: Each Course carry 60/30 marks of 3 hours duration 40/20 sessional marks.

4.9 Internal Assessment Scheme

a) Theory Courses: Internal assessment shall be conducted for awarding Sessional marks on the dates specified. **Three-unit tests shall be conducted for I year students and two Unit Tests for semesters.**

Internal Assessment shall be of 90 minutes duration and for a maximum of 40 marks for each test.

S. No.	Type of Assessment	Weightage Assigned
(i)	Testing of knowledge through mid-examination for year/sem as (Mid-1+Mid-2+Mid3) or (Mid-1 + Mid-2)	40
(ii)	Assignments	05
(iii)	Dynamic Learning activities : Project Work/ Seminar/Tech-fest/Group Discussion, Quizzes etc./Extra-curricular activities/NSS/NCC/ IPSGM/Cleaning & Greening of Campus etc.	05
	T O T A L	50

At least one assignment should be completed for each unit which carries 10 marks. The total assignment marks should be reduced to 5.

At least one dynamic learning activity is to be conducted which carries 10 marks. The total marks should be reduced to 5.

The total 50 marks assigned to internal assignment is to be scaled down to 20 marks.

b) Practical Courses:

(i) **Drawing Courses:**

The award of Sessional marks for internal Assessment shall be as given in the following table:

Distribution of Marks for the Internal Assessment Marks			
First Year (Total:40 Marks)		**Semesters (Total:40 Marks)**	
Max:20 Marks	Max:20 Marks	Max:20 Marks	Max:20 Marks
From the Average of THREE Unit Tests.	From the Average of Assessment of Regular Class work Exercises.	From the Average of TWO Unit Tests.	From the Average of Assessment of Regular Class work Exercises.

- For first year engineering drawing each unit test will be conducted for a duration of 2 hours with maximum marks of 40.
- (Part - A : 4 questions x 5 marks = 20 Marks ; Part –B: 2 questions x 10 marks = 20 marks).
- For the semester drawing examinations, Two Unit tests shall be conducted as per the Board End Examination Question Paper Pattern.
- All Drawing exercises are to be filed in serial order and secured for further scrutiny by a competent authority

(ii) Laboratory Courses:

(a) Student's performance in Laboratories / Workshop shall be assessed during the year/ semester of study for 40 marks in each practical Course.

(b) Evaluation for Laboratory Courses, other than Drawing courses:

i. Instruction (teaching) in laboratory courses (except for the course on Drawing) here after shall be task/competency based as delineated in the Laboratory sheets, prepared by SBTET, AP & NITTTR- ECV and posted in SBTET website.

ii. Internal assessment for Laboratory shall be done on the basis of task/s performed by the student as delineated in the laboratory sheets, prepared by SBTET, AP & NITTTR- ECV and posted in AP, SBTET website.

iii. Question paper for End semester Evaluation shall also be task/s based and shall be prepared and distributed by SBTET as done in case of theory courses be prepared as per SBTET rules in vogue.

c) Internal assessment in Labs / workshops / Survey field work etc., during the course of study shall be done and sessional marks shall be awarded by the concerned Teacher.

d) For practical examinations, except in drawing, there shall be two examiners. External examiner shall be appointed by the Principal in consultation with respective Head of Section, preferably choosing a qualified person from in the order of preference.

i) Nearby Industry

ii) Govt / Semi Govt organization like R & B, PWD, PR, Railways, BSNL, APSRTC, APSEB etc.

iii) Govt / University Engg College.

iv) HoDs from Govt. Polytechnic

Internal examiner shall be the person concerned with internal assessment as in (c) above. The end examination shall be held along with all theory papers in respect of drawing.

e) Question Paper for Practicals: Question paper should cover (the experiments / exercise prescribed to test various) skills like handling, manipulating, testing, trouble shooting, repair, assembling and dismantling etc., from more than one experiment / exercise

f) Records pertaining to internal assessment marks of both theory and practical Courses are to be maintained for official inspection.

g) In case of Diploma programs having Industrial Training, Internal Assessment and Summative Evaluation, shall be done as illustrated in the following table:

Assessment no	**Upon completion of**	**By**	**Based on**	**Max Marks**
1	12 weeks	1.The faculty concerned (Guide) and 2. Training in charge (Mentor) of the industry	Learning outcomes as given in the scheme of assessment ,for Industrial Training	120
2	22 weeks			120

3.Final summative Evaluation	24 week	1.The faculty member concerned, 2.HoD concerned and 3.An external examiner	1.Demonstration of any one of the skills listed in learning outcomes	30
			2.Training Report	20
			3.Viva Voce	10
			TOTAL	**300**

h) Each staff member including Head of Section shall be assigned a batch of students 10 to 15 for making assessment during industrial training.

GUIDELINES FOR INDUSTRIAL TRAINING OF DIPLOMA IN ELECTRICAL AND ELECTRONICS ENGINEERING PROGRAMME:

1. Duration of the training: 6 months (24 weeks).
2. Eligibility: As per SBTET norms
3. Training Area: Students can be trained in APGENCO/APTRANSCO/APDISCOM/Captive Power plants/Wind power plants,/Solar power plants/Milk factories/Railways/Roadways/Communication sectors/Television sectors/Public and private Organizations or industries or companies etc., related to electrical & electronics fields.
4. The Industrial Training shall carry 300 marks and pass marks is 50% in assessment at industry (first and second assessment put together) and also 50% in final summative assessment at institution level.
5. Formative assessment at industry level shall be carried out by the representative of the industry, where the student is undergoing training and the faculty from the concerned section in the institution.
6. If the student fails to secure 50% marks in industrial assessments put together, the student should reappear for 6 months industrial training at his/her own expenses.
7. If the student fails to secure 50% marks in final summative assessment at institution level, the student should reappear for final summative assessment in the subsequent board examination.
8. Final Summative assessment at institution level is done by a committee including **1. Head of the section (of concerned discipline ONLY), 2. External examiner from an industry and 3.**

Faculty member who assessed he student during industrial training as member.

9. During Industrial Training the candidate shall put a minimum of 90% attendance.
10. If the student fails to secure 90% attendance during industrial training, the student should reappear for 6 months industrial training at his/her own expenses.

4.10 Minimum Pass Marks

a) Theory Examination:

For passing a theory Course, a candidate has to secure a minimum of 35% in end examination and a combined minimum of 35% of both Sessional and end examination marks put together.

b) Practical Examination:

For passing a practical Course, a candidate has to secure a minimum of 50% in end examination and a combined minimum of 50% of both sessional and practical end examination marks put together. In case of D.C.C.P., the pass mark for Typewriting and Shorthand is 45% in the end examination. There are no sessional marks for typewriting and Shorthand Courses of D.C.C.P course.

C) Industrial Training:

I. Monitoring: Similar to project work each teacher may be assigned a batch of 10-15 students irrespective of the placement of the students to facilitate effective monitoring of students learning during industrial training.
II. Assessment: The Industrial training shall carry 300 marks and pass marks is 50% in assessments at industry (first and second assessment) and final summative assessment at institution level put together i.e. 150 marks out of 300 marks. And also student has to secure 50% marks in final summative assessment at institution level.

4.11. Provision for Improvement

Improvement is allowed only after he / she has completed all the courses from First Year to Final semester of the Diploma.

a) Improvement is allowed in any 4 (Four) Courses of the Diploma.
b) The student can avail of this improvement chance **ONLY ONCE**, that too within the succeeding two examinations after the completion of Diploma. However, the duration including Improvement examination shall not exceed **FIVE** years from the year of first admission.
c) No improvement is allowed in Practical / Lab Courses or Project work or Industrial Training assessment. However, improvement in drawing Course(s) is allowed.
d) If improvement is not achieved, the marks obtained in the previous Examinations hold good.
e) Improvement is not allowed in respect of the candidates who are punished under Mal-practice in any Examination.

f) Examination fee for improvement shall be paid as per the notification issued by State Board of Technical Education and Training from time to time.

g) All the candidates who wish to appear for improvement of performance shall deposit the original Marks Memos of all the years / Semesters and also original Diploma Certificate to the Board. If there is improvement in performance of the current examination, the revised Memorandum of marks and Original Diploma Certificate will be issued, else the submitted originals will be returned.

4.12. Rules of Promotion From 1ST YEAR TO 3rd, 4th, 5th, 6th and 7th Semesters:

A) For Diploma Courses of 3 Years duration

i. A candidate shall be permitted to appear for first year examination provided he / she puts in 75% attendance (which can be condoned on Medical grounds up to 10%) i.e. attendance after condonation on Medical grounds should not be less than 65% and pay the examination fee.

ii. A candidate shall be promoted to 3rd semester if he/she puts the required percentage of attendance in the first year and pays the examination fee. A candidate who could not pay the first year examination fee has to pay the promotion fee as prescribed by State Board of Technical Education and Training, AP from time to time before commencement of 3rd semester.

iii. A candidate shall be promoted to 4th semester provided he/she puts the required percentage of attendance in the 3rd semester and pay the examination fee. A candidate, who could not pay the 3rd semester exam fee, has to pay the promotion fee as prescribed by State Board of Technical Education and Training AP from time to time before commencement of 4th semester.

A candidate is eligible to appear for the 4th semester examination if he/she

a) Puts the required percentage of attendance in the 4th semester
b) Should not have failed in more than four Courses in 1st year

For IVC & ITI Lateral Entry Students:

a) A candidate is eligible to appear for the 4th semester examination if he/she puts the required percentage of attendance in the 4th semester
b) A candidate is eligible to appear for the 4th semester examination if he/she clears at least two subjects in third semester.

iv) A candidate shall be promoted to 5th semester provided he / she puts the required percentage of attendance in the 4th semester and pays the examination fee. A candidate, who could not pay the 4th semester examination fee, has to pay the promotion fee as prescribed by State Board of Technical Education and Training from time to time before commencement of 5th semester.

A candidate is eligible to appear for the 5th semester examination if he/she

a) Puts the required percentage of attendance in the 5th semester
b) Should get eligibility to appear for 4th Semester examination.
The first backlog exam in 5th semester will be conducted only in instant/supplementary diploma examination.

For IVC& ITI Lateral Entry students:

a) Puts the required percentage of attendance in the 5th semester

v) A candidate shall be sent to Industrial training provided he/she puts in the required percentage of attendance in the 4th semester and pay the examination fee/ promotion fee as prescribed by SBTET.

A candidate is eligible to appear for Industrial Training assessment (Seminar/Viva-voce)

a) Puts the required percentage of attendance, i.e., 90% in 6th semester Industrial Training

For IVC & ITI Lateral Entry students:

a) Puts the required percentage of attendance, ie., 90% in 6th semester Industrial Training.
b) should get eligibility to appear for 5th Semester Examination.

B) For Diploma Courses of 3 ½ Years duration (MET/ CH/ CHPP/ CHPC/ CHOT/ TT):

i. A candidate shall be permitted to appear for 1st year examination provided he / she puts in 75% attendance (which can be condoned on Medical grounds upto 10%) i.e. attendance after condonation on Medical grounds should not be less than 65% and pay the examination fee.
ii. A candidate shall be promoted to 3rd semester if he/she puts the required percentage of attendance in the 1st year and pays the examination fee. A candidate who could not pay the 1st year examination fee has to pay the promotion fee as prescribed by State Board of Technical Education and Training from time to time before commencement of 3rd semester.
iii. A candidate shall be promoted to 4th semester provided he/she puts the required percentage of attendance in the 3rd semester and pay the examination fee. A candidate, who could not pay the 3rd semester exam fee, has to pay the promotion fee as prescribed by State Board of Technical Education and Training from time to time before commencement of 4th semester.
A candidate is eligible to appear for the 4th semester exam if he/she

a). Puts the required percentage of attendance in the 4th semester

b). Should not have failed in more than Four backlog Courses of 1st year.

For IVC & ITI Lateral Entry students:

a) Puts the required percentage of attendance in the 4th semester

iv. A candidate shall be promoted to 5th semester industrial training provided he / she puts the required percentage of attendance in the 4th semester and pays the examination fee. A candidate, who could not pay the 4th semester examination fee, has to pay the promotion fee as prescribed by State Board of Technical Education and Training from time to time before commencement of 5th semester.

v. Promotion from 5th to 6th semester is automatic (i.e., from 1st spell of Industrial Training to 2nd spell) provided he/she puts the required percentage of attendance, which in this case ie.,90 % of attendance and attends for the VIVA-VOCE examination at the end of training.

vi. A candidate shall be promoted to 7th semester provided he / she puts the required percentage of attendance in the 6th semester and pays the examination fee. A candidate, who could not pay the 6th semester examination fee, has to pay the promotion fee as prescribed by State Board of Technical Education and Training from time to time before commencement of 7th semester.

vii. A candidate shall be promoted to 7th semester of the course provided he/she has successfully completed both the spells of Industrial Training.

A candidate is eligible to appear for 7th semester examination if he/she

a) Puts in the required percentage of attendance in the 7th semester

b) Should get eligibility to appear for 4th semester Examination.

For IVC & ITI Lateral Entry students:

a) Puts in the required percentage of attendance in the 7th semester

b) Should not have failed more than four backlog Courses of 3rd Semester

C) For Diploma Courses of 3 ½ Years duration (BM):

The same rules which are applicable for conventional courses also apply for this course. The industrial training in respect of this course is restricted to one semester (6 months) after the 6th semester (3 years) of the course.

i. A candidate shall be permitted to appear for first year examination provided he / she puts in 75% attendance (which can be condoned on Medical grounds upto 10%) i.e. attendance after condonation on Medical grounds should not be less than 65% and pay the examination fee.

ii. A candidate shall be promoted to 3rd semester if he/she puts the required percentage of attendance in the first year and pays the examination fee. A candidate who could not pay the first year examination fee has to pay the promotion fee as prescribed by State Board of Technical Education and Training from time to time before commencement of 3rd semester.

iii. A candidate shall be promoted to 4th semester provided he/she puts the required percentage of attendance in the 3rd semester and pay the examination fee. A candidate who could not pay the 3rd semester examination fee, has to pay the promotion fee as prescribed by State Board of Technical Education and Training from time to time before commencement of 4th semester.

A candidate is eligible to appear for the 4th semester examination if he/she

a) Puts in the required percentage of attendance in the 4th semester
b) Should not have failed in more than Four backlog Courses of 1st year

For IVC & ITI Lateral Entry Students:

A candidate is eligible to appear for the 4th semester examination if he/she puts the required percentage of attendance in the 4th semester

iv. A candidate shall be promoted to 5th semester provided he / she puts the required percentage of attendance in the 4th semester and pays the examination fee. A candidate, who could not pay the 4th semester examination fee, has to pay the promotion fee as prescribed by State Board of Technical Education and Training from time to time before commencement of 5th semester.

A candidate is eligible to appear for the 5th semester exam if he/she

a) Puts in the required percentage of attendance in the 5 th semester.
b) Should get eligibility to appear for 4th Semester examination.

For IVC & ITI Lateral Entry students:

a) Puts in the required percentage of attendance in the 5th semester.
b) Should not have failed in more than Four backlog Courses of 3rd Semester.

v. A candidate shall be promoted to 6th semester provided he/she puts in the required percentage of attendance in the 5th semester and pays the examination fee.

A candidate who could not pay the 5th semester examination fee, has to pay the promotion fee as prescribed by State Board of Technical Education and Training from time to time before commencement of 6th semester.

A candidate is eligible to appear for 6th semester examination

a) Puts in the required percentage of attendance in 6th semester and
b) should get eligibility to appear for 4th Semester Examination.

For IVC & ITI Lateral Entry students:

a) Puts in the required percentage of attendance in 6th semester.
b) Should get eligibility to appear for 5th Semester Examination.

vi. A candidate shall be promoted to 7th semester provided he/she puts in the required percentage of attendance in 6th semester and pay the examination fee. A candidate, who could not pay the 6th semester examination fee, has to pay the promotion fee prescribed by SBTET from time to time before commencement of the 7th semester (Industrial Training).

A candidate is eligible to appear for 7th semester Industrial Training assessment (Seminar/Viva-voce) if he/she --

a) Puts in the required percentage of attendance, ie., 90% in 7th semester Industrial Training
b) Should get eligibility to appear for 4th Semester Examination.

For IVC & ITI Lateral Entry students:

a) Puts in the required percentage of attendance, ie., 90% in 7th semester Industrial Training.
b) Should get eligibility to appear for 5th Semester Examination.

Important Note:

Seminar/Viva-voce should not be conducted for Not-Eligible Candidates, till the candidate gets eligibility. However, the record of internal Assessment for Industrial Training for 260 marks shall be maintained at Institution Level for all candidates and the data is to be uploaded only for eligible candidates. For not eligible candidates the data is to be uploaded as and when the candidate gets eligibility.

Other Details

a) In case a candidate does not successfully complete the Industrial training, he / she will have to repeat the training at his / her own cost.

b) The First spell of Industrial training shall commence 10 days after the completion of the last theory examination of 4th Semester.

c) The Second spell of Industrial training shall commence within 10 days after the completion of first spell of Industrial training.

4.13. Students Performance Evaluation

Successful candidates shall be awarded the Diploma under the following divisions of pass.

a) First Class with Distinction shall be awarded to the candidates who secure an overall aggregate of 75% marks and above.
b) First Class shall be awarded to candidates who secure overall aggregate of 60% marks and above and below 75% marks.

c) Second Class shall be awarded to candidates who secure a pass with an overall aggregate of below 60% and above 50% of marks.
   i. The Weightage of marks for various year/Semesters which are taken for computing overall aggregate shall be 25% of I year marks + 100% of 3rd and subsequent Semesters.
   ii. In respect IVC & ITI Lateral Entry candidates who are admitted directly into diploma course at the 3rd semester (i.e., second year) level the aggregate of (100%) marks secured at the 3rd and subsequent semesters of study shall be taken into consideration for determining the overall percentage of marks secured by the candidates for award of class/division.

d) Second Class shall be awarded to all students, who fail to complete the Diploma in the regular 3 years/ 3 ½ years and four subsequent examinations, from the year of first admission.

14. EXAMINATION FEE SCHEDULE:

The examination fee should be as per the notification issued by State Board of Technical Education and Training, AP from time to time.

15. Structure of Examination Question Paper:

I. Formative assessment (Internal examination)

a) For theory Courses:

Three unit tests for first year and two unit tests for semesters shall be conducted with a duration of 90 minutes for each test for maximum marks of 40. It consists of part A and Part B.

Part A contains five questions and carries 16 marks. Among these five questions first question consists of four objective items like one word or phrase answer/filling-in the blanks/true or false etc with one mark for each question. The other four questions are short answer questions and carry three marks each.

Part B carries 24 marks and consists of three questions with internal choice i.e., Either/Or type, and each question carries 8 marks.

The sum of marks of 3 tests for I year and 2 tests for semesters shall be reduced to 20 marks in each Course for arriving at final sessional marks.

b) For drawing Courses:

For I year:

Three-unit tests with duration of 90 minutes and for maximum marks of 40 marks shall be conducted for first year. It consists of part A and Part B.

Part A consists four questions for maximum marks of 16 and each question carries four marks (4×4 marks=16 marks).

Part B carries maximum marks of 24 and consists of five questions while the student shall answer any three questions out of these five questions. Each question in this part carries a maximum mark of 8, (3×8 marks=24 marks).

The sum of marks obtained in 3-unit test marks shall be reduced to 20 marks for arriving at final sessional marks. Remaining 20 marks are awarded by the Course teacher based on the student's performance during regular class exercise.

For semester:

Two-unit tests with duration of 90 minutes and for maximum marks of 40 marks shall be conducted for EE-406. It consists of part A and Part B.

Part A consists two questions for maximum marks of 20 and each question carries ten marks (2×10 marks=20 marks).

Part B carries maximum marks of 20 and consists of two questions while the student shall answer any one questions out of these two questions. Each question in this part carries a maximum mark of 20, (1×20 marks=20 marks).

The sum of marks obtained in 2-unit tests marks shall be reduced to 20 marks for arriving at final sessional marks. Remaining 20 marks are awarded by the Course teacher based on the student's performance during regular class exercise.

c) For Laboratory /workshop: 50% of total marks for the Course shall be awarded based on continuous assessment of the student in laboratory/workshop classes and the remaining 50% shall be based on the sum of the marks obtained by the students in two tests.

II. Summative assessment (End examination)

The question paper for theory examination is patterned in such a manner that the Weightage of periods/marks allotted for each of the topics for a particular Course be considered. End Examination paper is of 3 hours duration.

a) **Each theory paper consists of Section 'A' and 'B'** .
Section 'A' with Max marks of 30, contains 10 short answer questions. All questions are to be answered and each carries 3 marks, i.e., 10 x 3 = 30.

Section 'B' with Max marks of 50 contains 8 essay type questions. Only 5 questions are to be answered and each carries 10 marks. Max. Marks: 5 x 10 = 50.

Thus the total marks for theory examination shall be: 80.

b) **For Engineering Drawing Course (107) consist of section 'A' and section 'B'**.
Section 'A' with max marks of 20, contains four (4) questions. All questions in section 'A' are to be answered to the scale and each carries 5 marks, ie. 4 x 5=20.

Section 'B' with max marks of 40, contains six (6) questions. The student shall answer any four (4) questions out of the above six questions and each question carries 10 Marks, i.e., 4 x 10 = 40.

For engineering drawing course (EE-406) consists of Section A and B.

Section 'A' with max marks of 20, contains four (4) questions. All questions in section 'A' are to be answered to the scale and each carries 5 marks, ie. 4 x 5=20.

Section 'B' with max marks of 40, contains three (3) questions. The student shall answer any two (2) questions out of the above three questions and each question carries 20 Marks, i.e., 2 x 20 = 40.

c) **Practical Examinations**

For Workshop practice and Laboratory Examinations, Each student has to pick up a question paper distributed by Lottery System.

Max. Marks for an experiment / exercise	:	50
Max. Marks for VIVA-VOCE	:	10
Total Max. Marks	:	60

In case of practical examinations with 50 marks, the marks shall be distributed as

Max. Marks for an experiment / exercise	:	25
Max. Marks for VIVA-VOCE	:	05
Total Max. Marks	:	30

In case of any change in the pattern of question paper, the same shall be informed sufficiently in advance to the candidates.

d) **Note: Evaluation for Laboratory Courses, other than Drawing courses**:

I. Instruction (teaching) in laboratory courses (except for the course on Drawing) hereafter shall be task/competency based as delineated in the Laboratory sheets, prepared by SBTET, AP and posted in its website.

II. Internal assessment for Laboratory shall be done on basis of task/s performed by the student as delineated in the laboratory sheets, prepared by SBTET, AP and posted in its website.

III. Question paper for End semester Evaluation shall be prepared as per SBTET rules in vogue.

16. ISSUE OF MEMORONDUM OF MARKS

All candidates who appear for the end examination will be issued memorandum of marks without any payment of fee. However candidates who lose the original memorandum of marks have to pay the prescribed fee to the Secretary, State Board of Technical Education and Training, A.P. for each duplicate memo from time to time.

17. MAXIMUM PERIOD FOR COMPLETION OF DIPLOMA Programmes:

Maximum period for completion of the diploma courses is twice the duration of the course from the date of First admission (includes the period of detention and discontinuation of studies by student etc) failing which they will have to forfeit the claim for qualifying for the award of Diploma (They will not be permitted to appear for examinations after that date). This rule applies for all Diploma courses of 3 years and 3 ½ years of engineering and non-engineering courses.

18. ELIGIBILITY FOR AWARD OF DIPLOMA

A candidate is eligible for award of Diploma Certificate if he / she fulfil the following academic regulations.

i. He / She pursued a course of study for not less than 3 / 3 ½ academic years & not more than 6 / 7 academic years.

ii. He / she has completed all the Courses.
Students who fail to fulfil all the academic requirements for the award of the Diploma within 6 / 7 academic years from the year of admission shall forfeit their seat in the course & their seat shall stand cancelled.

<u>For IVC & ITI Lateral Entry students</u>:

i. He / She pursued a course of study for not less than 2 / 2 ½ academic years & not more than 4 / 5 academic years.

ii. He / she has completed all the Courses.

Students who fail to fulfil all the academic requirements for the award of the Diploma within 4 / 5 academic years from the year of admission shall forfeit their seat in the course & their seat shall stand cancelled.

19. ISSUE OF PHOTO COPY OF VALUED ANSWER SCRIPT, RECOUNTING& REVERIFICATION:

A) FOR ISSUE OF PHOTO COPIES OF VALUED ANSWER SCRIPTS

I. A candidate desirous of applying for Photo copy of valued answer script/s should apply within prescribed date from the date of the declaration of the result.
II. Photo copies of valued answer scripts will be issued to all theory Courses and Drawing Course(s).
III. The Photo copy of valued answer script will be dispatched to the concerned candidate's address as mentioned in the application form by post.
IV. No application can be entertained from third parties.

B) <u>FOR RE-COUNTING(RC) and RE-VERIFICATION(RV) OF THE VALUED ANSWER SCRIPT</u>

i. A candidate desirous of applying for Re-verification of valued answer script should apply within prescribed date from the date of the declaration of the result.
ii. Re-verification of valued answer script shall be done for all theory Courses and Drawing Course(s).

iii. The Re-verification committee constituted by the Secretary, SBTETAP with Course experts shall re-verify the answer scripts.

I. **RE-COUNTING**

The Officer of SBTET will verify the marks posted and recount them in the already valued answer script. The variations if any will be recorded separately, without making any changes on the already valued answer script. The marks awarded in the original answer script are maintained (hidden).

II. RE-VERIFICATION

(i) The Committee has to verify the intactness and genuineness of the answer script(s) placed for Re-verification.

(ii) Initially single member shall carry out the re-verification.

(iii) On re-verification by single member, if the variation is less than 12% of maximum marks, and if there is no change in the STATUS in the result of the candidate, such cases will not be referred to the next level ie., for 2-Tier evaluation.

(iv) On re-verification by a single member, if the variation is more than 12% of maximum marks, it will be referred to 2-Tier evaluation.

(v) If the 2-Tier evaluation confirms variation in marks as more than 12% of maximum marks, the variation is considered as follows:

a) If the candidate has already passed and obtains more than 12% of the maximum marks on Re-verification, then the variation is considered.

b) If the candidate is failed and obtains more than 12% of the maximum marks on Re-verification and secured pass marks on re-verification, then the status of the candidate changes to PASS.

c) If a candidate is failed and obtains more than 12% of the maximum marks on Re-verification and if the marks secured on re-verification are still less than the minimum pass marks, the status of the candidate remain FAIL only.

(vii) After Re-verification of valued answer script the same or change if any therein on Re-verification, will be communicated to the candidate.

(viii) On Re-verification of Valued Answer Script if the candidate's marks are revised, the fee paid by the candidate will be refunded or else the candidate has to forfeit the fee amount.

Note: No request for Photo copies/ Recounting /Re-verification of valued answer script would be entertained from a candidate who is reported to have resorted to Malpractice in that examination.

4.20. Mal Practice Cases:

If any candidate resorts to Mal Practice during examinations, he / she shall be booked and the Punishment shall be awarded as per SBTETAP rules and regulations in vogue.

4.21. Discrepancies/ Pleas:

Any Discrepancy /Plea regarding results etc., shall be represented to the SBTETAP within one month from the date of issue of results. Thereafter, no such cases shall be entertained in any manner.

4.22. Issue of Duplicate Diploma

If a candidate loses his/her original Diploma Certificate and desires a duplicate to be issued he/she should produce written evidence to this effect. He / she may obtain a duplicate from the Secretary, State Board of Technical Education and Training, A.P., on payment of prescribed fee and on production of an affidavit signed before a First Class Magistrate (Judicial) and non-traceable certificate from the Department of Police. In case of damage of original Diploma Certificate, he / she may obtain a duplicate certificate by surrendering the original damaged certificate on payment of prescribed fee to the State Board of Technical Education and Training, A.P.

In case the candidate cannot collect the original Diploma within 1 year from the date of issue of the certificate, the candidate has to pay the penalty prescribed by the SBTET AP from time to time.

4.23. Issue of Migration Certificate and Transcripts:

The Board on payment of prescribed fee will issue these certificates for the candidates who intend to prosecute Higher Studies in India or Abroad.

24.SPECIFIC CHANGES INCORPORATED IN PRESENT CURRICULUM C-23

ELECTRICAL & ELECTRONICS ENGINEERING BRANCH:

a) The number of theory subjects in each semester is limited to 05 only by restructuring the related subjects/topics and deleting repeated/higher order topics. Similarly, the relevant laboratories are restructured to find room for new laboratories.
b) The duration of engineering drawing is made 03 periods by reducing the syllabus which is not necessary for Electrical & Electronics Engineering students.
c) To boost the technical knowledge for better understanding of theory concepts the ratio of Theory & Practical is made 50:50 in this C-23 curriculum.
d) The Electrical Engineering Drawing I & II are restructured and made into one single electrical drawing subject by deleting the topics which cover in theory subjects to find space for introducing new laboratories.
e) A new laboratory EE-410 is introduced in IV semester titled with HYBRID POWER SYSTEM LABORATORY in which power systems practicals are introduced.
f) Industrial visits play a key role for technical students which help to bridge the gap between classroom learning and real-world job circumstances. Keeping this in view, the industrial visits are made compulsory in EE-410, HYBRID POWER SYSTEM LABORATORY and proper weightage is given for industrial visits.
g) A new theory subject titled ELECTRIC VEHICLE TECHNOLOGY, EE-502 is introduced in V semester in which EV technology and battery technology topics are introduced to meet the present industrial needs.
h) MATLAB practicals are introduced in MATLAB PRACTICE LABORATORY, EE-506 in V semester in which simulation practicals are incorporated.
i) SCADA practicals have been incorporated in PLC & SCADA laboratory, EE-507 in V semester to throw light on importance of SCADA in power system.

NOTE: REQUIRED SERVICES OF FACULTY FROM OTHER DISCIPLINES:

1. A faculty of Electronics & Communication Engineering shall invariably handle the following courses for the best benefit of the students.

   I. EE-304 – Electronics Engineering
   II. EE-309 – Electronics Engineering Laboratory
   III. EE-504 – Digital Electronics & Micro Controllers
   IV. EE-509 – Digital Electronics & Micro Controllers Laboratory

2. A faculty of Mechanical Engineering shall invariably handle the following course for the best benefit of the students.

   I. EE-405 – General Mechanical Engineering

3. A faculty of Computer Engineering shall invariably handle the following course for the best benefit of the students.

   I. EE-305 – Programming in C
   II. EE-310 – Programming in C Laboratory

4.The faculty of EEE to be trained in the fields of newly added topics such as SCADA, CAD, PLC and MATLAB etc., in order to enable them to perform effectively.

4.25. General

i. The Board may change or amend the academic rules and regulations or syllabi at any time and the changes or amendments made shall be applicable to all the students, for whom it is intended, with effect from the dates notified by the competent authority.
ii. All legal matters pertaining to the State Board of Technical Education and Training, AP are within the jurisdiction of Mangalagiri.
iii. In case of any ambiguity in the interpretation of the above rules, the decision of the Secretary, SBTET, A.P., Mangalagiri is final.

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C-23 Curriculum for DEEE

With Industrial training (In-house) in Semester VI

VISION
To develop Electrical & Electronics Engineering professionals competent to face the global challenges in a Edifying environment conducive to learn technical knowledge, skills blended with ethics and values, to Coordinate and serve to the society for betterment and comfortable living.

MISSION

M1	To provide a competitive learning environment, through a need based curriculum designed in collaboration with industry, conducive for high quality education emphasising on transfer of knowledge and skill development essential for the profession and the society as well.
M2	To nurture higher order leadership qualities and ethics and values in students to enable them to be leaders in their chosen professions while maintaining the highest level of ethics.
M3	To encourage the spirit of inquisition to promote innovation and entrepreneurship strengthened with life skills to sustain the stress.
M4	To foster effective interactions and networking with all the stake holders so as to work towards the growth and sustainability of the society and environment.

Programme Educational Objectives (PEOs)

On completion of the Diploma Electrical & Electronics Engineering programme, the students should have acquired the following characteristics

PEO1	An ability to apply knowledge of mathematics, Science , engineering and management principles in solving problems in the field of Electrical and Electronics Engineering.
PEO2	To be life-long learners with sprit of enquiry and zeal to acquire new knowledge and skills so as to remain contemporary and posses required professional skills.
PEO3	To enhance entrepreneurial, communication and other soft skills, which will enable them to work globally as leaders, team members and contribute to nation building for the betterment of the society.
PEO4	To make them strongly committed to the highest levels of professional ethics and focus on ensuring quality, adherence to public policy and law, safety, reliability and environmental sustainability in all their professional activities

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 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 engaging updating in the context of technological changes.

PROGRAMME SPECIFIC OUTCOMES (PSOs)

1. An ability to understand the basic concepts of Electrical & Electronics Engineering and to apply them to various areas like Wiring Installations, Lighting Schemes , Static & Rotating machinery, drawing layouts , Power System (Generation, Transmission, Distribution& utilisation), Digital electronics, power control devices, Computer programming ,managerial skills and the use SMART technologies .

2. An ability to Repair, develop and trouble shooting of Various Electrical & Electronics equipment's by using suitable tools and techniques, to design Customized applications in Electrical & Electronics Engineering at economic and efficient considerations, to develop software & hardware solutions.

3. Wisdom of social and environmental awareness along with ethical responsibility to have a successful career and to sustain passion and zeal in the field of Electrical & Electronics Engineering for real-world applications in the field of Electronics using optimal resources as an Entrepreneur.

DIPLOMA IN ELECTRICAL & ELECTRONICS ENGINEERING
SCHEME OF INSTRUCTIONS AND EXAMINATIONS
(FIRST YEAR)

Subject Code	Name of the Subject	Instruction period /week		Total Period /year	Scheme of Examination			
		Theory	Practical/ Tutorial		Duration (hours)	Sessional Marks	End Exam Marks	Total Marks
THEORY								
EE-101	English	3	-	90	3	20	80	100
EE-102	Engineering Mathematics - I	5	-	150	3	20	80	100
EE-103	Engineering Physics	3	-	90	3	20	80	100
EE-104	Engineering chemistry & Environmental studies	3	-	90	3	20	80	100
EE-105	Electrical Engineering Material Science	4	-	120	3	20	80	100
EE-106	Basic Electrical Technology	6	-	180	3	20	80	100
PRACTICAL								
EE-107	Engineering Drawing	-.	3	90	3	40	60	100
EE-108	Electrical Wiring Laboratory	-	6	180	3	40	60	100
EE-109	Physics Laboratory Practice	-	1.5	45	1½	20	30	50
EE-110	Chemistry Laboratory Practice	-	1.5	45	1½	20	30	50
EE-111	Comp. Fundamentals Laboratory	-	3	90	3	40	60	100
	TOTAL	**24**	**15**	**1170**	**30**	**280**	**720**	**1000**

NOTE: 03 periods per week are allotted to Student Centric Activity (Library, Sports & Games, Clean & Green, Preparation for placements etc)

DIPLOMA IN ELECTRICAL & ELECTRONICS ENGINEERING
SCHEME OF INSTRUCTIONS AND EXAMINATIONS
(III SEMESTER)

Subject Code	Name of the Subject	Instruction period /week		Total Period /year	Scheme of Examination			
		Theory	Practical/ Tutorial		Duration (hours)	Sessional Marks	End Exam Marks	Total Marks
THEORY								
EE-301	Engineering Mathematics - II	4	-	60	3	20	80	100
EE-302	Electrical Machines- I	5	-	75	3	20	80	100
EE-303	A.C. Circuits & Transformers	6	-	90	3	20	80	100
EE-304	Electronics Engineering	4	-	60	3	20	80	100
EE-305	Programming in ''C''	5	_	75	3	20	80	100
PRACTICAL								
EE-306	Electrical CAD Laboratory	-	3	45	3	40	60	100
EE-307	Electrical Machines – I Laboratory	-	3	45	3	40	60	100
EE-308	Circuits & Transformers Laboratory	-	3	45	3	40	60	100
EE-309	Electronics Engineering Laboratory	-	3	45	3	40	60	100
EE-310	Programming in ''C'' Laboratory	-	3	45	3	40	60	100
	TOTAL	**24**	**15**	**585**	**30**	**300**	**700**	**1000**

NOTE: 03 periods per week are allotted to Student Centric Activity (Library, Sports & Games, Clean & Green, Preparation for placements etc)

DIPLOMA IN ELECTRICAL & ELECTRONICS ENGINEERING
SCHEME OF INSTRUCTIONS AND EXAMINATIONS
(IV SEMESTER)

Subject Code	Name of the Subject	Instruction period /week		Total Period /year	Scheme of Examination			
		Theory	Practical/ Tutorial		Duration (hours)	Sessional Marks	End Exam Marks	Total Marks
THEORY								
EE-401	Electrical Installation & Estimation	4	-	60	3	20	80	100
EE-402	Electrical Machines - II	5	-	75	3	20	80	100
EE-403	Power Systems – I	4	-	60	3	20	80	100
EE-404	Power Electronics & PLC	4	-	60	3	20	80	100
EE-405	General Mechanical Engineering	4	-	60	3	20	80	100
PRACTICAL								
EE-406	Electrical Engineering Drawing	-	6	90	3	40	60	100
EE-407	Electrical Machines - II Laboratory	-	3	45	3	40	60	100
EE-408	Communications Skills Laboratory	-	3	45	3	40	60	100
EE-409	Power Electronics Laboratory	-	3	45	3	40	60	100
EE-410	Hybrid Power Systems Laboratory	-	3	45	3	40	60	100
	TOTAL	**21**	**18**	**585**	**30**	**300**	**700**	**1000**

NOTE: 03 periods per week are allotted to Student Centric Activity (Library, Sports & Games, Clean & Green, Preparation for placements etc)

DIPLOMA IN ELECTRICAL & ELECTRONICS ENGINEERING
SCHEME OF INSTRUCTIONS AND EXAMINATIONS
(V SEMESTER)

Subject Code	Name of the Subject	Instruction period /week		Total Period /year	Scheme of Examination			
		Theory	Practical/ Tutorial		Duration (hours)	Sessional Marks	End Exam Marks	Total Marks
THEORY								
EE 501	Industrial Management &Smart Technologies	4	-	60	3	20	80	100
EE-502	Electric Vehicle Technology	5	-	75	3	20	80	100
EE-503	Power Systems - II	5	-	75	3	20	80	100
EE-504	Digital Electronics & Micro Controllers	5	-	75	3	20	80	100
EE-505	Electrical Utilisation & Traction	5	-	75	3	20	80	100
PRACTICAL								
EE-506	MATLAB Practice Laboratory	-	3	45	3	40	60	100
EE-507	PLC & SCADA Laboratory	-	3	45	3	40	60	100
EE-508	Life Skills	-	3	45	3	40	60	100
EE-509	Digital Electronics & Micro Controllers Laboratory	-	3	45	3	40	60	100
EE-510	Project Work	-	3	45	3	40	60	100
	TOTAL	**24**	**15**	**585**	**30**	**300**	**700**	**1000**

NOTE: 03 periods per week are allotted to Student Centric Activity (Library, Sports & Games, Clean & Green, Preparation for placements etc)

DIPLOMA IN ELECTRIAL AND ELECTRONICS ENGINEERING
SCHEME OF INSTRUCTIONS AND EXAMINATIONS
VI SEMESTER
INDUSTRIAL TRAINING

Sl. No.	Course Title	Duration	Scheme of evaluation			Remarks
			Item	Nature	Max. Marks	
1	Industrial Training	6 months	1.First Assessment at training place/ Industry (After 12 Weeks)	Assessment of Learning outcomes by both the faculty and training Mentor of the industry	120	Pass marks is 50% in assessment at training place/industry (first and second assessment put together)
			2.Second Assessment at training place/Industry (After 20 weeks)	Assessment of Learning outcomes by both the faculty and training Mentor of the industry	120	
			Final Summative assessment at institution level after completion of training.	Training Report	20	Pass marks is 50% in final summative assessment
				Demonstration of any one of the skills listed in learning outcomes	30	
				Viva Voce	10	
TOTAL MARKS					**300**	

FIRST YEAR

DIPLOMA IN ELECTRICAL & ELECTRONICS ENGINEERING
SCHEME OF INSTRUCTIONS AND EXAMINATIONS

(FIRST YEAR) Subject Code	Name of the Subject	Instruction period /week		Total Period /year	Scheme of Examination			
		Theory	Practical/ Tutorial		Duration (hours)	Sessional Marks	End Exam Marks	Total Marks
THEORY								
EE-101	English	3	-	90	3	20	80	100
EE-102	Engineering Mathematics - I	5	-	150	3	20	80	100
EE-103	Engineering Physics	3	-	90	3	20	80	100
EE-104	Engineering chemistry & Environmental studies	3	-	90	3	20	80	100
EE-105	Electrical Engineering Material Science	4	-	120	3	20	80	100
EE-106	Basic Electrical Technology	6	-	180	3	20	80	100
PRACTICAL								
EE-107	Engineering Drawing	-.	3	90	3	40	60	100
EE-108	Electrical Wiring Laboratory	-	6	180	3	40	60	100
EE-109	Physics Laboratory Practice	-	1.5	45	1½	20	30	50
EE-110	Chemistry Laboratory Practice	-	1.5	45	1½	20	30	50
EE-111	Comp. Fundamentals Laboratory	-	3	90	3	40	60	100
	TOTAL	**24**	**15**	**1170**	**30**	**280**	**720**	**1000**

NOTE: 03 periods per week are allotted to Student Centric Activity (Library, Sports & Games, Clean & Green, Preparation for placements etc)

ENGLISH
(COMMON)

Course Code	Course Title	No. of Periods/Week	Total No. of Periods	Marks for FA	Marks for SA
EE-101	English	3	90	20	80

S. No.	Unit Title	No of Periods	COs Mapped
1	English for Employability	8	CO1, CO2, CO3, CO4,CO5
2	Living in Harmony	8	CO1, CO2, CO3, CO4,CO5
3	Connect with Care	8	CO1, CO2, CO3, CO4, CO5
4	Humour for Happiness	8	CO1, CO2, CO3, CO4, CO5
5	Never Ever Give Up!	8	CO1, CO2, CO3, CO4, CO5
6	Preserve or Perish	9	CO1, CO2, CO3, CO4, CO5
7	The Rainbow of Diversity	8	CO1, CO2, CO3, CO4, CO5
8	New Challenges- Newer Ideas	8	CO1, CO2, CO3, CO4, CO5
9	The End Point First!	8	CO1, CO2, CO3, CO4, CO5
10	The Equal Halves	8	CO1, CO2, CO3, CO4, CO5
11	Dealing with Disaster	9	CO1, CO2, CO3, CO4, CO5
Total Periods		**90**	

Course Objectives	- To improve grammatical knowledge and enrich vocabulary.
	- To develop effective reading, writing and speaking skills.

	- To comprehend themes related to Personality, Society, Environment to exhibit Universal Human Values.

CO No.	Course Outcomes
CO1	Apply and use various grammatical rules and concepts to communicate in academic, professional and everyday situations
CO2	Use appropriate vocabulary in various contexts.
CO3	Read and comprehend different forms of academic, professional and everyday texts.
CO4	Communicate effectively in speaking and writing in academic, professional and everyday situations.
CO5	Display human values by applying the knowledge of themes related to Self, Society, Science and Environment for holistic and harmonious living through communication.

CO-PO Matrix

Course Code **Common-101**	**Course Title: English** **Number of Course Outcomes: 4**				**No. of Periods: 90**
POs	Mapped with CO No.	CO Periods Addressing PO in Column 1		Level of Mapping (1,2,3)	Remarks
		Number	Percentage		
PO1		Not directly Applicable for English course, however activities that use content from science and technology relevant to the Programme taken up by the student shall be exploited for communication in the Course.			
PO2					
PO3					
PO4					
PO5	CO5	16	18%		>50%: Level 3

PO6	CO1, CO2, CO3, CO4,	52	58%		21-50%: Level 2
PO7	CO1, CO2, CO3, CO4,CO5	22	24%		Up to 20%: Level 1

Level 3 – Strongly Mapped, Level 2- Moderately Mapped; Level 1- Slightly Mapped

Learning Outcomes

1. English for Employability

1.1. Perceive the need for improving communication in English for employability
1.2. Use adjectives and articles effectively while speaking and in writing
1.3. Write simple sentences

2. Living in Harmony

2.1. Develop positive self-esteem for harmonious relationships
2.2. Use affixation to form new words
2.3. Use prepositions and use a few phrasal verbs contextually

3. Connect with Care

3.1. Use social media with discretion
3.2. Speak about abilities and possibilities
3.3. Make requests and express obligations
3.4. Use modal verbs and main verbs in appropriate form
3.5. Write short dialogues for everyday situations

4. Humour for Happiness

4.1. Realize the importance of humour for a healthy living
4.2. Improve vocabulary related to the theme
4.3. Acquire reading and speaking skills
4.4. Frame sentences with proper Subject – Verb agreement
4.5. Understand the features of a good paragraph and learn how to gather ideas as a preliminary step for writing a good paragraph.

5. Never Ever Give Up!

5.1. Learn to deal with failures in life
5.2. Use the present tense form for various every day communicative functions such as speaking and writing about routines, professions, scientific descriptions and sports commentary
5.3. Write paragraphs with coherence and other necessary skills

6. Preserve or Perish

6.1. Understand the ecological challenges that we face today and act to save the environment.

6.2. Narrate / Report past events
6.3. Develop vocabulary related to environment
6.4. Write e-mails

7. The Rainbow of Diversity

7.1. Appraise and value other cultures for a happy living in multi-cultural workspace
7.2. Understand the usage of different types of sentences
7.3. Ask for or give directions, information, instructions
7.4. Use language to express emotions in various situations
7.5. Write letters in various real life situations

8. New Challenges – Newer Ideas

8.1. Understand the functional difference between Active Voice and Passive Voice
8.2. Use Passive Voice to speak and write in various contexts
8.3. Understand the major parts and salient features of an essay
8.4. Learn about latest innovations and get motivated

9. The End Point First!

9.1. Understand the importance of setting a goal in life
9.2. Report about what others have said both in speaking and writing
9.3. Write an essay following the structure in a cohesive and comprehensive manner
9.4. Apply the words related to Goal Setting in conversations and in life

10. The Equal Halves

10.1. Value the other genders and develop a gender-balanced view towards life
10.2. Identify the use of different conjunctions in synthesising sentences
10.3. Write various types of sentences to compare and contrast the ideas
10.4. Apply the knowledge of sentence synthesis in revising and rewriting short essays
10.5. Develop discourses in speech and writing

11. Dealing with Disasters

11.1. Speak and write about different kinds of disasters and the concept of disaster management
11.2. Generate vocabulary relevant to disaster management and use it in sentences
11.3. Analyze an error in a sentence and correct it
11.4. Learn and write different kinds of reports

Textbook: **'INTERACT'** (A Text book of English for I Year Engineering Diploma Courses) - by SBTET, AP

Reference Books:

Martin Hewings : *Advanced Grammar in Use,* Cambridge University Press
Murphy, Raymond : *English Grammar in Use,* Cambridge University Press
Sidney Greenbaum : *Oxford English Grammar*, Oxford University Press
Wren and Martin (Revised by N.D.V. Prasad Rao) : *English Grammar and Composition*, Blackie ELT Books, S. Chand and Co.
Sarah Freeman : *Strengthen Your Writing*, Macmillan

End Exam = 80 Marks

PART-A: 10 Questions 3 marks each =30 Marks

PART-B: 5 out of 8 are to be answered : 10 marks each =50 Marks

Unit Tests 1,2,3 @ 40 Marks each

Part A: 16 marks: One question for 4 marks + 4 questions for 3 marks each (4+12 Marks=16 Marks)

Part B: 24 marks: 3 questions for 8 marks each with internal choice. (3X8 Marks= 24 Marks)

Weightage Table : C23-COMMON-101: English									
S. No.	**Name of the Unit**	**Periods Allocated (Total 90 periods)**	**Weightage of Marks Allocated (Short + Long Answer question)**	**Weightage (Long answer questions) @10 Marks**	**Marks Wise Distribution of Weightage (Short answer questions) @3 Marks**				**CO's Mapped**
					R	**U**	**Ap**	**An**	
1	English for Employability	8	20+9	2	3+3	3			CO1,CO2, CO3, CO4, CO5
2	Living in Harmony	8							CO1, CO2, CO3, CO4, CO5
3	Connect with Care	8				3			CO1, CO2, CO3, CO4, CO5
4	Humour for Happiness	8	20+9	2					CO1, CO2, CO3, CO4, CO5
5	Never Ever Give Up!	8					3		CO1, CO2, CO3, CO4, CO5
6	Preserve or Perish	9							CO1, CO2, CO3, CO4, CO5
7	The Rainbow of Diversity	8					3		CO1, CO2, CO3, CO4, CO5
8	New Challenges - Newer Ideas	8	10+3	1			3		CO1, CO2, CO3, CO4, CO5

9	The End Point First!	8	10+3	1			3		CO1, CO2, CO3, CO4, CO5
10	The Equal Halves	8	10+3	1			3		CO1, CO2, CO3, CO4, CO5
11	Dealing with Disasters	9	10+3	1				3	CO1, CO2, CO3, CO4, CO5
Short Answer Questions			**30**		**6**	**6**	**15**	**3**	
Long Answer Questions			**80**	**8** (Integration of the cognitive skills of Understanding, Applying & Analysing)					
Total			**110**						

C23- COMMON-101: ENGLISH: END EXAM (80 Marks) **Question Paper Pattern (Division of Topics: Question wise)**			
S.No. of the Question	**Weightage of Marks**	**Language Skill / grammatical Concept of the question**	**Sub aspects & Description**
PART-A ; 10 questions X3 marks = 30 Marks			
1	**3** (6 Questions X ½ Mark)	Articles & Prepositions	a) Definite, indefinite articles b) prepositions of place, time, directions
2	**3** (6 Questions X ½ Mark)	Vocabulary	Synonyms, Antonyms, affixes, words& phrases, Phrasal Verbs, words matching with meanings, one word substitutions,
3	**3**	Helping Verbs	a) Primary helping verbs

	(6 Questions X ½ Mark)		(be/do/have) b) Modal verbs
4	**3** (3 questions 1 mark each)	Tenses	Using appropriate Verb forms
5	**3** (3 questions 1 mark each)	Voice	Conversion : Active & Passive voice
6	**3** (3 questions 1 mark each)	Adjectives	Using appropriate adjective form/ conversion : Degrees of comparison
7	**3** (3 questions 1 mark each)	Types of sentences & positive, negative sentences	Conversion from one type of sentence to the other , making negative sentence
8	**3** (3 questions 1 mark each)	Syntheses of Sentences / Conjunctions / linkers	Transformation of sentences : Simple, complex & compound sentences / use of linkers/ conjunctions
9	**3** (3 questions 1 mark each)	Direct& Indirect Speech	Conversion from Direct to Indirect & Vice versa
10	**3** (3 questions 1 mark each)	Correction of Sentences	Remaining grammar aspects (concord & usage based…etc)
PART –B ; 5 QX10 M = 50 Marks			
11	**10 Marks**	Paragraph Writing	From Units 1,2,3 (theme based- focus on importance English learning and using)

12	**10**	Giving instructions or directions	From Units 4,5,6,7 Theme based / Situation based /role play/ general topic
13	**10**	Dialogue writing	
14	**10**	Essay writing	From Units 8,9,10,11 (theme based)
15	**10**	Letter writing	Formal / informal letters
16	**10**	Report Writing	Report on Mini projects/ industrial visits / camps/ events / celebrations
17	**10** (2 questions X 5 Marks)	a) E-Mail writing b) Framing questions	a) E mail etiquette b) Wh & Yes-No questions
18	**10** (Ten questions 1 mark each)	Reading Comprehension	An unseen piece of prose with 10 questions for reading comprehension check

Model Question Paper: End Exam **C23- Common- 101**

SBTET – I Year End Examinations

C23-Common-101: ENGLISH

Time: 3 Hrs. **Max.Marks: 80**

PART-A **10X3=30 Marks**

Instructions: Answer all the questions and each question carries 3 marks. Marks will be awarded only for the desired and accurate language / grammatical expressions.

1. A) Fill in the blanks with appropriate articles:

My father sent me _____ envelope through _____ messenger and _____ cover contained a bank cheque in my favour.

B) Fill in the blanks with suitable prepositions:

My mother arranged a beautiful flower vase _____ my study table, just beside my computer,

_____ which she keeps fresh flowers every day. The vase is made _____ ceramic.

2. A) Give synonyms for the words: i) depressed ii) caricature

B) Give antonyms for the words: i) natural ii) visible

C) Add affixes to the words: i) prefer ii) proper

3. A) Fill in the blanks with suitable Primary Helping Verbs (Be/ do/ have forms):

i) All the books _____ already been sold out.

ii) She paid condonation fees as she_____ not attend the classes regularly last semester.

iii) Why _____ you not giving me reply?

B) Fill in the blanks with suitable Modal verbs based on the clue given in brackets.

i) Pratap is an ambidextrous; he _____ write with his two hands. (ability)

ii) Jyothsna _____ pay the tuition fees by tomorrow. (obligation)

iii) My grandfather _____ to ride a horse in his youth. (Past habit)

4. Fill in the blanks with suitable verb form using the base form given in the brackets.

i) Suma_____ (bring) a pup to the class yesterday.

ii) Johnny _____(play) the piano in a music band every weekend.

iii) Girija _____ (watch) a movie on TV when I visited her last Sunday.

5. Change the voice of the following:

i) My elder brother paid my exam fees yesterday.

ii) These two chapters will be taught in next month.

iii) They are constructing a new house.

6. i) Pacific is _____(big) ocean of all. (Fill in with appropriate degree of the adjective given in the bracket)

ii) No other food item is as nutritious as honey. (Change into Comparative degree)

iii) Bangalore is one of the beautiful cities of India. (Change into Positive degree)

7. i) You need two thousand rupees to buy a new pair of shoes. Write a polite expression asking your father for money.

ii) Radhika has been invited for the wedding. (Convert into a negative sentence)

iii) Our pet pigeons flew away last night. (Convert into a negative sentence)

8. i) Ramesh can't reach on time _____ he travels by a superfast train. (Fill in with suitable conjunction)

ii) Though the long bell was given, the children stayed in the classroom. (Change into a simple sentence)

iii) Get a ticket on a sleeper coach, and then you can sleep during journey. (Change into a complex sentence)

9. i) Tarun said, " Prathima, I shall return your notes tomorrow". (change into a reported speech)

ii) Arjun requested his sister Priya not to disturb him while he was studying. (change into a direct speech)

iii) Teacher said, "Students, why are you talking in the class?" (change into a reported speech)

10. Correct the following sentences:

i) These flowers are smelling sweet.

ii) Either the father or his children has arrived home early.

iii) Every bike rider should abide to the traffic rules.

PART-B **10X5=50Marks**

Instructions: a) Answer any FIVE questions and each question carries TEN marks.

b) The criterion for the award of marks is the appropriate content, quality and clarity of expression but not the length of your answer.

11. Write a paragraph in 120 words about the problems you are experiencing in speaking English and your own solutions to overcome them.

12. Write a set of instructions to create a word file and insert a Table using MS office on a computer.

13. Write a dialogue in at least eight turns between a sales person at a readymade garment showroom and you as you want to buy a readymade dress.

14. Write an essay in about 175 words on valuing opposite gender and show mutual respect.

15. Write a letter to the Municipal Commissioner about the menace of street dogs in your area.

16. Imagine that your class had visited an industry / organisation relevant to your branch of Engineering; write a report about the visit to submit to your HOD.

17. a) Write an E-mail to your cousin requesting him/her to send you the diploma study material by a courier or post.

b) Frame THREE 'wh' questions & TWO 'Yes-No' questions from the following passage.

Dolphins are intelligent animals. A dolphin's nose is on top of its head. So, it can easily breathe on the surface of the water. The skin of a dolphin has no scales. It is soft and smooth. They swim in 'pods'; a very large pod

is called a 'herd'. They are very social and help each other fight off predators. Dolphins brain has two sides. One side sleeps while the other side stays awake.

18. Read the following passage and answer the questions that follow. Your answer should be accurate, precise and limited to a word or phrase or a simple sentence.

The Indian Army is the land-based branch and the largest component of the Indian Armed Forces. The President of India is the Supreme Commander of the Indian Army, and it is commanded by the Chief of Army Staff (COAS), who is a four-star general. The primary mission of the Indian Army is to ensure national security and national unity, defending the nation from external aggression and internal threats, and maintaining peace and security within its borders. It conducts humanitarian rescue operations during natural calamities and other disturbances, like Operation Surya Hope, and can also be requisitioned by the government to cope with internal threats. It is a major component of national power alongside the Indian Navy and the Indian Air Force. The army has been involved in four wars with neighbouring Pakistan and one with China. Other major operations undertaken by the army include: Operation Vijay, Operation Meghdoot and Operation Cactus.

a) What is the largest component of Indian Armed Forces?

b) Who is the four-star general?

c) "Maintaining internal peace and security is not one of the responsibilities of Indian

Army". Is the statement True or False ?

d) What is the primary mission of the Indian Army?

e) Name the operation held by the Indian Army during natural disaster.

f) What are the other two forces mentioned in the passage?

g) If you were to join Armed forces, which wing do you prefer? State your reason in a

sentence.

h) Pick the word from the passage that would mean: 'forcefulness or violent behavior'

i) Give the antonym for the word: 'internal'

j) Suggest a suitable title for the passage in a word or phrase.

_____

C23-Common-101 :English : Bifurcation of Syllabus for UNIT TESTS 1,2,3			
Unit Test	Lessons / Chapters	Grammar / Language aspects (Topics or Short Answer questions)	Writing Skills (Topics for Long answer/ Essay Questions)

U.T 1	Chapters 1,2,3	a) articles & prepositions, b)Vocabulary: Affixes, synonyms, Antonyms, matching meanings, words & phrases, one word substitutes) c)Adjectives (degrees of comparison) d) Main& Auxiliary Verbs e) phrasal verbs/ word order	a) Theme based Paragraph (focus on LSRW skills, importance of English, Self-esteem, SWOC analysis, Social media) b) Dialogue on themes of lessons 2&3 / Dialogue on General topic / a situation c) Reading comprehension
U.T 2	Chapters 4,5,6,7	a) concord b) Tenses c) Types of sentences d) Framing questions e) words &phrases, linkers	a) Theme based paragraph (Humour for happy living, learning from failures, Environmental protection, multi- culture /global culture) b) Letter writing (formal& informal), c) instructions/ directions, E-mail writing
U.T 3	Chapters 8,9,10,11	a) Voice (active &passive) b) Speech(direct& indirect) c) Synthesis of sentences (simple, complex, compound sentences) d) Error analysis e) words &phrases, linkers	a) Theme based paragraph/ Essay writing (Technical innovations, Goal setting, gender sensitivity, dealing with disaster) b) Essay writing, Report writing c) Reading Comprehension
Unit Test Question Paper pattern	Total 40 Marks (Part A=16 Part B =24)	Short Answer questions (Part-A) Q. 1 = 4 marks	Long Answer Questions: (Part-B) Q. 6,7,8 @ 8 marks each ; Each question with Internal choice

(40 Marks)		Q. 2 to 5 = 3 Marks each Total=16 Marks	Total: 8X3 = 24 Marks

C23- COMMON-101: ENGLISH: UNIT TEST Exams 1,2,3 (40 Marks each) **Question Paper Pattern (Division of Topics: Question wise)**				
S.No. **of the Question**	**Weightage of Marks**	**Language Skill / grammatical Concept of the question**	**Sub aspects & Description**	
UNIT TEST-1 Marks : 40 ; Time 90 Mnts. (Lessons 1,2,3) :				
PART-A : 16 Marks				
S.No.	**Marks allotted**	Grammatical concept/ aspect/ skill	Sub topics / concepts	
1	**4 Marks** (8 Questions X ½ Mark)	Vocabulary	a) Affixes, b) Synonyms c) antonyms d) one word substitutes	
2	**3** (6 Questions X ½ Mark)	Articles & Prepositions	a) Definite, indefinite articles b) Prepositions of place, time direction	
3	**3** (3 questions 1 mark each)	Adjectives	a) Using appropriate forms of adjectives b) Conversion of Degrees of comparison	
4	**3** (6 questions ½ mark each)	Helping Verbs	a) Primary helping verbs (be/do/have) b)Modal verbs	
5	**3 Marks** (3 questions 1 mark each)	Phrasal verbs	Using phrasal verbs in sentences of one's own	

Part – B : 8X3 = 24 Marks				
6	**8** Marks	Paragraph question A or B (internal choice)	Theme based questions : Lesson 1 : Focus on LSRW skills, problems and solutions in using English, Importance of English, English for employability, SWOC analysis	
7	**8**	Dialogue making A or B (internal choice)	Conversation / Role play between two people : a) Dialogue on themes of lessons 2&3 b) Dialogue on General topic / a situation	
8	**8**	Reading Comprehension A or B (internal choice)	Unseen prose passages with 8 different questions (F I V E model questions+ Others)	
Unit Test -2: Marks : 40 ; Time 90 Mnts. (Lessons 4,5,6,7)				
Part – A: 16 Marks				
1	**4Marks**	Tenses	Present, Past, Future tenses : Filling in with proper verb forms using the given base form	
2	**3**	Concord	Concord: agreement between subject and verb	
3	**3**	Framing questions	Framing Wh & Yes-No questions	
4	**3**	Types of sentences	Conversion of sentences (except questions) , Using of proper linkers / discourse markers	
5	**3 Marks**	Words& Phrases , linkers	Using words& phrases, linkers in sentences of one's own	

		Part – B : 8X3 = 24 Marks		
6	**8 Marks**	Paragraph writing A or B (internal choice)	a) Themes on lessons 4/5 b) Themes based on lessons 6/7	
7	**8**	Letter Writing (internal choice : A or B)	a) Letter writing : formal b) Letter writing: Informal	
8	**8**	a) Paragraph: Tenses Reinforcement b) Email & Instructions/ directions	a) Paragraph on Routines/ past narration / Future plans b) i) E- Mail writing (formal or informal) ii) Giving instructions/ directions	
		Unit Test -3: Marks : 40 ; Time 90 Mnts. (Lessons 8,9,10,11)		
		Part – A ; 16 Marks		
1	4 Marks	Error Analysis	Find errors and make corrections	
2	3	Voice	Conversion: Active & Passive voice	
3	3	Synthesis of sentence	Conversion: Simple, complex & compound sentences	
4	3	Reported speech	Conversion: Direct & Indirect speech	
5	3	Words & phrases, linkers	Matching words with their meanings/ Using words& phrases, linkers in sentences of one's own	
		Part- B : 8X3 = 24 Marks		
6	8 Marks	Essay writing A or B (internal choice)	a) Theme based (lessons 8 / 9) b) Theme based (Lessons 10/11)	

7	8	Report writing A or B (internal choice)	a) Report on Mini projects/ industrial visits / camps/ events /exhibitions / celebrations b) themes from lessons 8 to 11 …like disaster management / technical inventions / gender equality/ goal setting	
8	8	Reading Comprehension A or B (internal choice)	Reading passages with 8 different questions (FIVE model+ others)	

Model Question Papers : Unit Tests

Unit Test-1: C23- Common-101: English

Time: 90 Mnts. **Max. Marks: 40**

Part-A **16 Marks**

Instructions: Answer all the questions and the first question carries 3 marks. Question numbers from 2 to 5 carries three marks each. The marks will be awarded only for the desired and accurate language / grammatical expressions.

1. A) Give synonyms for the words: i) abruptly ii) advantage

B) Give antonyms for the words: i) pure ii) dry

C) Add affixes for the words: i) connect ii) worth

D) Give one word substitute for the following:

i) The interactive web page that can be updated frequently by an individual or group.

ii) An ability that can be acquired by anyone through practice.

2. A) Fill in the blanks with proper Articles:

i) My cousin joined M.Tech in _____ University in Tamil Nadu.

ii) Mrs. Rekha Chatterjee is _____ MLA from the West Bengal.

iii) My father came to _____ college yesterday to pay my exam fees.

B) Fill in with appropriate prepositions:

i) What can I do _____ you , Sarat?

ii) Mr. Agarwal distributed his property _____ his two daughters.

iii) The coach was pleased _____the performance of the players.

3. a) Fill in with proper form of the adjective given in the brackets :

Burj Khalifa is one of _____(tall) buildings in the world.

b) The tiger is more ferocious than the leopard. (Change into Positive degree)

c) Very few cities in India are as populous as Mumbai. (Change into comparative degree)

4. A) Fill in with proper Primary Helping Verbs (be/do/have forms)

i) Prasad _____ (be) at the canteen when I saw him a few minutes ago.

ii) He _____ (do) this work always.

iii) The teacher _____just left the classroom.

B) Fill in with appropriate Modal verbs based on the clue given in the brackets:

i) We all _____ respect our elders. (moral obligation)

ii) Sir, _____ I come in please? (seeking permission)

iii) Tarun _____ easily win the match. (ability)

5. Use the following phrasal verbs in sentences of your own.

i) bring up ii) give away iii) put off

Part-B **8X3=24 Marks**

Instructions: Answer all the questions. Each question carries 8 marks. The marks will be awarded for the appropriate content, quality and clarity of expressions, but not the length of your answer.

6. A) Write a paragraph in around 120 words about the significance of learning and using English in your present and future life.

OR

B) Write a paragraph in around 120 words about challenges you are facing in speaking and writing English and the solutions to overcome them.

7. A) Write a dialogue between two friends in at least six turns discussing the advantages and disadvantages of social media.

OR

B) Write a dialogue between two friends, who have joined different courses in different colleges after their tenth class and now exchanging information about their newly joined courses and colleges.

8. A) Read the following passage and answer the questions that follow. Your answer should be accurate, precise and limited to a word or phrase or a simple sentence:

Treating life as an adventure is the best quality of successful people. A person's security lies not in his comfort zone, but in his initiative, creativity and courage. Effective people do not label others from their past success or failure, but rediscover each time they meet them. These people are not overawed by top celebrities, cine personalities and sadhus. Winning people are excellent team players to take part in the process of creative problem solving. They are skillful at balancing their strengths and weaknesses with others. The final character of victorious people is exercising the four dimensions of life i.e., physical, mental, emotional, and enthusiastic.

Questions:

a) What is the best quality of successful people?

b) List out the three qualities which make a person secure?

c) Why are the effective people not wondered at the lives of celebrities?

d) What do the team players do?

e) What is the special skill of the winning people?

f) What is the final character of victorious people?

g) What qualities of effective or winning people do you want to inculcate?

h) Pick the word from the passage that would mean: “the feeling of respect, wonder and fear all together at something or someone”

OR

B) Read the following passage and answer the questions that follow. Your answer should be accurate, precise and limited to a word or phrase or a simple sentence:

Benjamin Franklin was born in 1706 in Boston, Massachusetts. He came from a big family. He had 16 brothers and sisters. When Benjamin was 15, his brother started the first Boston newspaper. It was called ‘The New England Courant’. He worked for the newspaper for a short time, but he was not happy. So, he went to Philadelphia and worked as a printer. In 1729, he bought a newspaper business. The newspaper was the ‘Pennsylvania Gazette’. He was very busy. In 1733, he started publishing ‘Poor Richard’s Almanac’. His pen name (the name he used as an author) was Richard Saunders. This book came out every year. Almanacs have information about weather and crops. They also have wise sayings. The wise saying “A penny saved is a penny earned” comes from Poor Richard’s Almanac. Benjamin Franklin was also an inventor. In 1743 he invented a very good stove called the Franklin stove. He invented swim fins. He invented bifocal glasses. He also invented the first odometer. He retired from his newspaper business in 1749. He stopped working on it. Then he

became busy with science. Benjamin Franklin was also very interested in American politics. He helped Thomas Jefferson write the Declaration of Independence. In 1776, he and other people signed the Declaration of Independence. Franklin died on April 17, 1790. He was 84 years old.

Questions:

a) How many siblings did Benjamin Franklin have?

b) What was the newspaper started by his brother?

c) What did he buy after working as a printer?

d) What information was available in his Almanacs?

e) Mention any two inventions made by Benjamin Franklin?

f) Rewrite the meaning of the saying in your own words: “A penny saved is a penny earned”

g) Which American president was Benjamin Franklin associated with?

h) Pick the word from the passage that would mean: “external limbs of fish that help them swim and steer”.

Unit Test-2: C23- Common-101: English

Time: 90 Mnts. Max. Marks: 40

Part-A 16 Marks

Instructions: Answer all the questions and the first question carries 4 marks. Question numbers from 2 to 5 carry Three marks each. The marks will be awarded only for the desired and accurate language / grammatical expressions.

1. Fill in with proper verb form using the base form given in the brackets.

a) The match _____ (start) already before we entered the stadium.

b) Rani _____ (clean) dishes when the phone rang.

c) They _____(hold) the thief tightly until the police arrived.

d) Mr. Rajesh and his team _____(work) on this project since last month.

2. Fill in with the appropriate word from the pair given in the brackets.

a) Bread and butter _____ a wholesome breakfast. (is / are)

b) The minister accompanied by his staff _____already arrived. (have/ has)

c) Not only the film director but also all the actors _____facilitated by the committee. (was/ were)

3. Frame two different 'Wh' questions and one 'Yes-No' question from the following:

India is the second most populous country just behind China. It is expected that in a few months, India stands top on the list due to our unprecedented birth rate. On the contrary, Japan is losing its population. The rate of death in Japan is double when compared to its birth rate of the country.

4. Convert the following sentences as directed.

a) I want your bike for one hour. (convert into an imperative sentence)

b) It is a very beautiful garden. (convert into an exclamatory sentence)

c) Alas! what a great tragedy. (convert into a declarative sentence)

5. Use the following words/ phrases/ linkers in sentences of your own:

a) struggle ii) ground breaking iii) however

Part-B **8X3=24 Marks**

Instructions: Answer all the questions. Each question carries 8 marks. The marks will be awarded for the appropriate content, quality and clarity of expressions, but not the length of your answer.

6. A) Write a paragraph in around 120 words about dealing with obstacles and failures in one's life.

OR

B) Write a paragraph in around 120 words about protecting our environment.

7. A) Write a letter to your Principal requesting him / her to issue your Original Tenth marks list as you need to update your ADHAR card with date of birth and other details and return the certificate after the updating work.

OR

B) Write a letter to your father requesting him to send you two thousand rupees as you have to pay your hostel fees.

8. A) Write a paragraph in around 120 words about your future plans after Diploma.

OR

B) i) Draft an E-mail to your friend inviting him/her to your village to spend the weekend with you.

ii) Write a set of instructions at least in five sentences about drawing money from an ATM.

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Unit Test-3: C23- Common-101: English

Time: 90 Mnts. **Max. Marks: 40**

Part-A **16 Marks**

Instructions: Answer all the questions and the first question carries 4 marks. Question numbers 2 to 5 carry Three marks each. The marks will be awarded only for the desired and accurate language / grammatical expressions.

1. Correct the following sentences:

a) All the books have been sold out last week.

b) I, Ramesh and you will together book a cab.

c) I am feeling terribly cold.

d) The police has arrested the gang of robbers.

2. Change the voice of the following:

a) A cat is chasing two rats.

b) The news has been published recently.

c) They will certainly win the match.

3. Rewrite the sentences as directed:

a) Though Rakesh studied well, he could not get the first class. (Convert into a simple sentence)

b) It was raining heavily, and so the match was cancelled. (Convert into a complex sentence)

c) The horse was too old to gallop. (Convert into a compound sentence)

4. Change the speech of the following as directed:

a) Satwik said to his mother, “I forgot my water bottle in my classroom.”

b) The teacher ordered the students not to make noise.

c) Swapna said, “Rajesh, what are you searching for?”

5. Use the following words /phrases/ linkers in sentences of your own:

i) apologize to ii) occasionally iii) for a while

Part-B **8X3=24 Marks Instructions:** Answer all the questions. Each question carries 8 marks. The marks will be awarded for the appropriate content, quality and clarity of expressions, but not the length of your answer.

6. A) Write an essay in around 180 words on how the technical inventions changed our lives.

OR

B) Write an essay in around 180 words about the significance of the gender equality.

7 A) Write a report about any disaster that you have read in newspaper or witnessed including your suggestions for better preventive measures to mitigate the loss.

OR

B) Write a report about the Inter Polytechnics Sports and Games Meet (IPSGM) held in your District headquarters.

8 A) Read the following passage and answer the questions that follow. Your answer should be accurate, precise and limited to a word or phrase or a simple sentence.

Animals living in modern zoos enjoy several advantages over animals in the wild; however, they must also suffer some disadvantages. One advantage of living in the zoo is that the animals are separated from their natural predators; they are protected and can, therefore, live without risk of being attacked. Another advantage is that they are regularly fed a special, well-balanced diet; thus, they do not have to hunt for food or suffer times when food is hard to find. On the other hand, zoo animals face several disadvantages. The most important disadvantage is that since they do not have to hunt for food or face their enemies, some animals became bored, discontented or even nervous. Another disadvantage is that zoo visitors can endanger their lives. Some animals can pick up airborne diseases from humans.

Questions:

a) What are the two animal habitations mentioned in the passage?

b) Give the main advantage of animals living in zoo.

c) What kind of food is the zoo animals fed with?

d) What is the most disadvantage aspect faced by the zoo animals?

e) How do you think that the visitors can harm the zoo animals?

f) Do you support keeping the animals in a zoo for our entertainment? Justify your answer in a sentence.

g) Pick the word from the passage that would mean: A violent or bigger animal that kills and eats the other tiny animal.

h) Suggest a suitable title for the passage.

OR

B) Read the following passage and answer the questions that follow. Your answer should be

accurate, precise and limited to a word or phrase or a simple sentence.

"I say to you today, my friends, even though we face the difficulties' of today and tomorrow, I still have a dream. I have a dream that one day this nation will rise up, live out the true meaning of its creed. I have a dream that one day on the red hills of Georgia sons of former slaves and sons of former slave-owners

will be able to sit down together at the table of brotherhood. I have a dream that my four little children will one day live in a nation where they will not be judged by the colour of their skin but by the content of their character. I have a dream…. I have a dream that one day in Alabama, with its vicious racists, with its governor having his lips dripping with the words of interposition and nullification, one day right there in Alabama little black boys and black girls will be able to join hands with little white boys and white girls as sisters and brothers:" On 28th August in 1963, Dr. Martin Luther King, Jr. spoke these immortal words to a crowd of over 200000 people who had gathered for the now historic march in Washington to demand an end to racial segregation in the USA, and for equality in jobs and civil rights.

Questions:

a) Who is the speaker of the above speech and what is his nationality?

b) What is the occasion of the above speech: ( )

i) a birthday party ii) an election campaign

iii) a movement for a right cause iv) a government function

c) What sort of discrimination did the speaker fight against?

d) What good does he expect regarding the children of slaves and masters?

e) What is the contextual meaning of the frequently used word "dream" ?

f) How should a nation be judged?

g) What are the two places mentioned by the speaker in his speech?

h) Pick the word from the passage that would mean: "that lives for ever without death"

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ENGINEERING MATHEMATICS-I
(COMMON TO ALL BRANCHES)

Course Code	Course Title	No. of Periods/week	Total No. of periods	Marks for FA	Marks for SA
EE-102	Engineering Mathematics-I	5	150	20	80

S.No.	Unit Title	No. of periods	COs mapped
1	Algebra	31	CO1
2	Trigonometry	44	CO2
3	Co-ordinate Geometry	23	CO3
4	Differential Calculus	34	CO4
5	Applications of Derivatives	18	CO5
Total Periods		**150**	

Course Objectives	(i) To apply the principles of Algebra, Trigonometry and Co-Ordinate Geometry to real-time problems in engineering. (ii) To comprehend and apply the concept of Differential Calculus in engineering applications.

Course Outcomes	CO1	Identify functions as special relations, resolve partial fractions and solve problems on matrices and determinants.
	CO2	Solve problems using the concept of trigonometric functions, their inverses and complex numbers.
	CO3	Find the equations and properties of straight lines, circles and conic sections in coordinate system.
	CO4	Evaluate the limits and derivatives of various functions
	CO5	Find solutions for engineering problems using differentiation.

Learning Outcomes

UNIT - I

C.O. 1 Identify functions, resolve partial fractions and solve problems on matrices and determinants.

L.O. 1.1 Define Set, ordered pair and Cartesian product of two sets - examples.

1.2 Explain Relations and functions – examples

1.3 Find Domain & Range of functions in finite sets – simple examples.

1.4 Define rational, proper and improper fractions of polynomials.

1.5 Explain the procedure of resolving proper fractions of the types mentioned below into partial fractions

$i)\quad \frac{f(x)}{(ax+b)(cx+d)} \qquad ii)\quad \frac{f(x)}{(ax+b)^2(cx+d)}$

1.6 Define a matrix and order of a matrix.

1.7 State various types of matrices with examples (emphasis on 3rd order square matrices).

1.8 Compute sum, difference, scalar multiplication and product of matrices. Illustrate the properties of these operations such as associative, distributive, commutative properties with examples and counter examples.

1.9 Define the transpose of a matrix and state its properties – examples.

1.10 Define symmetric and skew-symmetric matrices with examples. Resolve a square matrix into a sum of symmetric and skew-symmetric matrices and provide examples.

1.11 Define determinant of a square matrix; minor, co-factor of an element of a 3x3 square matrix with examples. Expand the determinant of a 3 x 3 matrix using Laplace expansion formula. State and apply the properties of determinants to solve problems.

1.12 Distinguish singular and non-singular matrices. Define multiplicative inverse of a matrix and list properties of adjoint and inverse. Compute adjoint and multiplicative inverse of a square matrix.

1.13 Solve system of 3 linear equations in 3 unknowns using Cramer's rule and matrix inversion method.

UNIT - II

C.O. 2 Solve problems using the concept of trigonometric functions, their inverses and complex numbers.

L.O. 2.1 Define trigonometric ratios of any angle - List the values of trigonometric ratios at specified values.

2.2 Draw graphs of trigonometric functions - Explain periodicity of trigonometric functions.

2.3 Define compound angles and state the formulae of sin(A±B), cos(A±B), tan(A±B) and cot(A±B).

2.4 Give simple examples on compound angles to derive the values of $\sin 15^0$, $\cos 15^0$, $\sin 75^0$, $\cos 75^0$, $\tan 15^0$, $\tan 75^0$ etc.

2.5 Derive identities like $\sin(A+B)\sin(A-B) = \sin^2 A - \sin^2 B$ etc.

2.6 Solve simple problems on compound angles.

2.7 Derive the formulae of multiple angles 2A, 3A etc and sub multiple angles A/2 in terms of angle A of trigonometric functions.

2.8 Derive useful allied formulae like $\sin^2 A = (1 - \cos 2A)/2$ etc.

2.9 Solve simple problems using the above formulae

Syllabus for Unit test-I

2.10 Derive the formulae on transforming sum or difference of two trigonometric ratios into a product and vice versa, examples on these formulae.

2.11 Solve problems by applying these formulae to sum or difference or product of two terms.

2.12 Explain the concept of the inverse of a trigonometric function by selecting an appropriate domain and range.

2.13 Define inverses of six trigonometric functions along with their domains and ranges.

2.14 Derive relations between inverse trigonometric functions so that the given inverse trigonometric function can be expressed in terms of other inverse trigonometric functions with examples.

2.15 State various properties of inverse trigonometric functions and identities like $\sin^{-1}x+\cos^{-1}x = \frac{\pi}{2}$, etc.

2.16 Apply formulae like $\tan^{-1} x + \tan^{-1} y = \tan^{-1}\left(\frac{x+y}{1-xy}\right),\ where\ x \geq 0, y \geq 0, xy < 1$ etc., to solve Simple problems.

2.17 Explain what is meant by solution of trigonometric equations and find the general solutions of sin x=k, cos x =k and tan x=k with appropriate examples.

2.18 Solve models of the type $a \sin^2 x + b \sin x + c = 0$ and $a \cos x + b \sin x = c$.

2.19 State sine rule, cosine rule, tangent rule and projection rule and solve a triangle using these formulae.

2.20 List various formulae for the area of a triangle with examples.

2.21 Define complex number, its modulus, conjugate, amplitude and list their properties.

2.22 Define the operations on complex numbers with examples.

2.23 Represent the complex number in various forms like modulus-amplitude (polar) form, Exponential (Euler) form with examples.

UNIT - III

Coordinate Geometry

C.O. 3 Find the equations and properties of straight lines, circles and conic sections in coordinate system.

L.O.3.1 Write the different forms of a straight line – general form, point-slope form, slope-intercept form, two-point form, intercept form and normal form (or perpendicular form).

3.2 Find distance of a point from a line, acute angle between two lines, intersection of two non-parallel lines and distance between two parallel lines.

3.3 Define locus of a point and circle.

3.4 Write the general equation of a circle and find the centre and radius.

3.5 Find the equation of a circle given (i) centre and radius, (ii)two ends of the diameter(iii) three non collinear points of type (0,0) (a,0), (0,b).

3.6 Define a conic section - Explain the terms focus, directrix, eccentricity, axes and latus-rectum of a conic withillustrations.

3.7 Find the equation of a conic when focus, directrix and eccentricity are given.

3.8 Describe the properties of Parabola, Ellipse and Hyperbola in standard forms whose axes are along the co-ordinate axes and solve simple examples on these conics.

Syllabus for Unit test-II

C.O.4 Evaluate the limits and derivatives of various functions.

L.O. 4.1 Explain the concept of limit and meaning of $\lim_{x\to a} f(x)=l$ and state the properties of limits.

4.2 Evaluate the limits of the type $\lim_{x\to l}\frac{f(x)}{g(x)}$ and $\lim_{x\to\infty}\frac{f(x)}{g(x)}$

4.3 State the Standard limits $\lim_{x\to a}\frac{x^n-a^n}{x-a}$, $\lim_{x\to 0}\frac{\sin x}{x}$, $\lim_{x\to 0}\frac{\tan x}{x}$, $\lim_{x\to 0}\frac{a^x-1}{x}$, $\lim_{x\to 0}\frac{e^x-1}{x}$, $\lim_{x\to 0}(1+x)^{\frac{1}{x}}$, $\lim_{x\to\infty}\left(1+\frac{1}{x}\right)^x$ **(**without proof) and solve simple problems using these standard limits.

4.4 Explain the concept of continuity of a function at a point and on an interval

4.5 State the concept of derivative of a function y = f(x) – definition, first principle as $\lim_{h\to 0}\frac{f(x+h)-f(x)}{h}$ and also provide standard notations to denote the derivative of a function.

4.6 Explain the significance of derivative in scientific and engineering applications.

4.7 Find the derivative of the elementary functions x^n, a^x, e^x, log x, sin x, cos x using the first principle.

4.8 Find the derivatives of standard algebraic, logarithmic and exponential functions.

4.9 Find the derivatives of trigonometric, inverse trigonometric and hyperbolic functions.

4.10 State the rules of differentiation of sum, difference, scalar multiplication, product and quotient of functions with simple illustrative examples.

4.11 Explain the method of differentiation of a function of a function (Chain rule) with illustrative examples.

4.12 Explain the method of differentiation of parametric functions with examples.

4.13 Explain the procedure for finding the derivatives of implicit functions with examples.

4.14 Explain the need of taking logarithms for differentiating some functions of $[f(x)]^{g(x)}$ type – examples on logarithmic differentiation.

4.15 Explain the concept of finding the second order derivatives with examples.

4.16 Explain the concept of functions of several variables, finding partial derivatives and difference between the ordinary and partial derivatives with simple examples.

4.17 Explain the concept of finding second order partial derivatives with simple problems.

C.O. 5 Evaluate solutions for engineering problems using differentiation

L.O. 5.1 State the geometrical meaning of the derivative - Explain the concept of derivative to find the slopes of tangent and normal to the curve y=f(x) at any point on it.

5.2 Find the equations of tangent and normal to the curve y=f(x) at any point on it – examples.

5.3 Explain the derivative as a rate of change in distance-time relations to find the velocity and acceleration of a moving particle with examples.

5.4 Explain the derivative as a rate measurer in the problems where the quantities like volumes, areas vary with respect to time- illustrative examples.

5.5 Define the concept of increasing and decreasing functions - Explain the conditions to find points where the given function is increasing or decreasing with illustrative examples.

5.6 Explain the procedure to find the extreme values (maxima or minima) of a function of single variable- simple problemsfor quadratic and cubic polynomials.

5.7 Apply the concept of derivatives to find the errors and approximations in simple problems.

Syllabus for Unit test-III

CO/PO – Mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PSO1**	**PSO2**	**PSO3**
CO1	3	2	1	2				3	2	3
CO2	3	3	3	2				3	3	1
CO3	3	2	2	1				3	2	2
CO4	3	3	2	2				3	2	1
CO5	3	3	3	3				3	3	3
Avg.	3	2.6	2.2	2				3	2.4	2

3 = Strongly mapped (High), **2 =**moderately mapped (Medium), **1 =**slightly mapped (Low)

Note:

PO5: Appropriate quiz programme may be conducted at intervals and duration as decided by concerned teacher.

PO6: Seminars on applications of mathematics in various engineering disciplines are to be planned and conducted.

PO7: Such activities are to be planned that students visit library to refer standard books on Mathematics and latest updates in reputed national and international journals, attending seminars, learning mathematical software tools.

PSO1: An ability to understand the concepts of basic mathematical concepts and to apply themin various areas like computer programming, civil constructions, fluid dynamics, electrical and electronic systems and all concerned engineering disciplines.

PSO2: An ability to solve the Engineering problems using latest software tool, along with analytical skills to arrive at faster and appropriate solutions.

PSO3: Wisdom of social and environmental awareness along with ethical responsibility to have a successful career as an engineer and to sustain passion and zeal for real world technological applications.

PO- CO – Mapping strength

PO no	Mapped with CO no	CO periods addressing PO in column I		Level (1,2 or 3)	Remarks
		No	%		
1	CO1, CO2, CO3,CO4,CO5	150	100%	3	>40% Level 3 Highly addressed 25% to 40% Level 2 Moderately addressed 5% to 25% Level 1 Low addressed <5% Not addressed
2	CO1, CO2, CO3,CO4,CO5	138	92%	3	
3	CO1, CO2, CO3,CO4,CO5	133	88.6%	3	
4	CO1, CO2, CO3,CO4,CO5	120	80%	3	
PSO 1	CO1, CO2, CO3,CO4,CO5	150	100%	3	
PSO 2	CO1, CO2, CO3,CO4,CO5	135	90%	3	
PSO 3	CO1, CO2, CO3,CO4,CO5	125	83.3%	3	

C-23 - ENGINEERING MATHEMATICS – I

(COMMON TO ALL BRANCHES)

COURSE CONTENT

Unit-I

Algebra

1. **Functions**:

   Definitions of Set, Ordered pair, Cartesian product of two sets, Relations, functions, domain & range of functions in finite sets.

2. **Partial Fractions:**

   Definitions of rational, proper and improper fractions of polynomials. Resolve rational fractions (proper fractions) in to their partial fractions covering the types mentioned below.

   $i)\quad \dfrac{f(x)}{(ax+b)(cx+d)}$ $\qquad$ $ii)\quad \dfrac{f(x)}{(ax+b)^2(cx+d)}$

3. **Matrices:**
   Definition of a matrix, types of matrices-examples, algebra of matrices-equality of two matrices, sum, difference, scalar multiplication and product of matrices. Transpose of a matrix-Symmetric, skew symmetric matrices-Minor, cofactor of an element-Determinant of a square matrix-Laplace's expansion, properties of determinants. Singular and non-singular matrices-Adjoint and multiplicative inverse of a square matrix- examples-System of linear equations in 3 variables-Solutions by Cramer's rule and Matrix inversion method-examples.

Unit-II

Trigonometry

4. **Trigonometric ratios:**
   Definition of trigonometric ratios of any angle, values of trigonometric ratios at specified values, draw graphs of trigonometric functions, periodicity of trigonometric functions.
5. **Compound angles:**
   Formulas of sin(A±B), cos(A±B), tan(A±B),cot(A±B),and related identities with problems.
6. **Multiple and sub multiple angles:**
   Formulae for trigonometric ratios of multiple angles 2A, 3A and sub multipleangles A/2
   with problems.
7. **Transformations:** Transformationsof products into sums or differences and vice versa - simple problems.
8. **Inverse trigonometric functions:**
   Definition, domains and ranges-basic properties- problems.
9. **Trigonometric equations:**
   Concept of a solution, principal value and general solution of trigonometric equations:
   Sinx =k ,cosx= k, tanx =k, where k is a constant. Solutions of simple quadratic equations and equations of type acosx+bsinx=c.
10. **Properties of triangles:**
    Relation between sides and angles of a triangle- sine rule, cosine rule, tangent rule and projection rule-area of a triangle- problems.
11. **Complex Numbers:**

Definition of a complex number, Modulus, conjugate and amplitude of a complex number, Arithmetic operations on complex numbers, Modulus- Amplitude (polar) form , Exponential form (Euler form) of a complex number- Problems.

UNIT-III
Coordinate geometry

12 **Straight lines:** various forms of straight lines, angle between lines, perpendicular distance from a point, intersection of non-parallel lines and distance between parallel lines-examples.

13. Circle: locus of a point, Circle, definition-Circle equation given (i) centre and radius, (ii) two ends of a diameter (iii) three non collinear points of type (0,0), (a,0), (0,b) - general equation of a circle – finding centre, radius.

14. Definition of a conic section, equation of a conic when focus directrix and eccentricity are given. Properties of parabola, ellipse and hyperbola in standard forms.

UNIT-IV
Differential Calculus

15. Concept of Limit- Definition and Properties of Limits and Standard Limits -Simple Problems-Continuity of a function at a point- Simple Examples only.

16. Concept of derivative- Definition (first principle)- different notations-derivatives of elementary functions. Derivatives of algebraic, logarithmic, trigonometric, inverse trigonometric and hyperbolic functions. Derivatives of sum, product, quotient, scalar multiplication of functions - problems. Chain rule, derivatives of parametric functions, derivatives of implicit functions, logarithmic differentiation – problems in each case. Second order derivatives – examples. Functions of several variables –First and second order partial differentiation-simple problems.

UNIT-V
Applications of Derivatives

17. Geometrical meaning of the derivative, equations of tangent and normal to a curve atany point - problems.

18. Physical applications of derivatives – velocity, acceleration, derivative as a rate measure –Problems.

19. Applications of the derivative to find the extreme values – Increasing and decreasing functions, finding the maxima and minima for quadratic and cubic polynomials.

20. Using the concept of derivative of a function of single variable, find the absolute error,relative and percentage errors and approximate values due to errors in measuring.

Textbook:

Engineering Mathematics-I, a textbook for first year diploma courses, prepared & prescribed by SBTET, AP.

Reference Books:

1. Shanti Narayan, A Textbook of matrices, S.Chand&Co.
2. Robert E. Moyer & Frank Ayers Jr., Schaum's Outline of Trigonometry, 4th Edition, Schaum's Series.
3. M.Vygodsky, Mathematical Handbook, Mir Publishers, Moscow.
4. Frank Ayers & Elliott Mendelson, Schaum's Outline of Calculus, Schaum's Series.

C-23 - Engineering Mathematics – I
Blue print

S.No.	Chapter/Unit title	No. of Periods	Weightage Allotted	Short type			Essay type			COs mapped
				R	U	Ap	R	U	Ap	
	Unit - I : Algebra									
1	Functions	5	3	1	0	0	0	0	0	CO1
2	Partial Fractions	6	3	1	0	0	0	0	0	CO1
3	Matrices and Determinants	20	16	2	0	0	0	0	1	CO1
	Unit - II : Trigonometry									
4	Trigonometric Ratios	2	0	0	0	0	0	0	0	CO2
5	Compound Angles	5	3	1	0	0	0	0	0	CO2
6	Multiple and Submultiple angles	8	3	1	0	0	0	0	0	CO2
7	Transformations	6	5	0	0	0	0	1/2	0	CO2
8	Inverse Trigonometric Functions	6	5	0	0	0	0	1/2	0	CO2
9	Trigonometric Equations	6	5	0	0	0	0	1/2	0	CO2
10	Properties of triangles	5	5	0	0	0	0	0	1/2	CO2
11	Complex Numbers	6	3	1	0	0	0	0	0	CO2
	Unit III : Co-ordinate Geometry									

12	Straight Lines	6	5	0	0	0	0	1/2	0	CO3
13	Circles	5	3	1	0	0	0	0	0	CO3
14	Conic Sections	12	5	0	0	0	0	1/2	0	CO3
	Unit – IV : Differential Calculus									
15	Limits and Continuity	6	6	1	1	0	0	0	0	CO4
16	Differentiation	28	20	0	0	0	1	1	0	CO4
	Unit – V : Applications of Derivatives									
17	Geometrical Applications	4	5	0	0	0	0	0	1/2	CO5
18	Physical Applications	6	5	0	0	0	0	0	1/2	CO5
19	Maxima and Minima	4	5	0	0	0	0	0	1/2	CO5
20	Errors and Approximations	4	5	0	0	0	0	0	1/2	CO5
Total		150	110	9	1	0	1	3 1/2	3 1/2	
Marks				27	3	0	10	35	35	

R: Remembering Type : 37 Marks
U: understanding Type : 38 Marks
Ap: Application Type : 35 Marks

C-23 Engineering Mathematics – I

Unit Test Syllabus

Unit Test	Syllabus
Unit Test-I	From L.O. 1.1 to L.O. 2.9
Unit Test-II	From L.O. 2.10 to L.O. 3.8
Unit Test-III	From L.O.4.1 to L.O. 5.7

Unit Test I **C –23, EE -102**

State Board of Technical Education and Training, A. P.

First Year

Subject name: Engineering Mathematics-I

Sub Code: EE-102

Time : 90 minutes **Max.marks:40**

Part-A **16Marks**

Instructions: **(1) Answer all questions.**

(2) First question carries four marks and the remaining questions carry Three marks each.

1. Answer the following:
   a. If $X=\{1,2,3,4\}$ and $Y=\{1,4,9,16,25\}$, then $f: X \to Y$ defined by $f=\{(1,1),(2,4),(3,9),(4,16)\}$ is a function: State TRUE/FALSE. (CO1)
   b. If $A=\begin{bmatrix}1 & 2\\ 3 & 4\end{bmatrix}$, then 3A =_____. (CO1)
   c. The value of $\sin 45° + \cos 45^o$ is _____. (CO2)
   d. The formula for $\tan 2A$ in terms of $\tan A$ is _____. (CO2)
2. If $A=\begin{bmatrix}1 & 3\\ 4 & -9\end{bmatrix}$, $B=\begin{bmatrix}2 & 4\\ -3 & 1\end{bmatrix}$ then find $A+B$. (CO1)
3. Find the determinant of $\begin{bmatrix}2 & -1 & 4\\ 0 & -2 & 5\\ -3 & 1 & 3\end{bmatrix}$. (CO1)
4. Find the value of $\sin 75^0$. (CO2)
5. Prove that $\frac{\sin 2A}{1-\cos 2A} = \cot A$ (CO2)

Part-B **3×8=24**

Instructions: **(1) Answer all questions.**

(2) Each question carries eight marks

(3) Answer should be comprehensive and the criterion for valuation is the content but not the length of the answer.

6. A) Resolve $\frac{2x}{(x-1)(x-3)}$ into partial fractions. (CO1)

   or

   B) Resolve $\frac{x-4}{(x-2)(x-3)}$ into partial fractions. (CO1)

7. A) If $A=\begin{bmatrix} 2 & 3 & 4 \\ 5 & 7 & 9 \\ -2 & 1 & 3 \end{bmatrix}$ and $B=\begin{bmatrix} 3 & 1 & -5 \\ 2 & 1 & 4 \\ 0 & 3 & 1 \end{bmatrix}$, then find AB (CO1)

Or

B) If $P=\begin{bmatrix} 3 & 1 & 4 \\ 1 & -2 & 0 \\ 3 & 1 & 6 \end{bmatrix}$ and $Q=\begin{bmatrix} 1 & 5 & -3 \\ 0 & 6 & 9 \\ -2 & 7 & 8 \end{bmatrix}$, show that $\left(P+Q\right)^T = P^T + Q^T$. (CO1)

8. A) Find the adjoint of the matrix $\begin{bmatrix} 1 & 2 & -2 \\ -1 & 3 & 5 \\ 2 & 7 & -4 \end{bmatrix}$ (CO1)

or

B) Solve the following system of linear equations by Cramer's rule:
$x-y+z=2, 2x+3y-4z=-4, 3x+y+z=8$ (CO1)

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Unit Test II **C –23, EE -102**

State Board of Technical Education and Training, A. P.

First Year

Subject name: Engineering Mathematics-I

Sub Code: EE- 102

Time : 90 minutes **Max.marks:40**

Part-A **16Marks**

Instructions: **(1) Answer all questions.**

(2) First question carries four marks and the remaining questions carry threemarks each

1. Answer the following.

a. $\sin C+\sin D=2\cos\left(\frac{C+D}{2}\right)\sin\left(\frac{C-D}{2}\right)$: State TRUE/FALSE (CO2)

b. If $\sin^{-1}\left(\frac{3}{5}\right)=\tan^{-1}(\mathrm{x})$, then $x=$ _____. (CO2)

c. If $z=2+3i$, then $|z|$=_____. (CO2)

d. The eccentricity of the rectangular hyperbola is _____. (CO3)

2. Express $(3-4i)(7+2i)$ in terms of $a+ib$ (CO2)

3. Find the intercepts made by the straight line $x + 5y - 10 = 0$. (CO3)

4. Find the centre and radius of the circle $x^2+y^2-2x+4y-4=0$ (CO3)

5. Find the vertex and focus of the parabola $y^2 = 8x$. (CO3)

Part-B **3×8=24**

Instructions: **(1) Answer all questions.**
(2) Each question carries eight marks
(3) Answer should be comprehensive and the criterion for valuation is the content but not the length of the answer.

6. A) Prove that $\frac{sin5\theta+sin\theta}{cos5\theta+cos\theta} = tan3\theta$. (CO2)

or

B) Prove that $tan^{-1}\left(\frac{1}{4}\right) + tan^{-1}\left(\frac{3}{5}\right) = \frac{\pi}{4}$ (CO2)

7. A) Solve $2\sin^2\theta-\sin\theta-1=0$ (CO2)

or

B) If a =3, b=4, c=5, find the area of the ΔABC. (CO2)

8. A) Find the equation of the line passing through $(1,1)$ and perpendicular to the line $2x+3y-1=0$. Also find the perpendicular distance from the given point to the given line. (CO3)

or

B) Find the equation of the ellipse whose focus is (2, 0), directrix is x+y-1= 0 and eccentricity is ½. (CO3)

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Unit Test III **C –23, EE -102**

State Board of Technical Education and Training, A. P

First Year

Subject name: Engineering Mathematics-I

Sub Code: EE-102

Time : 90 minutes **Max.Marks:40**

Part-A **16 Marks**

Instructions: **(1) Answer all questions.**

(2) First question carries four marks and the remaining questions carry threemarks each.

1. Answer the following:

   a. $\lim_{x\to 1}\frac{x^2+1}{x+5}=\frac{1}{3}$: State TRUE/FALSE. (CO4)

   b. $\frac{d}{dx}(x^n)=$_____ (CO4)

   c. $\frac{d}{dx}\left(3\tan^{-1}x\right)=?$ (CO4)

   d. Write the formula for finding the percentage error in x. (CO5)

2. Evaluate $\lim_{\theta\to 0}\frac{sin2\theta}{\theta}$ (CO4)

3. Find the derivative of $3\tan x+4\log x$ w.r.t. x. (CO4)

4. Differentiate $x^2\sin x$ w.r.t. x. (CO4)

5. Find the slope of the tangent to the curve $y=x^3-3x+2$ at the point $(1,7)$. (CO5)

Part-B **3×8=24**

Instructions: **(1) Answer all questions.**

(2) Each question carries eight marks

(3) Answer should be comprehensive and the criterion for valuation is the content but not the length of the answer.

6. A) if $x=at^2$ and $y=2at$ then find $\frac{dy}{dx}$ (CO4)

   or

   B) Find $\frac{dy}{dx}$, if $y=x^x$ (CO4)

7. A) If $y=ae^x+be^{-x}$, then prove that $\frac{d^2y}{dx^2}-y=0.$ (CO4)

   or

B) If $u(x,y) = \log(x+y)$, then find $\frac{\partial u}{\partial x}$ and $\frac{\partial u}{\partial y}$ (CO4)

8. A) The radius of a sphere is decreasing at a rate of 0.2 cm/sec. How fast is its surface area decreasing when the radius is 10 cm. (CO5)

or

B) Find the maximum and minimum values of the function $f(x) = x^3 - 3x$. (CO5)

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END-EXAM MODEL PAPERS

STATE BOARD OF TECHNICAL EDUCATION, A.P

C-23 ENGINEERING MATHEMATICS-I,EE- 102

TIME : 3 HOURS **MODEL PAPER- I** **MAX.MARKS : 80M**

PART-A

Answer All questions. Each question carries THREE marks. **10x3=30M**

1. If $A = \left\{0, \frac{\pi}{4}, \frac{\pi}{2}\right\}$ and $f : A \to B$ is a function defined by $f(x) = \cos x$, then find the range of f. (CO1)

2. Resolve the function $\frac{x}{(x-1)(x-2)}$ into partial fractions. (CO1)

3. If $A = \begin{bmatrix} 3 & 9 & 0 \\ 1 & 8 & -2 \end{bmatrix}$ and $B = \begin{bmatrix} 4 & 0 & 2 \\ 7 & 1 & 4 \end{bmatrix}$, find A+B (CO1)

4. Find the determinant of the matrix $\begin{bmatrix} 2 & -1 & 4 \\ 0 & -2 & 5 \\ -3 & 1 & 3 \end{bmatrix}$ by Laplace's expansion. (CO1)

5. Show that $\frac{\cos 16^0 + \sin 16^0}{\cos 16^0 - \sin 16^0} = \tan 61^0.$ (CO2)

6. Prove that $\frac{\sin 2\theta}{1-\cos 2\theta} = \cot\theta.$ (CO2)

7. Find the modulus of the complex number $3 + 4i$. (CO2)

8. Find the equation of the circle with centre (0, 0) and radius 5. (CO3)

9. Evaluate $\lim_{x\to 0} \frac{2x^2 - 3x + 1}{x^2 - 2x + 4}$. (CO4)

10. Find $\lim_{x\to 0} \frac{\sin 77x}{\sin 11x}$. (CO4)

PART-B

Answer any FIVE questions. Each question carries TEN marks. 5x10=50M

11. Solve the system of linear equations $x+y+z=6$, $x-y+z=2$ and $2x+y-z=1$ using matrix inversion method. (CO1)

12. A) Show that $\frac{sin7\theta+sin5\theta}{cos7\theta+cos5\theta} = tan6\theta$. (CO2)

B) Prove that $tan^{-1}\left(\frac{1}{7}\right) + tan^{-1}\left(\frac{1}{13}\right) = tan^{-1}\left(\frac{2}{9}\right)$ (CO2)

13. A) Solve $(2\sin x - 1)(\tan x - \sqrt{3}) = 0$. (CO2)

B) If a =10, b=12, c =5, then find the area of the ΔABC. (CO2)

14. A) Findthe distance between the parallel lines $4x - 3y + 9 = 0$ and $4x - 3y + 5 = 0$. Also find their slopes. (CO3)

B) Find the equation of the conic whose focus is (1,0), directrix is 3x+4y+1=0 and eccentricity is 2. (C03)

15. A) Find the derivative of $3tanx - 4logx - 7x^2 + \sqrt{x}$ w.r.t *x.* (CO4)

B) Find the derivative of x^2e^{3x} w.r.t *x.* (CO4)

16. A) If $x = a(1-\cos\theta), y = a(\theta+\sin\theta)$, then find $\frac{dy}{dx}$. (CO4)

B) If $u(x,y) = x^2y + y^2x$, then find $\frac{\partial u}{\partial x}$ *and* $\frac{\partial u}{\partial y}$ (CO4)

17. A) Find the equation of tangent to the curve $y = x^2 + 1$ at (2,1) . (CO5)

B) The radius of a circular plate is increasing at 0.7 cm/sec. What isthe rate of increase in its area when radius is 10 cm? (CO5)

18. A) Find maximum or minimum value of $f(x) = x^2 - 4x + 3$. (CO5)

B) If an error of 0.02 cm is made in the side of a square, what is the approximate error in the area and perimeter of the square? (CO5)

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STATE BOARD OF TECHNICAL EDUCATION, A.P.

C-23 ENGINEERING MATHEMATICS-I,EE- 102

TIME : 3 HOURS **MODEL PAPER- II** **MAX.MARKS : 80M**

PART-A

Answer All questions. Each question carries THREE marks. **10x3=30M**

1. If A={-1, 0, 1} and $f: A \to B$is defined by $f(x) = x^2 - x + 1$, then find the range of *f*. (CO1)

2. Resolve the function $\frac{1}{(x+1)(x-2)}$ into partial fractions. (CO1)

3. If A = $\begin{bmatrix} 3 & 9 & 0 \\ 1 & 8 & -2 \end{bmatrix}$and B= $\begin{bmatrix} 4 & 0 & 2 \\ 7 & 1 & 4 \end{bmatrix}$, then find $(A+B)^T$. (CO1)

4. If A= $\begin{bmatrix} 4 & 2 \\ -1 & 1 \end{bmatrix}$, then find A^2. (CO1)

5. Find the value of $\frac{cos36^0+sin36^0}{cos36^0-sin36^0} = tan\,81^0$. (CO2)

6. Prove that $\frac{1+cos2\theta}{sin2\theta} = cot\theta$. (CO2)

7. Find the modulus of the complex number 3+2*i.* (CO2)

8. Find theequation of the circle with centre (1,2) and radius 4. (CO3)

9. Find $\lim_{x\to 0} \frac{2x^2-3x+1}{x^2-2x+4}$. (CO4)

10. Find $\lim_{x\to 0} \frac{\sin 5x}{\tan 3x}$. **(**CO4)

PART-B

Answer any FIVE questions. Each question carries TEN marks. **5x10=50M**

11. Solve the system of linear equations $x - y + 3z = 5,\ 4x + 2y - z = 0$ and $-x + 3y + z = 5$ using Cramer's rule. (CO1)

12 A) Show that$cos40^0 + cos80^0 + cos160^0 = 0$. (CO2)

B) Prove that $tan^{-1}\left(\frac{1}{4}\right) + tan^{-1}\left(\frac{3}{5}\right) = \frac{\pi}{4}$ (CO2)

13. A) Solve $2\cos^2\theta - 3\cos\theta + 1 = 0$**.** (CO2)

B) If a =5, b=7, C =30°, then find the area of the ΔABC. (CO2)

14. A) Find the line passing through the point (2,3) and perpendicular to the line $x - 7y + 15 = 0$. Also find the distance from the given point to the given line. (CO3)

B) Find the vertex, focus, directrix and latus rectum of the parabola $y^2 = 16x$. (CO3)

15. A) Find the derivative of $3cos\ x + log\ x + 21x + 8e^{-x}$ w.r.t.*x.* (CO4)

B) Find the derivative of $\frac{1-x^2}{1+x^2}$ w.r.t. x. (CO4)

16. A) If $y = x^{\sin x}$, then find $\frac{dy}{dx}$. (CO4)

B) If $y = \tan^{-1} x,$ then prove that $\left(1+x^2\right)\frac{d^2y}{dx^2}+2x\frac{dy}{dx}=0.$ (CO4)

17. A) Find the equation of tangent to the curve $y = x^3 - 2x^2 + 4$ at (2,4). (CO5)

B) If $s(t) = t^2 + 2t + 3$is the displacement of a particle, find its velocity and acceleration at the time t=3 sec. (CO5)

18. A) Find maximum or minimum value of $f(x)=3+10x-5x^2$. (CO5)

B) If an error of 0.02 cm is made in the side of a square, then what is the percentage error in the calculated value of its area? (CO5)

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ENGINEERING PHYSICS

Course code	Course Title	No. of Periods per week	Total No. of Periods	Marks for FA	Marks for SA
EE-103	Engineering Physics	3	90	20	80

TIME SCHEDULE

S.No	Major Topics	No. of Periods
1.	Units and measurements	09
2.	Statics	11
3.	Gravitation	12
4.	Concepts of energy	10
5.	Thermal physics	10
6.	Sound	12
7.	Electricity & magnetism	13
8.	Modern physics	13
	Total:	**90**

CO - PO MAPPING

S.No	Major Topics	No. of Periods	COs
1.	Units and measurements	09	
2.	Statics	11	CO
3.	Gravitation	12	
4.	Concepts of energy	10	CO
	Thermal physics	10	
6.	Sound	12	CO
7.	Electricity & magnetism	13	
8.	Modern physics	13	CO
	Total:	**90**	

Course objectives	(1) To understand the basic concepts of physics for various Engineering applications as required for industries. (2) To equip the students with the scientific advances in technology and make the student suitable for any industrial organization.

COURSE OUTCOMES	CO1	Familiarize with various physical quantities, their SI units and errors in measurements; understand the concepts of vectors and various forces in statics.
	CO2	Understand the concepts of gravitation with reference to applications in satellites, provides the knowledge of various forms of energy and their working principles.
	CO3	Familiarize with the knowledge of conduction of heat and gas laws; provides the knowledge on musical sound and noise as pollution and also the concepts of echo and reverberation.
	CO4	Provide basic knowledge of electricity and concepts of magnetism and magnetic materials; familiarize with the advances in Physics such as photoelectric ell, optical fibers, semiconductors, superconductors and nanotechnology.

MATRIX SHOWING MAPPING OF COURSE OUT COMES WITH PROGRAMME OUTCOMES

C-23

	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	1	2	1			2
CO2	3		2	2	1		2
CO3	2				1		
CO4	2	2	2	2	2		3

ENGINEERING PHYSICS

3 = strongly mapped 2 = moderately mapped 1 = slightly mapped

OBJECTIVES

Upon completion of the course the student shall be able to

1.0 Understand the concept of units and measurements

1.1 Explain the concept of Units
1.2 Define the terms
a) Physical quantity, b) Fundamental physical quantities and
c) Derived physical quantities
1.3 Define unit
1.4 Define fundamental units and derived units
1.5 State SI units with symbols
1.6 State Multiples and Submultiples in SI system
1.7 State rules of writing S.I. units
1.8 State advantages of SI units
1.9 What are direct and indirect measurements.
1.10 Define accuracy and least count
1.11 Define error in measurement
1.12 Define absolute, relative and percentage errors with their formulae
1.13 Solve simple problems on absolute, relative and percentage errors

2.0 Understand the concepts of statics

2.1 Explain the concept of Vectors
2.2 Define scalar and vector quantities with examples
2.3 Represent vectors geometrically
2.4 Define the types of vectors (equal, negative, unit, co-initial, co-planar vectors, Position vector)
2.6 Resolve the vector into rectangular components

2.7 State and explain triangle law of addition of vectors
2.8 Define concurrent and co-planar forces
2.9 State and explain Lami's theorem
2.10 State parallelogram law of addition of forces with diagram
2.11 Write the expressions for magnitude and direction of resultant (no derivation)
2.12 Illustrate parallelogram law with examples (i) flying of bird and (ii) working of sling.
2.13 Define moment of force and couple.
2.14 Write the formulae and S.I units of moment of force and couple.
2.15 Solve simple problems on (i) Resolution of force and (ii) Parallelogram law of forces (finding R,α and θ).

3.0 Understand the concepts of Gravitation

3.1 State and explain Newton's universal law of gravitation.
3.2 Define G and mention its value.
3.3 Explain the acceleration due to gravity (g)
3.4 Explain the factors affecting the value of g
3.5 Derive the relationship between g and G.
3.6. State and explain the Kepler's law of planetary motion
3.7 Define a satellite.
3.8 What are natural and artificial satellites? Give examples.
3.9 Define orbital velocity and write its formula.
3.10 Define escape velocity and write its formula.
3.11 Write a brief note on PSLV
3.12 Write a brief note on GSLV
3.13 Mention the applications of artificial satellites
3.14 Solve simple problems on (i) Newton's law of gravitation and (ii) calculation of orbital and escape velocities.

4.0 Understand the concepts of Energy.

4.1 Define work done and energy. Mention their SI units.
4.2 List various types of energy.
4.3 Define P.E with examples. Write its equation.
4.4 Define K.E with examples. Write its equation.
4.5 Derive relationship between K.E and momentum.
4.6 State the law of conservation of energy. Give various examples.
4.7 Write a brief note on solar energy.
4.8 Explain the principle of solar thermal conversion.
4.9 Explain the principle of photo voltaic effect
4.10 Solve simple problems on (i) work done (ii) P.E & K.E and (iii) Relation between K.E & momentum.

5.0 Understand the concepts of thermal physics

5.1 Define the concepts of heat and temperature
5.2 State the modes of transmission of heat
5.3 Define conduction, convection and radiation with two examples each.
5.4 State and explain Boyle's law
5.5 Define absolute zero temperature
5.6 Explain absolute scale of temperature

5.7 State the relationship between Degree Celcius, Kelvin and Fahrenheit temperatures
5.8 State Charles laws and write its equation
5.9 State Gay-Lussac's law and write its equation
5.10 Define ideal gas
5.11 Derive ideal gas equation
5.12 Explain why universal gas constant (R) is same for all gases
5.13 Calculate the value of R for 1 gram mole of gas.
5.14 Solve simple problems on (i) Interconversion of temperatures between °C, K and F (ii) Gas laws and (iii) Ideal gas equation.

6.0 Understand the concepts of Sound

6.1 Define the term sound
6.2 Define longitudinal and transverse waves with one example each
6.3 Explain the factors which affect the velocity of sound in air
6.4 Distinguish between musical sound and noise
6.5 Explain noise pollution and state SI unit for intensity of sound
6.6 Explain sources of noise pollution
6.7 Explain effects of noise pollution
6.8 Explain methods of minimizing noise pollution
6.9 Define Doppler effect
6.10 List the Applications of Doppler effect
6.11 Define reverberation and reverberation time
6.12 Write Sabine's formula and name the parameters contained
6.13 Define echoes and explain the condition to hear an echo.
6.14 Mention the methods of reducing an echo
6.15 Mention the applications of an echo
6.16 What are ultrasonics
6.17 Mention the applications of ultrasonics, SONAR,
6.18 Solve simple problems on echo

7.0 Understand the concepts of Electricity and Magnetism

7.1 Explain the concept of P.D and EMF
7.2 State Ohm's law and write the formula
7.3 Explain Ohm's law
7.4 Define resistance and specific resistance. Write their S.I units.
7.5 State and explain Kichoff's first law.
7.6 State and explain Kirchoff's second law.
7.7 Describe Wheatstone's bridge with legible sketch.
7.8 Derive an expression for balancing condition of Wheatstone's bridge
7.9 Describe Meter Bridge experiment with necessary circuit diagram.
7.10 Write the formulae to find resistance and specific resistance in meter bridge
7 .11 Explain the concept of magnetism
7.12 What are natural and artificial magnets (mention some types)
7.13 Define magnetic field and magnetic lines of force and write the properties of magnetic lines of force
7.14 State and explain the Coulomb's inverse square law of magnetism
7.15 Define magnetic permeability
7.16 Define para, dia, ferro magnetic materials with examples
7.17 Solve simple problems on (i) Ohm's law (ii) Kirchoff's first law (iii) Wheatstone bridge (iv) meter bridge

and (v) Coulomb's inverse square law

8.0 Understand the concepts of Modern physics

8.1 State and Explain Photo-electric effect
8.2 State laws of photoelectric effect
8.3 Explain the Working of photoelectric cell
8.4 List the Applications of photoelectric effect
8.5 Recapitulate refraction of light and its laws
8.6 Define critical angle
8.7 Explain the Total Internal Reflection
8.8 Explain the principle and working of Optical Fiber
8.9 List the applications of Optical Fiber
8.10 Explain the energy gap based on band structure
8.11 Distinguish between conductors, semiconductors and insulators base on energy gap
8.12 Define doping
8.13 Explain the concept of hole
8.14 Explain the types of semiconductors : Intrinsic and extrinsic
8.15 What are n-type and P-type semiconductors
8.16 Mention the applications of semiconductors
8.17 Define super conductor and superconductivity
8.18 List the applications of superconductors
8.19 Nanotechnology definition, nonmaterials and applications

COURSE CONTENT

1. Units and measurements

Introduction – Physical quantity – Fundamental and Derived quantities – Fundamental and derived units - SI units –Multiples and Sub multiples – Rules for writing S.I. units-Advantages of SI units – Direct and indirect measurements – Accuracy and least count – Errors : Absolute, relative and percentage errors – Problems.

2. Statics

Scalars and Vectors – Representation of a vector - Types of vectors - Resolution of vector into rectangular components – Triangle law of vectors – Concurrent forces - Lami's theorem - Parallelogram law of forces : Statement, equations for magnitude and direction of resultant, examples – Moment of force and couple – Problems.

3. Gravitation

Newton's law of gravitation and G – Concept of acceleration due to gravity (g) – Factors affecting the value of g – Relation between g and G- Kepler's laws – Satellites : Natural and artificial – Orbital velocity and escape velocity – Polar and geostationary satellites – Applications of artificial satellites – Problems.

4. Concepts of energy

Workdone & Energy-Definition and types of energy - potential energy - kinetic energy-- K.E and Momentum relation – Law of Conservation of energy, examples - Solar energy, principle of thermal and photo conversion – Problems.

5. Thermal physics

Modes of transmission of heat - Expansion of Gases - Boyle's law - Absolute scale of temperature - Thermometric scales and their inter conversion - Charle's law - Gay-Lussac's law - Ideal gas equation - Universal gas constant (R) - Problems.

6. Sound

Sound - Nature of sound - Types of wave motion, Longitudinal and transverse – Factors affecting the velocity of sound in air - musical sound and noise - Noise pollution – Causes & effects- Methods of reducing noise pollution- Doppler effect- Echo- Reverberation-Reverberation time-Sabine 's formula - Ultrasonics & applications – SONAR - Problems.

7. Electricity & Magnetism

Concept of P.D and EMF - Ohm's law and explanation- Specific resistance- Kirchoff's laws - Wheatstone's bridge - Meter bridge.

Natural and artificial magnets – magnetic field and magnetic lines of force - Coulomb's inverse square law – Permeability – Magnetic materials – Para, dia, ferro – Examples – Problems.

8. Modern Physics

Photoelectric effect – laws of photoelectric effect – photoelectric cell - Applications of photo electric cell - Total internal reflection- Fiber optics - Principle and working of an optical fiber- Applications of optical fibers – Semiconductors : Based on Energy gap – Doping – Hole - Intrinsic and extrinsic semiconductors (n-type & p-type) – Applications of semiconductors - Superconductivity – applications – Nanotechnology definition, nano materials, applications.

REFERENCES

1. Intermediate physics - Volume - I & 2	Telugu Academy (English version)
2. Unified physics Volume 1, 2, 3 and 4	Dr. S.L Guptha and Sanjeev Guptha
3. Concepts of Physics, Vol 1 & 2	H.C. Verma
4. Text book of physics Volume I	Resnick & Holiday
5. Fundamentals of physics	Brijlal & Subramanyam
6. Text book of applied physics	Dhanpath Roy
7. NCERT Text Books of physics	Class XI & XII Standard
8. e-books/e-tools/websites/Learning Physics software	

Blue Print for setting question paper at different levels

S.No	*Major Topics*	*Weightage of Marks*	*Short Answer Type(Marks)*			*Essay Type(Marks)*		
			R	*U*	*A*	*R*	*U*	*A*
1	*Units and measurements*	*03*	*0*	*0*	*3*	*0*	*0*	*0*
2	*Statics*	*13*	*0*		3	*0*	*10*	*0*
3	*Gravitation*	*20*	*0*	*0*	*0*	*10*	*10*	*0*
4	*Concepts of energy*	*13*	*0*	*0*	*3*	*0*	*10*	*0*
5	*Thermal physics*	*13*	*0*	*3*	*0*	*0*	*0*	*10*
6	*Sound*	*16*	*0*	*3*	*3*	*0*	*10*	*0*
7	*Electricity & magnetism*	*16*	*0*	*3*	*3*	*0*	*10*	*0*
8	*Modern Physics*	*16*	*3*	*0*	*3*	*0*	*0*	*10*
	Total:	***110***	***3***	***9***	***18***	***10***	***50***	***20***

(C–23) COMMON-103 UNIT TEST - I, FIRST YEAR

ENGINEERING PHYSICS

Time : 90 Minutes *Total Marks* : 40

PART—A 16 Marks

Instructions : (i) Answer all questions.

(ii) Question 1 carries 4 marks. Question numbers from (2) to (5) carries 3 marks each.

1. (i) Which among the following is a fundamental quantity.

   (a) Force (b) Momentum (c) Time (d) Density (CO1)

   (ii) Pascal is the S.I unit of pressure. (True/ False) (CO1)

   (iii) Displacement is vector quantity (Yes/No) (CO1)

   (iv) The formula for orbital velocity is _____ (Fill in the blank) (CO2)

2. Define absolute, relative errors and percentage errors. (CO1)
3. Define equal vectors, unit vector and co-initial vectors. (CO1)
4. A force of 100 N acts at a point at an angle of 60° to the horizontal. Find the horizontal and vertical components of force. (CO1)
5. Define natural and artificial satellites. Give one example each. (CO2)

PART—B 24 Marks

Instructions : (i) Answer *all* questions.

(ii) Each question carries 8 marks with interalchoice.

6. (a) Define concurrent and co-planar forces. Explain Lami's theorem. (CO1)

   OR

   (b)Two forces 20 N and 30N acts at a point an angle of 60°between them. Find the magnitude and direction of the resultant. (CO1)

7. (a) State and explain Kepler's law of planetary motion. (CO2)

   OR

   (b) Define acceleration due to gravity (g). Write any three factors affecting Thevalueof g. (CO2)

8. (a) Write a brief note on PSLV and GSLV. (CO2)

   (OR)

   (b) State Newton's universal law of gravitation and derive the relationship between g and G. (CO2)

(C–23) COMMON-103 UNIT TEST -II, FIRST YEAR

ENGINEERING PHYSICS

Time : 90 Minutes *Total Marks* : 40

PART—A 16 Marks

Instructions : (i) Answer all questions.

(iii) Question 1 carries 4 marks. Question numbers from (2) to (5) carries 3 marks each.

1 (i) Which among the following is unit of Work.

(a) newton (b) pascal (c) joule (d) watt (CO2)

(ii) According to Boyle's law, at constant temperature, the pressure of a gas is directly proportional to its volume (True/ False) (CO3)

(iii) Velocity of sound in a medium varies with temperature (Yes/No) (CO3)

(iv) The S.I unit of intensity of sound _____ (Fill in the blank) (CO3)

2 Define potential energy, give one example. (CO2)

3 Briefly write about absolute scale of temperature. (CO3)

4 An ideal gas of given mass at temperature 100 °C occupies a volume of 240 CC at constant pressure. Find its volume at 150 °C. (CO3)

5. Write any three differences between musical sound and noise. (CO3)

PART—B 24 Marks

Instructions : (i) Answer *all* questions.

(ii) Each question carries 8 marks with interal choice.

6. (a) Write about solar energy and solar thermal conversion. (CO2)

OR

(b). Define kinetic energy and derive the relationship between KE and momentum. (CO2)

7. (a) Write ideal gas equation and calculate the value of R for 1 gram mole of a gas. (CO3)

OR

(b) Define conduction, convection and radiation with one example each. (CO3)

8. (a) Write four methods of reducing an echo and four applications of echo. (CO3)

(OR)

(b) What are ultrasonics. Mention six applications of it. (CO3)

(C–23) COMMON-103 UNIT TEST - III, FIRST YEAR

ENGINEERING PHYSICS

Time : 90 Minutes *Total Marks* : 40

PART—A 16 Marks

Instructions : (i) Answer all questions.

(iv) Question 1 carries 4 marks. Question numbers from (2) to (5) carries 3 marks each.

1. (i) The unit of specific resistance is

(a) Ω (b) Ω /m (c) Ω -m (d) pascal (CO4)

(ii) Magnetic field lines are open curves. (True/False) (CO4)

(iii) At the critical angle, the angle of refraction is equal to 90°. (Yes/No) (CO4)

(iv) Photoeletric cell converts ____ energy into electric energy (Fill in the blank) (CO4)

2. Find the current passing through a conductor of resistance 2 Ω when P.D of 50 V is applied across it. (CO4)

3. State the Coulomb's inverse square law of magnetism and write the equation for it. . (CO4)

4. State three laws of photo electric effect. (CO4)

5. Write any three applications of superconductors. (CO4)

PART—B 24 Marks

Instructions : (i) Answer *all* questions.

(ii) Each question carries 8 marks with interal choice.

6. (a) State and explain Kirchoff's laws. (CO4)

OR

(b) Draw circuit diagram of Meter bridge. Two resistors of 10 Ω and 30 Ω are connected in the left and right gaps of a meter bridge. Find the balancing length. (CO4)

7. (a) Define para, ferro and dia magnetic materials with two examples each. (CO4)

OR

(b) Explain the principle and working of an optical fiber. (CO4)

8. (a) Explain intrinsic and extrinsic semiconductors. (CO4)

(OR)

(b) Explain conductors, semiconductors and insulators based on energy gap. (CO4)

BOARD DIPLOMA EXAMINATION, (C–23)

FIRST YEAR EXAMINATION

ENGINEERING PHYSICS

Time : 3 hours *Total Marks* : 80

PART—A 3×10=30

Instructions : (1) Answer all questions.

(2) Each question carries three marks.

(3) Answers should be brief and straight to the point and shall not exceed *five* simple sentences.

1. Write any three advantages of S.I units. (CO1)
2. Define moment of force. Write its SI unit. (CO1)
3. Find the work done in lifting a body of mass 10 kg through a height of 20 m against gravity. (CO2)
4. Define absolute zero temperature. Convert -10 °C into Kelvin temperature. (CO3)
5. Define Doppler effect. Mention one application. (CO3)
6. Write the Sabine's formula for reverberation time and name the parameters in it. (CO3)
7. Define specific resistance. Write its S.I unit. (CO4)
8. Write any three characteristics of magnetic lines of force. (CO4)
9. Draw a neat diagram of photoelectric cell and name the parts. (CO4)
10. Write any three applications of optical fibers. (CO4)

PART—B **10×5=50**

Instructions : (1) Answer *any* five questions.

(2) Each question carries ten marks.

(3) Answers should be comprehensive and the criterion for valuation is the content but not the length of the answer.

11. (a) State and explain triangle law of vectors. 6 (CO1)

(b) A force of 100 N acts on a particle at an angle of 30° to the horizontal. Find the horizontal and vertical components of force. 4

12. State and explain Kepler's law of planetary motion. 10 (CO2)
13. (a) Derive the relationship between g and G.

(b) Calculate the orbital velocity of a satellite so that it revolves around the earth if the Radius of earth = 6.5×10^6 m, mass of earth = 6×10^{24} kg and Gravitational constant G = 6.67×10^{-11} Nm^2/kg^2. 5+5 (CO2)

14. Explain the principle of solar thermal conversion and photo voltaic effect. 5+5 (CO2)

15. (a) Derive the ideal gas equation.
    (b) Volume of a gas at 27 °C is 100 CC. Keeping the pressure constant, find its volume at a temperature of 50 °C. 7+3 (CO3)

16. (a) Write any five methods of reducing noise pollution.
    (b) Define echo. Write three applications of it. 5+2+3 (CO3)

17. (a) Derive an expression for balancing condition of Wheatstone's bridge with neat circuit diagram.
    (b) The values of resistance of P, Q, R are 50 Ω, 10 Ω and 15 Ω respectively in the balanced condition of the bridge. Find the unknown resistances. 7+3 (CO4)

18. Explain n-type and P-type semiconductors. 5+5 (CO4)

ENGINEERING CHEMISTRY AND ENVIRONMENTAL STUDIES

Course code	Course Title	No. of Periods per week	Total No. of Periods	Marks for FA	Marks for SA
EE-104	Engineering Chemistry and Environmental Studies	3	90	20	80

S.No	Unit Title/Chapter	No of Periods	COs Mapped
1	Fundamentals of Chemistry	14	CO1
2	Solutions, Acids and Bases	16	CO1
3	Electrochemistry	12	CO2
4	Corrosion	8	CO2
5	Water Treatment	8	CO3
6	Polymers & Engineering materials	12	CO4
7	Fuels	6	CO4
8	Environmental Studies	14	CO5
	Total	90	

Course Objectives

Course Title: Engineering Chemistry & Environmental Studies	
Course Objectives	1. To familiarize with the concepts of chemistry involved in the process of various Engineering Industrial Applications. 2. To know the various natural and man-made environmental issues and concerns with an interdisciplinary approach that include physical, chemical, biological and socio cultural aspects of environment. 3. to reinforce theoretical concepts by conducting relevant experiments/exercises

Course outcomes

Course Outcomes	CO1	Explain Bohr`s atomic model, chemical bonding, mole concept, acids and bases, P^H and Buffer solutions
	CO2	Explain electrolysis, Galvanic cell, batteries and corrosion
	CO3	Explain the chemistry involved in the treatment of hardness in water
	CO4	Explain the methods of preparation of polymers and chemical composition and applications of alloys, composite materials, liquid crystals and Nano materials
	CO5	Explain Global impacts due to air pollution, causes , effects and control methods of water pollution and Understand the environment, forest resources, E-Pollution and Green Chemistry Principles.

Course code C-104	Engineering. Chemistry and Environmental studies No of Course Objectives:5				No Of periods 90
POs	Mapped with CO No	CO periods ddressing PO in Col 1 NO %		Level 1,2,3	remarks
PO1	CO1,CO2,CO3, CO4,CO5	42	46.7 %	3	>40% level 3 (highly addressed) 25% to 40% level2(moderately addressed 5% to 25% level1 (Low addressed < 5%(not addressed)
PO2	CO1,CO2	9	10.0%	1	
PO3	CO2,CO3	8	8.9%	1	
PO4	CO1	10	11.1%	1	
PO5	CO4,CO5	13	14.4%	1	
PO6					
PO7	CO4	8	8.9%	1	

COs-POs mapping strength (as per given table)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	3	2	1	1	1			1	1	
CO2	3	2	2					1	1	
CO3	3		2	3						
CO4	3			2			2			
CO5	3				3			1		
AVERAGEE	**3**	**2**	**1.6**	**2**	**2**		**2**	**1**	**1**	

3=strongly mapped 2= moderately mapped 1= slightly mapped

Note: The gaps in CO and PO mapping will be achieved by one or more appropriate activities from the following:

i) Seminars ii) Tutorials iii) Guest Lectures iv) Assignments v) Quiz competitions vi) Industrial visit vii) Tech Fest viii) Mini project ix) Group discussions x) Virtual classes xi) Library visit for e-books

Model Blue Print with Weightage for Blooms category and questions for each chapter and COs mapped

S.No	Unit Title/Chapter	No of Periods	Weightage of marks	Marks wise distribution of Weightage				Question wise distribution of Weightage				Mapped with CO
				R	U	Ap	An	R	U	Ap	An	
1	Fundamentals of Chemistry	14	21	15*	3	3		1½*	1	1		CO1
2	Solutions, Acids and Bases	16	21	8*	10	0	3	1½*	1		1	CO1
3	Electrochemistry	12	13	0	10	3			1	1		CO2
4	Corrosion	8	13	3	10	0		1	1			CO2
5	Water Treatment	8	13	10	0	0	3	1			1	CO3
6	Polymers & Engineering materials.	12	13	0	10	3		0	1	1		CO4
7	Fuels	6	3	0	0	3		0		1		CO4
8	Environmental Studies	14	13	0	13	0			2			CO5
Total		**90**	**110**	**36**	**56**	**12**	**6**	**5**	**7**	**4**	**2**	

***One question of 10 marks be given with 50% weightage from unit title 1and 2**

Upon completion of the course the student shall be able to learn out

ENGINEERINGCHEMISTRY AND ENVIRONMENTAL STUDIES

1. Atomic structure

1.1 Explain the charge, mass of fundamental particles of an atom (electron, proton and neutron) and the concept of atomic number and mass number.

1.2 State the Postulates of Bohr's atomic theory and its limitations.

1.3 Explain the significance of four Quantum numbers and draw the atomic structures of Silicon and Germanium.

1.4 Explain 1. Aufbau principle, 2 Pauli's exclusion principle 3 Hund's principle.

1.5 Define Orbital of an atom and draw the shapes of s, p and d- Orbitals.

1.6 Write the electronic configuration of elements up to atomic number 30

1.7 Explain the significance of chemical bonding

1.8 Explain the Postulates of Electronic theory of valency

1.9 Define and explain Ionic and Covalent bonds with examples of NaCl , *H_2,*O_2 and *N_2. (* Lewis dot method)

1.10 List out the Properties of Ionic compounds and covalent compounds and distinguish between their properties.

2. Solutions, Acids and Bases

2.1 Define the terms 1.Solution, 2.Solute and 3.Solvent

2.2 Classify solutions based on solubility.

2.3 Define mole and problems on mole concept.

2.4 Define the terms 1. Atomic weight, 2.Molecular weight and 3. Equivalent weight and calculate Molecular weight and Equivalent weight of the given acids.(HCl,H_2SO_4,H_3PO_4)Bases (NaOH, $Ca(OH)_2$, $Al(OH)_3$) and Salts (NaCl, Na_2CO_3, $CaCO_3$)

2.5 Define molarity and normality and numerical problems on molarity and normality

a) Calculate the Molarity or Normality if weight of solute and volume of solution are given

b) Calculate the weight of solute if Molarity or normality with volume of solution are given

c) Problems on dilution to convert high concentrated solutions to low concentrated Solutions

2.6 Explain Arrhenius theory of Acids and Bases and give the limitations of Arrhenius theory of Acids and Bases.

2.7 Define ionic product of water and pH and numerical problems on pH (Strong Acids and Bases).

2.8 Define buffer solution and classify buffer solutions with examples. Give its applications.

3. Electrochemistry

3.1 Define the terms1. Conductor 2. Semiconductor 3.Insulator, 4.Electrolyte5.Non–electrolyte. Give two examples each.

3.2 Distinguish between metallic conduction and Electrolytic conduction

3.3 Explain electrolysis by taking example fused NaCl and list out the applications of electrolysis.

3.4 Define Galvanic cell and explain the construction and working of Galvanic cell.

3.5 Distinguish between electrolytic cell and galvanic cell.

3.6 Define battery and list the types of batteries with examples.

3.5 Explain the construction, working and applications of i) Dry cell (Leclanche cell, ii) Lead storage battery iii) Lithium-Ion battery iii) Hydrogen-Oxygen fuel cell.

4. Corrosion

4.1 Define the term corrosion.

4.2 state the Factors influencing the rate of corrosion

4.3 Describe the formation of a) composition cell b) stress cell c) concentration cell during corrosion.

4.4 Define rusting of iron and explain the mechanism of rusting of iron.

4.5 Explain the methods of prevention of corrosion

a)Protective coatings (anodic and cathodic coatings)

b) Cathodic protection (Sacrificial anode process and Impressed–voltage process)

5. Water Treatment

5.1 Define soft water and hard water with respect to soap action.

5.2 Define and classify the hardness of water.

5.3 List out the salts that causing hardness of water(with Formulae)

5.4 State the disadvantages of using hard water in industries.

5.5 Define Degree of hardness and units of hardness(mg/L) or(ppm).

5.6 Numerical problems on hardness.

5.7 Explain the methods of softening of hard water by :a) Ion-exchange process, b) Reverse Osmosis.

6. Polymers & Engineering materials.

A) Polymers

6.1 Explain the concept of polymerisation

6.2 Describe the methods of polymerization a)addition polymerization of ethylene b)condensation polymerization of Bakalite (Only flow chart)

6.3 Explain the methods of preparation and uses of the following plastics:

1. PVC 2.Teflon 3. Polystyrene 4. Nylon 6,6

B) Engineering materials

6.4 Define an alloy. Write the composition and applications of the following.

1.Nichrome 2. Duraluminium 3. Stainless Steel.

6.5. Define elastomers: Write the compostion and applications of the following

1. Buna- S 2. Neoprene

6.6 Define Composite materials: Write the composition and applications of the following:

1.Glass Fibre Reinforcement composites(GFR) 2. Carbon Fibre Reinforcement Composites(CFR)

6.7 Define Liquid Crystals. Classify and give applications of the following:

1. Nematic 2. Smectic crystals

6.7 Define Nono materials. Write the composition and applications of the following:

1. nanotubes 2. Nano crystals.

7. Fuels

7.1 Define the term fuel

7.2 Classify the fuels based on occurrence.

7.3 Write the composition and uses of the following:

1. LPG 2. CNG 3. Biogas 4. Power alcohol

7.4 Write the commercial production of Hydrogen as future fuel. Give its advantages and

disadvantages.

8. ENVIRONMENTALSTUDIES

8.1 Define the term environment and explain the scope and importance of environmental studies.

8.2 Define the segments of environment 1).Lithosphere 2).Hydrosphere 3).Atmosphere 4).Biosphere

8.3 Define the following terms:
1)Pollutant 2).Pollution 3).Contaminant 4)receptor 5)sink 6) particulates 7)dissolved oxygen (DO) 8)Threshold limit value (TLV) 9).BOD 10) COD 11) eco system 12) Producers 13) Consumers
14) Decomposers with examples.

8.4 State the renewable and non- renewable energy sources with examples.

8.5 State the uses of forest resources.

8.6 Explain the causes and effects of deforestation

8.7 Define air pollution and give its Global impacts(1) Greenhouse effect, 2) Ozone layer depletion
and 3) Acid rain)

8.8 Define Water pollution. Explain the causes, effects and control methods of Water pollution.

8.9 Define E-Pollution, State the sources of e-waste Explain its health effects and control methods.

8.10 Define green chemistry. Write the Principles and benefits of green chemistry.

COURSE CONTENT

ENGINEERING CHEMISTRY AND ENVIRONMENTAL STUDIES

1. Fundamentals of Chemistry

Atomic Structure: Introduction - Fundamental particles – Bohr's theory – Quantum numbers – Aufbau principle - Hund's rule - Pauli's exclusion Principle- Orbitals, shapes of s, p and d orbitals - Electronic configurations of elements

Chemical Bonding: significance–Electronic theory of valency- types of chemical bonds – Ionic and covalent bond with examples–Properties of Ionic and Covalent compounds.

2. Solutions, Acids and Bases

Solutions: Terms and Types of solutions- mole concept –numerical problems on mole concept - Methods of expressing concentration of a solution –molarity and normality – Numerical problems on molarity and normality.

Acids and Bases: Arrhenius theory of acids and bases – Ionic product of water- pH – numerical problems on pH–Buffer solutions- Classification- applications.

3. Electrochemistry

Conductors, semiconductors, insulators, electrolytes and non-electrolytes – electrolysis of fused

NaCl–-applications of electrolysis - Galvanic cell – Battery-Types- Dry Cell(Leclanche Cell),Lead Storage battery- Hydrogen –Oxygen fuel cell.

4. Corrosion

Introduction - factors influencing corrosion - composition, stress and concentration cells–rusting of iron and its mechanism – prevention of corrosion by coating methods, cathodic protection methods.

5. Water technology

Introduction–soft and hard water–causes of hardness–types of hardness–disadvantages of hard water – degree of hardness (ppm and mg/lit) – Numerical problems on hardness - softening methods – Ion- Exchange process– Reverse Osmosis.

6. Polymers & Engineering materials

Polymers**:** concept of polymerization – types of polymerization – addition, condensation with examples – Preparation and uses of the following plastics i).PVC ii) Teflon iii) Polystyrene iv) Nylon 6,6

Elastomers: Preparation and application of the following elastomers i)Buna-s ii) Neoprene

Engineering materials:

Alloys-composition and applications of i) Nichrome, ii)Duralluminium iii) Stainless Steel.

Composite materials- Composition and applications of i) GFR ii) CFR

Liquid Crystals-types- applications of i) Nematic Crystals ii) Smectic cyrstals

Nano meterials- Composition and applications of i) Nanotubes ii) Nano crystals.

7. Fuels

Definition and classification of fuels–-composition and uses of i) LPG ii) CNG iii) Biogas iv) Power alchol.

8. ENVIRONMENTALSTUDIES

Environment –scope and importance of environmental studies – important terms related to environment–renewable and non-renewable energy sources–Forest resources – Deforestation - Air pollution – Global impacts on environment –Water pollution – causes – effects – control measures - E-Pollution- Sources-health effects-control methods. Green Chemistry- Principles-Benefits

Table specifying the scope of syllabus to be covered for Unit Test- 1, Unit Test- 2 and Unit Test -3

Unit Test	**Learning outcomes to be covered**
Unit Test - 1	**From 1.1 to 2.8**
Unit Test - 2	**From 3.1 to 5.7**
Unit Test - 3	**From 6.1 to 8.10**

REFERENCE BOOKS

1. Telugu Academy Intermediate chemistry Vol. 1&2
2. Jain & Jain Engineering Chemistry
3. O.P. Agarwal, Hi- Tech. Engineering Chemistry
4. Sharma Engineering Chemistry
5. A.K. De Engineering Chemistry

Model question paper for Unit Test with Cos mapped

UNIT TEST –I

Model Question Paper (C-23)

ENGINEERING CHEMISTRY & ENVIRONMENTAL STUDIES (104)

TIME: 90 minutes Total Marks: 40

PART-A 16 Marks

Instructions: (1) Answer all questions.
(2) First question carries 4 marks and each of rest carries 3 marks.
(3) Answers for Q.No. 2 to 5 should be brief and straight to the point and shall not exceed five simple sentences.

1. a. Number electrons present in Na^+ ion is ---------- (CO1)
   b. The molarity and normality of NaOH is the same (True or False) (CO1)
   c. Acid with pH 6 is stronger than Acid pH 4 (True or False) (CO1)
   d. 2s is spherical shaped orbital but 3p is ---------- (CO1)
2. Distinguish between orbit and orbital. (CO1)
3. Define buffer solution. Give two examples. (CO1)
4. Calculate the number of moles present 10.6 gm. of Na_2CO_3. (CO1)
5. Draw the atomic structures of Si and Ge. (CO1)

PART – B

3x8M = 24M

Answer either (A) or (B) from each questions from Part-B.
Each question carries 8 marks.

6. a) Explain Postulations of Bhor's atomic theory. Give its limitations. (CO1)

(OR)

b) Explain the significance of Quantum numbers. (CO1)

7. a) Define molarity normality. Calculate the molarity and normality of 10.6 gm of Na_2CO_3 present in 500 ml solution. (CO1)

(OR)

b) Explain Arrhenius theory of acids and bases. Give its limitations (CO1)

8. a) Define ionic bond. Explain the formation of ionic bond in NaCl. (CO1)

(OR)

b) Define solution. Explain the types of solutions based on its solubility. (CO1)

UNIT TEST –II

Model Question Paper (C-23)

ENGINEERING CHEMISTRY & ENVIRONMENTAL STUDIES (104)

TIME: 90 minuts Total Marks:40

PART-A 16 Marks

Instructions: (1) Answer all questions.

(2) First question carries 4 marks and each of rest carries 3 marks.

(3) Answers for Q. No. 2 to 5 should be brief and straight to the point and shall not exceed five simple sentences.

1. a) Graphite is an insulator. (True of False) (CO2)
   b) ---------- is an electrolyte in Hydrogen-Oxygen fuel cell (CO2)
   c) Zinc is more active than Iron. (True or False) (CO2)
   d) Write the Chemical formula of rust. (CO2)
2. Write any three differences between metallic conduction and electrolytic conduction.(CO2)
3. Write a short note on stress cell. (CO2)
4. Define hard water. Mention any two salts that cause hardness (CO3)
5. What is the role of salt bridge? (CO2)

PART – B 3x8M = 24M

Answer either (A) or (B) from each questions from Part-B. Each question carries 8 marks.

6. a) Explain construction and working of galvanic cell with neat diagram . (CO2)

(OR)

b) Explain construction and working of Lead storage battery. (CO2)

7. a) Calculate the temporary, permanent and total hardness of water containing the following salts.

   $CaSO_4$ =13.6 mg/lit, $Mg(HCO_3)_2$ = 7.3 mg/lit ,

   $Ca(HCO_3)_2$ = 16.2 mg/lit, $MgCl_2$ = 9.5 mg/lit (CO3)

(OR)

b) Explain Ion-Exchange process of softening of hard water. (CO3)

8. a) What is rusting of iron? Explain Mechanism of rusting of iron. (CO2)

(OR)

b) Explain cathodic protection methods. (CO2)

UNIT TEST –III

Model Question Paper (C-20)

ENGINEERING CHEMISTRY & ENVIRONMENTAL STUDIES (104)

TIME: 90 minutes Total Marks:40

PART-A 16 Marks

Instructions: (1) Answer all questions.
(2) First question carries 4 marks and each of rest carries 3 marks.
(3) Answers for Q. No. 2 to 5 should be brief and straight to the point and shall not exceed five simple sentences.

1. a) Semiconductor Nano Crystals are called ..... (CO4)
   b) Chloroprene is the monomer of Neoprene. (True/False) (CO4)
   c) Give any two examples for green house gases. (CO5)
   d) Presence of ozone in stratosphere is a pollutant. (Yes/No) (CO5)
2. Define liquid crystals. State the types. (CO4)
3. Write the commercial production of Hydrogen by electrolysis of water. (CO4)
4. Define Green Chemistry. List any two benefits. (CO5)
5. Define TLV. Give one example. (CO5)

PART – B 3x8M = 24M

Answer either (A) or (B) from each questions from Part-B.
Each question carries 8 marks.

6. a) Define polymerisation. Explain condensation polymerisation by taking nylon 6,6 as an example. . (CO4)

   (OR

   b) Define elastomers. Give a method of preparation and applications of Buna-S. (CO4)

7. a) What is air pollution? Discuss any one of Global impacts of air pollution. (CO5)

   (OR)

   b) Write the composition and uses of the following:
   i) LPG ii) CNG iii) Biogas iv) Power Alcohol (CO4)
8. a) Define e-waste. State the sources and explain e-waste management. (CO5)

   (OR)

   b) Define water pollution. Write the causes of water pollution. (CO5)

Model Question Paper (C-23)

ENGINEERING CHEMISTRY & ENVIRONMENTAL STUDIES (104)

TIME: 3hrs Total Marks:80

PART-A

Instructions: (1) Answer all questions. (2) Each question carries Three marks. 3x10=30M

1. Draw the atomic structures of Si and Ge. (CO1)

2. Write the anomalous electronic configuration of Chromium and Copper. (CO1)
3. State the limitations of Arrhenius theory of acids and bases. (CO1)
4. Define solution. Classify solutions based on solubility. (CO1)
5. State the applications of Li-ion batteries. (CO2)
6. List the factors that influence the rate of corrosion of metals. (CO2)
7. Mention disadvantages of hard water used in industries. (CO3)
8. State any three applications of nanotubes. (CO4)
9. Write the composition and uses of LPG. (CO4)
10. What is e-waste? State the sources of e-waste. (CO5)

PART – B

Instructions: (1) Answer any five questions. (2) Each question carries Ten marks.

10x5=50M

11. Explain the significance of quantum numbers. (CO1)

12. Define molarity and normality. Calculate the molarity and normality of 250 ml of solution that contains 5.3 gm of sodium carbonate. (CO1)

13. a) Define ionic bond. Explain the formation of ionic bond in NaCl. (CO1)
    b) Define Buffer solution. Give any two examples and applications. (CO1)
14. a) Explain the construction and working of Fuel cells. (CO2)
    b) State any four differences between electrolytic cells and Galvanicl cells. (CO2)

15. a) Explain mechanism of rusting of iron. (CO2)
    b) Write a short note on Sacrificial anodic method of prevention of corrosion. (CO2)

16. Define hard water. Explain ion-exchange of softening of hard water with a neat diagram . (CO3)
17. a) Define elastomer. Write a method of preparation and any two applications of Buna-s . (CO4)
    b) What are Liquid Crystals? Give any two examples and applications. (CO4)
18. a) Define deforestation. State the impacts of deforestation. (CO5)
    b) Write a short note on Ozone layer depletion. (CO5)

ELECTRICAL ENGINEERING MATERIAL SCIENCE

Course code	Course title	No. of periods/week	Total no. of periods	Marks for FA	Marks for SA
EE-105	ELECTRICAL ENGINEERING MATERIAL SCIENCE	04	120	20	80

S.no	Unit Title	No. of Periods	CO'S Mapped
1	Conducting Materials and Semiconducting Materials	25	CO1
2	Insulating Materials and Di- electric Materials	30	CO2
3	Magnetic Materials	15	CO3
4	Magnetic effects of Electric Current and Electromagnetic Induction	30	CO4
5	Electrostatics and Capacitance	20	CO5
	TOTAL	**120**	

Course objectives	1) To familiarise with the knowledge of different electrical engineering materials. 2) To comprehend the magnetic effects of electric current. 3) To know the concept of electro-magnetic induction and electrostatic field.

Course outcomes	CO1	EE-105.1	Explain the properties of different conducting and semi-conducting materials and their applications
	CO2	EE-105.2	Analyze Insulating materials and dielectric materials
	CO3	EE-105.3	Describe Magnetic materials and their properties
	CO4	EE-105.4	Comprehend the principles of Magnetic effects of Electric Current and Electromagnetic Induction
	CO5	EE-105.5	Understand the concepts of Electrostatics and Capacitance

LEARNING OUTCOMES

1. Conducting Materials and Semiconducting Materials

1.1 Define Conducting Materials
1.2 State the properties of conducting materials
1.3 Define the terms (i) Hardening (ii) Annealing
1.4 State the main requirements of (i) Low Resistivity Materials (ii) High resistivity materials
1.5 List some examples of i) Low Resistivity Materials ii) High Resistivity materials
1.6 Mention the Properties & Applications of Copper and Aluminium
1.7 Distinguish between Copper and Aluminium
1.8 Mention the properties & applications of ACSR Conductors and AAAC.
1.9 List the properties & Applications of High Resistive Materials of (i) Nichrome (ii) Tungsten (iii) Carbon
1.10 Define Semiconducting materials
1.11 Classify Semiconducting materials
1.12 Define (i) Intrinsic Semiconductors and (ii) Extrinsic Semiconductors
1.13 Distinguish between Intrinsic and Extrinsic semiconductors.
1.14 Explain the formation of (i) P – type semiconductor and (ii) N – type semiconductor
1.15 Distinguish between P and N type Semiconductors

2. Insulating Materials and Di-electric materials

2.1 Define Insulating Materials
2.2 Draw energy level diagrams of conductors, insulators and semi-Conductors
2.3 Distinguish between Conductors, Insulators and Semiconductors
2.4 Define Insulation resistance and explain factors affecting insulation resistance
2.5 Classify insulating materials
2.6 State the properties and applications of (i) Impregnated paper (ii) Wood (iii) Asbestos (iv) Mica (v) Ceramics (vi) Glass
2.7 Explain the properties and applications of PVC
2.8 State the effects of the following on P.V.C.
(i) Filler (ii) Stabilizer (iii) Plasticizer (iv) Additives.

2.9 Know the Permittivity of commonly used di – electric materials
(i) Air (ii) Bakelite (iii) Glass (iv) Mica (v) Paper (vi) Porcelain (vii) Transformer oil
2.10 Explain Polarization
2.11 Explain Di-electric Loss
2.12 List any four applications of Di-electrics

3. Magnetic Materials

3.1 Classify the Magnetic Materials
(i)Ferro (ii) Para (iii) Dia-Magnetic materials with examples

3.2 Explain (i) Soft Magnetic materials (ii) Hard Magnetic materials
3.3 Draw (i) B-H Curve (ii) Hysteresis loop
3.4 Explain Hysteresis loop
3.5 Explain Hysteresis loss and State Steinmetz equation (No-Problems)
3.6 Explain Eddy Current Losses
3.7 State Curie point
3.8 Define Magnetostriction

4. Magnetic effects of Electric Current and Electromagnetic Induction

4.1 State Coulombs laws of Magnetism
4.2 Define the terms Absolute and Relative Permeability of medium and give relation between them
4.3 Explain the concept of lines of force & magnetic field
4.4 State Right hand Thumb rule
4.5 Draw the field patterns due to
(i) Straight current carrying conductor (ii) Solenoid
4.6 State and list the applications of (i) Work law (ii) Biot-Savart's Law (Laplace law)
4.7 Explain the Mechanical force on a current carrying Conductor placed inside a Magnetic field.
4.8 Derive an expression for the magnitude of the force on a current carrying conductor inside a magnetic field.
4.9 State Fleming's Left Hand rule
4.10 Understand the concept of the Magnetic circuit and Define the terms MMF, Flux and Reluctance
4.11 Compare Magnetic circuit with Electric circuit in different aspects
4.12 Explain the effect of air gap in a magnetic circuit
8.13 Explain the terms leakage flux and leakage co-efficient
8.14 State Faraday's laws of Electro-Magnetic Induction
8.15 Explain Dynamically and Statically induced E.M.Fs
8.16 State Lenz's law
8.17 Explain Fleming's Right Hand rule
8.18 State the concept of Self and Mutual inductance and write their expressions
8.19 State Co-efficient of coupling
8.20 Develop an expression for the energy stored in a magnetic field

5. Electrostatics and Capacitance

5.1 State Coulomb's laws of Electrostatics and solve the problems

5.2 Define the following terms

(i) Unit Charge (ii) Absolute permittivity (iii) Relative permittivity (iv) Electric Flux (v) Flux Density (vi) Field intensity

5.3 Draw the field patterns due to

i) Isolated positive charge
ii) Isolated negative charge
iii) Unlike charges placed side by side
iv) Like charges placed side by side

5.4 Compare Electrostatic and Magnetic lines of force in different aspects.

5.5 Define the concept of electric potential and potential difference

5.6 Define Di-electric strength and Di-electric constant

5.7 Give the permittivity of commonly used Di-electric materials

5.8 Define Capacitance and state factors affecting the capacitance of a capacitor

5.9 Derive the formula for capacitance of a parallel plate capacitor

5.10 State different types of capacitors with its uses

5.11 Derive an expression for equivalent capacitance

i) When two Capacitors are connected in series
ii) When two Capacitors are connected in parallel

5.12 Derive an expression for the Energy stored in a capacitor

CO-PO/PSO MATRIX

CO No	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
EE-105.1	3	1						3		1
EE-105.2	3	1						3		
EE-105.3	3	2						3		
EE-105.4	3	3		3	3			3	2	2
EE-105.5	3	2	3					3	2	2
Average	**3**	**1.8**	**3**	**3**	**3**			**3**	**2**	**1.7**

3-Strongly Mapped 2- Moderately Mapped 1- Slightly Mapped

Note:

The gaps in CO and PO mapping will be achieved by one or more appropriate activities from the

following:
(i) Assignments (ii) Tutorials (iii) Seminars (iv) Guest Lectures (v) Group Discussions (vi) Quizzes (vii) Industrial Visits (viii) Tech Fests (ix) Mini Projects (x) Library Visits

HYPONATED COURSE CONTENTS

1. **Conducting Materials and Semiconducting materials:**
   Conducting Materials – Properties - Hardening, Annealing - Low Resistivity Materials – Requirements – Properties and applications of Copper and Aluminium - Comparison between Copper and Aluminium - ACSR Conductors, AAAC - High Resistive Materials – Requirements - Properties and applications of Nichrome, Tungsten and Carbon - Semiconducting materials - classification - comparison between intrinsic and extrinsic semiconductors – Formation of P-type and N-type semiconductors-comparison of P-type and N-type semiconductors.

2. **Insulating Materials and Di-electric materials**
   Insulating materials – Energy level diagrams of Conductors, Insulators and Semiconductors - Distinguish between Conductors, Insulators and Semiconductors - Factors effecting Insulation resistance - Classification of Insulating materials - Properties & Applications of Impregnated Paper, Wood, Asbestos, Mica, Ceramics, Glass - properties and applications of PVC - effects of the (i)Filler (ii) Stabilizer (iii) Plasticizer (iv) Additives on P.V.C. - Permittivity of different Di - electric materials - Polarization - Dielectric Loss – Applications of Dielectrics.

3. **Magnetic Materials**
   Classification of magnetic materials - Soft & Hard magnetic materials- B-H Curves - Hysteresis loop - Hysteresis loss - Steinmetz equation - Eddy Current Loss -- Curie Point – Magnetostriction.

4. **Magnetic effects of Electric Current and Electromagnetic Induction**
   Coulombs laws- Permeability - Lines of force – Right Hand Thumb rule - Field pattern due to (i) long straight current carrying conductor (ii) solenoid - Work Law and its applications – Biot Savart's Law (Laplace Law) - Mechanical force on a current carrying conductor placed inside a magnetic field - Direction of force - Fleming's Left Hand rule - Magnetic circuit - mmf - Flux - Reluctance - Comparison of Magnetic circuit With Electric circuit - Magnetic leakage flux and leakage Co-efficient. Faraday's laws - Dynamically and Statically induced E.M.F - Lenz's Law & Fleming's Right Hand rule - Self and Mutual inductance - Co-efficient of coupling - Energy stored in a magnetic field.

5. Electrostatics and Capacitance

   Coulomb's Laws of Electrostatics–Permittivity, Electric flux, Flux density, Field intensity - Electrostatic field patterns due to (i) Isolated positive charge (ii) Isolated negative charge (iii) Unlike charges placed side by side (iv) Like charges placed side by side - Comparison of Electrostatic and Magnetic lines of force - Concept of Electric potential and Potential difference – Di-electric strength – Di-electric constant - Capacitance – Factors affecting the Capacitance of Capacitor – capacitance of a parallel plate capacitor - Types of Capacitors - Equivalent capacitance when connected in series and parallel - Uses - Energy stored in a Capacitor.

REFERENCE BOOKS

1 Dr. K.Padmanabham - Electronic Components – Laxmi publications (P) Ltd.
2 Electrical Engineering Materials – N.I T.T.T.R Publications
3 B.K.Agarwal - Introduction to Engineering materials – Tata McGraw Hill Publishers
4 Ian P.Jones - Material science for Electrical and Electronic Engineers – Oxford Publications
5 B.L.Theraja – Electrical Technology, Vol.-1 – S.Chand & Co. Publications

Blue print:

S. No.	Unit title	No. of periods	Weightage allocated	Marks wise distribution of weightage			Question wise distribution of weightage			CO'S mapped
				R	U	AP	R	U	Ap	
1.	Conducting Materials and Semiconducting Materials	25	26	3	23	0	1	3	0	**CO1**
2.	Insulating Materials and Di-electric Materials	30	26	3	23	0	1	3	0	**CO2**
3.	Magnetic Materials	15	13	3	10	0	1	1	0	**CO3**
4.	Magnetic effects of Electric Current and Electromagnetic Induction	30	29	6	23	0	2	3	0	**CO4**
5.	Electrostatics and Capacitance	20	16	3	3	10	1	1	1	**CO5**
Total		**120**	**110**	**18**	**82**	**10**	**6**	**11**	**1**	

Syllabus to be Covered for Unit Tests

Unit Test	Learning Outcomes to be Covered
Unit Test – I	From 1.1 to 2.6
Unit Test – II	From 2.7 to 4.6
Unit Test – III	From 4.7 to 5.12

C-23-EE-105

MODEL PAPER – FORMATIVE ASSESSMENT-1

BOARD DIPLOMA EXAMINATION, (C-23)

DEEE – FIRST YEAR EXAMINATION

EE-105 : ELECTRICAL ENGINEERING MATERIAL SCIENCE

Time: 90 Minutes **Total Marks: 40**

PART-A **(1 x 4) + (4 x 3) = 16**

Instructions:

i. Answer all **five** questions.
ii. First question carries **four** marks and remaining each question carries **three** marks.
iii. Answers should be brief and straight to the point and shall not exceed five simple sentences

1. (a) Nichrome is an alloy of _____. (CO1)
   (b) Silicon and Germanium materials are _____ type of semiconductors. (CO1)
   (c) Impregnated Paper is a conducting material True / False. (CO2)
   (d) Insulation resistance _____ with the age of the material (increases/decreases) (CO2)
2. Define the terms Hardening and Annealing. (CO1)
3. Mention any three properties of ACSR conductors. (CO1)
4. Distinguish between Intrinsic and Extrinsic Semiconductors in three aspects. (CO1)
5. State any three properties of mica. (CO2)

PART-B **3 X 8 = 24**

Instructions:

i. Answer all three questions.
ii. Each question carries eight marks.
iii. The answers should be comprehensive and the criteria for valuation are the content but not the length of the answer.

6. (a) State the main requirements of Low resistivity materials. (CO1)

   (or)

   (b) State the properties and applications of carbon (CO1)

7. (a) Explain the formation of P- Type Semiconductor. (CO1)

   (or)

   (b) Distinguish between P-Type and N-Type Semiconductors. (CO1)

8. (a) Draw energy level diagrams of conductors, insulators and semi-Conductors. (CO2)

   (or)

   (b) State the properties and applications of (a) Asbestos (b) Glass. (CO2)

C-23-EE-105

MODEL PAPER – FORMATIVE ASSESSMENT-2

BOARD DIPLOMA EXAMINATION, (C-23)

DEEE – FIRST YEAR EXAMINATION

EE-105 : ELECTRICAL ENGINEERING MATERIAL SCIENCE

Time: 90 Minutes **Total Marks: 40**

PART-A **(1 x 4) + (4 x 3) = 16**

Instructions:

i. Answer all **five** questions.
ii. First question carries **four** marks and remaining each question carries **three** marks.
iii. Answers should be brief and straight to the point and shall not exceed five simple sentences

1. (a) Plasticizers are added to PVC in order to _____ (CO2)
   (b) The relative permeability of a paramagnetic substance is slightly more than unity**.** True/False (CO3)
   (c) Above curie temperature, ferromagnetic material exhibits _____ magnetism. (CO3)
   (d) Right Hand Thumb rule is used to determine _____ (CO4)

2. State the any three applications of PVC. (CO2)
3. Mention the permittivity values of (i) Air (ii) Bakelite (iii) Glass (CO2)
4. State any three examples of dia-magnetic materials. (CO3)
5. Define Magnetostriction in magnetic materials. (CO3)

PART-B **3 X 8 = 24**

Instructions:

i. Answer all three questions.
ii. Each question carries eight marks.
iii. The answers should be comprehensive and the criteria for valuation are the content but not the length of the answer.

6. (a) Explain the phenomenon of Polarization in Di-Electric materials. (CO2)

(or)

   (b) State dielectric loss and any four applications of Di-electrics. (CO2)

7. (a) Explain Hard and Soft magnetic materials. (CO3)

(or)

   (b) Explain Hysteresis loop. (CO3)

8. (a) Draw the field patterns due to
   (i) Straight current carrying conductor (ii) Solenoid (CO4)

(or)

(b) State and list the applications of (i) Work law (ii) Biot-Savart's Law (CO4)

C-23-EE-105

MODEL PAPER – FORMATIVE ASSESSMENT-3

BOARD DIPLOMA EXAMINATION, (C-23)

DEEE – FIRST YEAR EXAMINATION

EE-105: ELECTRICAL ENGINEERING MATERIAL SCIENCE

Time: 90 Minutes **Total Marks: 40**

PART-A **(1 x 4) + (4 x 3) = 16**

Instructions:

i. Answer all **five** questions.

ii. First question carries **four** marks and remaining each question carries **three** marks.

iii. Answers should be brief and straight to the point and shall not exceed five simple sentences.

1. (a) Fleming's Right Hand rule is used to determine _____ (CO4)
   (b) The value of Co-efficient of coupling (K) lies between _____ (CO4)
   (c) Relative permittivity has no units (True/False) (CO5)
   (d) The equivalent capacitance when two capacitances C_1 and C_2 are connected in series combination is given by (CO5)
2. State Fleming's Left Hand rule. (CO4)
3. State Lenz's law . (CO4)
4. State Coulomb's laws of Electrostatics. (CO5)
5. Define Di-electric strength and Di-electric constant. (CO5)

PART-B **3 X 8 = 24**

Instructions:

i. Answer all three questions.
ii. Each question carries eight marks.
iii. The answers should be comprehensive and the criteria for valuation are the content but not the length of the answer.

6. (a) Derive an expression for the magnitude of the force on a current carrying conductor inside a magnetic field. (CO4)

(or)

(b) Compare Magnetic circuit with Electric circuit in different aspects. (CO4)

7. (a) Explain Dynamically and Statically induced E.M.Fs. (CO4)

(or)

(b) Develop an expression for the energy stored in a magnetic field (CO4)

8. (a) Draw the field patterns due to

i) Isolated positive charge
ii) Isolated negative charge
iii) Unlike charges placed side by side
iv) Like charges placed side by side (CO5)

. (or)

(b) Derive an expression for the Energy stored in a capacitor. (CO5)

MODEL PAPER – SUMMATIVE EXAMINATION
C-23-EE-105
BOARD DIPLOMA EXAMINATION, (C-23)
DEEE – FIRST YEAR EXAMINATION
EE-105: ELECTRICAL ENGINEERING MATERIAL SCIENCE

Time: 3 hours **Total marks: 80**

PART-A **10 X 3 = 30**

Instructions:

i. Answer all questions.
ii. Each question carries three marks.
iii. Answers should be brief and straight to the point and shall not exceed five simple sentences

1. Define the terms (a) Hardening (b) Annealing (CO1)
2. State any three applications of ACSR Conductors. (CO1)
3. Classify insulating materials. (CO2)
4. Define Polarisation in Dielectric Materials. (CO2)
5. Define Magnetostriction in magnetic materials. (CO3)
6. State Coulombs laws of Magnetism. (CO4)

7. State Lenz's law. (CO4)
8. State Fleming's Right Hand rule. (CO4)
9. Define Di-electric strength and Di-electric constant. (CO5)
10. List the factors affecting the capacitance of a capacitor. (CO5)

PART-B **5 X 10 = 50**

Instructions:

i. Answer any five questions.
ii. Each question carries ten marks.
iii. The answers should be comprehensive and the criteria for valuation are the content but not the length of the answer.

11. Distinguish between Copper and Aluminium in any ten aspects. (CO1)
12. Explain the formation of (i) P – type semiconductor and (ii) N – type semiconductor (CO1)
13. Define Insulation resistance and explain factors affecting insulation resistance (CO2)
14. Explain the properties of PVC and state its applications. (CO2)
15. Explain (i) Soft Magnetic materials (ii) Hard Magnetic materials (CO3)
16. Derive an expression for the magnitude of the force on a current carrying conductor inside a magnetic field. (CO4)
17. Compare Magnetic circuit with Electric circuit in different aspects (CO4)
18. Derive an expression for equivalent capacitance when two Capacitors C_1 and C_2 are connected in Series (CO5)

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BASIC ELECTRICAL TECHNOLOGY

Course code	Course title	No. of periods/week	Total no. of Periods	Marks for FA	Marks for SA
EE-106	BASIC ELECTRICAL TECHNOLOGY	06	180	20	80

S.no	Unit Title	No. of Periods	CO'S Mapped
1	Basic Principles of Electricity	35	**CO1**
2	Resistive Circuits	40	**CO2**
3	Work, Power, Energy and Heating effects of Electric Current	40	**CO3**
4	Conversion Techniques	25	**CO4**
5	Network Theorems	40	**CO5**
TOTAL		**180**	

Course Objectives	i. To understand the basic principles of Electricity and analysing resistive circuits. ii. To comprehend the heating effects of electric current iii. To analyse various DC network theorems.

Course outcomes	**CO1**	EE-106.1	Understand basic principles of electricity
	CO2	EE-106.2	Familiarise with various laws and analysis of resistive circuits
	CO3	EE-106.3	Understand work, power, energy concepts and heating effects of Electric current
	CO4	EE-106.4	Analyse various electric circuit source conversion techniques
	CO5	EE-106.5	Analyse various DC network theorems

LEARNING OUTCOMES

1. Basic Principles of Electricity

1.1 Define Electric Current, Potential difference, Voltage and EMF
1.2 State Ohm's Law and solve problems
1.3 List the limitations of Ohm's Law
1.4 Define the terms
i) Specific resistance ii) Conductance iii) Conductivity

1.5 Derive the relation R =$\rho l/a$ and solve the problems
1.6 Explain the effects of temperature on resistance
1.7 Develop the expression for resistance at any temperature as $R_t = R_o (1+\alpha_o t)$
1.8 Define temperature Co-efficient of resistance and give its unit
1.9 Write the formula for Co-efficient of resistance at any temperatures $\boldsymbol{\alpha_t = \frac{\alpha_0}{1+\alpha_0 t}}$

2. Resistive Circuits

4.1 Develop the expressions for equivalent Resistance with simple SERIES and PARALLEL connections
4.2 Solve problems on equivalent resistance in case of Series - Parallel networks
4.3 State the concept of division of current when two Resistors are connected in parallel and solve the problems
4.4 Differentiate between active and passive circuits.
4.5 Define junction, branch and loop in circuits
4.6 State (i) Kirchhoff's current law (KCL) (ii) Kirchhoff's voltage law (KVL)
4.7 Solve problems by applying branch current method only

3. Work, Power, Energy and Heating effects of Electric Current

3.1 State and explain electric Work, Power and Energy
3.2 Solve problems on Work, Power and Energy
3.3 Mention the typical power ratings of home appliances like Electric lamps (Incandescent, fluorescent, CFL & LED), Water heater, Electric Iron, Fans, Refrigerators, Air and Water coolers, Television sets, Air Conditioners, Water Pumps, Computers, Printers etc.
3.4 Calculate Electricity bill of domestic consumers as per the Electricity Tariff
3.5 Define Joule's law and state its expression.
3.6 Define Thermal efficiency
3.7 Solve problems on Electric heating
3.8 Explain the applications of heat produced due to Electric current in
(i) Metal Filament lamp (ii) Electric kettle (iii) Electric Cooker (iv) Geyser

4. Conversion Techniques

4.1 Explain star and delta circuits
4.2 Explain the concept of circuit transformation and equivalent circuits
4.3 Develop transformation formulae for star- delta transformations and vice-versa
4.4 Solve problems on Star Delta Transformation.

4.5 Explain ideal voltage source & ideal current source
4.6 Explain Source transformation technique
4.7 Solve simple problems on Source transformation technique

5. Network Theorems

5.1 State the need for network theorems
5.2 list different types of theorems applied to DC circuits
5.3 State Super position theorem.
5.4 State Thevenin's theorem.
5.5 State Norton's theorem
5.6 State Maximum power transfer theorem.
5.7 Solve problems on the above theorems (All the theorems with reference to D.C only)

CO-PO/PSO MATRIX

CO No	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PSO1	PSO2	PSO3
EE-106.1	3			3				3		
EE-106.2	3	3				1		3		
EE-106.3	3	3				1	1	3	2	1
EE-106.4	3	3	3		1			3		
EE-106.5	3	3	3	2	1			3		
Average	**3**	**3**	**3**	**2.5**	**1**	**1**	**1**	**3**	**2**	**1**

3-Strongly Mapped 2- Moderately Mapped 1- Slightly Mapped

Note:
The gaps in CO and PO mapping will be achieved by one or more appropriate activities from the following:
(i) Assignments (ii) Tutorials (iii) Seminars (iv) Guest Lectures (v) Group Discussions (vi) Quizzes (vii) Industrial Visits (viii) Tech Fests (ix) Mini Projects (x) Library Visits

HYPONATED COURSE CONTENTS

1. Basic Principles of Electricity

Electric current – Electric Potential, Potential difference, voltage and EMF - Ohm's law and its limitations – Resistance– Specific Resistance – Conductance - Conductivity – effects of temperature on resistance - Temperature coefficient of Resistance.

2. Resistive Circuits

Resistances in series, parallel and series-parallel combinations - concept of division of current when two Resistors are connected in parallel - active and passive circuits - junction, branch, loop – KCL & KVL.

3. Work, Power &Energy and Magnetic Effects of Electric Current

Units of electric Work, Power and Energy. – Ratings of different Domestic Appliances - Calculation of Electricity bill of Domestic Consumer – Mechanical Equivalent of Heat (Joules Law) - Thermal Efficiency - Heat produced due to flow of Current in Metal Filament lamps, Electrical Kettle, Electric Cooker, Geyser

4. Conversion Techniques

Star and delta circuits - ideal voltage source & ideal current source - source transformation - Star-Delta & Delta-Star Transformations.

5. Network Theorems

Need for network theorems - superposition theorem -Thevenin's Theorem - Norton's theorem - Maximum transfer theorem.

REFERENCE BOOKS

1) B.L.Theraja – Electrical Technology, Vol.-1 – S.Chand & Co. Publications
2) V. K .Mehta-Introduction to Electrical Engg
3) J.B.Gupta –A course in Electrical Technology – KATSON BOOKS
4) G.B. Bharadhwajan & A. SubbaRao -Elements of Electrical Engineering.
5) William H. Hayt – Engineering Circuit Analysis – Tata McGraw - Hill

Blue print:

S.No.	Unit title	No. of period	Weightage allocated	Marks wise distribution of weightage			Question wise distribution of weightage			CO'S mapped
				R	U	Ap	R	U	Ap	

1.	Basic Principles of Electricity	35	19	6	3	10	2	1	1	**CO1**
2.	Resistive Circuits	40	23	3	0	20	1	0	2	**CO2**
3.	Work, Power, Energy and Heating effects of Electric Current	40	29	6	3	20	2	1	2	**CO3**
4.	Conversion Techniques	25	13	3	0	10	1	0	1	**CO4**
5.	Network Theorems	40	26	3	3	20	1	1	2	**CO5**
Total		**180**	**110**	21	9	80	7	3	8	

Syllabus to be Covered for Unit Tests

Unit Test	**Learning Outcomes to be Covered**
Unit Test – I	From 1.1 to 2.4
Unit Test – II	From 2.5 to 4.2
Unit Test – III	From 4.3 to 5.7

Time: 90 Minutes Total Marks: 40

PART-A **(1 x 4) + (4 x 3) = 16M**

Instructions:

i. Answer all five questions.

ii. First question carries four marks and remaining each question carries three marks

1. (i) EMF means _____ (CO1)
   (ii) The unit of current is volts (TRUE/FALSE) (CO1)
   (iii) The unit of conductivity is _____ (CO1)
   (iv) If two resistors are connected in parallel, then the equivalent resistance will _____ (increase/decrease) (CO2)
2. State the laws of resistance. (CO1)
3. Derive an expression for resistance at any temperature $R_t = R_0(1+ \alpha_0 t)$. (CO1)
4. Develop the expression for equivalent Resistance when two resistors R_1 and R_2 are connected in series. (CO2)
5. Differentiate between active and passive circuits (CO2)

PART-B **3 X 8 = 24M**

Instructions: i. Answer all three questions. ii. Each question carries eight marks.

6. (a) Derive the relation R =$\rho l/a$ (CO1)

(or)

(b) Explain the effects of temperature on resistance (CO1)

7. (a) A conductor wire has a resistance of 5 ohms. What will be the resistance of the wire, if its diameter is reduced to half and length increased four times. (CO1)

(or)

(b) A lead wire of length 50 meters and 0.5 cm in diameter has a resistance of 500 ohms. Calculate its specific resistance. If the wire is drawn out to three times its original length, by how much times would you expect its resistance to be increased. (CO1)

8. (a) Derive an expression for equivalent resistance when three resistances R_1 , R_2 and R_3 are connected in Parallel. (CO2)

(or)

(b) A resistance of R Ω is connected in series with a parallel circuit consisting of two resistances 4 Ω and 6 Ω respectively. Calculate the value of R if the current in 4 Ω resistance is to be 3A and applied voltage to be 36 V. (CO2)

FORMATIVE ASSESSMENT - 2

BOARD DIPLOMA EXAMINATION

DEEE – FIRST YEAR EXAMINATION

EE-106 BASIC ELECTRICAL TECHNOLOGY

Time: 90 Minutes Total Marks: 40

PART-A **(1 x 4) + (4 x 3) = 16M**

Instructions:

i. Answer all five questions.

ii. First question carries four marks and remaining each question carries three marks

1. (i) The other name for loop is _____ (CO2)
   (ii) KVL deals with node currents (True/False). (CO2)
   (iii) CFL means _____ (CO3)
   (iv) Units of thermal efficiency is _____ (CO3)
2. Define junction and branch (CO2)
3. State Electric Work and Energy (CO3)
4. Define thermal efficiency and explain terms involved in its formula. (CO3)
5. What do you understand by circuit transformation? (CO4)

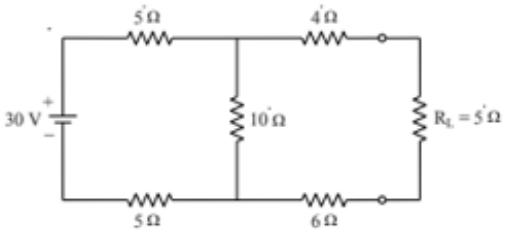
PART-B **3 X 8 = 24M**

Instructions:

i. Answer all three questions.

ii. Each question carries eight marks.

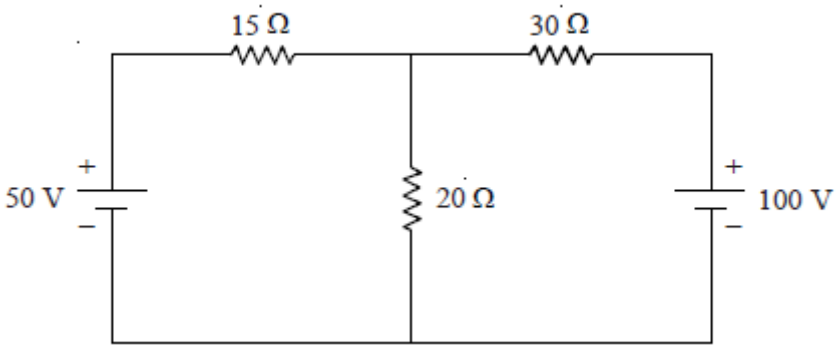
6) (a) In the network shown in Fig. Calculate the current through load resistance R_L (CO2)



FIG

(or)

Using Kirchhoff's laws, find the current 20 ohm resistors in the circuit shown in Fig. (CO2)



7) (a) An electric kettle rated at 1.5KW ,230V takes 7.5 minutes to raise the temperature of 1.5kg of water from 15^0 C to boiling point. Find the efficiency of the kettle. (CO3)

(or)

(b) An immersion heater is required to heat 45.36 litres of water from 20^0C to 90^0C in one hour. Calculate the energy consumed in KWhrs if the efficiency is 86%. (CO3)

8) (a) Calculate the monthly bill of domestic service with the following loads for a month of 30 days.

(i) 4 lamps of 100 W each used for 6 hours a day.
(ii) 2000 W immersion heater used for 1 hour a day.
(iii) 3 fans of 60W each used for 10 hrs a day.
(iv) One 1.5 hp motor working at 80% efficiency for 2hrs/day.

The cost per unit of consumption is Rs.1.35/- and a meter rent of Rs.30 per one month. (CO3)

(or)

(b) Mention the power ratings of the following home appliances (CO3)

i) Incandescent lamp ii) fluorescent lamp iii) Water heater iv) Refrigerator
v) Air conditioner vi) Television vii) Computers viii) Induction stove

BOARD DIPLOMA EXAMINATION
DEEE – FIRST YEAR EXAMINATION
EE-106 BASIC ELECTRICAL TECHNOLOGY
FORMATIVE ASSESSMENT-3

Time: 90 Minutes Total Marks: 40

PART-A **(1 x 4) + (4 x 3) = 16M**

Instructions:

i. Answer all five questions.

ii. First question carries four marks and remaining each question carries three marks

1. (i) Delta connection has no neutral (True/False) (CO4)
   (ii) Internal resistance of voltage source is _____ (CO4)
   (iii) By applying Thevenin's theorem short circuit current can be calculated (True/False) (CO5)
   (iv) Norton's theorem is used to calculate_____ (CO5)
2. Define ideal voltage source (CO4)
3. What do you understand by source transformation (CO4)
4. State Maximum Power Transfer Theorem (CO5)
5. State the importance of Thevenin's theorem (CO5)

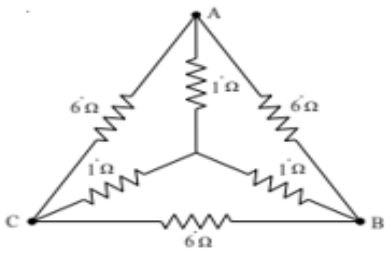
PART-B **3 X 8 = 24**

Instructions: **i. Answer all three questions.**
ii. Each question carries eight marks.

6) (a) Develop the transformation formulae from star to delta (CO4)

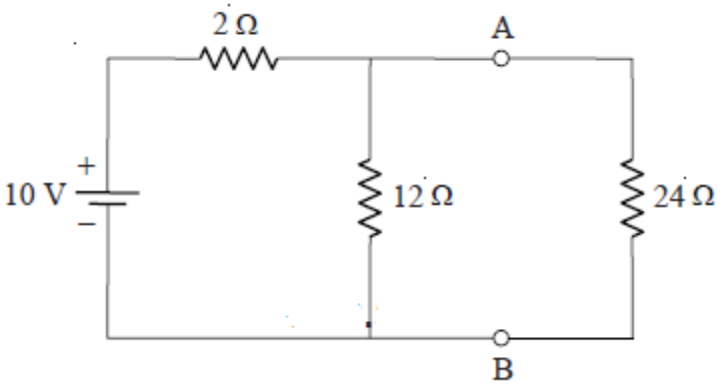
(or)

(b) A network of resistances is shown in Fig. Find the equivalent resistance measured between (i) A and B (ii) B and C and (iii) C and A using star/Delta transformation. (CO4)



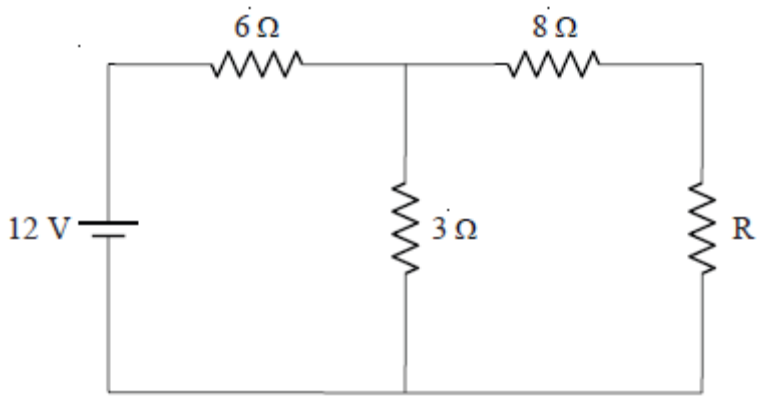
FIG

7. (a) Find the current through 24Ω resistor in the network shown in Fig. by using Thevenin's theorem. (CO5)

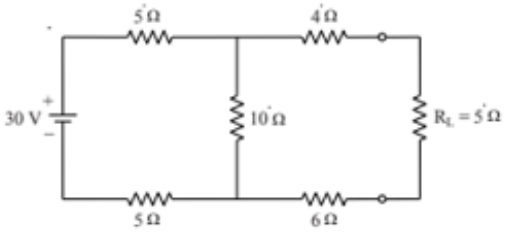


(OR)

(b) For the circuit shown in Fig. determine the value of R for maximum power transfer and also calculate the power delivered under the given condition. (CO5)



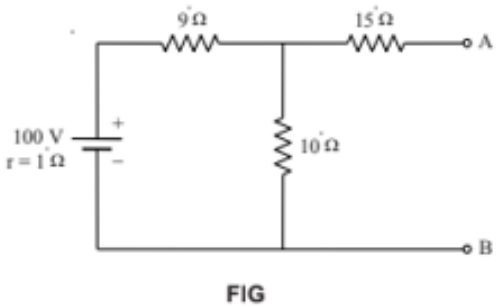
8(a) In the network shown in Fig. Calculate the current through load resistance R_L by using Norton's theorem. (CO5)



FIG

(or)

(b) Find the value of load resistance to be connected across terminals A and B to get maximum power delivered in the circuit shown in Fig. (CO5)



FIG

BOARD DIPLOMA EXAMINATION

DEEE - FIRST YEAR EXAMINATION

EE-106 BASIC ELECTRICAL TECHNOLOGY

Time: 3 Hours Max.Marks:80

PART-A 10x3=30M

Instructions:

1) Answer all questions. Each question carries 3 marks.

2) Answer should be brief and straight to the point and shallexceed five simple sentences.

1. State Ohm's Law (CO1)
2. Define the terms i) Specific resistance ii) Conductance (CO1)
3. Define temperature co-efficient of resistance and give its units. (CO1)
4. Differentiate between active and passive circuits. (CO2)
5. Define Electrical Work and Power (CO3)
6. State Joules's Law (CO3)
7. Define Thermal efficiency (CO3)
8. What do you understand by source transformation (CO4)
9. State the need for network theorems (CO5)
10. State Maximum Power Transfer Theorem (CO5)

PART-B 5x10=50M

Instructions: **1) Answer any Five questions and each question carries Ten marks.**

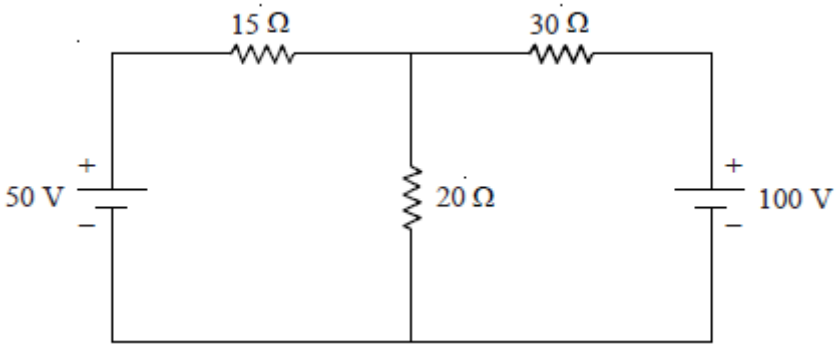
2) The answer should be comprehensive and the criteria for valuation is the content but not the length of the answer.

11. a) Develop the expression for resistance at any temperature as $R_t = R_0 (1+\alpha_0 t)$. (CO1)

    b) The resistance of a conductor at 10°C is 5 ohms and at 100°C is 12 ohms. Find the resistance at 0°C and also find temperature co-efficient at 40°C. (CO1)

12. A resistance of R Ω is connected in series with a parallel circuit consisting of two resistances 4 Ω and 6 Ω respectively. Calculate the value of R if the current in 4 Ω resistance is to be 3A and applied voltage to be 36 V. (CO2)

13. Using Kirchhoff's laws, find the current 20 ohm resistors in the circuit shown in Fig. (CO2)



14. An electric kettle is rated 1.5kW; 230V takes 5 minutes to bring 1kg ofwater to boiling point from 15°C. Find the efficiency of kettle. (CO3)

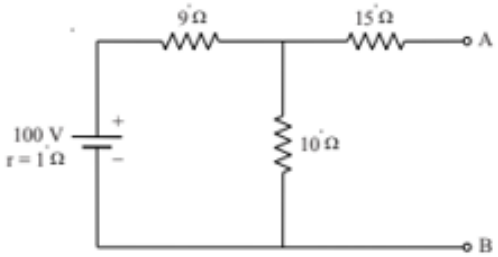
15. Calculate the monthly bill of domestic service with the following loads for a month of 30 days.

(i) 6 lamps of 100 W each used for 6 hours a day.
(ii) 1000 W immersion heater used for 1 hour a day.
(iii) 2 fans of 60W each used for 7 hrs a day.
(iv) One 2 hp motor working at 80% efficiency for 2hrs/day.

The cost per unit of consumption is Rs.1.35/- and a meter rent of Rs.30 per one month. (CO3)

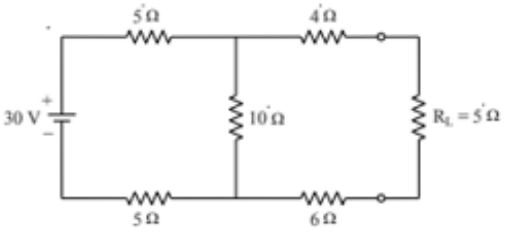
16. Develop transformation formulae for delta to star (CO4)

17. Find the value of load resistance to be connected across terminals A and B to get maximum power delivered in the circuit shown in Fig. (CO5)



FIG

18. In the network shown in Fig. Calculate the current through load resistance R_L by using Norton's theorem. (CO5)



FIG

ENGINEERING DRAWING

Course code	Course Title	No. of periods /week	Total No. of periods	Marks for FA	Marks for SA
EE-107	ENGINEERING DRAWING	3	90	40	60

S.No	Unit Title	No. of periods	CO's Mapped
1	Use of Drawing Instruments, Free Hand Lettering and Dimensioning Practice	10	**CO1**
2	Principles of Geometric Constructions	15	**CO2**
3	Projections of points, lines, planes and solids	20	**CO3**
4	Sectional Views	20	**CO4**
5	Orthographic projection	25	**CO5**
	Total	**90**	

Course Objectives and Course Outcomes

Course Objectives	Upon completion of the course the student shall be able to understand the basic graphic skills and use them in preparation, reading and interpretation of engineering drawings.

Course Outcomes	**CO1**	EE-107.1	Practice the use of engineering drawing instruments and Familiarise with the conventions to be followed in engineering drawing as per BIS
	CO2	EE-107.2	Construct the i) basic geometrical constructions ii) engineering curves
	CO3	EE-107.3	Visualise and draw the projections of i) Points ii) Lines iii) Regular Planes iv) Regular Solids
	CO4	EE-107.4	Visualise and draw the sectional views of components
	CO5	EE-107.5	Visualise and draw the orthographic projections of components

LEARNING OUTCOMES

Upon completion of the course the student shall able to

1.0 **Use of Drawing Instruments, Free Hand Lettering and Dimensioning Practice**

1.1 State the importance of drawing as an engineering communication medium
1.2 Select the correct instruments to draw the different lines / curves.
1.3 Use correct grade of pencil and other instruments to draw different types of lines and for different purposes
1.4 Identify the steps to be taken to keep the drawing clean and tidy.
1.5 Write titles using vertical and slopping (inclined) lettering and numerals of 7mm, 10mm and 14mm height.
1.6 Acquaint with the conventions, notations, rules and methods of dimensioning in engineering drawing as per the B.I.S.
1.7 Dimension a given drawing using standard notations and desired system of dimensioning.

2.0 Principles of Geometric Constructions

2.1 Practice the basic geometric constructions like i) dividing a line into equal parts
i) Exterior and interior tangents to the given two circles
ii) Tangent arcs to two given lines and arcs
2.2 Draw any regular polygon using general method when i) side length is given
i) Inscribing circle radius is given ii) describing circle radius is given
2.3 Draw the engineering curves like i) involute ii) cycloid

3.0 Projections of points, lines, planes and solids (All in first quadrant only)

3.1 Explain the basic principles of the orthographic projections

3.2 Visualise and draw the projection of a point with respect to reference planes (HP & VP)
3.3 Visualise and draw the projections of straight lines with respect to two reference Planes (up to lines parallel to one plane and inclined to other plane)
3.4 Visualise and draw the projections of planes (up to planes perpendicular to one plane and inclined to other plane)
3.5 Visualise and draw the projections of regular solids like Prisms, Pyramids, Cylinder, Cone (up to axis of solids parallel to one plane and inclined to other plane)

4.0 Sectional Views

4.1 Identify the need to draw sectional views.
4.2 Draw sectional views of regular solids by applying the principles of hatching.

5.0 Orthographic projection

5.1 Draw the orthographic views of an object from its pictorial drawing.
5.2 Draw the minimum number of views needed to represent a given object fully.

Competencies and Key competencies to be achieved by the student

S.No	Major topic	Key Competency
1.	Use of Drawing Instruments, Free Hand Lettering and Dimensioning Practice	• Explain the linkages between Engineering drawing and other subjects of study in Diploma course.
		• Select the correct instruments to draw various entities in different orientation
		• Write titles using sloping and vertical lettering and numerals as per B.I.S (Bureau of Indian standards)
		• Dimension a given drawing using standard notations and desired system of dimensioning
2.	Geometrical construction	• Dividing a line into equal parts, tangents to circles, Construct involute, cycloid from the given data.
3.	Projection of points, Lines, Planes & Solids	• Draw the projections of points, straight lines, planes & solids with respect to reference planes (HP& VP)
4.	Sectional Views	• Differentiate between true shape and apparent shape of section • Apply principles of hatching. • Draw simple sections of regular solids

5.	Orthographic Projection	• Draw the minimum number of views needed to represent a given object fully.

COURSE CONTENTS:

NOTES: 1. B.I.S Specification should invariably be followed in all the topics. 2. A-3 Size Drawing Sheets are to be used for all Drawing Practice Exercises.

1.0 Use of Drawing Instruments, Free Hand Lettering and Dimensioning Practice

Explanation of the scope and objectives of the subject of Engineering Drawing . Its importance as a graphic communication -Need for preparing drawing as per standards – SP-46 –1988 – Mention B.I.S - Role of drawing in -engineering education - Basic Tools, tools for drawing– Mentioning of names under each classification and their brief description -Scales: Recommended scales reduced & enlarged -Lines: Types of lines, selection of line thickness - Selection of Pencils -Sheet Sizes: A0, A1, A2, A3, A4, A5, Layout of drawing sheets in respect of A0, A1, A3 sizes, Sizes of the Title block and its contents - Care and maintenance of Drawing Sheet,

Importance of lettering – Types of lettering -Guide Lines for Lettering Practicing of letters & numbers of given sizes (7mm, 10mm and 14mm)-Advantages of single stroke or simple style of lettering - Use of lettering stencils- Purpose of engineering Drawing, Need of B.I.S code in dimensioning -Shape description of an Engineering object -Definition of Dimensioning size description -Location of features, surface finish, fully dimensioned Drawing -Notations or tools of dimensioning, dimension line extension line, leader line, arrows, symbols, number and notes, rules to be observed in the use of above tools -Placing dimensions: Aligned system and unidirectional system (SP-46-1988)-Arrangement of dimensions Chain, parallel, combined progressive, and dimensioning by co-ordinate methods-The rules for dimensioning standard, features “Circles (holes) arcs, angles, tapers, chamfers, and dimension of narrow spaces.

2.0 Geometric Constructions

Division of a straight line into given number of equal parts –Drawing interior and exterior tangents to two circles of given radii and centre distance-Drawing tangent arc of given radius to touch two lines inclined at given angle (acute, right and obtuse angles), Tangent arc of given radius touching a circle or an arc and a given line, Tangent arcs of radius R, touching two given circles internally and externally-Construction of any regular polygon by general method for given side length, inscribing circle radius and describing/superscripting circle radius - Involute, Cycloid, explanations as locus of a moving point, their engineering application, viz., Gear tooth profile, screw threads, springs etc. – their construction

3.0 Projection of points, lines and planes and Solids (All in first quadrant only)

Classification of projections, Observer, Object, Projectors, Projection, Reference Planes, Reference Line, Various angles of projections –Differences between first angle and third angle projections

Projections of points -Projections of straight line –(a) Parallel to both the planes, (b)Perpendicular to one of the planes and (c) Inclined to one plane and parallel to other planes-Projections of regular planes-(a) Plane parallel to one of the reference planes, (b) Plane perpendicular to HP and inclined to VP and vice versa- Projections of regular solids- (a) Axis perpendicular to one of the planes, (b) Axis parallel to VP and inclined to HP and vice versa.

4.0 Sectional Views

Need for drawing sectional views – what is a sectional view - Hatching – Section of regular solids inclined to one plane and parallel to other plane

5.0 Orthographic Projections

Meaning of orthographic projection - Using a viewing box and a model – Number of views obtained on the six faces of the box, - Legible sketches of only 3 views for describing object -Concept of front view, top view, and side view sketching these views for a number of engineering objects - Explanation of first angle projection. – Positioning of three views in First angle projection - Projection of points as a means of locating the corners of the surfaces of an object – Use of meter line in drawing a third view when other two views are given -Method of representing hidden lines -Selection of minimum number of views to describe an object fully.

REFERENCE BOOKS

1 Engineering Graphics by P I Varghese – (McGraw-hill)
2 Engineering Drawing by Basant Agarwal & C.M Agarwal - (McGraw-hill)
3 Engineering Drawing by N.D.Bhatt.
4 T.S.M. & S.S.M on " Technical Drawing" prepared by T.T.T.I., Madras.
5 SP-46-1998 – Bureau of Indian Standards.

PO-CO Mapping

EE-107	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	3	2	2		1		1	2	3	1
CO2	3	2	2			2	1	2	3	1
CO3	3	2	2	1	1		1	2	3	1
CO4	3	2	2	1		2	1	2	3	1
CO5	3	2	2	1	1	2	1	2	3	1
CO6	3	2	2	1	1	2	1	2	3	1
AVERAGE	**3**	**3**	**3**	**1**	**1**	**2**	**1**	**2**	**3**	**1**

3: High, 2: Moderate,1: Low

Blue Print

S.No	Unit Title	No. of Periods	Weightage Allocated	Marks wise distribution of weightage			Question wise distribution of weightage			CO'S Mapped
				R	U	AP	R	U	AP	
1	Use of Drawing Instruments, Free Hand Lettering and Dimensioning Practice	10	10	05	05	00	01	01	00	CO1
2	Principles of Geometric Constructions	15	15	00	00	15	00	00	02	CO2
3	Projections of points, lines, planes and solids	20	25	00	00	25	00	00	03	CO3
4	Sectional Views	20	10	00	00	10	00	00	01	CO4
5	Orthographic projection	25	20	00	00	20	00	00	02	CO5
Total		**90**	**80**	**05**	**05**	**70**	**01**	**01**	**08**	

Table specifying syllabus to be covered for UNIT TEST I, II and III.

Unit Test	Learning Outcomes to be Covered
Unit Test – I	From 1.1 to 2.3
Unit Test – II	From 3.1 to 3.5
Unit Test – III	From 4.1 to 5.2

UNIT TEST-I, C-23, I YEAR, EE-107

ENGINEERING DRAWING

TIME:90 MINUTES MAX MARKS: 40

PART-A (4X5=20)

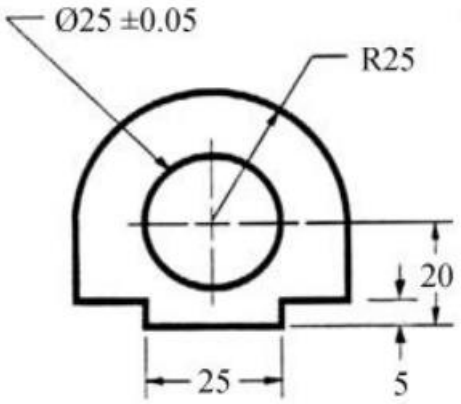
Instructions :

(1) Answer all questions. (2) Each question carries five marks. (3) All dimensions are in mm.

1. Write the following using single-stroke capital inclined letters of 14mm size **CO1**

"ALL THE BEST FOR YOUR EXAMINATION"

2. The component and its dimensions are shown in the fig. below. Redraw it to a full scale adopting the recommendations of SP : 46–1988. **CO1**



3. Divide a line of length 60 mm into seven equal parts. **CO2**

4.. Construct regular pentagon of side 25 mm by any one method. **CO2**

PART-B (2X10=20)

5. . Draw an internal common tangent to two circles of radii 30 mm and 20 mm. **CO2**

6. . A circle of 50 mm diameter rolls along a line for one revoluation clock wise. Draw the locus of a point on the circumference of circle which is in contact with the line. **CO2**

7. Draw an involute to a circle of radius 20 mm. **CO2**

8. Draw a helix of pitch 60 mm on a cylinder of diameter of 50 mm. **CO2**

UNIT TEST-II, C-23, 1st YEAR, EE-107, ENGINEERING DRAWING

TIME:90 MINUTES **MAX MARKS: 40**

PART-A **(4X5=20M)**

Answer all questions and each question carries four marks.

1. A point A is lying at 30 mm behind V.P and 60 mm below H.P. Draw its projections. **CO3**
2. A 60 mm long line pq has an end p at 20 mm above the H.P. and 30 mm in front of the VP. The line is inclined at 45° to the HP. And 30° to the VP. Draw its projections. **CO3**
3. A circular plane of diameter 60 mm is touching the VP with a point on its circumference. The plane is inclined at 45° to VP and perpendicular to HP. The centre of the plane is 40 mm above HP. Draw its projections. **CO3**
4. A square prism 40 mm base side and height 60 mm is standing vertically on its square base 10 mm above HP and one of its rectangular faces making an angle of 60° with V.P. Draw its projections. **CO3**

PART-B **(2X10=20 M)**

Answer any two questions and Each question carries ten marks

5. A pentagonal lamina of side 25 mm rest on the HP on one of its edges, such that the surface is inclined at 45° to the HP, and the edge on which it rests is inclined at 60° to the VP. Draw its projections **CO3**
6. A rectangular plane ABCD of size 40mm X 30mm is inclined to the HP at 30°. Its shorter side AB is parallel to HP and inclined at 45° to VP. Draw its projections. **CO3**
7. A hexagonal pyramid of base side 25 mm and height 60 mm is standing on HP with one of its base edges making an angle of 60o with VP and axis making an angle of 45° with HP. Draw its projection. **CO3**
8. Draw the projections of a cone , base 30mm diameter and axis 50mm long resting on HP on a point of its base circle with the axis making an angle 45°with HP and parallel to VP. **CO3**

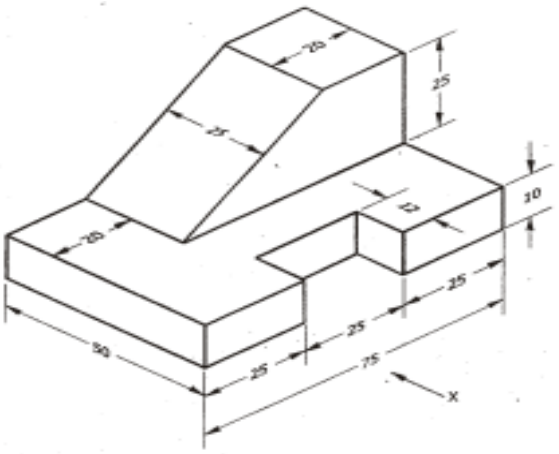
UNIT TEST-III, C-23, 1st YEAR, EE-107,
ENGINEERING DRAWING

TIME:90 MINUTES **MAX MARKS: 40**

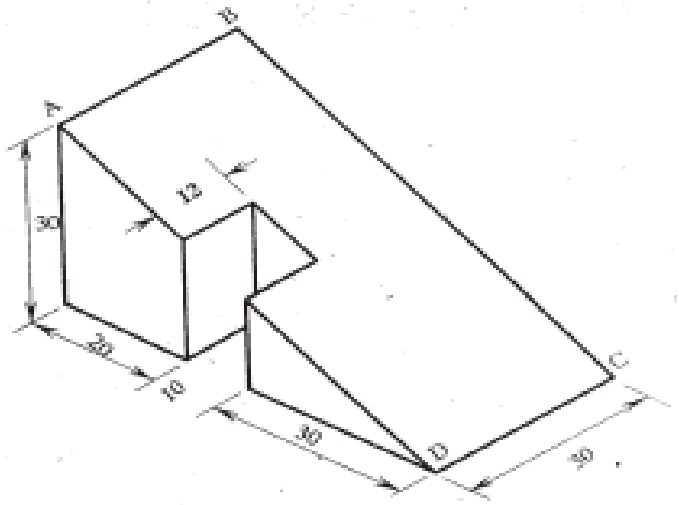
PART-A **(4X5=20M)**

Answer all questions and each question carries four marks.

1. A triangular prism with a base side of 50 mm and height 70 mm is resting on one of its rectangular faces on HP with the axis perpendicular to VP. The prism is cut by a horizontal section plane passing through the axis. Draw front view and sectional top view of the prism. **CO4**
2. A square pyramid of base side 50mm and axis 75 mm long is resting on the ground with its axis vertical and sides of the base equally inclined to the VP. It is cut by a section plane perpendicular to VP inclined at 45^{o} to HP and bisecting the axis. Draw its sectional top view. **CO4**
3. Draw the front view and top view of the following figure : **CO5**



4. Draw the front view and top view of the following figure **CO5**



PART-B **(2X10=20 M)**

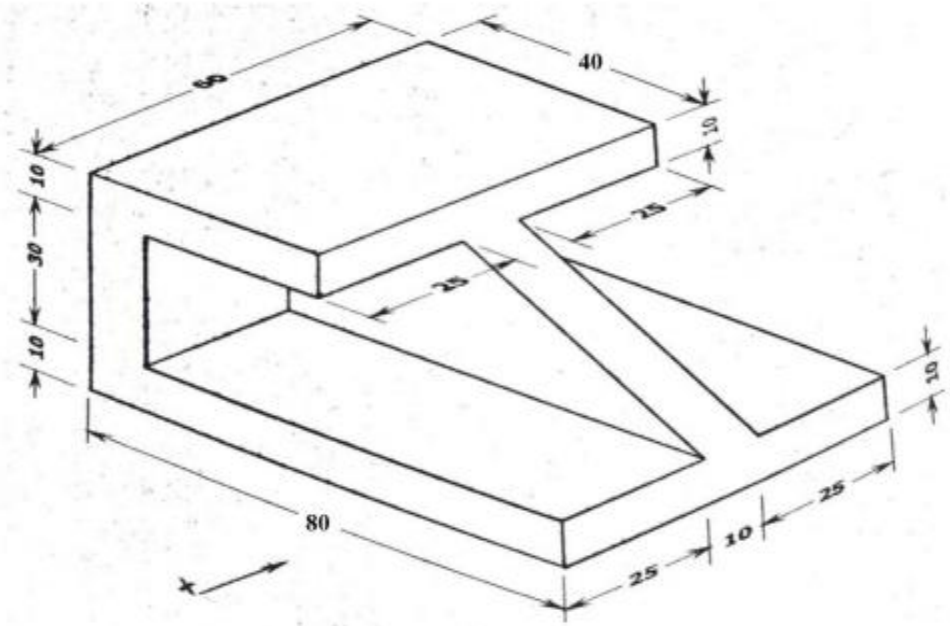
***Answer any Two questions, Each question carries ten marks*.**

1. A pentagonal pyramid of base side 40 mm and height 80mm is resting on HP on its base with one of its base side parallel to VP. It is cut by a plane inclined at 30^{o} to HP, perpendicular to

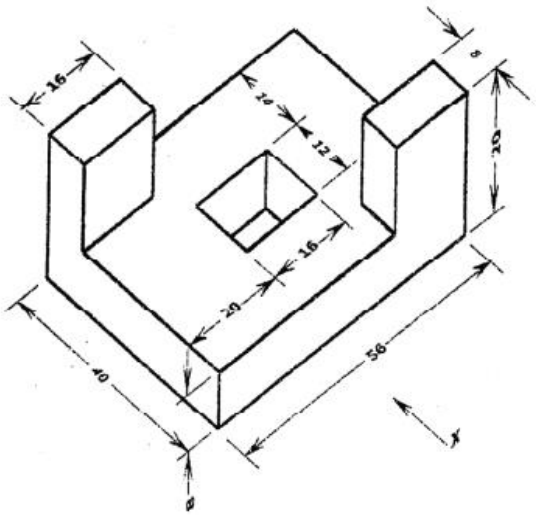
VP and is bisecting the axis. Draw its front view, sectional top view and the true shape of section. **CO4**

2. A cone of diameter 60 mm and height 70 mm is resting on ground on its base. It is cut by a section plane perpendicular to VP inclined at 45° to HP and cutting the axis at a point 40 mm from the bottom. Draw the front view , sectional top view and true shape. **CO4**

7. Draw the front view, side view and top view of the following figure: **CO5**



8. Draw orthographic views of front view and top view of the given isometric figure below. **CO5**



C-23-EE-107

BOARD DIPLOMA EXAMINATIONS
MODEL QUESTION PAPER
DEEE – I-YEAR
EE-107 :: ENGINEERING DRAWING

Time: 90 Minutes **Total Marks: 40**

Instructions:i. All the dimensions are in mm

ii. Use first angle projections only

iii. Due weightage will be given for the dimensioning and neatness

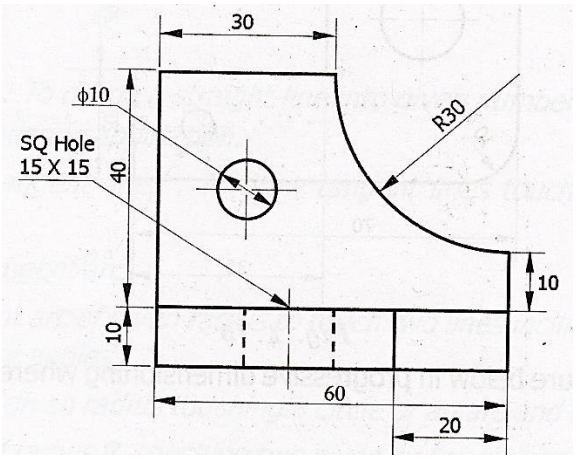
PART – A **05 x 04=20**

i. Answer all the questions
ii. Each question carries FIVE marks

1. Write the following in single stroke capital vertical lettering of size 10mm

   ORTHOGRAPHIC PROJECTIONS

2. Redraw the given fig. and dimension it according to SP-46:1988.Assume suitable scale



3. Draw internal common tangents to two unequal circles of radii 26mm and 20mm. The distance between the circles is 75mm.

4. Draw the projections of a point A lying on HP and 25mm in front of V.P.

PART – B **10 X 04 = 40**

i. Answer any FOUR questions

ii. Each question carries TEN marks

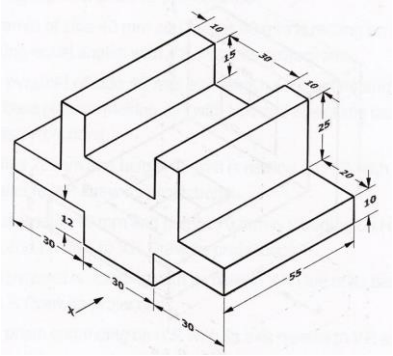
5. Draw the involute of a circle of diameter 30 mm and also draw a tangent to the curve at a distance of 60 mm from the centre of the circle.

6. A right circular cone of height 80 mm and base radius 60 mm is resting in the H.P. on one of its generators and its axis is parallel to V.P. Draw the projections of the solid.

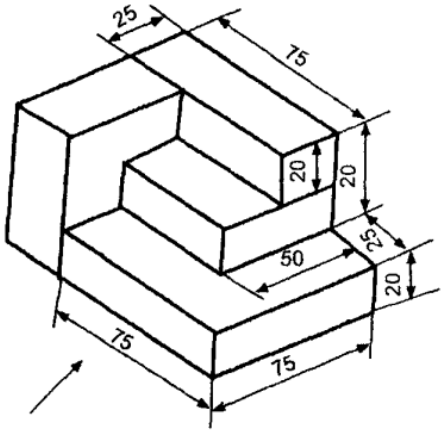
7. A cylinder with base 40mm diameter and 50mm long rests on a point of its base on HP such that the axis makes an angle of 30° with HP. Draw the projections of the cylinder.

8. A regular hexagonal prism of height 80 mm and base side 40 mm is resting in the H.P. on its base. It is cut by an auxiliary inclined plane of 60^0 inclination passing through the axis at a distance of 30 mm from the top base. Draw the sectional views of the solid and the true section.

9. Draw the front view, top view and left side view of the object shown in the fig.



10. Draw the front view, top view and left side view of the object shown in the fig.



ELECTRICAL WIRING LABORATORY

Course code	Course title	No. of periods/ week	Total no.of periods	Marks for FA	Marks for SA
EE-108	ELECTRICAL WIRING LABORATORY	06	180	40	60

S.no	Chapter Title	No. of Periods	CO'S Mapped
1	Wiring tools and Accessories	20	**CO1**
2	Electrical Wiring Joints and Soldering Practice	30	**CO2**
3	Lamp Circuits	50	**CO3**
4	DC and AC circuits	40	**CO4**
5	Test and repair of domestic appliances	40	**CO5**
TOTAL		**180**	

Course objectives	1) To familiarise with the knowledge of different wiring tools used in electrical wiring 2) To know the etiquette of working in the domestic wiring 3) To identify and rectify the simple faults that can occur in domestic appliances

Course outcomes	CO1	EE-108.1	Understanding various tools and know their usage
	CO2	EE-108.2	Perform different joints, Soldering practice and execute different wiring circuits
	CO3	EE-108.3	Perform various lamp control methods
	CO4	EE-108.4	Identify the difference between DC and AC
	CO5	EE-108.5	Testing and repairing of domestic applications.

LEARNING OUTCOMES

1. Wiring Tools and Accessories

1.1 Identify the following electrical wiring tools with respect to i) Size ii) Shape iii) Purpose iv) Speed v) Use

a) Screw drivers
b) Pliers
c) Drilling machines & Drilling Bits.
d) Rawl plug jumper, and poker
e) Voltage/line tester
f) Splicers (insulation remover)
g) Standard Wire gauge

1.2 Identify different types of Electrical Wiring accessories with respect to i) Size ii) Shape iii) Purpose iv) Use.

a) Switches
b) Ceiling roses
c) Lamp Holders and Adopters
d) Sockets
e) Plug
f) Fuses

1.3 Identify different types of main switches with respect to i) Rating ii) Purpose iii) Use.

SP, DP mains, TP, ICDP, ICTP, SPDT, DPDT, TPDT, Changeover-Knife type, Rotary, Micro, Modular switches, 2-pole and 3-pole MCBs

1.4 Study different types of wires and cables (1/18,3/20,7/20) with respect to sizes rating, purpose and use etc

2. Electrical Wiring Joints and Soldering Practice

2.1 Prepare Straight joint/ Married joint

2.2 Prepare T joint
2.3 Prepare Western union joint
2.4 Prepare Pigtail joint
2.5 Familiarisation to use soldering tools and components
2.6 Soldering simple electronic circuits on PCB

3. Lamp Circuits

3.1 Make a circuit with One lamp controlled by one switch using PVC surface conduit system
3.2 Make a circuit with Two lamps controlled by two switches using PVC surface conduit system
3.3 Make a circuit with One lamp controlled by one switch and provision of 2/3-pin socket.
3.4 Make a circuit for Stair-case wiring
3.5 Make a circuit for Go-down wiring
3.6 Control two Lamps by Series - Parallel connection using one 1-way switch & two 2-way switches with PVC surface conduit system
3.7 Control two sub- circuits through Energy meter, MCB's and two 1-way switches.
3.8 Prepare switch board with star delta starter, MCB, Pilot lamps for 3 phase motor
3.9 Control and practice the wiring for Fluorescent Lamp
3.10 Connect Computer by main switch board with a miniature circuit breaker.

4. DC and AC circuits

4.1 Demonstrate unidirectional current flow with 12 V battery
4.2 Determine polarity using a Voltmeter /LED
4.3 Demonstrate AC using a Low voltage Transformer
4.4 Practice Series and Parallel connection of Lamps
4.5 Practice Bright and Dim light arrangement

5. Test and repair of the Domestic appliances

5.1 Testing and repair of electric heater
5.2 Testing and repair of iron box
5.3 Testing and repair of electric kettle
5.4 Testing and repair of electric cocker
5.5 Testing and repair of electric geyser

CO-PO/PSO MATRIX

CO No	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
EE-108.1	3	1						3		
EE-108.2	3			2	1.5			3		
EE-108.3	3		1.5					3	1.5	
EE-108.4	3							3		
EE-108.5	3	2			1			3	1	
Average	**3**	**1.5**	**1.5**	**2**	**1.25**			**3**	**1.25**	

3-Strongly Mapped 2- Moderately Mapped 1- Slightly Mapped

Competencies to be achieved by the Student:

S.No	Competencies	Key Competencies
1	Handle the different wiring tools and accessories a) select switches, and MCB's b) Identify wires and cables as per the requirements of the load.	•Identify the size and specifications of various tools used for electrical wiring. • Understand the usage of the standard wire gauge. •Identify the type, size and specifications of DP mains,
2.1	To prepare a Straight joint/Married joint using a 7/20 Al. Cable	• Identify the size of the cable • Perform splicing of Insulation properly. • Perform Straight joint/Married joint
2.2	To prepare a T joint using a 7/20 Al. Cable	•Insert the leads of the wires properly as per the sketches. • Twist the wires properly.
2.3	To prepare a Western union joint using a single strand Al. Cable	• Overlap the two wires properly • Twist the binding wires properly
2.4	To prepare a Pig tail joint using a single strand Copper Cable	• Place the wires in V-shape. • Twist the wires in clock wise direction.

2.5	To Familiarise various soldering tools and components	• Identifying Soldering gun, flux, lead
2.6	To solder simple electronic circuits on PCB	• Draw the layout of circuit • Carefully Soldering the circuit on PCB.
3.1	To control one lamp by one 1-way switch with PVC surface conduit wiring system	• Draw wiring diagram • Identify the size of cable, PVC pipe, type of1-way switch and lamp holder. • Make Connections as per Wiring Diagram
3.2	To control two lamps by two 1-way switches w\ith PVC surface conduit wiring system	• Draw wiring diagram • Handle the screw driver, electrician Knife, line tester to fix the PVC pipe using saddles and junction boxes. • Select colour and length of wire for phase and neutral • Switch on the supply after making of the connections • Disconnect the circuit after testing.
3.3	To control one lamp and 2/3 pin socket by two1-way switches with PVC surface conduit wiring system	• Connect 2/3 pin socket properly with respect to phase, neutral and earth. • Connect phase wire through switches.
3.4	Stair-case wiring	• Select two 2-way switches • Connect 2- way switches as per circuit diagram. • Test with 1-phase, 230V, 50 Hz supply to the circuit connected through ICDP switch.
3.5	Go-down wiring scheme	• Draw wiring diagram • Connect the circuit as per the diagram. • Observe sequence of operation of switches • Test with 1-phase,230 V,50 Hz supply to the circuit, neutral wire to the bottom point of the 1- way switch and phase to the first point of lamp holder
3.6	Series-Parallel connection	• Select colour and length of wire for phase and neutral. • Make connections as per wiring diagram. • Draw wire through PVC pipe properly • Observe glow intensity of lamps for series and parallel connections
3.7	Control two sub circuits through Energy meter, MCB's and two 1-way switches	• Draw wiring diagram. • Identify the size of cable,1-way switch, PVC pipe, MCB, capacity of Inverter and Socket • Read the specifications of MCB, capacity of Inverter and Socket • Make connections as per wiring diagram. • Draw wire through PVC pipe properly. • Connect supply to Inverter through MCB properly. • Select appropriate socket with switch control. • Make earth wire connections for required points.

3.8	Prepare switch board with star delta starter, MCB, Pilot lamps for 3 phase motor	• Select the size of cable, PVC pipe, star-delta starter, MCB and lamp holder • Make connections as per wiring diagram. • Draw wire through PVC pipe properly. • Draw wire of the 3-phase to the motor through star-delta starter. • Test with 3-phase, 415 V, 50 Hz supply to the circuit connected through ICDP switch. • Test by changing any two phases of input supply
3.9	Wiring practice of fluorescent lamp	• Make connections as per wiring diagram. • Connect top point and bottom point of the choke to tube light properly. • Note the importance and working of starter.
3.10	Connect computer by main switch board with a miniature circuit breaker.	• Draw wiring diagram. • Identify the size of cable, 1-way switch, PVC pipe, MCB and Sockets • Read the specifications of MCB and Sockets • Make connections as per wiring diagram. • Connect supply to Computer through MCB properly. • Select appropriate sockets with 1-way switch control. • Make earth wire connections for require points.
4.1	Demonstrate difference between DC and AC	• Connect DC source and measure V & I • Connect proper AC source and measure V &I • Make inferences.
5.1	Testing and repair of domestic appliances	• Inspect the appliance visually. • Check for any discrepancies. • Perform the disassembling operation • Test the inner parts for any faults • Rectify the faults if any . • Replace the parts if necessary. • Perform the assembling. • Test the Domestic appliance for proper functioning.

Note: 1. Every student has to bring insulated tool kit and follow the general safety precautions throughout the lab sessions

2. Should not touch the live terminals.

PHYSICS LABORATORY

Course code	Course Title	No. of Periods/Weeks	Total No. of periods	Marks for FA	Marks for SA
EE-109	PHYSICS LABORATORY	3	45	40	60

TIME SCHEDULE

S.No	List of experiments	No. of Periods
1.	Vernier calipers	03
2.	Micrometer (Screw gauge)	03
3.	Verification of Lami's theorem using concurrent forces	03
4.	Determination of g using simple pendulum	03
5.	Focal length and power of convex lens	03
6.	Refractive index of solid using travelling microscope	03
7.	Verification of Boyle's law using Quill tube	03
8	Determination of pole strength of the bar magnet through magnetic field lines	03
9	Resonance apparatus – Determination of velocity of sound in air	03
	Experiments for demonstration	
10	Meter bridge – Determination of resistance and specific resistance of a wire	03
11	Verification of Newton's law of cooling	03
12	Photo electric cell – Study of its characteristics	03
	Revision	06
	Test	03
	Total:	**45**

Course objectives	(1) To provide strong practical knowledge of Physics to serve as a tool for various device applications in Engineering. (2) To enhance scientific skills of the students by incorporating new experiments so as to enrich the technical expertise of the students as required for industries.

COURSE OUTCOMES	CO1	Improving accuracy in various measurements; understanding the nature of the forces keeping the body in equilibrium.
	CO2	Estimating the acceleration caused by the gravity of earth; Practical study of the concepts of refraction of light at curved/plane surface
	CO3	Understanding the pressure of the gas as function of its volume; study of the combined magnetic field of the earth and an artificial magnet to estimate its pole strength; Estimating the velocity of sound in air through resonance phenomenon.
	CO4	Applying Kirchoff's laws to evaluate the specific resistance of a wire; Study of exchange of heat from system to surrounding by graphical analysis; Conversion of light to micro currents as potential engineering application.

Objectives:

Upon completion of the course the student shall be able to

1.0 Practise with Vernier calipers to determine the volumes of a cylinder and sphere..

2.0 Practise with Screw gauge to determine thickness of a glass plate and cross sectional area of a wire.

3.0 Verify the Lami's theorem using concurrent forces.

4.0 Determine the value of acceleration due to gravity using Simple Pendulum. To verify the result from $l\text{-}T^2$ graph.

5.0 Calculate the Focal length and focal power of convex lens using distant object method, U-V method , U-V graph and 1 / U – 1 / V graph methods.

6.0 Determine the refractive index of a solid using travelling microscope

7.0 Verify the Boyle's law using Quill tube. To draw a graph between P and 1/l.

8.0 Determination of magnetic pole strength of a bar magnet by drawing magnetic lines of force and locating null points (either N-N or N-S method)

9.0 Determine the velocity of sound in air at room temperature and its value at zero degree

centigrade.

10.0 Determine the resistance and specific resistance of material of a wire using Meter Bridge

11.0 To verify the Newton's law of cooling.

12..0 To study the characteristics of photo electric cell.

S.No	List of experiments	No. of Periods	COs
1.	Vernier calipers	03	CO1
2.	Micrometer (Screw gauge)	03	
3.	Verification of Lami's theorem using concurrent forces	03	
4.	Determination of g using simple pendulum	03	CO2
5.	Focal length and power of convex lens	03	
6.	Refractive index of solid using travelling microscope	03	
7.	Verification of Boyle's law using Quill tube	03	CO3
8	Determination of pole strength of the bar magnet through magnetic field lines	03	
9	Resonance apparatus – Determination of velocity of sound in air	03	
10	Meter bridge – Determination of resistance and specific resistance of a wire	03	CO4
11	Verification of Newton's law of cooling	03	
12	Photo electric cell – Study of its characteristics	03	

Competencies and Key competencies to be achieved by the student

Name of the Experiment	Competencies	Key competencies
1. Hands on practice on Vernier Calipers(03)	• Find the Least count • Fix the specimen in posit • Read the scales • Calculate the physical quantities of given object	• Read the scales • Calculate the requisite physical quantities of given objects

2. Hands on practice on Screw gauge (03)	• Find the Least count • Fix the specimen in posit • Read the scales • Calculate thickness of glass place and cross section of wire and other quantities	• Read the scales • Calculate thickness of given glass plate • Calculate cross section of wire and other quantities
3. Verification of Parallelogram law of forces and Triangle law of forces (03)	• Fix suitable weights • Note the positions of threads on drawing sheet • Find the angle at equilibrium point • Construct parallelogram • Compare the measured diagonal • Construct triangle • Find the length of sides • Compare the ratios	• Find the angle at equilibrium point • Constructing parallelogram • Construct triangle • Compare the ratios of force and length
4. Simple pendulum (03)	• Fix the simple pendulum to the stand • Adjust the length of pendulum • Find the time for number of oscillations • Find the time period • Calculate the acceleration due to gravity • Draw l-T and l-T^2 graph	• Find the time for number of oscillations • Find the time period • Calculate the acceleration due to gravity • Draw l-T and l-T^2 graph

➢ CO-PO MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
C0.1	3	2	2	2	2	1	2
C0.2	3		1	1	1	1	1
C0.3	3	2			1		
C0.4	3	2	2			1	2

CHEMISTRY LABORATORY

Course code	Course Title	No. of Periods/Weeks	Total No. of periods	Marks for FA	Marks for SA
EE-110	Chemistry Laboratory	3	45	40	60

CO1	Operate and practice volumetric apparatus and preparation of standard solution
CO2	Evaluate and judge the neutralization point in acid base titration
CO3	Evaluate the end point of reduction and oxidation reaction
CO4	Judge the stable end point of complex formation, stable precipitation
CO5	Judge operate and demonstrate and perform precise operations with instrument for investigation of water pollution parameters

PO- CO mapping

Course code Common-110	**Chemistry Laboratory No of Cos:5**				**No Of periods 45**
POs	Mapped with CO No	CO periods addressing PO in Col 1 NO	%	Level 1,2,3	remarks
PO1	CO1,CO2,CO3, CO4,CO5	12	26.66	2	>40% level 3 (highly addressed) 25% to 40% level2(moderately addressed 5% to 25% level1 (Low addressed < 5%(not addressed)
PO2	CO1,CO2,CO3, CO4,CO5	9	20	1	
PO3					
PO4	CO1,CO2,CO3, CO4,CO5	12	26.66	2	
PO5	CO2,CO3, CO4,CO5	12	26.66	2	
PO6					
PO7					

COs-POs mapping strength (as per given table)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	2	3		1				1		
CO2	2	3		2	2			1		
CO3	2	3		2	2			1		
CO4	2	3		2	2			1		
CO5	2	3		2	2			1		

3=strongly mapped 2= moderately mapped 1= slightly mapped

Note: The gaps in CO and PO mapping will be achieved by one or more appropriate activities from the following: i) Seminars ii) Tutorials iii) Guest Lectures iv) Assignments v) Quiz competitions vi) Industrial visit vii) Tech Fest viii) Mini project ix) Group discussions x) Virtual classes xi) Library visit for e-books

TIMESCHEDULE

S.No	Name of the Experiment	No. of Periods	Mapped with COs
1.	gnition of chemical substances and solutions used in the laboratory by senses. liarization of methods for Volumetricanalysis	03	CO1
2.	ıtion of Std Na_2CO_3 and making solutions of different dilution solution.	03	CO1
3.	Estimation of HCl solution using Std.Na_2CO_3 solution	03	CO2
4.	Estimation of NaOH using Std.HCl solution	03	CO2
5	ination of acidity of water sample	03	CO2
6	ination of alkalinity of water sample	03	CO2
7.	ion of Mohr's Salt using Std.$KMnO_4$	03	CO3
8.	ion of Ferrous ion by using Std. $K_2Cr_2O_7$	03	CO3
9.	ination of total hardness of water using Std. EDTA solution	03	CO4
10.	ion of Chlorides present in water sample	03	CO4
11.	ion of Dissolved Oxygen(D.O)in water sample	03	CO5
12.	Determination of pH using pH meter	03	CO5
13	Determination of conductivity of water and adjusting ionic strength	03	CO5
14.	Determination of turbidity of water	03	CO5
15.	Estimation of total solids present in water sample	03	CO5
	Total:	**45**	

Objectives:

Upon completion of the course the student shall be able to

1.0 Practice volumetric measurements (using pipettes, measuring jars, volumetric flask, burettes) and gravimetric measurements (using different types of balances), making dilutions, etc. To identify the chemical compounds and solutions by senses.

2.0 Practice making standard solutions with pre weighed salts and to make solutions of desired dilutions using appropriate techniques.

3.0 Conduct titrations adopting standard procedures and using Std. Na_2CO_3solutionfor estimation of HCl

4.0 Conduct titrations adopting standard procedures and using Std. HCl solution for estimation of NaOH

5.0 Conduct titrations adopting standard procedures to determine the acidity of given samples of water (One ground water and one surface / tap water, and rain water if available)

6.0 Conduct titrations adopting standard procedures to determine the alkalinity of given samples of water (One ground water and one surface / tap water)

7.0 Conduct titrations adopting standard procedures and using Std.$KMnO_4$ solution for estimation of Mohr'sSalt

8.0 Conduct titrations adopting standard procedures and using Std.$K_2Cr_2O_7$ solution for estimation of Ferrous ion.

9.0 Conduct titrations adopting standard procedures to determine the total hardness of given samples of water (One ground water and one surface / tap water) using Std. EDTA solution

10.0 Conduct titrations adopting standard procedures to determine the chlorides present in the given samples of water and wastewater (One ground water and one surface / tap water)

11.0 Conduct the test using titrometric / electrometric method to determine Dissolved Oxygen (D.O) in given water samples (One sample from closed container and one from open container / tap water)

12.0 Conduct the test on given samples of water / solutions (like soft drinks, sewage, etc.) to determine their pH using standard pH meter

13.0 Conduct the test on given samples of water / solutions

a) To determine conductivity

b) To adjust the ionic strength of the sample to the desired value

14.0 Conduct the test on given samples of solutions (coloured and non- coloured) to determine their turbidity in NTU

15.0 To determine the total solids present in given samples of water (One ground water and one surface / tap water)

Competencies and Key competencies to be achieved by the student

Name of the Experiment (No of Periods)	Competencies	Key competencies
Familiarization of methods for Volumetric analysis.Recognition of chemical substances And solutions (03)	-	--
Preparation of Std Na_2CO_3 and making solutions of different dilution(03)	▪ Weighing the salt to the accuracy of .01 mg ▪ Measuring the water with volumetric flask, measuring jar, volumetric pipetteand graduated pipette ▪ Making appropriate dilutions	▪ Weighing the salt to the accuracy of .01 mg ▪ Measuring the water with volumetric flask, measuring jar, volumetric pipette and graduated pipette ▪ Making appropriate dilutions
Estimation of HCl solution using Std. Na_2CO_3solution (03) Estimation of NaOH using Std.HCl solution (03) Determination of acidity of water sample (03) Determination of alkalinity of water sample (03) Estimation of Mohr's Salt using Std.$KMnO_4$ (03) Estimation of Ferrous ion by using Std.$K_2Cr_2O_7$ (03) Determination of total hardness of water using Std.EDTA solution (03) Estimation of Chlorides present in water sample (03) Estimation of Dissolved Oxygen(D.O) in water sample (By titration method) (03)	▪ Cleaning the glassware and rinsing with appropriate solutions ▪ Making standard solutions ▪ Measuring accurately the standard solutions and titrants ▪ Filling the burette with titrant ▪ Fixing the burette to the stand ▪ Effectively Controlling the flow of the titrant ▪ Identifying the end point ▪ Making accurate observations ▪ Calculating the results	▪ Making standard solutions ▪ Measuring accurately the standard solutions and titrants ▪ Effectively Controlling the flow of the titrant ▪ Identifying the end point ▪ Making accurate observations

Determination of pH using pH meter (03) Determination of conductivity of water and adjusting ionic strength to required level (03) Determination of turbidity of water (03)	▪ Familiarize with instrument ▪ Choose appropriate 'Mode' / 'Unit' ▪ Prepare standard solutions / buffers, etc. ▪ Standardize the instrument with appropriate standard solutions ▪ Plot the standard curve ▪ Make measurements accurately ▪ Follow Safety precautions	▪ Prepare standard solutions / buffers, etc. ▪ Standardize the instrument with appropriate standard solutions ▪ Plot the standard curve ▪ Make measurements accurately
Estimation of total solids present in water sample (03)	▪ Measuring the accurate volume and weight of sample ▪ Filtering and air drying without losing any filtrate ▪ Accurately weighing the filter paper, crucible and filtrate ▪ Drying the crucible in an oven	▪ Measuring the accurate volume and weight of sample ▪ Filtering and air drying without losing any filtrate ▪ Accurately weighing the filter paper, crucible and filtrate

SCHEME OF VALUATION

A)	Writing Chemicals, apparatus ,principle and procedure	5M
B)	Demonstrated competencies Making standard solutions Measuring accurately the standard solutions and titrants Effectively controlling the flow of the titrant Identifying the end point Making accurate observations	20M
C)	Viva-voce	5M
	Total	30M

COMPUTER FUNDAMENTALS LABORATORY

Course code	Course Title	No. of Periods/Weeks	Total No. of periods	Marks for FA	Marks for SA
EE-111	Computer Fundamentals Laboratory	3	90	40	60

Time schedule:

S.No.	Chapter/Unit Title	**No. of sessions each of 3 periods duration**	No. of Periods
1.	Computer hardware Basics	2	6
2.	Windows Operating System	2	6
3.	MS Word	8	24
4.	MS Excel	7	21
5.	MS PowerPoint	5	15
6	Adobe Photoshop	6	18
	Total periods	30	90

S.No.	Chapter/Unit Title	No.of Periods	CO's Mapped
1.	Computer hardware Basics	6	CO1
2.	Windows Operating System	6	CO1
3.	MS Word	24	CO2
4.	MS Excel	21	CO3
5.	MS PowerPoint	15	CO4
6	Adobe Photoshop	18	CO5
	Total periods	90	

Course Objectives	i)To know Hardware Basics ii)To familiarize operating systems iii)To use MS Office effectively to enable to students use these skills in future courses iv) To use Adobe Photoshop in image editing.

Course Outcomes	At the end of the course students will be able to		
	CO1	CM-111.1	Identify hardware and software components
	CO2	CM-111.2	Prepare documents with given specifications using word processing software
	CO3	CM-111.3	Use Spread sheet software to make calculation and to draw various graphs / charts.
	CO4	CM-111.4	Use Power point software to develop effective presentation for a given theme or topic.
	CO5	CM-111.5	Edit digital or scanned images using Photoshop

CO-PO/PSO MATRIX

CO NO.	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CM-111.1	3	3	3	3	3	3	3	3	2	3
CM-111.2	3	3	3	3	3	3	3	3	2	3
CM-111.3	3	3	3	3	3	3	3	3	2	3
CM-111.4	3	3	3	3	3	3	3	3	2	3
CM-111.5	3	3	3	3	3	3	3	3	2	3
Average	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**2**	**3**

3=Strongly mapped , 2=moderately mapped, 1=slightly mapped

Learning Outcomes:

I. Computer Hardware Basics

1. a).To Familiarize with Computer system and hardware connections
   b).To Start and Shut down Computer correctly
   c).To check the software details of the computer
2. To check the hardware present in your computer

II. Windows's operating system

3. To Explore Windows Desktop
4. Working with Files and Folders
5. Windows Accessories: Calculator – Notepad – WordPad – MS Paint

III. Practice with MS-WORD

6. To familiarize with Ribbon layout of MS Word
   Home – Insert - Page layout – References – Review- View.
7. To practice Word Processing Basics
8. To practice Formatting techniques
9. To insert a table of required number of rows and columns
10. To insert Objects, Clipart and Hyperlinks
11. To use Mail Merge feature of MS Word
12. To use Equations and symbols features

IV. Practice with MS-EXCEL

13. To familiarize with MS-EXCEL layout
14. To access and enter data in the cells
15. To edit a spread sheet- Copy, Cut, Paste, and selecting Cells
16. To use built in functions and Formatting Data
17. To create Excel Functions, Filling Cells
18. To enter a Formula for automatic calculations
19. To sort and filter data in table.
20. To present data using Excel Graphs and Charts.
21. To develop lab reports of respective discipline.
22. To format a Worksheet in Excel, Page Setup and Print

V. Practice with MS-POWERPOINT

23. To familiarize with Ribbon layout features of PowerPoint 2007.
24. To create a simple PowerPoint Presentation
25. To set up a Master Slide in PowerPoint
26. To insert Text and Objects
27. To insert a Flow Charts
28. To insert a Table
29. To insert a Charts/Graphs
30. To insert video and audio
31. To practice Animating text and objects
32. To Review presentation

VI. Practice with Adobe Photoshop

33. To familiarize withstandard toolbox
34. To edit a photograph.
35. To insert Borders around photograph.
36. To change Background of a Photograph.
37. To change colors of Photograph.
38. To prepare a cover page for the book in your subject area.
39. To adjust the brightness and contrast of the picture so that it gives an elegant look.
40. To type a word and apply the shadow emboss effects.

Key competencies:

Expt No	Name of Experiment	Competencies	Key competencies
1 (a).	To familiarize with Computer system and hardware connections	a. Identify the parts of a Computer system: i). CPU ii). Mother Board iii) Monitor iv) CD/DVD Drive v) Power Switch vi) Start Button vii) Reset Button b. Identify and connect various peripherals c. Identify and connect the cables used with computer system d. Identify various ports on CPU and connect Keyboard & Mouse	Connect cables to external hardware and operate the computer
1 (b).	To Start and Shut down Computer correctly	a. Log in using the password b. Start and shut down the computer c. Use Mouse and Key Board	a. Login and logout as per the standard procedure b. Operate mouse &Key Board
1 (c).	To Explore Windows Desktop	a. Familiarize with Start Menu, Taskbar, Icons and Shortcuts b. Access application programs using Start menu, Task manager c. Use Help support	a. Access application programs using Start menu b. Use taskbar and Task manager
2.	To check the software details of the computer	a. Find the details of Operating System being used b. Find the details of Service Pack installed	Access the properties of computer and find the details

3.	To check the hardware present in your computer	a. Find the CPU name and clock speed b. Find the details of RAM and Hard disk present c. Access Device manager using Control Panel and check the status of devices like mouse and key board d. Use My Computer to check the details of Hard drives and partitions e. Use the Taskbar	a. Access device manager and find the details b. Type /Navigate the correct path and Select icon related to the details required
4.	Working with Files and Folders	a. Create folders and organizing files in different folders b. Use copy / paste move commands to organize files and folders	a. Create files and folders Rename , arrange and search for the required folder/file
	Working with Files and Folders Continued....	c. Arrange icons – name wise, size, type, Modified d. Search a file or folder and find its path e. Create shortcut to files and folders (in other folders) on Desktop f. Familiarize with the use of My Documents g. Familiarize with the use of Recycle Bin	b. Restore deleted files from Recycle bin
5.	To use Windows Accessories: Calculator – Notepad – WordPad – MS Paint	a. Familiarize with the use of Calculator b. Access Calculator using Run command c. Create Text Files using Notepad and WordPad and observe the difference in file size d. Use MS paint and create .jpeg, .bmp files using MS Paint	a. Use windows accessories and select correct text editor based on the situation. b. Use MS pain to create /Edit pictures and save in the required format.
6.	To familiarize with Ribbon layout of MS word. – Home – Insert-	a. Create/Open a document b. Use Save and Save as features c. Work on two Word documents simultaneously	a. Create a Document and name appropriately and save

	page layout-References-Review-View	d. Choose correct Paper size and Printing options	b. Set paper size and print options
7.	To practice Word Processing Basics	a. Typing text b. Keyboard usage c. Use mouse (Left click / Right click / Scroll) d. Use Keyboard shortcuts e. Use Find and Replace features in MS- word f. Use Undo and Redo Features g. Use spell check to correct Spellings and Grammar	a. Use key board and mouse to enter/edit text in the document. b. Use shortcuts c. Use spell check/ Grammar features for auto corrections.
8.	To practice Formatting techniques	a. Formatting Text b. Formatting Paragraphs c. Setting Tabs d. Formatting Pages e. The Styles of Word f. Insert bullets and numbers g. Themes and Templates h. Insert page numbers, header and footer	a. Format Text and paragraphs and use various text styles. b. Use bullets and numbers to create lists c. Use Templates /Themes d. Insert page numbers date, headers and footers
9.	To insert a table of required number of rows and columns	a. Edit the table by adding the fields – Deleting rows and columns –inserting sub table – marking borders. Merging and splitting of cells in a Table b. Changing the background colour of the table c. Use table design tools d. Use auto fit – fixed row/ column height/length – Even distribution of rows / columns features e. Convert Text to table and Table to Text f. Use Sort feature of the Table to arrange data in ascending/descending order	a. Insert table in the word document and edit b. Use sort option for arranging data.

10.	To Insert objects, clipart and Hyperlinks	a. Create a 2-page document. &Insert hyperlinks and t Bookmarks. b. Create an organization chart c. Practice examples like preparing an Examination schedule notice with a hyperlink to Exam schedule table.	a. Insert hyperlinks &Bookmarks b. Create organization charts/flow charts
11.	To Use Mail merge feature of MS Word	a. Use mail merge to prepare individually addressed letters b. Use mail merge to print envelopes.	Use Mail merge feature
12.	To use Equations and symbols features.	a. Explore various symbols available in MS Word b. Insert a symbol in the text c. Insert mathematical equations in the document	Enter Mathematical symbols and Equations in the word document
13.	To Practice with MS-EXCEL	a. Open /create an MS Excel spread sheet and familiarize with MS Excel 2007 layout like MS office Button- b. Use Quick Access Toolbar-Title Bar- Ribbon-Worksheets-Formula Bar-Status Bar	a. Familiarize with excel layout and use b. Use various features available in toolbar
14.	To access and Enter data in the cells	a. Move Around a Worksheets-Quick access -Select Cells b. Enter Data-Edit a Cell-Wrap Text-Delete a Cell Entry-Save a File-Close Excel	a. Access and select the required cells by various addressing methods b. Enter data and edit
15.	To edit spread sheet Copy, Cut, Paste, and selecting cells	a. Insert and Delete Columns and Rows-Create Borders-Merge and Center b. Add Background Color-Change the Font, Font Size, and Font Color c. Format text with Bold, Italicize, and Underline-Work with Long Text-Change a Column's Width	Format the excel sheet
16.	To use built in functions and Formatting Data	a. Perform Mathematical Calculations verify -AutoSum	Use built in functions in Excel

		b. Perform Automatic Calculations-Align Cell Entries	
17.	To enter a Formula for automatic calculations	a. Enter formula b. Use Cell References in Formulae c. Use Automatic updating function of Excel Formulae d. Use Mathematical Operators in Formulae e. Use Excel Error Message and Help	Enter formula for automatic calculations
18.	To Create Excel Functions, Filling Cells	a. Use Reference Operators b. Work with sum, Sum if , Count and Count If Functions c. Fill Cells Automatically	a. Create Excel sheets involving cross references and equations b. Use the advanced functions for conditional calculations
19.	To sort and filter data in table	a. Sort data in multiple columns b. Sort data in a row c. Sort data using Custom order d. Filter data in work sheet	a. Refine the data in a worksheet and keep it organized b. Narrow a worksheet by selecting specific choice
20.	To Practice Excel Graphs and Charts	a. Produce an Excel Pie Chart b. Produce c. Excel Column Chart	a. Use data in Excel sheet to Create technical charts and graphs Produce Excel Line Graph b. Produce a Pictograph in Excel
21.	To develop lab reports of respective discipline	ate Lab reports using MS Word and Excel	a. Insert Practical subject name in Header and page numbers in Footer
22.	To format a Worksheet in Excel, page setup and print	a. Shade alternate rows of data b. Add currency and percentage symbols c. Change height of a row and width of a column d. Change data alignment e. Insert Headers and Footers f. Set Print Options and Print	a. Format Excel sheet b. Insert headers &footers and print

23.	To familiarize with Ribbon layout &features of PowerPoint 2007.	Use various options in PowerPoint a. Home b. Insert c. Design d. Animation e. Slideshow f. View g. Review	Access required options in the tool bar
24.	To create a simple PowerPoint Presentation	a. Insert a New Slide into PowerPoint b. Change the Title of a PowerPoint Slide c. PowerPoint Bullets d. Add an Image to a PowerPoint Slide e. Add a Textbox to a PowerPoint slide	a. Create simple PowerPoint presentation with photographs/ClipArt and text boxes b. Use bullets option
25.	To Set up a Master Slide in PowerPoint and add notes	a. Create a PowerPoint Design Template b. Modify themes c. Switch between Slide master view and Normal view d. Format a Design Template Master Slide e. Add a Title Slide to a Design Template f. The Slide Show Footer in PowerPoint f. Add Notes to a PowerPoint Presentation	a. Setup Master slide and format b. Add notes
26.	To Insert Text and Objects	a. Insert Text and objects b. Set Indents and line spacing c. Insert pictures/ clipart d. Format pictures e. Insert shapes and word art f. Use 3d features g. Arrange objects	Insert Text and Objects Use 3d features

27.	To insert a Flow Chart / Organizational Charts	a. Create a Flow Chart in PowerPoint b. Group and Ungroup Shapes c. Use smart art	Create organizational charts and flow charts using smart art
28.	To insert a Table	a. PowerPoint Tables b. Format the Table Data c. Change Table Background d. Format Series Legend	Insert tables and format
29.	To insert a Charts/Graphs	a. Create 3D Bar Graphs in PowerPoint b. Work with the PowerPoint Datasheet c. Format a PowerPoint Chart Axis d. Format the Bars of a Chart e. Create PowerPoint Pie Charts f. Use Pie Chart Segments g. Create 2D Bar Charts in PowerPoint h. Format the 2D Chart e. Format a Chart Background	Create charts and Bar graphs, Pie Charts and format.
30.	To Insert audio & video, Hyperlinks in a slide Add narration to the slide	a. Insert sounds in the slide and hide the audio symbol b. Adjust the volume in the settings c. Insert video file in the format supported by PowerPoint in a slide d. Use automatic and on click options e. Add narration to the slide f. Insert Hyperlinks	a. Insert Sounds and Video in appropriate format. b. Add narration to the slide c. Use hyperlinks to switch to different slides and files
31.	To Practice Animation effects	a. Apply transitions to slides b. To explore and practice special animation effects like *Entrance, Emphasis, Motion Paths &Exit*	Add animation effects
32.	Reviewing presentation	a. Checking spelling and grammar b. Previewing presentation c. Set up slide show d. Set up resolution e. Exercise with Rehearse Timings feature in PowerPoint	a. Use Spell check and Grammar feature b. Setup slide show c. Add timing to the slides d. Setup automatic slide show

		f. Use PowerPoint Pen Tool during slide show g. Saving h. Printing presentation (a) Slides (b) Hand-out	
33	To familiarize withstandard toolbox	a. Open Adobe Photoshop b. Use various tools such as i. The Layer Tool ii. The Color& Swatches Tool iii. Custom Fonts & The Text Tool iv. Brush Tool v. The Select Tool vi. The Move Tool vii. The Zoom Tool viii. The Eraser ix. The Crop Tool x. The Fill Tool	photograph and save it in Photoshop
34	To edit a photograph	a. Use the Crop tool b. Trim edges c. Change the shape and size of a photo d. Remove the part of photograph including graphics and text	to edit image by using corresponding tools.
35	To insert Borders around photograph	a. Start with a single background layer b. Bring the background forward c. Enlarge the canvas d. Create a border color e. Send the border color to the back f. Experiment with different colors	create a border or frame around an image to add visual interest to a photo
36	To change Background of a Photograph	a. open the foreground and background image b. Use different selection tools to paint over the image c. Copy background image and paste it on the foreground. d. Resize and/or drag the background image to reposition.	swap background elements using the Select and Mask tool and layers.

		e. In the Layers panel, drag the background layer below the foreground image layer.	
37	To change colors of Photograph	a. Change colors using: olor Replacement tool **ue/Saturation adjustment layer tool**	Able to control color saturation
38	To prepare a cover page for the book in subject area	a. open a file with height 500 and width 400 for the cover page. b. apply two different colors to work area by dividing it into two parts using Rectangle tool. c. Copy any picture and place it on work area→ resize it using free transform tool. d. Type text and apply color and style e. Apply effects using blended options	Able to prepare cover page for the book
39	To adjust the brightness and contrast of picture to give an elegant look	a. open a file b. Go to image→ adjustments→ Brightness/Contrast. f. adjust the brightness and contrast g. save the image	Able to control brightness/contrast.
40	To type a word and apply the shadow emboss effects	a. open a file b. Select the text tool and type text. c. Select the typed text go to layer→ layer style→ blended option→ drop shadow, inner shadow, bevel and emboss→ contour→ satin→ gradient overlay d. Save the image.	Able to apply shadow emboss effects

Table specifying the scope of syllabus to be covered for unit tests

Unit Test	Learning outcomes to be covered
Unit test-1	From 1 to 8
Unit test-2	From 9 to 22
Unit test-3	From 23 to 40

I Year Internal Lab Examination

UNIT TEST - I
MODEL QUESTION PAPER
COMPUTER FUNDAMENTALS LAB

SCHEME: C-23 **SUBJ CODE: CM-111**

MAX MARKS:40 **Time:90Min**

……

1. Identify the internal hardware components of a PC and assemble them.
2. Identify the external components or peripherals of a PC and connect them.
3. Identify the components on motherboard.
4. Perform the process of placing processor on CPU slot.
5. Perform the process of removing and placing the RAM in the corresponding slot.
6. Identify the CMOS battery and test whether it is working it or not.
7. Find details of following:
   a) Operating System being used.
   b) Processor name
   c) RAM
   d) Hard disk
8. Create a folder by your name, search a file or folder and find its path.
9. Draw the National Flag using MS Paint.
10. Create a word document that contains TEN names of your classmates (boys-5 & girls-5) and perform the following tasks:
    a) Save the document to your desktop.
    b) Sort the names in each list alphabetically.
    c) Set line spacing to 1.15.
    d) Use bullet points for the names in both lists separately.

I Year Internal Lab Examination
UNIT TEST - II
MODEL QUESTION PAPER
COMPUTER FUNDAMENTALS LAB

SCHEME: C-23 **SUBJ CODE: CM-111**
MAX MARKS:40 **Time:90Min**

……1. Write individually addressed letters to your friends about the Republic Day celebration using Mail Merge.
2. Create a Word document about your college and insert page numbers in footer and College Name in header.
3. Create your class time table using Tables in MS Word.

4. Create a 2-page document about your College & insert hyperlinks for courses offered in the college and insert Bookmarks next to College Name.
5. Write individually addressed letters to your friends (at least 5 members) to intimate the External Examination time table using Mail Merge.
6. Write an equation $\frac{(x+y)^2}{(x-y)^2} = \frac{x^2+2xy+y^2}{x^2-2xy+y^2}$ in MS word.
7. Create the organizational structure of your college in MS Word.
8. Create a spreadsheet by totaling marks of 3 or more subjects, then calculate percentage and hence find grade based on boundary conditions of FIVE students:
   Grades O >= 90%, A >=80%, B >=70%, C >=60%, D >=50%, E >=40%, F <40%
9. Create a Excel spreadsheet for the following data, making sure that the cell marked with Category (A1) is pasted in cell A1 in the spreadsheet and perform the questions below.

Category (A1)	Product Name	Quantity	Inventory	Price per Unit	Total Price
Office Supplies	Binder	2	20	12.99	25.98
Office Supplies	Pencil	20	20	0.99	
Electronics	Samsung 4K Smart TV	1	5	399.00	
Electronics	Bluetooth Speakers	4	5	44.49	
Computers	Lenovo X230 12in Laptop	2	2	279.90	

   a). Change the format of the “Total Price” column to “Currency” format.
   b) Calculate Total Price by writing formula.
   c) Turn on filtering for the table.
   d) Sort the table by column “Category” from A to Z.
10. Create a spreadsheet to calculate Cumulative monthly attendance for a period of Three months.

I Year Internal Lab Examination

UNIT TEST - III
MODEL QUESTION PAPER
COMPUTER FUNDAMENTALS LAB

SCHEME: C-23 **SUBJ CODE: COMMON-111**
MAX MARKS:40 **Time:90Min**

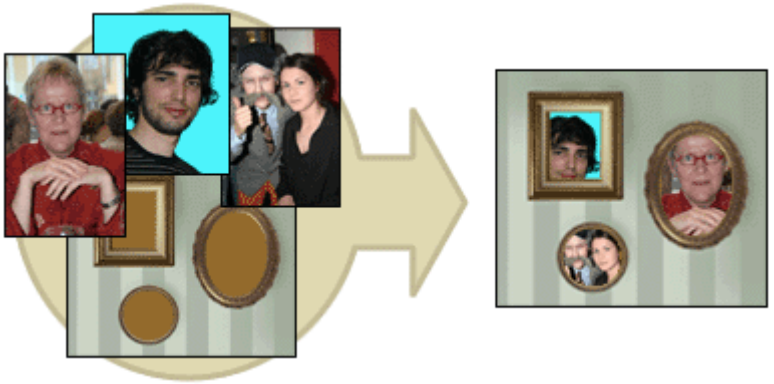
……1.
Create a PowerPoint Presentation about your College in 5 slides only.
2. Create a PowerPoint Presentation on Computer Hardware in minimum 5 slides.
3. Create a PowerPoint Presentation on Computer Fundamentals with *Entrance, Emphasis* effects in minimum 5 slides.
4. Create a PowerPoint Presentation on any topic with special animation effects like *Entrance, Motion Paths & Exit.*
5. Resize the image using photoshop.
6. Change the background of a Photograph.
7. Edit an image by using

a) Crop tool.

b) Resize the image

c) Save the new image with new name keeping original image as it is.

8. A Picture of two parrots (parrots.jpg) is given to you. Make anyone of one of the parrots in Black & White.
9. Convert a color image to monochrome and improve quality of photograph.
10. Copy three pictures and fit into the empty frames.



BOARD DIPLOMA EXAMINATIONS

DIPLOMA IN COMPUTER ENGINEERING

MODEL PRACTICAL QUESTION PAPER-YEAR END EXAM

COMPUTER FUNDAMENTALS LAB

SCHEME: C-23 **SUBJ CODE: CM-111**

MAX MARKS:60 **TIME: 3HOURS**

……

1. Identify the internal hardware components of a PC and assemble them.

2. Identify the external components or peripherals of a PC and connect them.

3. Write the procedure to create the files and folders
4. Write the procedure to access Calculator, Paint and Notepad application
5. Write the procedure to perform the following in MS Word
   (a) Change the Font Size
   (b) Change the Font Style
   (c) Change the Text Size
6. Write the procedure to perform the following in MS Word
   (a) Change the Font Color.
   (b) Use Various Text Alignment Options.

(c) Format text in Bold, Italic and Underline.

7. Create the hierarchy of your family in MS Word.

8. Write the procedure to perform the following in MS Word:

   (a) Insert a Table
   (b) Add a Row
   (c) Add a column
   (d) Delete a Row
   (e) Delete a column

9. Write the procedure to use Equation $\frac{(x+y)^2}{(x-y)^2} = \frac{x^2+2xy+y^2}{x^2-2xy+y^2}$ and Symbols.

10. Write the procedure to perform the following in MS Excel

    (a) To Modify Column Width

    (b) To Modify Row Height

    (c) Format text in Bold, Italic, and Underline.

11. Write the procedure to create charts and Graphs in MS Excel

12. Write the procedure to create simple Power Point Presentation on your college in Three slides.

13. Write the procedure to perform Animation on Text and Objects in your presentation.

14. Take a photographic image. Give a title for the image. Put the border. Write your names. Write the Name of Institution and Place.

15. Prepare a cover page for the book in your subject area. Plan your own design.

16. You are given a picture of a flower and associated background (Extract.jpg).Extract the Flower only from that and organize it on a background. Select your own background for organization.
17. You are given a picture (BrightnessContrast.jpg). Adjust the brightness and contrast of the picture so that it gives an elegant look.
18. You are given a picture (position.jpg). Position the picture preferably on a plain background of a color of your choice - Positioning include rotation and scaling.
19. Remove the arrows and text from the given photographic image(Filename: photo.jpg).
20. Type a word; apply the following effects. Shadow Emboss.

III SEMESTER

DIPLOMA IN ELECTRICAL & ELECTRONICS ENGINEERING
SCHEME OF INSTRUCTIONS AND EXAMINATIONS
(III SEMESTER)

Subject Code	Name of the Subject	Instruction period /week		Total Period /year	Scheme of Examination			
		Theory	Practical/ Tutorial		Duration (hours)	Sessional Marks	End Exam Marks	Total Marks
THEORY								
EE-301	Engineering Mathematics - II	4	-	60	3	20	80	100
EE-302	Electrical Machines- I	5	-	75	3	20	80	100
EE-303	A.C. Circuits & Transformers	6	-	90	3	20	80	100
EE-304	Electronics Engineering	4	-	60	3	20	80	100
EE-305	Programming in ''C''	5	_	75	3	20	80	100
PRACTICAL								
EE-306	Electrical CAD Laboratory	-	3	45	3	40	60	100
EE-307	Electrical Machines – I Laboratory	-	3	45	3	40	60	100
EE-308	Circuits & Transformers Laboratory	-	3	45	3	40	60	100
EE-309	Electronics Engineering Laboratory	-	3	45	3	40	60	100
EE-310	Programming in ''C'' Laboratory	-	3	45	3	40	60	100
	TOTAL	**24**	**15**	**585**	**30**	**300**	**700**	**1000**

NOTE: 03 periods per week are allotted to Student Centric Activity (Library, Sports & Games, Clean & Green, Preparation for placements etc)

ENGINEERING MATHEMATICS-II

(COMMON TO C/M/EE/A/MET/MNG/AA/CER/TT)

Course Code	Course Title	No. of Periods/week	Total No. of periods	Marks for FA	Marks for SA
EE-301	ENGINEERING MATHEMATICS-II	4	60	20	80

S.No.	Unit Title	No. of periods	COs mapped
1	Indefinite Integration	20	CO1
2	Definite Integration	10	CO2
3	Applications of Definite Integrals	10	CO3
4	Differential Equations	20	CO4
	Total Periods	60	

Course Objectives	(iii) To understand the concepts of indefinite integrals and definite integrals with applications to engineering problems. (iv) To understand the formation of differential equations and learn various methods of solving first order differential equations. (v) To learn the principles of solving homogeneous and non-homogeneous differential equations of second order.

Course Outcomes	CO1	Integrate various functions using different methods.
	CO2	Evaluate definite integrals.
	CO3	Solve engineering problems by applying definite integrals.
	CO4	Obtain differential equations and solve differential equations of first order and first degree. Solve homogeneous and non-homogeneous differential equations of second order.

ENGINEERING MATHEMATICS – II

Learning Outcomes
Unit-I

C.O. 1 Integrate various functions using different methods.

L.O.1.1. Explain the concept of Indefinite integral as an anti-derivative.

1.2. State the indefinite integral of standard functions and properties of $\int (u+v)\,dx$ and $\int k\,u\,dx$ where *u, v* are functions of *x* and *k* is constant.

1.3. Solve problems involving standard functions using the above rules.

1.4. Evaluate integrals involving simple functions of the following type by the method of substitution.

i) $\int f(ax+b)\,dx$, *where f(x)* is in standard form.

ii) $\int (f(x))^n\, f'(x)\,dx$

iii) $\int [f'(x)/\, f(x)]dx$

iv) $\int [f(g(x))]g'(x)dx$

1.5. Find the integrals of *tan x, cot x, sec x* and *cosec x* using the above.

1.6. Evaluate the Standard integrals of the functions of the type

$i)\ \frac{1}{a^2+x^2}, \frac{1}{a^2-x^2}, \frac{1}{x^2-a^2}$

$ii)\ \frac{1}{\sqrt{a^2+x^2}}, \frac{1}{\sqrt{a^2-x^2}}, \frac{1}{\sqrt{x^2-a^2}}$

$iii)\ \sqrt{x^2-a^2}, \sqrt{x^2+a^2}, \sqrt{a^2-x^2}$

1.7. Evaluate integrals using decomposition method.

1.8. Solve problems using integration by parts.

1.9 Use Bernoulli's rule for evaluating the integrals of the form $\int u.v\,dx$.

1.10. Evaluate the integrals of the form $\int e^x[f(x)+f'(x)]dx$

Unit-II

C.O.2 Evaluate definite integrals.

L.O.2.1. State the fundamental theorem of integral calculus

2.2. Explain the concept of definite integral.

2.3. Solve simple problems on definite integrals over an interval using the above concept.

2.4. State various properties of definite integrals.

2.5. Evaluate simple problems on definite integrals using the above properties.

Syllabus for Unit test-I completed

Unit -III

C.O.3 Solve engineering problems by applying definite integrals.

L.O. 3.1. Find the area bounded by a curve and axes.

3.2. Obtain the mean and R.M.S values of the simple functions.

3.3. Solve some simple problems using Trapezoidal rule and Simpson's 1/3 rule for the approximation of definite integrals.

Unit -IV

C.O. 4 Form differential equations and solve differential equations of first order and first degree and Solve homogeneous and non-homogeneous differential equations of second order

L.O.4.1. Define a Differential equation, its order and degree

4.2 Find order and degree of a given differential equation.

4.3 Form a differential equation by eliminating arbitrary constants.

4.4 Solve the first order and first degree differential equations by variables separable method.

4.5 Solve linear differential equation of first order of the form $\frac{dy}{dx} + \mathrm{P}y = \mathrm{Q}$, where P and Q are functions of x or constants.

4.6 Solve homogeneous second order linear differential equations of the type $(aD^2 + bD + c)\, y = 0$ where a, b, c are real numbers and provide examples.

4.7 Define complementary function, particular integral and general solution of a non-homogeneous linear differential equation of second order with constant coefficients.

4.8 Describe the methods of solving f(D) = X, where f(D) is a polynomial of second order and X is a function of the forms k, $e^{ax}, sinax, cosax$ and *x* and their linear combinations.

Syllabus for Unit test-II completed

C-23

Engineering Mathematics – II

CO/PO – Mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PSO1**	**PSO2**	**PSO3**
CO1	3	2	2	2				3	1	2
CO2	3	2	2	2				3	1	2
CO3	3	3	3	3				3	3	3
CO4	3	3	3	3				3	3	3
Avg.	3	2.5	2.5	2.5				3	2	2.5

3 =Strongly mapped (High), **2 =** Moderately mapped (Medium), **1 =** Slightly mapped (Low)

PO5: Appropriate quiz programme may be conducted at intervals and duration as decided by concerned teacher.

PO6: Seminars on applications of mathematics in various engineering disciplines are to be planned and conducted.

PO7: Such activities are to be planned that students visit library to refer standard books on Mathematics and latest updates in reputed national and international journals, attending seminars, learning mathematical software tools.

PSO1: An ability to understand the concepts of basic mathematical techniques and to apply them in various areas like computer programming, civil constructions, fluid dynamics, electrical and electronic systems and all concerned engineering disciplines.

PSO2: An ability to solve the Engineering problems using latest software tools, along with analytical skills to arrive at faster and appropriate solutions.

PSO3: Wisdom of social and environmental awareness along with ethical responsibility to have a successful career as an engineer and to sustain passion and zeal for real world technological applications.

C-23
Engineering Mathematics – II
PO- CO – Mapping strength

PO no	Mapped with CO no	CO periods addressing PO in column I		Level (1,2 or 3)	Remarks
		Number	%		
1	CO1, CO2, CO3,CO4	60	100%	3	>40% Level 3 Highly addressed
2	CO3,CO4	30	50%	3	
3	CO3,C04	30	50%	3	25% to 40% Level 2 Moderately addressed
4	CO3,C04	30	50%	3	
5					
6					
7					5% to 25% Level 1 Low addressed
PSO 1	CO1, CO2, CO3,CO4	60	100%	3	
PSO 2	CO3,CO4	30	50%	3	<5% Not addressed
PSO 3	CO1, CO2, CO3,CO4	45	75%	3	

ENGINEERING MATHEMATICS – II

COURSE CONTENTS

Unit-I

Indefinite Integration:

1. Integration regarded as anti-derivative – Indefinite integrals of standard functions. Properties of indefinite integrals. Integration by substitution or change of variable. Integrals of tan x, cot x, sec x, cosec x.

Evaluation of integrals which are of the following forms:

$$i)\frac{1}{a^2+x^2},\frac{1}{a^2-x^2},\frac{1}{x^2-a^2}$$

$$ii)\frac{1}{\sqrt{a^2+x^2}},\frac{1}{\sqrt{a^2-x^2}},\frac{1}{\sqrt{x^2-a^2}}$$

$$iii)\sqrt{x^2-a^2},\sqrt{x^2+a^2},\sqrt{a^2-x^2}$$

Integration by decomposition of the integrand into simple rational algebraic functions.

Integration by parts, Bernoulli's rule and integrals of the form $\int e^x [f(x) + f'(x)]\, dx$.

Unit-II

Definite Integration

2. Definite integral-fundamental theorem of integral calculus, properties of definite integrals, evaluation of simple definite integrals.

Unit-III

Applications of Definite Integrals

3. Area bounded by a curve and axes. Mean and RMS values of a function on a given interval. Trapezoidal rule, Simpson's 1/3 rule to evaluate an approximate value of a define integral. Simple examples.

Unit -IV

Differential Equations

4. Definition of a differential equation-order and degree of a differential equation- formation of differential equations-solutions of differential equations of first order and first degree using methods, variables separable, linear differential equation of the type $\frac{dy}{dx}+\mathrm{P}y=\mathrm{Q}.$ Solutions of homogenous and non-homogeneous linear differential equations of second order with constant coefficients.

Reference Books:

1. B. S. Grewal, Higher Engineering Mathematics, Khanna Publishers.
2. Schaum's Outlines Differential Equations, Richard Bronson & Gabriel B. Costa
4. M.Vygodsky, Mathematical Handbook: Higher Mathematics, Mir Publishers, Moscow.

BLUE PRINT

S.No.	Chapter/Unit title	No. of Periods	Weightage Allotted	Short type			Essay type			COs mapped
				R	U	Ap	R	U	Ap	
Unit – I: Indefinite integration										
1	Indefinite integration	20	34	1	2	0	1/2	2	0	CO1
Unit – II: Definite integration										
2	Definite Integrals	10	16	0	2	0	0	1	0	CO2
Unit – III: Applications of Definite Integrals										
3	Area of curves	3	3	0	0	1	0	0	0	CO3
4	Mean and RMS values	3	8	0	0	1	0	0	1/2	CO3
5	Numerical Integration	4	10	0	0	0	0	0	1	CO3
Unit – IV : Differential Equations										
6	Introduction to Differential Equations	5	6	2	0	0	0	0	0	CO4
7	Solutions of first order differential equations	4	13	0	0	1	0	0	1	CO4
8	Solutions of second order homogeneous differential equations	4	10	0	0	0	0	0	1	CO4
9	Solutions of second order non-homogeneous differential equations	7	10	0	0	0	0	0	1	CO4
	Total	60	110	3	4	3	1/2	3	4 1/2	

Marks	9	12	9	5	30	45	

R: Remembering Type :14 Marks
U: understanding Type :42 Marks
Ap: Application Type : 54 Marks

Engineering Mathematics – II

Unit Test Syllabus

Unit Test	Syllabus
Unit Test-I	From L.O 1.1 to L.O 2.5
Unit Test-II	From L.O 3.1 to L.O 4.8

UNIT TEST MODEL PAPERS C –23, XX-301

Unit Test I

State Board of Technical Education and Training, A. P

III SEM

Subject name: **Engineering Mathematics-II**

Sub Code: **xx-301**

Time: 90 minutes **Max. Marks: 40**

Part-A **16 Marks**

Instructions: (1) Answer **all** questions.

(2) First question carries **four** marks and the remaining questions carry **three** marks each.

1. Answer the following:
   a. $\int x^6 dx = ---$ **(CO1)**
   b. $\int \frac{1}{16+x^2} dx = --$ **(CO1)**
   c. $\int e^x \left(f(x) + f'(x) \right) dx = e^x f(x) + c$: State TRUE/FALSE **(CO1)**
   d. $\int_0^1 x dx = --$ **(CO2)**
2. Evaluate $\int \left(\sec^2 x + 2e^x \right) dx.$ **(CO1)**
3. Evaluate $\int \frac{\sin(\log x)}{x} dx.$ **(CO1)**
4. Evaluate $\int_0^{\frac{\pi}{2}} \cos x dx$ **(CO2)**
5. Evaluate $\int_0^{1/2} \frac{1}{\sqrt{1-x^2}} dx$ **(CO2)**

Part-B **3×8=24 Marks**

Instructions: (1) Answer **all** questions. (2) Each question carries **eight** marks
(3) Answer should be comprehensive and the criterion for valuation is the content but not the length of the answer.

6. A) Evaluate $\int \sin^4 x \cos x dx.$ **or** **(CO1)**

   B) Evaluate $\int \frac{1}{(x+1)(x+2)} dx.$ **(CO1)**

7. A) Evaluate $\int \sqrt{1-\sin 2x} dx.$ **or** **(CO1)**

   B) Evaluate $\int x^2 e^{3x} dx.$ **(CO1)**

8. A) Evaluate $\int_0^1 \frac{tan^{-1}x}{1+x^2} dx$ **or** **(CO2)**

   B) $\int_0^{\frac{\pi}{2}} \frac{\sin x}{\sin x + \cos x} dx$

(CO2)

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Unit Test II **C –23, XX -301**

State Board of Technical Education and Training, A. P

III Sem

Subject name: **Engineering Mathematics-II**

Sub Code: **xx-301**

Time : 90 minutes Max.marks:40

Part-A **16 Marks**

Instructions: (1) Answer **all** questions.
(2) First question carries **four** marks and the remaining questions carry **three** marks each

1. Answer the following:
   a. Formula to find area bounded by $y = f(x)$ and X-axis from x=a to x=b is____ (**CO3**)
   b. Integrating factor of $\frac{dy}{dx} + P(x)y = Q(x)$ is $e^{\int Pdx}$: State TRUE/FALSE **(CO4)**
   c. The order of the differential equation $\frac{d^3y}{dx^3} + \frac{d^2y}{dx^2} + y = 0$ is _____. **(CO4)**
   d. The auxiliary equation of the differential equation $\frac{d^2y}{dx^2} + 2\frac{dy}{dx} + y = 0$ is ____. **(CO4)**

2. Find the area bounded by the curve $y = 2x + 3,$ $x-$ axis, between the lines $x = 1, x = 2.$ **(CO3)**
3. Find the mean value of $f(x) = 2x$ in the interval $[2, 6].$ **(CO3)**
4. Form the differential equation by eliminating the arbitrary constant m from $y = mx + 1.$ **(CO4)**
5. Solve the differential equation $(D^2 - 9)y = 0.$ **(CO4)**

Part-B **3×8=24 Marks**

Instructions: (1) Answer **all** questions. (2) Each question carries **eight** marks

(3) Answer should be comprehensive and the criterion for valuation is the content but not the length of the answer.

6. A) Find the R.M.S value of $\sqrt{x}$ over the range $x=1$ and $x=3.$ **or** **(CO3)**

   B) Calculate the approximate value of $\int_1^6 x^2 dx$ by using Trapezoidal rule by dividing the range into 5 equal intervals. **(CO3)**

7. A) Solve $\frac{dy}{dx} = e^{2x+y}$ **or** **(CO4)**

   B) Solve $\frac{dy}{dx} + \frac{y}{x} = x^2.$ **(CO4)**

8. A) Solve $(D^2 - 2D + 1)y = e^{-x}$ **or** **(CO4)**

   B) Solve $(D^2 + 6D + 9)y = sin3x$ **(CO4)**

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END EXAM MODEL PAPERS

STATE BOARD OF TECHNICAL EDUCATION, A.P

ENGINEERING MATHEMATICS -- 301

TIME : 3 HOURS **MODEL PAPER- I** **MAX.MARKS : 80M**

PART-A

Answer All questions. Each question carries THREE marks. **10x3=30M**

11. Evaluate $\int (5^x + 5x)dx.$ **CO 1**

12. Evaluate $\int (\sin 3x + \cos 2x)dx.$ **CO 1**

13. Evaluate $\int \frac{\sin^{-1} x}{\sqrt{1-x^2}} dx$ **CO 1**

14. Evaluate $\int_0^1 (x^3 + 1)dx$ **CO 2**

15. Evaluate $\int_{-\frac{\pi}{2}}^{\frac{\pi}{2}} \sin x \, dx$ **CO 2**

16. Find the area bounded by the curve $y = x^2,$ the X-axis between the lines $x=1$ and $x=2.$ **CO3**

17. Find the mean value of the function $f(x) = \frac{1}{1+x^2}$ in the interval $[0,1]$. **CO 3**

18. Find the order and degree of the differential equation $\frac{d^3y}{dx^3} + 3\frac{d^2y}{dx^2} + 5y = 0$. **CO4**

19. Form the differential equation for the family of curves $y = mx$ by eliminating the arbitrary constant *m*. **CO4**

20. Solve $x\,dy = y\,dx$ **CO4**

PART-B

Answer any five questions. Each question carries TEN marks. **5x10=50M**

11. (a) Evaluate $\int\left(\cos 5x+4\sec^2 x+8e^{4x}+\frac{2}{x}\right)dx.$ **CO1**

(b) Evaluate $\int\sqrt{1+\sin 2\theta}\,d\theta$ **CO1**

12. (a) Evaluate $\int\frac{1}{\sqrt{25x^2+9}}dx$ **CO1**

(b) Evaluate $\int\frac{3x+1}{(x-1)(x+3)}dx.$ **CO1**

13. (a) Evaluate $\int x^3e^{2x}dx.$ **CO1**

(b) Evaluate $\int_0^{\pi/2} xcosx\,dx$ **CO2**

14. (a) Evaluate $\int_0^{\frac{\pi}{2}}\frac{\cos x}{\sin x+\cos x}dx$ **CO2**

(b) Find the RMS value of $\sqrt{x}$ over the range x=1 and x=2. CO3

15. Calculate the approximate value of $\int_2^{10}\frac{1}{1+x}dx$ by using Simpson's 1/3rd rule by dividing the range into 8 equal parts. **CO3**

16. Solve $\frac{dy}{dx}+\frac{y}{x}=\frac{1}{x^2}$ **CO4**

17. (a) Solve $(D^2+4D+4)y=0$ **CO4**

(b) Solve $\left(D^2+3D+2\right)y=0.$ **CO4**

18. Solve $(D^2+5D+6)y=e^{3x}+sin2x$ **CO4**

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END EXAM MODEL PAPERS

STATE BOARD OF TECHNICAL EDUCATION, A.P

ENGINEERING MATHEMATICS -- 301

TIME : 3 HOURS **MODEL PAPER- II** **MAX.MARKS : 80M**

PART-A

Answer All questions. Each question carries THREE marks. **10x3=30M**

1. Evaluate $\int (3^x + 3x)dx.$ **CO 1**
2. Evaluate $\int (\sin 2x + \cos 3x)dx.$ **CO 1**
3. Evaluate $\int \frac{logx}{x} dx$ **CO 1**
4. Evaluate $\int_0^{\frac{\pi}{4}} \sec^2 x\, dx$ **CO 2**
5. Evaluate $\int_{-1}^{1} x^3\, dx$ **CO 2**
6. Find the area bounded by $f(x) = 2x + 3$, X-axis and the lines x=0, x=1. **CO3**
7. Find the mean value of the function $f(x) = x^2$ in the interval [1,2] **CO3**
8. Find the order and degree of the differential equation $\frac{d^3y}{dx^3} + 3\frac{d^2y}{dx^2} + 3\frac{dy}{dx} + y = 0$ **CO4**
9. Form the differential equation for the family of curves $y = ae^x + be^x$ by eliminating the arbitrary constants *a* and *b*.
10. Solve $(1+x)\,dy = (1+y)dx$ **CO4**

PART-B

Answer All questions. Each question carries TEN marks. **5x 10=50M**

11. (a) Evaluate $\int \left(1 - 2x + \sec x \tan x + \frac{3}{x}\right) dx.$ **CO1**

(b) Evaluate $\int \sqrt{1-\cos 2x}\, dx$ **CO1**

12. (a) Evaluate $\int \frac{9}{\sqrt{25-x^2}} dx$ **CO1**

(b) Evaluate $\int \frac{1}{(x-1)(x+2)} dx.$ **CO1**

13. (a) Evaluate $\int x^2 e^{3x} dx.$ **CO1**

(b) Evaluate $\int_0^1 (x+2)(2x-1)dx$ **CO2**

14. (a) Evaluate $\int_0^{\frac{\pi}{2}} \frac{\sin^3 x}{\sin^3 x + \cos^3 x} dx$ **CO2**

(b) Find the R.M.S. value of the function $f(x) = \sqrt{sinx}$ over the range $x = 0$ and $x = \pi$ **CO3**

15. Find the approximate value of $\int_1^{11}(x+1)dx$ using Trapezoidal rule by dividing the interval into 10 equal parts. **CO3**

16. Solve $\frac{dy}{dx} + y\,cotx = cosecx$ **CO4**

17. (a) Solve $(D^2 + 4)y = 0$ **CO4**

(b) Solve $\left(D^2 + 4D + 3\right)y = 0.$ **CO4**

18. Solve $(D^2 - 5D + 4)y = x + sin2x$ **CO4**

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ELECTRICAL MACHINES-I

Course code	Course title	No. of periods/week	Total no. of periods	Marks for FA	Marks for SA
EE-302	ELECTRICAL MACHINES-I	5	75	20	80

S. No.	Unit Title	No. of Periods	CO'S Mapped
1.	Fundamentals of D.C Generators, Armature reaction and Characteristics	18	**CO1**
2.	Fundamentals of DC motors	12	**CO2**
3.	Speed Control and Testing of D.C Motors	12	**CO3**
4.	Basics of Electrical Measuring Instruments	18	**CO4**
5.	Transducers, Sensors and Electronic & Digital Instruments	15	**CO5**
Total		**75**	

Course Objectives:

Course Objectives	i. To Familiarise knowledge on construction, working principle and characteristics of DC machines and Armature reaction. ii. To know different methods of speed control and testing of motors. Iii. To use different generators and motors for specific applications. iv. To know the performance of different electrical and electronic measuring instruments. v. To know the working principle of Transducers and sensors.

Course outcomes:

Course outcomes	**CO1**	**EE-302.1**	Describe the parts of a DC machine, its usages and analyse armature reaction and commutation for its effects.
	CO2	**EE-302.2**	Describe the working of a D.C motor and analyse the characteristics for its performance
	CO3	**EE-302.3**	Familiarise the usage of starter for different DC motors and selecting specific methods of speed control for D.C motor and to analyse various tests on D.C motors.

	CO4	**EE-302.4**	Describe the construction and working of different electrical and electronic measuring instruments and to explain the measurement of resistance.
	CO5	**EE-302.5**	Choosing appropriate Transducer for a specific application and to describe the basic principle of electronic digital measuring instruments.

Learning Outcomes:

1. Fundamentals of D.C Generators, Armature reaction and Characteristics

1.1 Explain electro mechanical energy conversion.

1.2 Describe the constructional features of a D.C generator with a legible sketch and list the various materials used for each part.

1.3 Explain the working principle of D.C generator.

1.4 State the types of armature windings.

1.5 Derive the E.M.F equation of D.C generator in terms of Φ, Z, N, P &A and solve problems.

1.6 Classify D.C Generators based on excitation and draw its equivalent circuit by giving their voltage and current equations and solve problems.

1.7 State the various losses incurred in a D.C Generator and draw power flow diagram.

1.8 Define the mechanical, electrical and overall efficiencies of DC Generator.

1.9 Define Armature reaction and state its effects.

1.10 State Commutation and list the different methods of improving commutation.

1.11 Plot Open Circuit Characteristics, Internal characteristics and external characteristics of the following types of D.C. Generators:
(i) Separately excited (ii) Shunt (iii)Series

1.12 List the applications of above D.C generators.

2. Fundamentals of D.C Motors

2.1 Define DC motor

2.2 Explain the working of D.C motor.

2.3 Explain the significance of back E.M.F.

2.4 Classify DC motors.

2.5 Write the formula for Back E. M. F for different D.C Motors with equivalent circuits.

2.6 Solve Problems on Back E.M.F.

2.7 Define Torque and derive Torque equation of a D.C motor.
2.8 Plot the i) Electrical characteristics and ii) Mechanical characteristics of (a) Shunt b) Series D. C. Motors

2.9 List the applications of the various D.C motors.

3. Speed Control and testing of D.C Motors

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3.1 Explain the three different methods of speed Control (Flux, Armature and voltage) for D.C shunt motors.

3.2 Explain the different methods of speed control of series motor.

3.3 State the necessity of a starter and List different types of Starters for DC motors.
3.4 Explain the working of 3-point starter with legible sketch.

3.5 List different tests of D.C Motors.

3.6 Describe the direct and indirect methods of testing of the DC motors.

3.7 Explain the method of conducting brake test on D.C Series and Shunt motors.

4. Basics of Electrical measuring instruments.

4.1 Classify the instruments on the basis of (i) construction and output (ii) principle of working (iii) method of measuring the value

4.2 State the purpose of obtaining deflecting, controlling and damping torques in Indicating instruments.

4.3 Explain the working of Permanent Magnet Moving Coil.

4.4 State the advantages, disadvantages and applications of M.C Instruments.
4.5 Describe working of Moving Iron (M.I) Instrument i) Attraction type Instrument ii) Repulsion type
4.6 State the advantages and disadvantages of M.I. Instruments.

4.7 Explain the working of a dynamometer type instrument

4.8 State the need for instrument transformers (CT and PT).

4.10 Classify the resistance into Low, Medium and High Values giving examples for each.

4.11 Describe the construction and working of Megger

5. **Transducers, Sensors and Electronic & Digital Instruments**

5.1 Define Transducer
5.2 Classify Transducers (i)based on the principle of transduction form used (ii) as Primary and Secondary (iii) as Passive and Active (iv) as Analog and Digital (v) as Transducers and Inverse Transducers

5.3 State the applications of Transducers.
5.4 Describe the construction of Linear Variable Differential transformer (LVDT).
5.5 Explain the working of LVDT.
5.6 Define Sensor and list its types.
5.7 List the applications of sensors.

5.8 List the basic components of analog electronic instruments.
5.9 List the basic components of Digital instruments.
5.10 List the advantages of Digital Instruments over Analog Instruments.
5.11 Explain the Working of Digital Multi meter with block diagram.
5.12 Explain the Working of Single Phase Digital Energy meter with block diagram.

CO-PO/PSO MATRIX:

CO No	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
EE-302.1	3							3	2	
EE-302.2	3	3						3		
EE-302.3	3		2		2			3	2	1
EE-302.4	3	2		1				3		
EE-302.5	2		2	2				3	2	
Average	2.8	2.5	2	1.5	2			3	2	1

Note:
The gaps in CO and PO mapping will be achieved by one or more appropriate activities from the following: (i) Assignments (ii) Tutorials (iii) Seminars (iv) Guest Lectures (v) Group Discussions (vi) Quizzes (vii) Industrial Visits (viii) Tech Fests (ix) Mini Projects (x) Library Visits

HYPONATED COURSE CONTENT

1. Fundamentals of D.C Generators, Armature reaction and Characteristics

Electromechanical energy conversion – constructional features of D.C generator with legible sketches - principle of D.C generator - windings (i) Lap (ii) Wave - E.M.F equation -Classification of DC generators based on excitation-Voltage and Current equations for different types of D.C Generators- simple problems - losses incurred in the D.C Generators-mechanical, electrical and overall efficiencies of DC Generators - Armature reaction — Commutation and list of methods for improving commutation –Open circuit, internal and external characteristics of Separately excited, Shunt and Series DC Generators - Applications of D.C generators.

2. Fundamentals of D.C Motors

Definition of DC motor-Working of D.C motors-classification - significance of back E.M.F- Formula for back E.M.F for different D.C motors- Problems on E.M.F equation -Torque equation of DC motor - electrical and mechanical characteristics of D.C Shunt and Series motors - Applications of D.C motors.

3. Speed Control and testing of D.C Motors

Methods of speed control (Flux, Armature and Voltage) for D.C shunt motors - different methods of speed control for series motors - necessity of starter - Types of starters - 3-point starter - direct and indirect methods of testing of DC motors - list of different tests - Brake test test on DC series and shunt motors.

4. Basics of electrical measuring instruments:

Classification of instruments - Deflection, Controlling and Damping torques in the indicating Instruments - working of Permanent magnet moving coil-advantages, disadvantages and applications - working moving iron instruments – advantages and disadvantages – Dynamometer type instrument – working - instrument transformers- Classification of resistance - Construction and working of megger.

5. Transducers, Sensors and Electronic & Digital Instruments

Definition of transducer - Classification of Transducers - Applications of Transducers - construction and working of LVDT- Basic Concept of Sensors, types and its applications - Basic components of analog electronic Instruments - basic components of Digital instruments- advantages of Digital Instruments over Analog Instruments- working of digital multi meter with block diagram - working of single phase digital energy meter with block diagram.

REFERENCE BOOKS

1. B.L. Theraja -Electrical Technology - Vol - I –S.Chand&co.
2. B.L. Theraja -Electrical Technology - Vol –II -S.Chand&co.
3. P.S. Bhimbhra –Electrical machines
4. E.W. Golding and F.C. Widdis,Electrical Measurements and measuring instruments–Wheele publishers.
5. A. K.SAWHNEY - Electrical and Electronic measuring instruments –- Dhanpat Rai & Sons.

Blue print:

S.No.	Unit Title	No. of periods	Weightage allocated	Question wise distribution of weightage							CO'S mapped
				R	U	AP	R	U	Ap		
1.	Fundamentals of D.C Generators, Armature reaction and Characteristics	18	26	3	3	20	1	1	2		CO1
2.	Fundamentals of DC motors	12	19	6	3	10	2	1	1		CO2
3.	Speed Control and Testing of D.C Motors	12	13	3	10	-	1	1	-		CO3
4.	Basics of Electrical Measuring Instruments	18	26	3	23	-	1	3	-		CO4
5.	Transducers, Sensors and Electronic & Digital Instruments	15	26	6	20	-	2		-		CO5
Total		**75**	**110**	**21**	**59**	**30**	**7**	**8**	**3**		

Model Papers: Syllabus to be Covered for Unit Tests

Unit Test	Learning Outcomes to be Covered
Unit Test – I	From 1.1 to 3.5
Unit Test – II	From 3.6 to 5.12

MODEL PAPER – FORMATIVE ASSESSMENT-1
C-23-EE-302
BOARD DIPLOMA EXAMINATION, (C-23)
DEEE – THIRD SEMESTER EXAMINATION
EE-302 : ELECTRICAL MACHINES – I

Time: 90 Minutes Total Marks: 40M

PART-A **(1 x 4) + (4 x 3) = 16M**

Instructions:

i. **Answer all five questions.**
ii. **First question carries four marks and remaining each question carries three marks.**
iii. **Answers should be brief and straight to the point and shall not exceed five simple sentences**

1. (a) The yoke in a DC generator is made up of _____. CO1
   (b) The friction and windage losses are called Iron losses : True / False. CO1
   (c) The voltage equation of a D.C. motor is _____ . CO2
   (d) The type of starter used for DC shunt motor is_____. CO3
2. Define armature reaction. CO1
3. List different methods of improving commutation. CO1
4. Classify the DC motors. CO2
5. State the necessity of a starter. CO3

PART-B **3 X 8 = 24M**

Instructions:

i. **Answer all three questions.**

ii. **Each question carries eight marks.**

iii. **The answers should be comprehensive and the criteria for valuation are the content but not the length of the answer.**

6. (a) Describe the constructional features of a DC generator with a legible sketch. CO1

(OR)

(b) In a 110 V , D.C shunt generator the resistance of the armature and shunt windings are 0.06 ohm and 25 ohm respectively. The load consists of 200 lamps each rated at 55 watts , 110 V. Find the total electromotive force and armature current. Neglect armature reaction and brush drop. CO1

7. (a)Explain the working principle of DC motor. CO2

(OR)

(b) Derive the Torque equation of a DC motor. CO2

8. (a) Explain the flux control method and armature control method of speed control for DC shunt motor. CO3

(OR)

(b) Explain the working of 3-point starter with legible sketch. CO3

MODEL PAPER – FORMATIVE ASSESSMENT-2

C-23-EE-302

BOARD DIPLOMA EXAMINATION, (C-23)

DEEE – THIRD SEMESTER EXAMINATION

EE-302 : ELECTRICAL MACHINES-I

Time: 90 Minutes **Total Marks: 40M**

PART-A **(1 x 4) + (4 x 3) = 16M**

Instructions:

i. Answer all **five** questions.
ii. First question carries **four** marks and remaining each question carries **three** marks.
iii. Answers should be brief and straight to the point and shall not exceed five simple sentences

1. (a) The direct test of DC motor is also known as Brake test: **True / False**. CO3

(b) The type of electrical measuring instrument which is used only for DC work is_____. CO4

(c) An example for high resistance is _____. CO4

(d) The abbreviation of LVDT is _____. CO5

2. List the different tests of DC Motors. CO3

3. Classify the instruments on the basis of principle of working. CO4

4. State the advantages of moving iron instruments. CO4

5. Define transducer. CO5

PART-B **3 X 8 = 24M**

Instructions:

i. Answer all **three** questions.
ii. Each question carries **eight** marks.
iii. The answers should be comprehensive and the criteria for valuation are the content but not the length of the answer.

6. (a) Explain the method of conducting brake test on DC series motors. CO3

(OR)

(b) Explain the method of conducting brake test on DC shunt motors. CO3

7. (a) Explain the working of permanent magnet moving coil instruments. CO4

(OR)

(b). Describe the construction and working of Megger. CO4

8. (a)Explain the working of Linear Variable Differential transformer. CO5

(OR)

(b). Explain the working of single phase Digital Energy meter with block diagram. CO5

MODEL PAPER – SUMMATIVE EXAMINATION

C-23-EE-302

BOARD DIPLOMA EXAMINATION, (C-23)

DEEE – THIRD SEMESTER EXAMINATION

EE-302 : ELECTRICAL MACHINES – I

Time: 3 hours **Total marks: 80M**

PART-A **10 X 3 = 30M**

Instructions:

i. **Answer all questions.**
ii. **Each question carries three marks.**
iii. **Answers should be brief and straight to the point and shall not exceed five simple sentences**

1. Define armature reaction.	CO1
2. Classify DC generators based on excitation.	CO1
3. Plot the electrical characteristics of DC shunt motor.	CO2
4. List the applications of various DC motors.	CO2
5. Explain the significance of back e.m.f in a D.C. Motor.	CO2
6. State the necessity of a starter.	CO3
7. Classify the instruments on the basis of principle of working.	CO4
8. State the advantages of moving iron instruments.	CO4
9. State the applications of Transducers.	CO5
10. Define sensor.	CO5

PART-B **5 X 10 = 50**

Instructions:

i. **Answer any five questions and each question carries ten marks.**
ii. **The answers should be comprehensive and the criteria for valuation are the content but not the length of the answer**

11 In a 110 V , D.C compound generator the resistance of the armature, shunt and series windings are 0.06 ohm, 25 ohm and 0.5 ohm respectively. The load consists of 200 lamps each rated at 55 watts , 110 V. Find the total electromotive force and armature current when the machine is connected as (i) long shunt (ii) short shunt. Neglect armature reaction and brush drop. CO1

12. A 4 pole 250 V DC series generator supplies a load of 10 KW at the rated voltage. The armature and series field resistances are 0.1Ω and 0.15Ω respectively. The armature is lap wound with 50 slots, each slot containing 6 conductors. If the flux per pole is 50 mWb. Calculate the speed of the generator. CO1

13. A 400 V shunt motor has armature resistance of 0.8Ω and field resistance of 200Ω.Determine the back emf when giving an output of 7.46 kw at 85% efficiency. CO2

14. Explain the working of 3-point starter with legible sketch. CO3

15. Explain the working of dynamometer type instruments. CO4

16. Describe the construction and working of Megger. CO4

17. Explain the working of Linear Variable Differential transformer. CO5

18. Explain the working of single phase Digital Multimeter with block diagram. CO5

A.C. CIRCUITS AND TRANSFORMERS

Course code	Course title	No. of periods/ week	Total no. of periods	Marks for FA	Marks for SA
EE-303	A.C. CIRCUITS AND TRANSFORMERS	6	90	20	80

S. No.	Unit Title	No. of Periods	CO'S Mapped
1.	Fundamental of A.C.	13	**CO1**
2	Single phase A.C Circuits	23	**CO2**
3	Poly phase circuits	13	**C03**
4	Single phase transformers	28	**CO4**
5	Three phase transformers and Auto Transformers	13	**CO5**
Total		**90**	

Course objectives:

Course Objectives	i. To understand basics of alternating quantities ii. To acquire knowledge on A.C circuits and its components and to solve them. iii. To understand poly phase circuits and solve problems iv. To familiarise with the knowledge of single phase and three phase transformers

Course outcomes:

Course outcomes	**CO1**	EE-303.1	Understand the fundamental concepts of AC quantities and solving problems in j-notation
	CO2	EE-303.2	Comprehending the knowledge of resonance in series and parallel R, L, C circuits
	CO3	EE-303.3	Describe poly phase circuits and solving problems
	CO4	EE-303.4	Explain the working of single transformers and understand equivalent circuit parameters, efficiency and regulation.
	CO5	EE-303.5	Analyse the three phase transformers, types and cooling methods.

Learning outcomes:

1. Fundamentals of A.C

1.1 State the relation between poles, speed and frequency

1.2 Define the instantaneous value, maximum value, frequency, time period, Average value, R.M.S value, Form factor and Peak factor of an A.C quantity.

1.3 Derive the above for different alternating waveforms viz. half wave and full wave rectified sine wave.

1.4 Explain the terms phase and phase difference of an A.C quantity.

1.5 Understand j operator

1.6 Convert polar quantities into rectangular quantities and Vice-versa.

2. Single-phase A.C circuits

2.1 Derive relationship between voltage and current in a

(i) Pure resistive circuit ii) Pure inductive circuit iii) Pure capacitive circuit.

2.2 Calculate the impedance, current, phase angle, power and power factor in R-L

series circuits, R-C series circuits, L-C series circuits, R-L-C series circuits.

2.3 Solve Problems on Series Circuits

2.4 Define Resonance and Derive a formula for resonant frequency of a R-L-C series circuit.

2.5 Define Q- factor and state its importance,

2.6 Solve problems on Series Resonance.

2.7 State the concept of conductance, susceptance and admittance.

2.8 Explain the method of solving two branch parallel A.C circuits by using J- notation method

2.9 Solve Problems on j-notation method for two branch parallel A.C circuits.

3. Poly Phase Circuits

3.1 Define the term `Poly Phase'.
3.2 List advantages of 3 phase system over single phase system.

3.3 Write the expressions for three-phase emfs and represent them by phasor diagram.

3.4 State the concept of phase sequence.

3.5 Derive the relation between line and phase values of current and voltage in 3 phase

(i)Star circuits and (ii) delta circuits.

3.6 Derive the equation for power in 3 phase circuit.
3.7 Solve numerical examples in balanced loads.
3.8 Derive the formulae for measurement of 3 phase power and power factor by using two watt meters.
3.9 Solve simple problems on two watt meter method.

4. Single phase transformer

4.1 Define Transformer and Explain its working principle.

4.2 Classify the transformers based on

(i) number of phases (ii) construction (iii) function.

4.3 Explain the constructional details of transformers with legible Sketch..

4.4 Distinguish between shell type and core type transformers.

4.5 Derive the E.M.F equation of a single phase transformer and solve problems.

4.6 Define 'transformation' ratio.

4.7 Draw Vector diagram for a transformer working on no load.

4.8 Develop the vector diagram of a transformer on load for

(i) Unity power factor (ii) Lagging power factor (iii) Leading power factor

4.9 Draw the equivalent circuit of a transformer by approximation.

4.10 Determine the equivalent circuit constants from no-load test and short circuit test data and solve problems.

4.11 Derive the approximate equation for regulation for transformer.
4.12 List the losses taking place in a transformer and derive the condition for maximum efficiency of a transformer.
4.13 Solve simple problems on regulation and efficiency.

4.14 State the reason for transformer rating in KVA.

4.15 Define all-day efficiency.

4.16 Differentiate between distribution transformer and power transformer.

5. Three Phase Transformers and Auto transformers

5.1 State the advantages of 3 phase transformer over single phase transformer.

5.2 List the different types of three phase transformers by giving their symbolic representation

and voltage relationships.
5.3 State the applications of (i)star-star (ii)delta-star (iii)star-delta

(iv)delta- delta connected transformers.

5.4 State the need for parallel operation of three phase transformers.

5.5 State the conditions for parallel operation of 3 phase transformers.

5.6 List the special transformers.

5.7 State the advantages and disadvantages of autotransformers

5.8 State the necessity of cooling of power transformers.

5.9 List different methods of cooling of power transformer.

5.10 Draw a legible sketch of a power transformer and explain the function of each part.

5.11 State the need for Tap changing in power transformer and explain the `on load' and `off load' tap changing.

CO-PO/PSO MATRIX

CO No	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
EE-303.1	3	2	1					3		
EE-303.2	3		1					3		
EE-303.3	3		1					3		
EE-303.4	3							3	1	
EE-303.5	3	2		1	1			3		
Average	3	2	1	1	1			3	1	

Note:
The gaps in CO and PO mapping will be achieved by one or more appropriate activities from the following: (i) Assignments (ii) Tutorials (iii) Seminars (iv) Guest Lectures (v) Group Discussions (vi) Quizzes (vii) Industrial Visits (viii) Tech Fests (ix) Mini Projects (x) Library Visits

COURSE CONTENT

Fundamentals of A.C.

Relation between poles, speed and frequency- Definition of Alternating quantity, cycle, period, frequency, amplitude, instantaneous value and angular velocity - Average value - effective value/R.M.S

value definitions and derivations - calculations of these values for half wave rectified sine wave, full wave rectified Sine wave forms-form factor- peak factor **-** Representation of alternating quantities by equation, graphs and phasor diagrams **-** Phase and phase difference **–** Understanding of `J' notation for alternating quantities ,transformation from polar to rectangular notations and Vice-versa

Single phase A.C. Circuits

Concept of reactance, purely inductive and purely capacitive circuits - Derivation of voltage , current, power relations including phase relationships, wave forms and phasor diagrams **-** R-L, R-C , L-C & R-L-C series circuits - Derivation of relation between voltage, current, impedance, power including wave forms and phasor diagrams. Impedance triangle, phase angle, power factor, active and reactive components of current and power in above circuits – Definition of Resonance in series circuits and expression for resonant frequency- Q-factor-Importance of Q- factor- Problems on series circuits and series resonance- Concept of conductance, susceptance and admittance - Simple Parallel circuits - solution by `J' notation – problems.

Poly phase circuits

Definition of Poly phase - Advantages of poly-phase systems over single-phase systems - Location of coils for obtaining required phase difference - Representation of 2 phase,3 phase EMF by equations, graphs and phasors - phase sequence **-** Current in neutral in 2 phase and 3 phase system - Method of connection of star and delta - phasor diagram showing relation between phase and line quantities, Relation between phase and Line values of voltages and currents -power equation - Problems on 3 phase balanced circuits – Measurement of 3 phase power by two wattmeter and power factor in balanced circuits - Effect of Load power factor on wattmeter readings – Problems.

Single Phase Transformers

Introduction to Transformer, Classification of transformers, Construction of transformers, Theory of an ideal transformer - emf equation derivation – Transformation ratio and turns ratio and relation between them - Voltage ratio and current ratio – Transformer on no load - No load current components and no load power factor -Transformer on load – Equivalent circuit of transformer - Equivalent circuit constants by transformation, Short circuit test - Regulation of transformer - definition and derivation of approximate equation for regulation - determination of regulation from S.C. Test data , determination of losses in transformer from O.C. and S.C. tests data- efficiency, condition for maximum efficiency-simple problems on efficiency and regulation – rating of transformer- all-day efficiency definition- Differentiation between distribution transformer and power transformer.

Three- phase transformer & Auto transformer

Advantages of 3 phase transformer over single phase transformer. Descriptive treatment of star-star, delta-delta, star-delta and delta-star, voltage current and phase relation for the above groups- Need and conditions to be fulfilled for paralleling 3 phase transformer, open delta working of 3 phase transformers, Auto-transformers – applications, Necessity of cooling - Methods of cooling - Sketch of power transformer indicating parts and explain their functions - Tap changing gear - on load and off load tap changing in power transformer.

REFERENCE BOOKS

1. B.L. Theraja -Electrical Technology - Vol - I S. Chand &co.
2. V. K .Mehta-Introduction to Electrical Engg.
3. A.Chakrabarthy -Electrical Circuits - Dhanapat Rai and Sons
4. B.L. Theraja –A.K.Theraja-Electrical Technology - Vol - II S. Chand &co.
5. J.B.Gupta-Theory and performance of electrical machines-KATSON BOOKS

Blue print:

S. No.	Unit title	No. of periods	Weightage allocated	Marks wise distribution of weightage				Question wise distribution of weightage				CO'S Mapped
				R	U	Ap	An	R	U	Ap	An	
1.	Fundamental of A.C.	10	9	3	3	3	-	1	1	1	-	CO1
2	Single phase A.C Circuits	20	26	3	13	10		1	2	1		CO2
3	Poly phase circuits	10	26	6	10	10		2	1	1		C03
4	Single phase transformers	**25**	26	6	10	10		2	1	1		CO4
5	Three phase transformers and Auto Transformers	**10**	23	3	20	0		1	2	0		CO5
Total		**75**	110	**21**	**56**	**33**	**0**	**7**	**7**	**4**	**0**	

Syllabus to be Covered for Unit Tests

Unit Test	Learning Outcomes to be Covered
Unit Test-I	From 1.1 to 3.9
Unit Test-II	From 4.1 to 5.11

MODEL PAPER – FORMATIVE ASSESSMENT-1
C-23-EE-303
BOARD DIPLOMA EXAMINATION, (C-23)
DEEE – THIRD SEMESTER EXAMINATION
EE-303 :AC circuits & Transformers

Time: 90 Minutes **Total Marks: 40M**

PART-A **(1 x 4) + (4 x 3) = 16M**

Instructions: Answer all five questions.
First question carries four marks and remaining each question carries three marks.
Answers should be brief and straight to the point and shall not exceed five simple sentences

1.(a) If instantaneous voltage e=100Sin (50t), its RMS value is _____. CO1
(b) The polar form of 3-j4 is _____. CO1
(c) The relation between voltage and current in a pure inductance is _____. CO2
(d) The phase angle between any two phases in a three phase system is 120 degrees. True / False. CO3

2. Define (a) frequency (b) Form Factor related to A.C. quantity. CO1
3. A sinusoidal current wave is given by i= 100sin 100 πt .Determine (i) Average value and (ii) R.M.S value CO1
4. Define resonance of a RLC series circuit. CO2
5. List any three advantages of 3-phase system over single phase system. CO3

PART-B **3X8=24 MARKS**

Instructions: Answer all three questions.
Each question carries eight marks.
The answers should be comprehensive and the criteria for valuation are the content but not the length of the answer.

6.(a)Derive the Average value, RMS value and form factor of a fullwave rectified sinewave. CO1

(OR)

(b) Perform the following where A=6+j8,B=8-j10 CO1
(i)A+B (ii) A-B (iii) AXB (iv) A÷B

7.(a) A coil of resistance 6Ω and an inductance of 0·03 H is connected across of 50 V, 60 Hz supply. Find the (i) current, (ii) phase angle, (iii) power factor and (iv) power. CO2

(OR)

(b) A resistance of 50 Ω,inductance of 100mH and a capacitance of 100 µF are connected in series across 200volt,50Hz supply.Determine (i) Impedence (ii) current flowing through the circuit (iii) power factor (iv) power in watts. CO2

8.(a) Each phase of delta connected load comprises a resistor of 60Ω and capacitance of 40 µF in series.Calculate line and phase currents, total power when the load is connected to a 440V, 3-phase, 50Hz supply. CO3

(OR)

(b)) Derive the equation for power and power factor of a three-phase balanced load using two-wattmeter method. CO3

MODEL PAPER – FORMATIVE ASSESSMENT-2
C-23-EE-303
BOARD DIPLOMA EXAMINATION, (C-23)
DEEE – THIRD SEMESTER EXAMINATION
EE-303 :AC circuits & Transformers

Time: 90 Minutes **Total Marks: 40M**

PART-A **(1 x 4) + (4 x 3) = 16M**

Instructions: Answer all five questions.
First question carries four marks and remaining each question carries three marks.
Answers should be brief and straight to the point and shall not exceed five simple sentences

1.(a) For step down Transformers, the transformation ratio is less than 1 : (True / False) CO4
(b) The condition for maximum efficiency of Transformer is_____. CO4
(c) Any one advantage of autotransformer is_____. CO5
(d) Any one method of cooling of power transformer is _____. CO5

2. Define all-day efficiency of a transformer. CO4
3. Distinguish between shell-type and core-type transformers in any three aspects. CO4
4. State the advantages of 3-phase transformer over single phase transformer. CO5
5. List the special transformers. CO5

PART-B **3X8=24 MARKS**

Instructions: Answer all three questions.
Each question carries eight marks.
The answers should be comprehensive and the criteria for valuation are the content but not the length of the answer.

6.(a) Explain the working principle of transformer. CO4

(OR)

(b) Derive the EMF equation of a single-phase transformer. CO4

7.(a) Draw the equivalent circuit diagram refers to primary for a 4 kVA,
200/400 V and 50 HZ $1-\phi$ transformer from the test results as follows:
OC Test : 200 V, 0·8 A, 80 W on LV Side
SC Test : 20 V, 10 A, 100 W on HV Side CO4

(OR)

(b) Draw the Vector diagram of a practical transformer on load for unity power factor and lagging power factor. CO4

CO4

8.(a)State the need for parallel operation of three phase transformers and also state the conditions for parallel operation of three phase transformers. CO5

(OR)

(b))Explain the function of each part in a power transformer. CO5

MODEL PAPER – SUMMATIVE EXAMINATION

C-23-EE-303

BOARD DIPLOMA EXAMINATION, (C-23)

DEEE – THIRD SEMESTER EXAMINATION

EE-303 : AC circuits & Transformers

Time: 3 hours Total marks: 80

PART-A **10 X 3 = 30**

Instructions:

i. Answer all questions.
ii. Each question carries three marks.
iii. Answers should be brief and straight to the point and shall not exceed five simple sentences

1. State the relation between number of poles, speed and frequency CO1
2. Define the terms related to A.C. quantity (i) RMS value and (ii) peak factor. CO1
3. The given two vectors are A=30+j52 and B= 30-j52. Perform the functions. CO1
   (i) A+B (ii) A x B
4. Define resonance of series circuit and state the formula for resonance frequency. CO2
5. A resistance of 4Ω is connected in series with an inductance of 0.02H across the supply of 200V, 50Hz. Find current in the circuit. CO2
6. List any three advantages of 3-phase system over single phase system. CO3
7. State the concept of phase sequence. CO3
8. Classify the transformers based on number of phases. CO4
9. Define all-day efficiency of a transformer. CO4
10. List the special transformers CO5

PART-B **5 X 10 =50M**

Instructions:

i. Answer any five questions.
ii. Each question carries ten marks.
iii. The answers should be comprehensive and the criteria for valuation are the content but not the length of the answer.

11. Derive an expression for impedance, current, phase angle, power and power factor of an AC

circuit consisting of resistance and a pure capacitor in series. CO2

12.A resistance of 50Ω, inductance of 100 mH and a capacitance of 100 µF are connected in series across 200volt, 50Hz supply. Determine (i) Impedance (ii) current flowing through the circuit (iii) power factor (iv) power in watts. CO2

13. Derive the equation for power and power factor of a three-phase balanced load using two-wattmeter method. CO3

14. Each phase of delta connected load comprises a resistor of 60Ω and capacitance of 40 µF in series. Calculate line and phase currents, total power when the load is connected to a 440V, 3-phase, 50Hz supply. CO3

15. Draw the equivalent circuit diagram refers to primary for a 4 kVA, 200/400 V and 50 HZ $1-\phi$ transformer from the test results as follows:
OC Test : 200 V, 0·8 A, 80 W on LV Side
SC Test : 20 V, 10 A, 100 W on HV Side CO4

16. Draw the Vector diagram of a practical transformer on load for unity power factor and lagging power factor. CO4

17. Draw a legible sketch of Power transformer and explain the function of each part. CO5

18. State the necessity of cooling of power transformers and list methods of cooling of power transformers. CO5

ELECTRONICS ENGINEERING

Course Code	Course Title	No. of periods / Week	Total No. of Periods	Marks for FA	Marks for SA
EE-304	ELECTRONICS ENGINEERING	4	60	20	80

COURSE OUTCOMES MAPPING

S.No	Unit Titles	No. of periods	CO's Mapped
1.	Semiconductor devices	16	CO1
2.	Power Supplies	08	CO2
3.	Amplifiers	16	CO3
4	Oscillators	08	CO4
5.	Linear Integrated Circuits	12	CO5
	Total	**60**	

COURSE OBJECTIVES	i). To introduce students to the basic theory of semiconductor devices and their practical applications in electronics.
	ii). To familiarize students to the principle of operation, design and synthesis of different electronic circuit and integrated circuits, and their applications.
	iii). To provide strong foundation for further study of electronic circuits and integrated circuits.

COURSE OUTCOMES	CO1	EE304.1	Analyze the formation and working of various semiconductor devices.
	CO2	EE304.2	Explain the rectifiers and voltage regulators.
	CO3	EE304.3	Analyze the concept of amplifier, small signal amplifier, large signal amplifier and feed back amplifier.
	CO4	EE304.4	Analyze various oscillators.
	CO5	EE304.5	Analyze the op-amp application circuits.

LEARNING OUTCOMES

1. Semiconductor Devices

1.1 Define PN Junction Diode and explain the formation of it.

1.2 Explain the working of PN Junction diode with no bias, forward bias and reverse bias.

1.3 Draw the VI characteristics of PN Junction Diode.

1.4 Explain the working of Zener diode.

1.5 Draw the VI characteristics of Zener diode.
1.6 Explain formation of PNP and NPN transistors
1.7 State the different configurations of transistors.
1.8 Plot the Input / Output characteristics of a transistor in CE configuration.
1.9 Explain the working and VI characteristics of
(a) FET (b) MOSFET (c) IGBT

2. Power Supplies

2.1 Define Rectifier.
2.2 Explain the working and, draw the circuit diagrams and waveforms of:
(a) Half Wave Rectifier (b) Full Wave Rectifier (c) Bridge Rectifier
2.3 State the need of filter in power supplies.
2.4 List the different types of filters used in power supplies.
2.5 Explain the working of Zener diode as a Voltage regulator in a power supply.
2.6 Explain the working of voltage regulated power supply.

3. Amplifiers

3.1 Define Amplifier
3.2 Explain the operation of transistor as an amplifier.
3.3 List the applications of amplifiers.
3.4 List the different types of coupling methods in amplifiers
3.5 Explain the working and, draw the circuit diagrams and frequency response curves of RC coupled amplifier
3.6 Explain the need for power amplifier.
3.7 Distinguish between voltage amplifier and power amplifier.
3.8 Define the terms (a) feedback (b) feedback factor
3.9 Explain the effect of feedback on gain, band width and noise

4. Oscillators

4.1 Define Oscillator and classify different types of oscillators
4.2 State the conditions required for sustained oscillations
4.3 State the need of (a) AF Oscillator (b) RF Oscillator (c) Square Wave Oscillator
4.4 Draw the circuit diagram and explain the working of
(a) RC Phase Shift Oscillator (b) Hartley Oscillator (c) Colpitt's Oscillator
4.5 List the applications of oscillators.

5. Linear Integrated Circuits

5.1 Define Integrated Circuit.
5.2 List the advantages of Integrated Circuits over Discrete Circuits.
5.3 Explain the operation of Differential Amplifier.
5.4 List the characteristics of an Ideal Operational Amplifier.
5.5 Explain the working of Operational Amplifier.

5.6 Explain the working of OpAmp Inverting Amplifier.

5.7 State the concept of virtual ground.

5.8 Explain the Operational Amplifier as

(a) summer (b) integrator (c) differentiator (d) inverter.

5.9 Draw the Pin Diagram of 741 IC and state its important specifications and function of each pin.

CO'S – PO'S – PSO'S MAPPING STRENGTH

CO No	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
EE305.1	3							3		
EE305.2	3		2					3		
EE305.3	3	2	1					3	1	
EE305.4	3	1.5	1					3		
EE305.5	3	1	2	1	1.5			3	1	
Average	**3**	**1.5**	**1.5**	**1**	**1.5**			**3**	**1**	

Note:

The gaps in CO and PO mapping will be achieved by one or more appropriate activities from thefollowing:

(i) Assignments (ii) Tutorials (iii) Seminars (iv) Guest Lectures (v) Group Discussions (vi) Quizzes
(vii) Industrial Visits (viii) Tech Fests (ix) Mini Projects (x)

Library VisitsHYPONATED COURSE CONTENTS

1. Semi-conductor Devices

PN Junction Diode, forward and reverse bias- Zener diode, Zener diode characteristics - formation of PNP and NPN transistors- Transistor configurations - CB, CE and CC - Input and output characteristics of CE - FET, MOSFET, IGBT - characteristics and their applications.

2. Power supplies

Half wave, Full wave and Bridge rectifiers, Types of Filters, Voltage regulated power supply using Zener Diode.

3. Amplifiers

Principles of Operation- Classification of Amplifiers, Coupling methods, Frequency Response of R.C coupled amplifier – applications - Power amplifier – feedback amplifier.

4. Oscillators

Oscillator - types of oscillators - AF Oscillator - RF Oscillator -Square wave Oscillator - RC phaseshift Oscillator -Hartley oscillator- Colpitt's oscillator - applications of oscillators.

5. Linear Integrated circuits.

Differential Amplifier - advantages of ICs - Operational Amplifier – Gain – summer – integrator – differentiator - scale changer – inverter -741 IC .

Note : 1. This subject is to be taught by Electronics & Communication Engg. Faculty 2. Paper setting and paper evaluation is also to be done by Electronics & Communication Engg Faculty.

REFERENCE BOOKS

1. NN Bhargava – Basic Electroncis and linear circuits – TTTI, chandigarh
2. V.K. Mehta,Rohitmehta-Principles of Electronics, S Chand & Co.
3. G.K. Mithal -Applied Electronics-Khanna publishers
4. G.K.Mithal - Electronic devices and circuits-Khanna publishers
5. J.B.Gupta-A textbook of Electronics Engineering-KATSON BOOKS

BLUE PRINT

S. No	Unit Title	No. of periods	Weightage Allocated		Markswise Distribution of Weightage				Questionwise Distribution of Weightage				CO's Mapped
					R	U	Ap	An	R	U	Ap	An	
1	Semiconductor devices	16	26		3	23			1	3			CO1
2	Power Supplies	8	16		3	13			1	2			CO2
3	Amplifiers	16	21		3	18			1	2.5			CO3
4	Oscillators	8	21		3	18			1	2.5			CO4
5	Linear Integrated Circuits	12	26		3	23			1	3			CO5
	Total	**60**	**110**		**15**	**95**			**5**	**13**			

Model Papers: Syllabus to be Covered for Unit Tests

Unit Test	Learning Outcomes to be Covered
Unit Test-I	From 1.1 to 3.5
Unit Test-II	From 3.6 to 5.9

MODEL PAPER – FORMATIVE ASSESSMENT-1, C-23-EE-304

BOARD DIPLOMA EXAMINATION, (C-23)

DEEE – THIRD SEMESTER EXAMINATION

EE-304 : ELECTRONICS ENGINEERING

Time: 90 Minutes Total Marks: 40

PART-A (1 x 4) + (4 x 3) = 16

Instructions:

i. Answer all five questions.

ii. **First question carries four marks and remaining each question carries three marks.**

iii. Answers should be brief and straight to the point and shall not exceed five simplesentences

1. (a) Symbol for LED is_____.

   (b) Expand FET_____.

   (c) Application of Common Collector configuration of Transistor is_____.

   (d) Cut in Voltage of Silicon Diode_____. **(CO1)**

2. Draw the VI characteristics of p n junction Diode. **(CO1)**

3. Define Rectifier and draw the circuit diagram of Half Wave Rectifier. **(CO2)**

4. State the need of filter in power supplies. **(CO2)**

5. Define amplifier. **(CO3)**

PART-B 3 X 8 = 24

Instructions:

a. **Answer all three questions.**

b. **Each question carries eight marks.**

c. **The answers should be comprehensive and the criteria for valuation are the content but not the length of the answer.**

6. (a) Explain the working of PN Junction diode with no bias, forward bias and reverse bias. **(CO1)**

(OR)

(b) Explain the working and VI characteristics of field effect transisitor (FET). **(CO1)**

7. (a) Explain the working of full wave bridge rectifier with waveforms. **(CO2)**

(OR)

(b) Explain the working of Zener diode as a Voltage regulator in a power supply. **(CO2**)

8. (a) Explain the operation of transistor as an amplifier with circuit diagram. **(CO3)**

(OR)

(b) Explain the working, draw the circuit diagram and frequency response of RC coupled amplifier. **(CO3)**

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MODEL PAPER – FORMATIVE ASSESSMENT-2C-23-EE-304

BOARD DIPLOMA EXAMINATION, (C-23)

DEEE – THIRD SEMESTER EXAMINATION

EE-304 : ELECTRONICS ENGINEERING

Time: 90 Minutes Total Marks: 40

PART-A (1 x 4) + (4 x 3) = 16

Instructions:

a. Answer all five questions.

b. First question carries four marks and remaining each question carries three marks.

c. Answers should be brief and straight to the point and shall not exceed five simple sentences

1. (a) Feedback factor is defined as.

(b) In oscillator _____type of feed back is used.

(c) IC number for op amp is_____.

(d) In power amplifier the collector load has_____resistance. **(CO4)**

2. Define oscillator and classify it. **(CO4)**

3. List any three applications of oscillators. **(CO4)**

4. List any three advantages of Integrated Circuits over Discrete Circuits. **(CO5)**

5. State the concept of virtual ground. **(CO5)**

PART-B 3 X 8 = 24

Instructions:

i. Answer all three questions.

ii. Each question carries eight marks.

iii. The answers should be comprehensive and the criteria for valuation are the content but not the length of the answer.

6. (a) Explain the effect of feedback on gain, band width and noise. **(CO3)**

(OR)

(b) Explain the Need for power amplifier. **(CO3)**

7. (a) Draw the circuit diagram and explain the working of Hartley Oscillator. **(CO4)**

(OR)

(b) Draw the circuit diagram and explain the working of RC phase shift oscillator. **(CO4)**

8. (a) Explain the working of OpAmp Inverting Amplifier with circuit diagram. **(CO5)**

(OR)

(b) Draw the Pin Diagram of 741 IC and state its important specifications and function of each pin. **(CO5)**

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MODEL PAPER – SUMMATIVE EXAMINATIONC-23-EE-304

BOARD DIPLOMA EXAMINATION, (C-23)

DEEE – THIRD SEMESTER EXAMINATION

EE-304 : ELECTRONICS ENGINEERING

Time: 3 hour Total Marks: 80

PART-A 10 X 3 = 30

Instructions:

i. Answer all questions.

ii. Each question carries three marks.

iii. Answers should be brief and straight to the point and shall not exceed five simple sentences

1. Define PN Junction diode and draw its block diagram and symbol. **(CO1)**

2. Draw the VI characteristics of Zener Diode. **(CO1)**

3. Define Rectifier and draw the circuit diagram of Half Wave Rectifier. **(CO2)**

4. State the need of filter in power supplies. **(CO2)**

5. Define amplifier. n**(CO3)**

6. List any three advantages of RC coupled amplifier. **(CO3)**

7. State the need of oscillators. **(CO4)**

8. List any three applications of oscillators. **(CO4)**

9. List any three advantages of Integrated Circuits over Discrete Circuits. **(CO5)**

10. Draw the block diagram of OP-AMP 741 IC. **(CO5)**

PART-B 5 X 10 = 50

Instructions:

1. Answer any five questions.

2. Each question carries ten marks.

3. The answers should be comprehensive and the criteria for valuation are the content but not the length of the answer.

11. Explain the working of PN Junction diode with no bias, forward bias and reverse bias. (CO1)

12. Draw the input and output characteristics of transistor in common base configuration and explain. (CO1)

13. Explain full wave bridge rectifier with circuit diagram and wave forms (CO2)

14. Explain the effect of feedback amplifiers on gain, bandwidth and noise. (C03)

15. (a) Explain the concept of DC load line. (CO3)

(b) Draw the circuit diagram of Hartley oscillator (C04)

16. Explain about Barkhausen's criterion in Oscillator (CO4)

17. Define integrated circuit. Explain the working of differential amplifier (CO5)

18. Explain Op-Amp as inverting amplifier and give its gain expression. (CO5)

PROGRAMMING IN C

Course Code	Course Title	No. of periods / Week	Total No.of Periods	Marks for FA	Marks for SA
EE-305	PROGRAMMING IN C	5	75	20	80

COURSE OUTCOMES MAPPING

S.No	Unit Title	No. of periods	CO's Mapped
1.	Basics of 'C' Programming	10	C01
2.	Decision & Loop Control Statements	15	CO2
3.	Arrays& Strings	18	C03
4	User defined Functions	15	C04
5.	Structures , Unions & Pointers	17	CO5
	Total	**75**	

COURSE OBJECTIVES	i. To impart adequate knowledge on the need of programming languages andproblem solving techniques.
	ii. To develop programming skills using the fundamentals and basics of C-Language.
	iii. To enable effective usage of arrays, structures, functions, pointers and toimplement the memory management concepts.

COURSE OUTCOMES	CO1	EE-305.1	Develop C programs using operators with proper flow chart and algorithm.
	CO2	EE-305.2	Apply conditional and iterative statements to write C programs.
	CO3	EE-305.3	Develop C programs on arrays and strings.
	CO4	EE-305.4	Develop modular programming using functions.
	CO5	EE-305.5	Write programmes using structures, unions and pointers.

LEARNING OUTCOMES

1. Basics of 'C' Programming

1.1 State the Importance of 'C'
1.2 Explain the basic structure of 'C' Programming
1.3 Know the Programming style with sample program
1.4 Execute a 'C' Program
1.5 Know about the character set
1.6 Know about constants, variables, keywords &identifiers
1.7 List various data types with examples
1.8 Explain different arithmetic operators, relational operators and logical operators with their precedence
1.9 Explain the assignment statements
1.10 Explain the increment & decrement operators
1.11 Identify the compound Assignment operators
1.12 Explain the I/P functions printf and scanf
1.13 Know various type conversion techniques

2. Decision & Loop Control Statements

2.1 State the Importance of conditional expressions
2.2 List and explain the various conditional statements
2.3 Explain the switch statement
2.4 List the different iterative loops and explain them(for, do, while statements)
2.5 Define nesting and implement with simple programs
2.6 Differentiate 'break' and 'continue' statements with programs
2.7 Mention about the null statements and comma operator

3. Arrays & Strings

3.1 Define 1-D and 2-D Arrays.
3.2 Know how to initialize above arrays and access array elements
3.3 Explain simple programs using arrays
3.4 Define 'string'
3.5 Know how to declare and initialize string variables
3.6 Understand various string handling functions
3.7 Implement programs using string functions

4. User defined functions

4.1 Define 'function'
4.2 Understand the need for User defined function
4.3 Know the return values and their types
4.4 List the four storage classes supported by C
4.5 Discuss the importance of function proto types in programming
4.6 Differentiate local and external variables
4.7 Identify automatic and static variables and discuss them in detail

5. Structures, Unions & Pointers

5.1 Define a structure
5.2 Describe about structure variable
5.3 Explain initialization of structures
5.4 Know the accessing of members of a structure.
5.5 Illustrate concept of structure assignment
5.6 Explain how to find size of a structure.
5.7 Know passing of individual members of a structure to a function
5.8 Define Union and Illustrate use of union
5.9 Declare pointer, assign pointer, and initialize pointer
5.10 Discuss pointer arithmetic.
5.11 Illustrate with example how pointer can be used to realize the effect ofparameter passing by reference.
5.12 Illustrate with examples the relationship between arrays and pointers.
5.13 List various conditional and unconditional preprocessor directives

CO-PO/PSO MATRIX:

CO No	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
EE-305.1	3							3		
EE-305.2	3							3		
EE-305.3	3							3		
EE-305.4	3	1	1					3	1	
EE-305.5	3	1	1	1				3	1	1
Average	**3**	**1**	**1**	**1**				**3**	**1**	**1**

3-Strongly Mapped 2- Moderately Mapped 1- Slightly Mapped

Note : 1. This Subject is to be taught by Computer Engg. faculty
2. Paper setting and paper evaluation is also to be done by Computer Engg Faculty.

Note:

The gaps in CO and PO mapping will be achieved by one or more appropriate activities from the following:

(i) Assignments (ii) Tutorials (iii) Seminars (iv) Guest Lectures (v) Group Discussions (vi) Quizzes
(vii) Industrial Visits (viii) Tech Fests (ix) Mini Projects (x) Library Visits

HYPONATED COURSE CONTENTS

1. Basics of 'C' Programming

Structure of a C program, Programming rules, Character Set, Keywords, Constants, Variables, Data types, Type conversion, Arithmetic, Logical, Relational operators and precedences – Assignment, Increment, Decrement operators, evaluation of expressions. I/P functions

2. **Decision and Loop control Statements**

   If, If-else, Nested If else, Break, Continue and Switch statements Loops:- For, While, Do-while, Nesting of Loops- Null statement..

3. **Arrays and Strings**

   1 D Array declaration, Initialization, 2 D Array declaration, Initialization, Accessing of Array elements, Character Arrays declaration and Initialization of Strings, string handling functions

4. **User defined Functions**

   Function-Definition, Declaration, Return statement, passing parameters to function- Function calls, Storage classes of variables, Scope and visibility.

5. **Structures, Unions &Pointers**

   Structure features, Declaration and Initialization, Accessing of Structure members, Unions. Pointer declaration, Arithmetic operations and pointers, Pointers and Arrays, Various Preprocessor directives.

REFERENCE BOOKS

1. Yashwant Kanetkar–"Let us learn C"- BPB Publication, NewDelhi
2. Balaguru Swamy –"Programming in ANSI C"-TMH, III Edition
3. Byron Gottfried-Programming In C –Schaum Series
4. Reema Thareja-Programming in C - Oxford universitypress.
5. Brain W, Kernighan and DennisM . Ritchie-C Programming Language-pearson

BLUE PRINT

S. No	Unit Title	No. of periods	Weightage Allocated		Markswise Distribution of Weightage				Questionwise Distribution of Weightage				CO's Mapped
					R	U	Ap	An	R	U	Ap	An	
1	Basics of 'C' Programming	10	16		3	13			1	2			C01
2	Decision & Loop Control	15	26		3	13	10		1	3			CO2
3	Arrays& Strings	18	26		3	13	10		1	3			C03
4	User defined Functions	15	16		3	13			1	2			C04

5	Structures , Unions & Pointers	17	26		3	13	10		1	3			CO5
	Total	**75**	**110**		**15**	**65**	**30**		**5**	**13**			

Model Papers: Syllabus to be Covered for Unit Tests

Unit Test	Learning Outcomes to be Covered
Unit Test-I	From 1.1 to 3.7
Unit Test-II	From 4.1 to 5.13

MODEL PAPER – FORMATIVE ASSESSMENT-1

C-23-EE-305

BOARD DIPLOMA EXAMINATION, (C-23)

DEEE – THIRD SEMESTER EXAMINATION

EE-305 : PROGRAMMING IN C

Time: 90 Minutes Total Marks: 40

PART-A (1 x 4) + (4 x 3) = 16

Instructions:

i. Answer all five questions.

ii. First question carries four marks and remaining each question carries three marks.

iii. Answers should be brief and straight to the point and shall not exceed five simple sentences

1. (a) Keyword for Character data type in C_____.

   (b) Logical AND operation is denoted by_____.

   (c) The instruction a += 2; represents_____.

   (d) An array contains 10 elements. The index of last element is 10 : True / False **(CO1)**

2. List any six data types supported by C. **(CO1)**

3. State the importance of conditional expressions in a C program. **(CO2)**

4. List the different iterative loops. **(CO2)**

5. Define string **(CO3)**

PART-B 3 X 8 = 24

Instructions:

i. Answer all three questions.

ii. **Each question carries eight marks.**

iii. The answers should be comprehensive and the criteria for valuation are the content but not the length of the answer.

6. (a) Explain input and output functions printf and scanf **(CO1)**

(OR)

(b) Explain the assignment statement, increment and decrement operators in C programming. (CO1)

7. (a) Explain the SWITCH statement with one example. **(CO2)**

(OR)

(b) Explain about for loop with one example. **(CO2)**

8. (a) Write a C program to find the biggest number in a given array of numbers. **(CO3)**

(OR)

(b) Explain about string handling functions in C. **(CO3)**

***

MODEL PAPER – FORMATIVE ASSESSMENT-2C-23-

EE-305

BOARD DIPLOMA EXAMINATION, (C-23)

DEEE – THIRD SEMESTER EXAMINATION

EE-305 : PROGRAMMING IN C

Time: 90 Minutes Total Marks: 40

PART-A (1 x 4) + (4 x 3) = 16

Instructions:

i. Answer all five questions.

ii. **First question carries four marks and remaining each question carries three marks.**

iii. Answers should be brief and straight to the point and shall not exceed five simplesentences

1. (a) A function calling itself is called as recursion : True / False. **(CO4)**

(b) Variables declared with in the function are called_____. **(CO4)**

(c) The operator used to represent pointer variable is _____ (CO5)

(d) The keyword used to represent STRUCTURE is ___ **(CO5)**

2. Differentiate local and external variables **(CO4)**

3. List the four storage classes supported by C. **(CO4)**

4. Define Structure and give an example to it. **(CO5)**

5. List any six conditional preprocessor directives available in C. **(CO5)**

PART-B 3 X 8 = 24

Instructions:

i. Answer all three questions.

ii. Each question carries eight marks.

iii. The answers should be comprehensive and the criteria for valuation are the content but not the length of the answer.

6. (a) Discuss the importance of function prototypes in C.

(CO4)

(OR)

(b) Define function and explain the importance of user defined functions in C. **(CO4)**

7. (a) Explain about initialization of structures and accessing members of a structure. **(CO5)**

(OR)

(b) Explain how a pointer can be used to realize the effect of parameter passing by reference in C, with an example. **(CO5)**

8. (a) Define Union and illustrate the use of Unions in C programming. **(CO5)**

(OR)

(b) Write a C program to handle the student records using structures. **(CO5)**

***

MODEL PAPER – SUMMATIVE EXAMINATION

C-23-EE-305

BOARD DIPLOMA EXAMINATION, (C-23)

DEEE - THIRD SEMESTER EXAMINATIONS

EE-305 : PROGRAMMING IN C

Time: 3 hours Total Marks: 80

PART-A 10 X 3 = 30

Instructions:

i. Answer all questions.

ii. Each question carries three marks.

iii. Answers should be brief and straight to the point and shall not exceed five simple sentences

1. Define the terms identifier and keywords.. (CO1)
2. Give the syntax and purpose of printf() statement.. (CO1)
3. State the importance of conditional expressions in a C program. (CO2)
4. Differentiate 'break' and 'continue' statements. (CO2)
5. Define Array and how do access the elements of it (CO3)
6. List any four string handling functions of C. (CO3)
7. State the need of User Defined Function in programming (CO4)
8. List the four storage classes supported by C. (CO4)
9. Define Structure and give an example to it. (CO5)
10. State the importance of #include directive. (CO5)

PART-B 5 X 10 = 50

Instructions:

i. Answer any five questions.
ii. Each question carries ten marks.
iii. The answers should be comprehensive and the criteria for valuation are the content but not the length of the answer.

11. (a) Explain about increment and decrement operators. (CO1)

(b) Write a C program to find the area of the triangle when three sides are given. (CO1)

12. List various conditional statements and explain if - else statement. (C02)
13. Explain about SWITCH statement and write a simple program using SWITCH statement(CO2)
14. (a) Explain how to initialize 2-D arrays. (C03)

(b) Write a C program to add 2X2 matrices. (CO3)

15. Explain various string handling functions in C (C03)
16. Define function . Explain about function prototypes in C programming . (CO4)
17. Explain structure declaration, initialization and accessing members with an example. (CO5)
18. Illustrate with example how pointer can be used to realize the effect of parameter passing by reference. (CO5)

ELECTRICAL CAD LABORATORY

Course code	Course title	No. of periods/ week	Total no. of periods	Marks for FA	Marks for SA
EE-306	ELECTRICAL CAD LABORATORY	03	45	20	30

S.No	Unit Title	No. of periods	CO's Mapped
1.	Exercise on various tool bars, menus and standard Commands, Practice on dimensioning and formatting commands, insert commands and view commands.	14	CO1
2.	Exercise on drawing isometric drawings in 2D and introduction to 3D	5	CO1
3.	Exercise on drawing Electrical symbols, electrical wiring, electrical poles, towers and earthing systems.	15	CO2
4.	Exercise on drawing of the core section of transformer, pole and plinth mounted sub stations.	7	CO4
5	Exercise drawing the end view of D.C. Machine	4	CO5
	Total	**45**	

COURSE OBJECTIVES	1) The students will learn to create control designs using standard-based commands and drafting tools.
	2) To facilitate error-checking and schematic designing.
	3) The course will provide training on cinematic-quality rendering, 3D animation, and visual presentation of panel layout model.
	4) Overall, this course is intended to help control designers to design and implement the control systems efficiently.

COURSE OUTCOMES	CO1	EE-306.1	Familiarise and Practice on design of different engineering drawing models using basic commands
	CO2	EE-306.2	Drawing electrical circuits using basic symbols
	CO3	EE-306.3	Practicing on various poles, towers and earthing systems.
	CO4	EE-306.4	Design and drawing core sections of Transformers, Pole and plinth mounted substations.
	CO5	EE-306.5	Designing and development of end view of D.C. Machine.

LEARNING OUTCOMES

1. Exercise on various tool bars, menus and standard Commands, Practice on dimensioning and formatting commands, insert commands and view commands.

1. Study components in menu bar, Customise and arrange tool bar, Display the drawing created in the working area
2. Study of user coordinate system (UCS), Increase or decrease layouts
3. Give the inputs in the command bar, Display name and purpose of the tools, Study cross hair to locate the cursor
4. Invoke the commands, Getting started with AutoCAD, Create a new file, Open a file, Save a file, Close a file
5. Delete the object or text, Copy the object or text, Paste entities, Zoom an object.
6. Use LINE command, MLINE command, POLYLINE command
7. Draw a circle using CIRCLE command, with centre point and radius, POLYGON command, HELIX command
8. Draw a rectangular, Triangular and quadrilateral areas filled with a solid, colour with the help of plane tool
9. Understand SPLINE command, ELLIPSE command, DIV command
10. Understand INSERT command, HATCH command, MIRROR command, ARRAY command
11. Understand STRETCH command, TRIM command, BREAK command, JOINT command,

12. Understand FILLET command, CHAMFER command, EXPLODE command, GROUP command.

13. QDIM command, Practice LINEAR, ALIGNED and COORDINATE dimensions RADIUS or DIAMETER commands, ANGULUR dimension command, ARC LENGTH command BASELINE command, CENTREMARK command, LAYER command, Control the visibility of objects and assigned properties to objects, Practice the locking, unlocking of layers.
14. Write a text to drawing, change font size and style, Create a standard naming convention to a text styles, table styles, layer styles, dimension styles etc.

15. Insert blocks into current drawing file using INSERT command
16. Understand ATTACH RASTER IMAGE command, REDRAW command
17. Draw the orthographic views (side view, top view, front view) of any object
18. Draw the isometric views of any object, SHADE command, HIDE command.

2. Exercise on drawing isometric drawings in 2D and introduction to 3D

1. Visualise the isometric view SW,NE isometric views, Isometric SNAP and GRID
2. Use set snap spacing, Change the default axis colours, size of the crosshair display by using crosshair tab
3. Create an isometric circle on the current isometric plane using Ellipse Isocircle

4. Exercise on drawing Electrical symbols, electrical wiring, electrical poles, towers and earthing systems.

1. Draw various electrical symbols
2. Drawing of electrical wiring circuit of one lamp controlled by one switch
3. Drawing of electrical wiring circuit of stair case wiring
4. Drawing of electrical wiring circuit of godown wiring
5. Drawing of electrical wiring circuit of series parallel control circuits
6. Drawing of different electrical poles with cross-arms, insulators and stay sets
7. Drawing of transmission towers
8. Drawing of pipe earthing with dimensions
9. Drawing of plate earthing with dimensions

5. Exercise on drawing of the core section of transformer, pole and plinth mounted sub stations.

1. Drawing of plan and elevation of different stepped cores of single phase transformer.
2. Drawing of Pole mounted substation and Plinth mounted substation with dimensions

6. Exercise drawing the end view of D.C. Machine nd view of a D.C. Machine

1. Drawing of end view of D.C. Machine

CO-PO/PSO MATRIX

CO No	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PSO1	PSO2	PSO3
EE-306.1	3		1	1				3	1	
EE-306.2	3							3	1	
EE-306.3	3							3	1	
EE-306.4	3							3	1	
EE-306.5	3	2	1					3	1	
Average	**3**	**2**	**1**	**1**				**3**	**1**	

3-Strongly Mapped 2- Moderately Mapped 1- Slightly Mapped

Note:
The gaps in CO and PO mapping will be achieved by one or more appropriate activities from the following:
(i) Assignments (ii) Tutorials (iii) Seminars (iv) Guest Lectures (iv) Library Visits

HYPONATED COURSE CONTENTS

1. Exercise on various tool bars, menus and standard Commands, Practice on dimensioning and formatting commands, insert commands and view commands.

Study components in menu bar-Customise and arrange tool bar-Display the drawing created in the working area-user coordinate system (UCS)-Increase or decrease layouts-Give the inputs in the command bar-Display name and purpose of the tools-Study cross hair to locate the cursor-Invoke the commands-Getting started with AutoCAD-Create a new file-Open a file-Save a file-Close a file- Delete the object or text -Copy the object or text-Paste entities-Zoom an object.

Use LINE command-MLINE command-POLYLINE command-Draw a circle using CIRCLE command-with centre point and radius-POLYGON command-HELIX command-Draw a rectangular-Triangular and quadrilateral areas filled with a solid-colour with the help of plane tool-Understand SPLINE command-ELLIPSE command- DIV command-Understand INSERT command-HATCH command-MIRROR command-ARRAY command-Understand STRETCH command-TRIM command-BREAK command-JOINT command-Understand FILLET command-CHAMFER command-EXPLODE command- GROUP command

QDIM command-Practice LINEAR-ALIGNED and COORDINATE dimensions-RADIUS or DIAMETER

commands-ANGULUR dimension command-ARC LENGTH command-BASELINE command-CENTREMARK command-LAYER command-Control the visibility of objects and assigned properties to objects-Practice the locking, unlocking of layers-Write a text to drawing-change font size and style- Create a standard naming convention to a text styles-table styles-layer styles-dimension styles etc.

Insert blocks into current drawing file using INSERT command-Understand ATTACH RASTER IMAGE command-REDRAW command-Draw the orthographic views (side view-top view-front view) of any object-Draw the isometric views of any object-SHADE command-HIDE command.

2. Exercise on drawing isometric drawings in 2D and introduction to 3D

Visualise the isometric view SW-NE isometric views-Isometric SNAP and GRID-Use set snap spacing- Change the default axis colours-size of the crosshair display by using crosshair tab-Create an isometric circle on the current isometric plane using Ellipse Isocircle.

3. Exercise on drawing Electrical symbols, electrical wiring, electrical poles, towers and earthing systems.

Draw various electrical symbols - Drawing of electrical wiring circuit of one lamp controlled by one switch-stair case wiring- godown wiring-series parallel control circuits - Drawing of different electrical poles with cross-arms-insulators and stay sets-transmission towers - Drawing of pipe earthing and Plate earthing with dimensions.

4. Exercise on drawing of the core section of transformer, pole and plinth mounted sub stations.

Drawing of plan and elevation of different stepped cores of single phase transformer - Drawing of Pole mounted substation and Plinth mounted substation with dimensions.

5. Exercise drawing the end view of D.C. Machine nd view of a D.C. Machine

Drawing of end view of D.C Machine.

Reference books

1. Get started with AutoCAD Electrical (Vol.1 and 2)– James Richardson-Musselburgh Press Publishers
2. AutoCAD Electrical 2022 Black Book 7th edition–Gaurav Verma, Matt Weber – Cadcamcae Works Publishers

ELECTRICAL MACHINES – I LABORATORY

Course code	Course title	No. of periods/ week	Total no.of periods	Marks for FA	Marks for SA
EE-307	Electrical Machines – I Laboratory	3	45	40	60

S. no.	Unit Title	No. of Periods	CO'S Mapped
1	Characteristics of DC Generators	12	CO1
2	Testing and Speed control of DC motors	18	CO2
3	Measuring Instruments	6	CO3
4	Transducers and sensors	9	CO4
Total		**45**	

Course Objectives:

Course Objectives	i. To familiarise with the knowledge of different materials , tools used in Electrical Engineering process ii. To know the etiquette of working with the fellow workforce iii. To reinforce theoretical concepts by conducting Relevant experiments iv. To know the procedures for measuring resistance and power . V. To know the working of transducers and sensors

Course Outcomes:

Course outcomes	**CO1**	EE-307.1	Demonstrate the skill of planning and organizing experimental setup for D.C Generators,performing operations for investigating performance and to sketch graphically.
	CO2	EE-307.2	Analyse the experimental results to draw inferences, to make recommendations for selection of D,C motor and to run at various speeds for different applications and plotting various characteristics.
	CO3	EE-307.3	Conduct a test for measurement of resistance and power.

	CO4	EE-307.4	Analyse the working of transducers and sensors

Learning outcomes:

1. Characteristics of DC Generators

1. Obtain OCC of a DC shunt Generator at below, rated and above rated speeds.
2. Obtain Internal and External characteristics of DC Shunt Generator.
3. Obtain Internal and External characteristics of DC Series Generator.
4. Obtain Internal and External characteristics of DC Compound Generator

2. Testing and Speed Control of D.C Motors

1. Identify the terminals of the following DC Machines i) DC Shunt motor ii) DC Series Motor
2. Study the parts of DC 3 - point starter, 4 - point starter and Drum Controller Starter.
3. Obtain performance characteristics by conducting Brake Test on DC Shunt Motor
4. Obtain performance characteristics by conducting Brake Test on DC Series Motor.
5. Speed control of DC Shunt Motor by i) Rheostatic control method ii) Field control method
6. Obtain the performance of a DC Shunt Motor by conducting Swinburne's test.

3. Measuring Instruments

1. Calibration of dynamometer type of watt meter.
2. Measurement of earth resistance by using megger.

3. Transducers and sensors

1. Obtain the performance characteristics of LVDT by conducting an experiment.
2. Obtain the performance characteristics of thermocouple by conducting an experiment.

HYPONATED COURSE CONTENTS

1. Characteristics of DC Generators

OCC of a DC shunt Generator at below, rated and above rated speeds- Internal and External characteristics of DC Shunt Generator- Internal and External characteristics of DC Series Generator - Internal and External characteristics of DC Compound Generator

2. Testing and Speed Control of D.C Motors

Identification of terminals of DC machines - parts of DC 3 point starter - Brake Test on DC Shunt Motor - Brake Test on DC Series Motor-Methods of Speed control of DC Shunt Motor - Swinburne's test on DC Shunt Motor.

3. Measuring Instruments

Calibration of dynamometer type of watt meter-Measurement of earth resistance by using megger.

4. Transducers and sensors

Performance characteristics of LVDT- performance characteristics of thermocouple.

CO-PO/PSO MATRIX

CO No	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
EE-307.1	3							3		
EE-307.2	3							3	2	
EE-307.3	3							3		
EE-307.4	3	3	1	2	3	3	2	3	2	3
Average	3	3	1	2	3	3	2	3	2	3

3-Strongly Mapped 2- Moderately Mapped 1- Slightly Mapped

Note:
The gaps in CO and PO mapping will be achieved by one or more appropriate activities from the following:
(i) Assignments (ii) Tutorials (iii) Seminars (iv) Guest Lectures (v) Group Discussions (vi) Quizzes (vii) Industrial Visits (viii) Tech Fests (ix) Mini Projects (x) Library Visits

Competencies to be achieved by the student

S.No	Experiment title	Competencies	Key Competencies

1	OCC of a DC shunt Generator at below, rated and above rated speeds.	• Draw the relevant circuit diagram for OCC test. • Select the proper DC supply voltage. • Choose the proper range of voltmeter, ammeter and rheostat. • Make the connections according to circuit diagram. • Ensure that all the instruments are connected in proper polarity. • Check the speed and maintain it constant by means of field regulator before taking every reading. • Observe and note the readings in a tabular form. • Draw the graph between I_f Vs E_g.	• Make the connections according to circuit diagram. • Observe and note the readings in a tabular form. • Draw the graph between I_f Vs E_g.
2, 3 ,4	Internal and External characteristics of DC shunt generator DC series generator DC compound generator	• Draw the relevant circuit diagram • Select the proper DC supply voltage. • Choose the proper range of voltmeter, ammeter and rheostat. • Make the connections according to circuit diagram. • Ensure that all the instruments are connected in proper polarity. • Check the speed and maintain it constant by means of field regulator before taking every reading. • Apply load in steps upto rated current • Observe and note the readings in a tabular form. • Draw the graph between I_aVs E_g , I_l Vs V_l	• Make the connections according to circuit diagram • Observe and note the readings in a tabular form. • Draw the graph between I_aVs E_g , I_l Vs V_l
5	Identify the terminals of the following DC Machines DC Shunt motor, DC Series Motor	• Note down the name plate details. • Locate the different terminals of a DC Shunt Motor / DC Series Motor • Measure the resistance across different terminals using multimeter. • Record the resistance values of the terminals. • Identify the armature and shunt field / series field resistance according to resistance values observed.	• Measure the resistance across different terminals using multimeter. • Identification of armature and shunt field / series field resistance according to resistance values observed.

6	Study the parts of DC 3 point starter.	• Locate the Line, Armature, Field terminals of the starter (L-A-F) • Locate NVR coil and OLR coils. • Know the purpose of NVR and OLR coils. • Properly connect Starter and motor terminals • Properly handle the Starter terminals. • Properly start the motor.	• Know the purpose of NVR and OLR coils. • Properly handle the Starter terminals.
7,8	Performance characteristics of DC (Shunt, Series) by conducting Brake Test	• Select the proper DC supply voltage • Choose the proper range of voltmeter, ammeter and rheostat. • Connect the circuit as per the circuit diagram. • Ensure that all the instruments are connected in proper polarity. • Start the Motor with the starter. • Note the readings of speed N, current I and spring balance for a particular load. • Pour water in the break drum carefully. • Check the speed and maintain it constant by means of field regulator before taking every reading. • Note readings by varying loads on the motor upto rated current. • Calculate the torque, input, output and efficiency. • Draw performance curves of motor	• Connect the circuit as per the circuit diagram. • Note readings by varying loads on the motor upto rated current. • Calculate the torque, input, output and efficiency. • Draw performance curves of motor

9	Speed control of DC Shunt Motor by (a) Rheostatic control method (b) Field control Method	• Select the proper DC supply voltage • Choose the proper range of voltmeter, ammeter and • rheostat. • Connect the circuit as per the circuit diagram. • Ensure that all the instruments are connected in proper • polarity. • Handle the 3- point Starter • Set the Field Resistance of the motor by gradually • moving the knob on the rheostat coil. • Record the readings of Ammeter and Tachometer by gradually increasing the resistance in the Field rheostat. • Draw the graph speed Vs Field current. • Observe the graph and write the conclusions.	• Connect the circuit as per the circuit diagram. • Record the readings of Ammeter and Tachometer by gradually increasing the resistance in the Field rheostat. • Draw the graph speed Vs Field current. • Observe the graph and write the conclusions.
10	Performance of a DC Shunt Motor by conducting Swinburne's test.	• Select the proper DC supply voltage • Choose the proper range of voltmeter, ammeter and rheostat. • Connect the circuit as per the circuit diagram. • Ensure that all the instruments are connected in proper polarity. • keep the rheostat in maximum position in armature so that minimum voltage is applied to armature • Adjusting the field rheostat to minimum position • Adjust the speed of the motor to its rated value by using its Field Rheostat. • Taking the readings of Ammeter and Voltage by opening the Field switch • Taking the readings of Voltage and current by closing the field switch and gradually decreasing the resistance in the Rheostat. • Calculate the efficiency of the DC Machine as a Generator and as a	• Connect the circuit as per the circuit diagram. • Calculate the efficiency of the DC Machine as a Generator and as a Motor at various loads. • Draw the conclusions

		Motor at various loads. • Draw the conclusions Adjusting the field rheostat to minimum position • Adjust the speed of the motor to its rated value by using its Field Rheostat. • Taking the readings of Ammeter and Voltage by opening the Field switch • Taking the readings of Voltage and current by closing the field switch and gradually decreasing the resistance in the Rheostat. • Calculate the efficiency of the DC Machine as a Generator and as a Motor at various loads. • Draw the conclusions	
11	Calibration of dynamometer type of watt meter	• Select the proper supply voltage • Choose the proper range of voltmeter, ammeter and rheostat. • Connect the circuit as per the circuit diagram. • Ensure that all the instruments are connected in proper polarity. • Initially keep in no load condition. • Switch on power supply. • Load is switched on and note down the readings of ammeter, voltmeter and wattmeter. • Increase the load in steps and note down the corresponding meter readings at every step. • Remove the load gradually and switch off the supply. • Calculate the error and percentage error.	• Connect the circuit as per the circuit diagram. • Load is switched on and note down the readings of ammeter, voltmeter and wattmeter. • Calculate the error and percentage error.

12	Measurement of earth resistance by using megger.	• Connect the megger as per the connection diagram. • Switch ON the megger • Rotate the handle of the Megger at uniform speed. • The value of resistance is measured directly from the instrument.	• Rotation of the handle of the megger at uniform speed • The value of resistance is measured directly from the instrument.
13	Performance characteristics of LVDT	• Connections are given as per the circuit diagram • The screw gauge is adjusted for minimal voltage • The core is moved in clockwise direction with the help of screw gauge • The output voltage for each 1mm displacement was added and noted • The displacement core was brought to initial position and moved in anticlockwise direction. • Again for each 1mm displacement was noted • A graph is plotted between displacement and output voltage.	• Connections are given as per the circuit diagram • Performance characteristics of LVDT is studied.

14	performance characteristics of thermocouple.	• Connect the multi-meter to the Thermocouple as shown in the diagram • Heat the water up to90° C. • The emf is noted down after a certain interval such as 5°C. • Graph is plotted between emf and Thermocouple. • Calculate time constant from the graph	• Connect the multi-meter to the Thermocouple as shown in the diagram • Graph is plotted between emf and Thermocouple. • Calculate time constant from the graph.

CIRCUITS AND TRANSFORMERS LABORATORY

Course code	Course Title	No. of periods /week	Total No. of periods	Marks for FA	Marks for SA
EE-308	CIRCUITS AND TRANSFORMERS LABORATORY	3	45	40	60

COURSE OUTCOMES MAPPING

S.No	Major Topics	No. of periods	CO's Mapped
1	DC Circuits and DC Theorems	12	CO1
2	AC Circuits	12	CO2
3	Performance and testing of Transformers	21	CO3
	Total	**45**	

Upon completion of the course the student shall be able to	
Course Objectives	i) Verification of KCL, KVL and DC Theorems
	ii) Observe the response at R, L and C in series RLC circuit, determining the power in single phase and three phase balanced circuits
	iii) To reinforce theoretical concepts of transformers by conducting relevant experiments.

Course Outcomes	**CO1**	**EE-308-1**	Understand the connection patterns in bread board, able to connect circuit in bread board, verify DC theorems
	CO2	**EE-308-2**	Understand the operating procedure of CRO, able to connect the voltmeters and wattmeters in a circuit, able to determine the power in single phase and three phase balanced circuits

	CO3	**EE-308-3**	Able to determine the polarity of Transformer terminals and its transformation ratio, Understand the testing procedure of single phase transformers to determine its parameters, able to find dielectric strength of transformer oil

Course Outcomes:

LEARNING OUTCOMES

1.0. DC Circuits and DC Theorems

1.1. Verification of OHM's law
1.2. Verification of KCL and KVL
1.3. Verification of Super Position Theorem
1.4. Verification of Thevenin's Theorem
1.5. Verification of Maximum Power Transfer Theorem

2.0. AC Circuits

2.1. Verifying the response at R, L and C in series RLC circuit
2.2. Measurement of power in single phase circuit by 3-Voltmeter method
2.3. Measurement of power in three phase balanced circuit by 2-Wattmeter method

3.0. Performance and testing of Transformers

3.1. Determination of the polarity and voltage transformation ratio of a single phase transformer
3.2. Conduct load test on 1-phase Transformer and calculate efficiency and regulation
3.3. Conduct O.C. and S.C. tests on 1-phase transformer and from result
   a) Draw the equivalent circuit
   b) Calculate efficiency at various loads and power factor
   c) Find the load at which maximum efficiency occurs
3.4. Conduct Oil testing using oil testing kit to know the dielectric strength of transformer oil

CO-PO/PSO MATRIX

CO. No	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PS01	PS02	PS03
EE-308-1	3	2	1	-	-	-	1	3	1	-
EE-308-2	3	2	1	-	-	-	1	2	1	-
EE-308-3	3	1	-	-	-	-	-	1	2	-
Average	3	1.6	1				1	2	1.3	

3-Strongly Mapped 2- Moderately Mapped 1- Slightly Mapped

Note:
The gaps in CO and PO mapping will be achieved by one or more appropriate activities from the following:

(i) Assignments (ii) Tutorials (iii) Seminars (iv) Guest Lectures (v) Group Discussions (vi) Quizzes (vii) Industrial Visits (viii) Tech Fests (ix) Mini Projects (x) Library Visits

HYPONATED COURSE CONTENT

1.0. Verification of DC Circuits and DC Theorems

Verification of OHM's law, KCL and KVL – Verification of DC Theorems (Superposition, Thevenin's and Maximum power transfer)

2.0. AC Circuits

Verifying the response at R, L and C in series RLC circuit - Measurement of power - in single phase circuit by 3 Voltmeter method - in three phase balanced circuit by 2-Wattmeter method

3.0. Performance and testing of Transformers

Determination of - polarity of terminals - voltage transformation ratio – Direct load test on 1-phase Transformer – Calculation of efficiency and regulation - O.C. and S.C. tests on 1-phase transformer - equivalent circuit - efficiency at various loads and power factor - load at which maximum efficiency occurs - Test to know the dielectric strength of transformer oil

Competencies & Key competencies to be achieved by the student

Sl.No.	Experiment Title	Competencies	Key Competencies
1	Verification of DC Circuits and DC Theorems	• Understand the connection patterns in bread board • Identify the correct rating of resistors, voltage sources and meters • Connection of circuit diagram on bread board with proper input sources and meters • Interpreting the responses of various circuits related to verification of KCL, KVL and DC Theorems	• Connection of devices with exact ratings as per circuit diagram in bread board • Verification of laws and theorems in DC
2	AC Circuits	• Operating of CRO • Setting up the desired voltage source frequency • Connection of circuit diagram on bread board with proper input sources • Using CRO to observe output waveform patterns • Usage of 3 voltmeter and 2 wattmeter methods to measure power in single phase and three phase respectively	• Verifying the response at R, L and C in series RLC circuit • Ability to measure power in single phase and balanced three phase circuits

3	Performance and testing of Transformers	• Conduct polarity test and ascertain the relative polarities of secondary windings. • Interpret the name plate details of transformer • By selecting proper range and type of meters the circuit diagram to determine voltage transformation ratio is to be connected • Make connections as per circuit diagram with appropriate range and type of meters to conduct load test, O.C. test and S.C. test • Follow the precautions to be taken (ex: Check for loose and/or wrong connections if any and rectify) • Perform the tests as per standard procedure and make a note of test results • Calculate the efficiency and regulations from test data • Plot the efficiency curve and indicate the maximum efficiency point • Conduction of transformer Oil testing using oil testing kit to know the dielectric strength of transformer oil.	• Identifying the polarity of transformer terminals • Ability to find transformation ratio of transformer • Calculation of efficiency and voltage regulation by performing O.C., S.C. and load tests • Ability to determine dielectric strength of transformer oil

ELECTRONICS ENGINEERING LABORATORY

Course Code	Course Title	No. of periods / Week	Total No. of Periods	Marks for FA	Marks for SA
EE-309	ELECTRONICS ENGINEERING LABORATORY	3	45	40	60

COURSE OUTCOMES MAPPING

S.No	Major Topics	No. of periods	CO's Mapped
1.	**Semiconductor Devices**	12	CO1
2.	**Power Supplies**	12	CO2
3.	**Amplifiers**	6	CO3
4.	**Oscillators**	9	CO4
5.	**Linear Integrated Circuits**	6	C05
	Total	**45**	

COURSE OBJECTIVES	i. To impart adequate knowledge on electronic devices and circuits.
	ii. To develop skills of using amplifier and oscillators.
	iii. To enable effective usage of linear integrated circuits.

COURSE OUTCOMES	CO1	EE-309.1	Illustrate the characteristics of various electronic devices.
	CO2	EE-309.2	Developing Power Supply Circuits.
	CO3	EE-309.3	Designing amplifier and using them in various applications.
	CO4	EE-309.4	Practice on various oscillator circuits.
	CO5	EE-309.5	Practicing linear integrated circuits to develop various applications.

LEARNING OUTCOMES

1. **Semiconductor Devices**

1. Plot the VI characteristics of PN junction diode.
2. Plot the VI characteristics of Zener diode.
3. Plot the Input and Output characteristics of NPN transistor in Common Emitter configuration.
4. Plot the VI characteristics of Photo Diode
5. Plot the VI characteristics of LDR

2. Power Supplies

1. Implement Half Wave rectifier with and without filter.
2. Implement Full Wave rectifier with and without filter.
3. Implement Bridge Wave rectifier with and without filter.
4. Build a regulated power supply with (a) Zener Diode and (b) Voltage Regulator IC.

3. Amplifiers

1. Plot the frequency response characteristics of RC coupled amplifier.

4. Oscillators

1. Measure the frequency of Hartley oscillator.
2. Measure the frequency of Colpitts oscillator.

5. Linear Integrated Circuits

1. Implement Inverting Amplifier with IC 741 OpAmp.
2. Implement Inverting Integrator with IC 741 OpAmp.

CO-PO/PSO MATRIX

CO No	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
EE-309.1	3		2					3		
EE-309.2	3							3		
EE-309.3	3		1					3		
EE-309.4	3		1					3		
EE-309.5	3		1					3		
Average	**3**		**1.25**					**3**		

3-Strongly Mapped 2- Moderately Mapped 1- Slightly Mapped

Note : 1. This Lab is to be handled by Electronics & Communication Engg. faculty

2. Paper setting and paper evaluation is also to be done by Electronics & Communication Engg Faculty.

Note:
The gaps in CO and PO mapping will be achieved by one or more appropriate activities from the following:
(i) Assignments (ii) Tutorials (iii) Seminars (iv) Guest Lectures (v) Group Discussions (vi) Quizzes (vii) Industrial Visits (viii) Tech Fests (ix) Mini Projects (x) Library Visits

HYPONATED COURSE CONTENTS

1. Semiconductor Devices

VI characteristics of PN junction diode - VI characteristics of Zener diode - Input and Output characteristics of NPN transistor in Common Emitter configuration - VI characteristics of Photo Diode - VI characteristics of LDR.

2. Power Supplies

Half Wave rectifier with and without filter - Full Wave rectifier with and without filter - Bridge Wave rectifier with and without filter - Regulated power supply with (a) Zener Diode and (b) Voltage Regulator IC.

3. Amplifiers

Frequency response characteristics of RC coupled amplifier.

4. Oscillators

Measure the frequency of Hartley oscillator - Measure the frequency of Colpitts oscillator.

5. Linear Integrated Circuits

Inverting Amplifier with IC 741 OpAmp - Inverting Integrator with IC 741 OpAmp

Competencies & Key competencies to be achieved by the student

Sl.No.	Experiment Title	Competencies	Key Competencies
1	VI Characteristics of	• Understand the connection patterns in bread board • Identify diode,the correct rating of voltage sources and meters	• Connection of devices with exact ratings as per circuit diagram in bread board • Ability to plot the VI characteristics of various semiconductor

	Semiconductor Devices	• Connection of circuit diagram on bread board with proper input sources and meters • Interpreting the responses of the various semiconductor devices.	devices(PNjunction diode,zener diode, photo diode, LDR) and to plot input/output characteristics of NPN transistor in CE configuration
2	Power Supplies	• Operating of CRO • Setting up the desired voltage source frequency • Connection of circuit diagram on kit with proper input sources with and without filter • Using CRO to observe output waveform patterns with and without filter	• Verifying the responses at CRO with and without filter for various rectifiers(HalfWave rectifier,fullwave and bridge rectifier) • Ability to build regulated power supply with zener diode and voltage regulator IC
3	Amplifiers	• Operating of CRO • Setting up the desired voltage source frequency • Connection of circuit diagram on kit with proper input sources • Using CRO to observe frequency response waveform patterns	• Verifying the response at CRO • Ability to plot the frequency response characteristics of RC coupled amplifier
4	Oscillators	• Operating of CRO • Setting up the desired voltage source frequency • Connection of circuit diagram on kit with proper input sources • Using CRO to observe frequency response waveform patterns	• Verifying the output waveform at CRO (Hartley and colpitts oscillators) • Ability to draw output waveform
5	Linear Integrated Circuits	• Identify the components • Setup the circuit on the breadboard and check the connections. • Switch on the power supply • Give input. • Observe input and output on the two channels of the oscilloscope simultaneously. • Note down and draw the input and output waveforms on the graph	• Verify the input and output waveforms are out of phase.(inverting amplifier) • Verify the obtained gain is same as designed value of gain. • Observe input and output on two channels of the oscilloscope simultaneously • Ability to draw input and outputwaveforms(integrating amplifier)

PROGRAMMING IN C LABORATORY

Course Code	Course Title	No. of periods / Week	Total No.of Periods	Marks for FA	Marks for SA
EE-310	PROGRAMMING IN C LABORATORY	3	45	40	60

COURSE OUTCOMES MAPPING

S.No	Unit Titles	No. of periods	CO's Mapped
1.	C Programming Basics	6	CO1
2.	Decision & Loop Control Statements	9	CO2
3.	Exercises on functions	6	CO3
4	Arrays, Strings and Pointers in C	9	CO4
5.	Structures, Unions &Pre-processor Directives	6	C05
	Total	45	

COURSE OBJECTIVES	i) To impart adequate knowledge on the need of programming languages and problem solving techniques.
	ii) To develop programming skills using the fundamentals and basics of C language.
	iii) To enable effective usage of arrays, structures, functions, pointers and to implement the memory management concepts.

COURSE OUTCOMES	CO1	EE-310.1	Design problems solving with flow chart andalgorithm.
	CO2	EE-310.2	Practice conditional and iterative statements to write C programs.
	CO3	EE-310.3	Execute C programs that use functions.
	CO4	EE-310.4	Execute C programs using arrays and strings
	CO5	EE-310.5	Practice on structures, unions.

LEARNING OUTCOMES

1. C Programming Basics

1. Editing and executing simple programs (using printf and scanf functions) .
2. Exercises on operators in C.

2. Decision & Loop Control Statements

1 Exercises on conditional statements (if, if – else, else if statements).
2. Exercises on switch statements and conditional operator.

3. Exercises on looping statements (while, do – while and for statements).

3. Exercises on functions

1. Exercises on functions to demonstrate prototyping, parameter passing, function returningvalues
2. Exercises on recursion.

4. Arrays, Strings and Pointers in C

1. Exercises on one dimensional arrays and two dimensional arrays.
2. Exercises on Strings handling functions comparison, copying and concatenation.
3. Exercises to demonstrate use of Pointers, pointers as function arguments, functions returningpointers.

5. Structures, Unions &Pre-processor Directives

1. Exercise on structures.
2. Exercises on unions and C pre-processor Directives.

CO-PO/PSO MATRIX

CO No	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
EE-310.1	3	1	1					3		
EE-310.2	3		1					3		
EE-310.3	3		1	1				3		
EE-310.4	3	1	1					3		
EE-310.5	3	1	1	1				3		
Average	**3**	**1**	**1**	**1**				**3**		

3-Strongly Mapped 2- Moderately Mapped 1- Slightly Mapped

Note:

The gaps in CO and PO mapping will be achieved by one or more appropriate activities from thefollowing:

(i) Assignments (ii) Tutorials (iii) Seminars (iv) Guest Lectures (v) Group Discussions (vi) Quizzes
(vii) Industrial Visits (viii) Tech Fests (ix) Mini Projects (x) Library Visits

Note : 1. This Lab is to be handled by Computer Engg. faculty
2. Paper setting and paper evaluation is also to be done by Computer Engg Faculty.

HYPONATED COURSE CONTENTS

1. C Programming Basics

Editing, compiling and executing simple programs (using printf and scanf functions) - Exerciseson operators in C.

2. Decision & Loop Control Statements

Exercises on conditional statements (if, if – else, else if statements) , switch statements and conditional operator) - Exercises on looping statements (while, do – while and for statements).

3. Exercises on functions

Exercises on functions to demonstrate prototyping, parameter passing, function - returning values and recursion.

4. Arrays, Strings and Pointers in C

Exercises on one dimensional arrays and two dimensional arrays, Strings handling functions comparison, copying and concatenation - Exercises to demonstrate use of Pointers, pointers as function arguments, functions returning pointers

5. Structures, Unions & Preprocessor Directives

Exercise on structures, unions and C pre-processor Directives.

Competencies & Key competencies to be achieved by the student

Sl.No.	Experiment Title	Competencies	Key Competencies
1	**C Programming Basics**	• Opening of Turbo C • Understand about work space • Procedure to open new file in Turbo C • Able to write simple programs • Understanding the procedure to save file. • Understand about different tabs in Turbo C • To know about Execution of program in Turbo C • Understand to see ouput file	• Perform simple mathematics related programs by using Turbo C • Familiarization with work space of Turbo C
2	Decision & Loop Control Statements	• Opening of new file in Turbo C • Understand about different looping statements like if, if-else, while, do-while and for loop • Understand about SWITCH statements • Executing different programs related to loop control statements. • Save program file Turbo C • Understand about output of program	• Writing of different programs using loop control statements • Observation of outputs
3	Exercises on functions	• Opening of new file in Turbo C • Understand to use function in C program • Understand to use recursive functions in C • Understand to use Function call technique in C program • Save the program file	• Usage of recursive functions • Usage of External and internal variables • Usage of function call technique • Observation of outputs

		• Understand about output of program	
4	Exercises on Arrays, Strings and Pointers in C	• Opening of new file in Turbo C • Understand about arrays and their usage • Understand about strings and their usage • Understand about pointers and their usage • Writing of C programs using arrays , strings and pointers • Save the program file • Understand about output of a program	• Usage of one dimensional and multi dimensional arrays • Usage of string handling functions • Usage of pointers • Writing program using arrays , strings and pointers • Observation of outputs
5	Structures, Unions & Preprocessor Directives	• Opening of new file in Turbo C • Understand about Structures • Understand about unions • Understand about preprocessor directives • Usage of structures, unions and pointers in C program • Save the program file • Understand about output of a program	• Usage of structures in program • To know the difference between structures and unions • Types of pre processor directives and their importance in C program • Writing of programs using structures • Observation of outputs

IV SEMESTER

DIPLOMA IN ELECTRICAL & ELECTRONICS ENGINEERING
SCHEME OF INSTRUCTIONS AND EXAMINATIONS
(IV SEMESTER)

Subject Code	Name of the Subject	Instruction period /week		Total Period /year	Scheme of Examination			
		Theory	Practical/ Tutorial		Duration (hours)	Sessional Marks	End Exam Marks	Total Marks
THEORY								
EE-401	Electrical Installation & Estimation	4	-	60	3	20	80	100
EE-402	Electrical Machines-II	5	-	75	3	20	80	100
EE-403	Power Systems – I	4	-	60	3	20	80	100
EE-404	Power Electronics & PLC	4	-	60	3	20	80	100
EE-405	General Mechanical Engineering	4	-	60	3	20	80	100
PRACTICAL								
EE-406	Electrical Engineering Drawing	-	6	90	3	40	60	100
EE-407	Electrical Machines-II Laboratory	-	3	45	3	40	60	100
EE-408	Communications Skills Laboratory	-	3	45	3	40	60	100
EE-409	Power Electronics Laboratory	-	3	45	3	40	60	100
EE-410	Hybrid Power Systems Laboratory	-	3	45	3	40	60	100
	TOTAL	**21**	**18**	**585**	**30**	**300**	**700**	**1000**

NOTE: 03 periods per week are allotted to Student Centric Activity (Library, Sports & Games, Clean & Green, Preparation for placements etc)

ELECTRICAL INSTALLATION AND ESTIMATION

Course code	Course title	No. of periods/week	Total no. of periods	Marks for FA	Marks for SA
EE-401	ELECTRICAL INSTALLATION AND ESTIMATION	4	60	20	80

S. No.	Unit Title	No.of Periods	CO'S Mapped
1	Wiring Systems	7	CO1
2	Estimation of Lighting and Power Loads	20	CO2
3	Estimation of OH Lines and Earthing systems	18	CO3
4	Departmental Tests	9	CO4
5	Electrical Safety	6	C05
Total		**60**	

Course Objectives:

Course Objectives	(i) To understand different wiring systems, service mains (ii) To estimate the cost of domestic installations, industrial installations of electrical equipment and earthing (iii) To know the safety precautions, Departmental procedure for acquiring electrical connection

Course outcomes:

	CO1	EE-404.1	Describing the specifications of various wiring accessories and different components of wiring system
	CO2	EE-404.2	Estimate the materials required and their cost in domestic installation and power wiring installation.

Course outcomes	**CO3**	EE-404.3	Estimate the electrical materials required for OH lines, Earthing systems.
	CO4	EE-404.4	Extending the knowledge on departmental procedure for acquiring electrical connection. Calculation of Transformer ratings for Rural electrification
	C05	EE-404.5	Extending the knowledge on electrical safety and precautions to be taken

Learning Outcomes:

1. Wiring systems

1.1 Mention the use of wires, cables, Types of Installations and wiring Accessories**.**

1. 2 Explain (i) Surface conduit system (ii) Concealed wiring system.

1.3 State merits and demerits of (i) Surface conduit system (ii) Concealed wiring system.

1.4 List different types of knife switches.

1.5 List the MCB types with specifications and mention their applications (MCCB, ELCB AND RCCB)

1.6 List the different types of fuses and specify the materials used.

1.7 List different ratings of fuses and state their applications.

1.8 State the reasons for not using fuse in Neutral wire

2. Estimation of Lighting and Power Loads

2.1 Define service mains and explain different types of service mains

2.2 List the electrical material used in wiring the service mains.

2.3 List the schedule of rates used in preparing estimate for house wiring and service mains

2.4 Estimate the material requirement with cost for (i) PVC conduit wiring and (ii) PVC casing capping wiring for the given plan of a building.

2.5 Draw the wiring layout for a big office building, workshop/ Electrical Laboratory

2.6 Prepare layout and draw single line wiring diagrams as per standard practice for a given set of machines in a workshop.

2.7 Prepare the estimate of the materials for the complete installation of machines in a work shop / laboratory as per standard practice

2.8 Select the type of wiring and service mains used for the irrigation pump set.

2.9 Prepare an estimate for electrifying the irrigation pump set scheme

2.10 Prepare estimation for submersible pump installation

3. Estimation of OH Lines and Earthing systems

3.1 Select the type of insulators to be used for over headlines

3.2. Calculate the total number of insulators required for the given OH Line

3.3 Select the type, size and number of cross arms required for the over headline

3.4 Determine the size and total length of overhead conductor required for the line giving due Consideration for the sag to be allowed

3.5 Estimate the quantity of all materials required for given 11 kV and 400V overhead lines

3.6 Draw and explain plinth and Pole Mounted transformer substations

3.7 Estimate the quantity of all the electrical accessories and components required for the given

(i) Pole mounted transformer (ii) Plinth mounted transformer

3.8 State the purpose of Earthing and mention its types that are normally used.

3.9 Select the suitable type of Earthing for a given installation

3.10 Draw and explain (i) pipe earthing (ii) plate Earthing with neat sketches.

3.11 Estimate the materials required for pipe and plate earthing.

4. Departmental Tests

4.1 Describe the departmental procedure for obtaining a service connection

4.2 Specify insulation resistance desirable for a given electrical installation

4.3 Specify the value of earth resistance to be maintained for a given electrical Installations

4.4 List different tests to be conducted before energizing a newly constructed electrical installation.

4.5 Describe the test procedure for continuity of wiring in an electrical installation.

4.6 Explain the procedure for conducting insulation test of domestic wiring

4.7 Explain the Survey of load particulars in a village for

(i) Domestic (ii) industrial (iii) agricultural loads.

4.8 Calculate the capacity of a transformer required assuming suitable diversity factor

4.9 Determine the location point of transformer and calculate the tail end voltage regulations

5. Electrical Safety

5.1 State the importance of electrical safety.

5.2 State the common electrical hazards.

5.3 Define electric shock and state the effects of electric shock on human body.

5.4 State the safety precautions to be taken to avoid electric shock.

5.5 List safety equipments used while working with electricity.

5.6 Describe the procedure of first aid for shock treatment to an electrocuted person.

5.7 State the reasons for fire accidents and state the prevention techniques.

5.8 Define fire extinguisher and State fire extinguishing techniques.

5.9 List different fire extinguishers in common use.

CO-PO/PSO MATRIX

CO No	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PSO1	PSO2	PSO3
EE-404.1	3							3	2	1
EE-404.2	3	3	1	1		2	1	3	2	1
EE-404.3	3	2	1	1	2	2	1	3	2	1
EE-404.4	3	2	1	1		2	1	3	2	1
EE-404.5	3			1	1		3	3	2	
Average	**3**									

3-Strongly Mapped 2- Moderately Mapped 1- Slightly Mapped

Note:
The gaps in CO and PO mapping will be achieved by one or more appropriate activities from the following:
(i) Assignments (ii) Tutorials (iii) Seminars (iv) Guest Lectures (v) Group Discussions (vi) Quizzes (vii) Industrial Visits (viii) Tech Fests (ix) Mini Projects (x) Library Visits

HYPONATEDCOURSE CONTENT

1. Wiring Systems

Introduction, size of wires, standard wires, types of wires - various wiring systems -- Distribution boards - Main switches – Different types of fuses and fuse carriers.

2. Estimation of Lighting and power loads

Estimation of domestic lighting installation service main - specification - quantity of materials required for service main – estimation and selection of interior wiring system suitable to a given building - number of sub circuits - calculation of length of wire and quantity of accessories required - estimates of materials for execution of the domestic wiring installation - Power wiring installation Drawing wiring layout for a big office building, electrical laboratory, - Irrigation pump installation - Estimation up to 10 HP service main - calculation of size and quantity of wire and other components required - Types of starter and control panel – Estimate for the installation of submersible pump.

3. Estimation of OH Lines and Earthing

Distribution lines of 11 kV and 400 Volt OH lines estimation only -quantity of materials required for lines of length 1 km - number of poles - Cross arms - insulators - conductor length and size - Distribution transformer erection- Estimation of quantity of materials required for structures, isolators - HG fuse isolators, lightening arrestors for pole mounted substation and plinth mounted substation Quantity estimation for materials required in electrical Earthing for pipe earthling and plate Earthing

4. Departmental Tests

Electrical installation testing - departmental procedure for obtaining service connection - desirable insulation resistance for domestic and power circuits - procedure for conducting insulation resistance test and continuity tests, earth continuity test - Design of rural electrification scheme - Load survey-determination of capacity of transformer - estimation of quantity of materials required for the erection of distribution lines and 11 kV feeder from a nearby 11 kV feeder - determining the feasibility of placement of distribution transformer

5. Electrical Safety

Safety procedures - Electric shock and first aid, causes for fire hazards in Electrical installations-reasons for fire accidents - prevention techniques -fire extinguisher- different fire extinguishers

REFERENCE BOOKS:

1. G.C Garg &S.L.Uppal-Electrical Wiring ,Estimating & costing Electricalwiring,

2. J.B.Gupta -Estimating &costing
3. BVS Rao -Maintenance and Operation of Electrical Equipment – Vol-I-TMH
4. S. Rao -Testing, Commissioning Operation & Maintenance of Electrical equipment–TMH
5. V.K Mehta- Electrical Estimating & costing

Blue print:

S. No.	Unit Title	No. of periods	Weightage allocated	Marks wise distribution of			Question wise distribution of			CO'S mapped
				R	U	Ap	R	U	Ap	
1	Wiring Systems	7	16	6	10	0	2	1	0	CO1
2	Estimation of Lighting and Power Loads	20	36	6	10	20	2	1	2	CO2
3	Estimation of OH Lines and Earthing systems	18	26	6	10	10	2	1	1	CO3
4	Departmental Tests	9	16	6	10	0	2	1	0	CO4
5	Electrical Safety	6	16	6	10	0	2	1	0	CO5
Total		**60**	**110**	**30**	**50**	**30**	**10**	**5**	**3**	

Model Papers: Syllabus to be Covered for Unit Tests

Unit Test	Learning Outcomes to be Covered
Unit Test-I	From 1.1 to 2.10
Unit Test-II	From 3.1 to 5.9

MODEL PAPER – FORMATIVE ASSESSMENT-1
C-23-EE-401
BOARD DIPLOMA EXAMINATION, (C-20)
DEEE – FOURTH SEMESTER EXAMINATION
EE-401 : ELECTRICAL INSTALLATION AND ESTIMATION

Time: 90 Minutes Total Marks: 40

PART-A **(1 x 4) + (4 x 3) = 16**

Instructions:

i. **Answer all five questions.**
ii. **First question carries four marks and remaining each question carries three marks.**
iii. **Answers should be brief and straight to the point and shall not exceed five simple sentences**

1. (a) State the full form of VIR related to cables.

   (b) _____ is example for totally enclosed type fuse

   (c) The line that brings electrical energy from the supplier's distributing line to the consumer premise is known as service line. (True/False).

   (d) The total load in any sub-circuit in lighting load should not exceed _____ watts.

2. List different types of main switches (CO1)
3. List different wiring accessories (CO1)
4. Draw the wiring layout for a electrical laboratory. (CO2)
5. Calculate the size of the cable required for 10 HP, 415 V, 3-phase, 50 Hz squirrel cage induction motor. Assume efficiency of the motor as 85% and power factor as 0.8 lagging. (CO2)

PART-B **3 X 8 = 24**

Instructions:

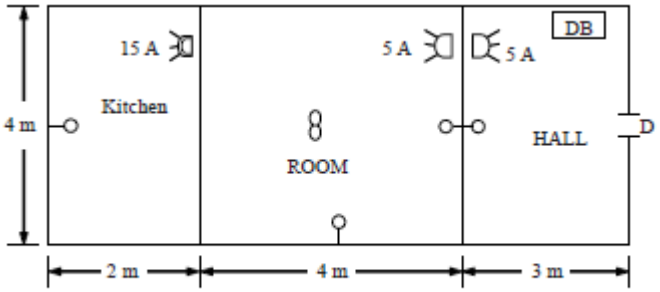
i. **Answer all three questions.**
ii. **Each question carries eight marks.**
iii. **The answers should be comprehensive and the criteria for valuation are the content but not the length of the answer.**

6. (a) Explain Surface Conduit system of wiring with legible sketches. (CO1)

(OR)

(b) Explain Concealed Conduit wiring with legible sketches (CO1)

7. (a) The plan of a residential building is shown in Fig. It is to be provided with CTS system of wiring. Estimate the materials required and its cost. Wattage of Lamps = 60 W, Fan = 80 W, 5 A socket = 100 W, 15 A socket = 1000 W. Assume any missing date. (CO2)



Fig

(OR)

(b) Draw the wiring layout for a electrical laboratory having the following motors

i) 10 Hp Motor ii) 5 HP motor iii)1 H.P Motor (CO2)

8. (a) A 7 H.P (metric), 415 V, 3-phase, 50 Hz squirrel-cage Induction motor is to be installed in a floor mill, the plan of which is shown in Fig. Show the layout of wiring diagram and estimate the quantity of materials required and their approximate cost. Assume any missing data. (CO2)

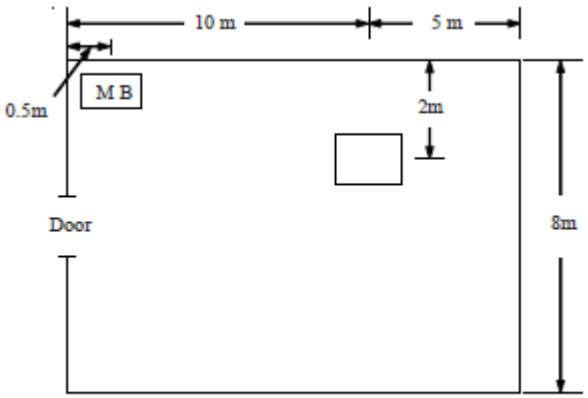


Fig 2.23 : Layout of Floor Mill

(OR)

(b) A submersible irrigation pump set of 10 H.P, 3-phase, 400V, 50Hz motor positioned at a depth of 38m in a tube well from the ground level. The distance between the nearest L.T pose and switch control room is 10m and distance between switch control room and tube well is 3m. Estimate the quantity of materials required and their cost. (CO2)

UNIT TEST II - MODEL PAPER – FORMATIVE ASSESSMENT-2

C-23-EE-401

BOARD DIPLOMA EXAMINATION, (C-20)

DEEE – FORTH SEMESTER EXAMINATION

EE-401 : ELECTRICAL INSTALLATION AND ESTIMATION

Time: 90 Minutes Total Marks: 40

PART-A **(1 x 4) + (4 x 3) = 16**

Instructions:

i. Answer all five questions.
ii. First question carries four marks and remaining each question carries three marks.
iii. Answers should be brief and straight to the point and shall not exceed five simple sentences

1. (a) In 400 V Distribution line, _____ insulator is used at tension point
(b) Cross arms are not necessary for 11 kV distribution line (True/False)

(c) Water can be used to extinguish the fire due to electric short circuit (True/False)
(d) The value of earth resistance to be maintained at a work shop is ____ ohms.

2. Estimate the number of poles required for a 11kV, 3-phase overhead line for 2km long with a span of 75 m. (CO2)
3. State the purpose of earthing. (CO3)
4. List different tests to be conducted before energizing a new electrical installation (CO4)
5. List safety equipment used while working with electricity (CO5)

PART-B **3 X 8 = 24**

Instructions:

i. Answer all three questions.
ii. Each question carries eight marks.
iii. The answers should be comprehensive and the criteria for valuation are the content but not the length of the answer.

6. (a) Estimate the quantity of material required for a 11kV, 3-phase overhead line with 6/1 × 2.59 mm ACSR conductor for 1km long on 8m PSCC poles. The span between two poles is 70 m (CO3)

(or)

(b) Draw a neat sketch of plate earthing and estimate the quantity of materials required. (CO3)

7. (a) Calculate the regulation of a distribution line with 7/2.11 mm ACSR conductor which is emanating from Distribution transformer, the load particulars with distance are shown in Fig. (CO4)

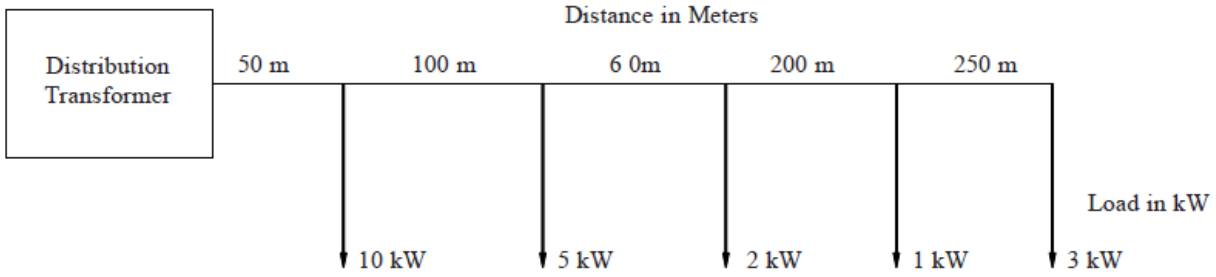


Fig : Load Particulars of a Distribution Line

(or)

(b) Determine the capacity of a transformer required in a village for the following load particulars.

1. 100 No's of domestic loads of 500W each.
2. 2 Industries with 5 H.P. motors each.
3. 50 Agricultural pump-sets with 2 H.P. motors each.
4. 1 Hospital with a load of 10 kW load. (CO4)

8. a) Describe the procedure of first aid for shock treatment to an electrocuted person (CO5)

(or)

b) State the reasons for fire accidents and state the prevention techniques (CO5)

MODEL PAPER – SUMMATIVE EXAMINATION
C-20-EE-404
BOARD DIPLOMA EXAMINATION, (C-20)
DEEE – FOURTH SEMESTER EXAMINATION
EE-401 : ELECTRICAL INSTALLATION AND ESTIMATION

Time: 3 hours Total marks: 80

PART-A **10 X 3 = 30**

Instructions:

i. **Answer all questions.**
ii. **Each question carries three marks.**
iii. **Answers should be brief and straight to the point and shall not exceed five simple sentences**

1. List the different types of main switches. (CO1)
2. Define service main and state different types of service mains. (CO1)
3. Draw the wiring layout for a workshop.(CO2)
4. Calculate the size of the cable for the given 3-phase, 7.5 HP, 400V induction motor.(CO2)

5. Estimate the quantity of schedule for number of poles, number of stays with 1 km, 11kV over head line as per IE rule. (CO3)
6. List any six materials used in plinth mounted sub-station (CO3)
7. State the need for load survey in a rural electrification (CO4)
8. List different tests to be conducted before energizing a new electrical installation (CO4)
9. State the reasons for fire accidents in electrical system. (CO5)
10. List different fire extinguishers in common use (CO5)

PART-B **5 X 8 = 40**

Instructions:

i. **Answer all five questions.**
ii. **Each question carries eight marks.**
iii. **The answers should be comprehensive and the criteria for valuation are the content but not the length of the answer.**

11. Explain surface conduit wiring with legible sketches. (CO1)

12. Estimate the quantity of materials required and their cost to make the concealed type conduit wiring for a building, the plan of which is shown in Fig. Assume any missing data. (CO2)

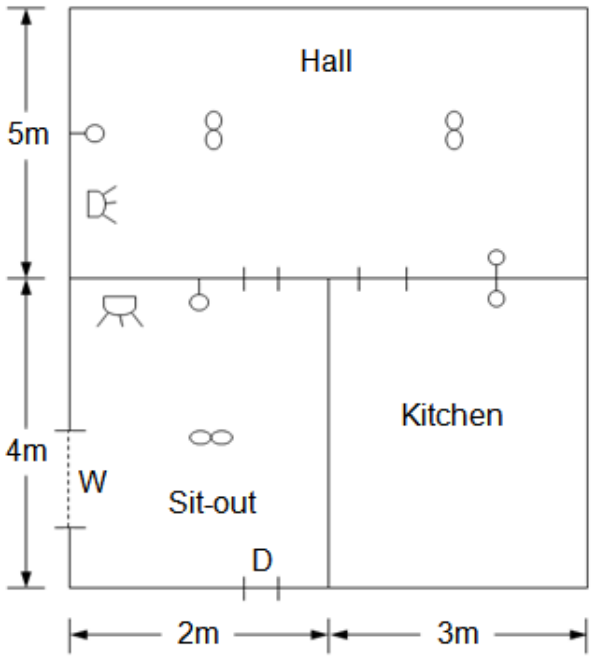


Fig. Plan of a building

(OR)

(b)The plan of a residential building is shown in Fig. It is to be provided with C.T.S. system of wiring. Estimate thematerials required and its cost. Wattage of Lamps = 60W, Fan = 80W, 5A socket = 100W, 15A

socket = 1000W. Assume any missing date. (CO2)

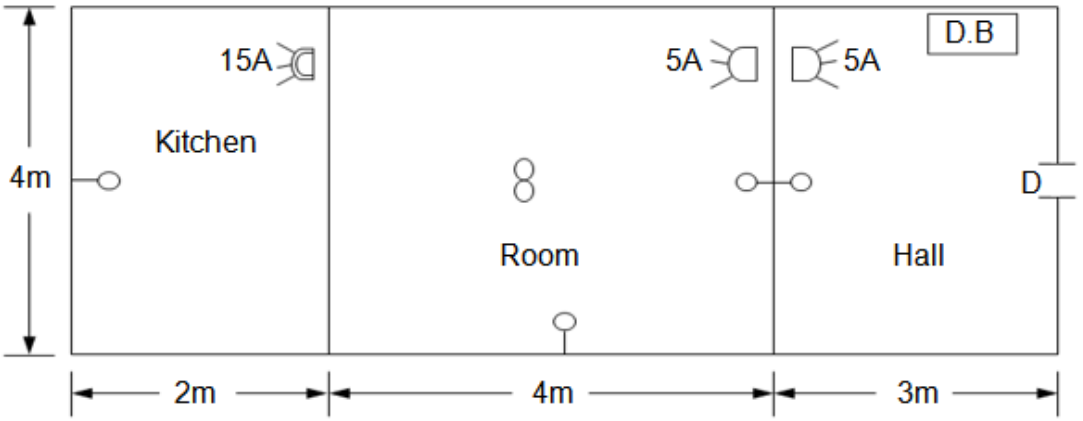


Fig. Plan of a residential building

13. A 400V, 3-Ø, 2 no's induction motors are to be installed in a workshop as shown in Fig. Prepare a schedule with quantity of material and its approximate cost. Draw a wiring layout. Assume missing data, if any. (CO2)

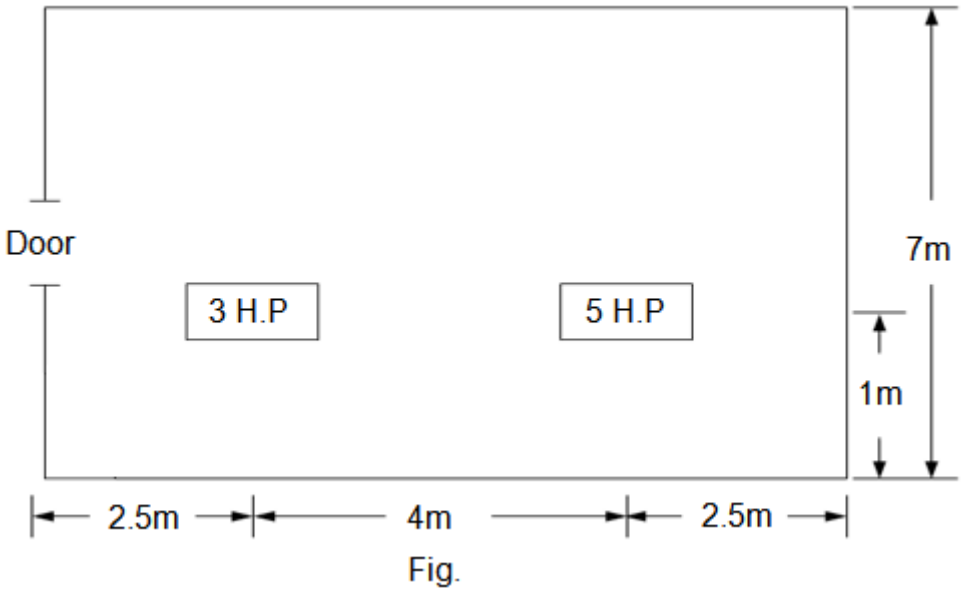


Fig.

(OR)

14.A submersible irrigation pump set of 10 H.P, 3-phase, 400V, 50Hz motor positioned at a depth of 38m in a tube well from the ground level. The distance between the nearest L.T pose and switch control room is 10m and distance between switch control room and tube well is 3m. Estimate the quantity of materials required and their cost. Also draw wiring diagram. (CO2)

15. Estimate the quantity of materials required for a 11KV overhead line for a length of 3.5 Km with an assumption of 60m span, with 7/2.59 sq.mm, ACSR conductor and 2 cut points in the line. (CO3)

16. Draw a neat sketch of 11kV/440V pole mounted substation and estimate the quantity of materials required for the erection. (CO3)

17. Describe the procedure to be followed for obtaining the new domestic electrical connection (CO4)

18. Describe the procedure of first aid for shock treatment to an electrocuted person (CO5)

ELECTRICAL MACHINES-II

Course code	Course title	No. of periods/week	Total no. of periods	Marks for FA	Marks for SA
EE-402	ELECTRICAL MACHINES-II	5	75	20	80

S. no	Unit Title	No. of Periods	CO'S Mapped
1	3- Phase Induction Motors	**20**	CO1
2	Fractional Horse Power Motors	**12**	CO2
3	Alternators	**16**	CO3
4	Parallel operation of Alternators	**12**	CO4
5	Synchronous motors	**15**	CO5
		75	

Course Objectives:

Course Objectives	1) To familiarize with the knowledge of Induction Motors and Fractional Horse Power Motors 2) To understand the working of Alternators and its parallel operation 3) To Understand the working of Synchronous motors

Course outcomes:

Course outcomes	**CO1**	EE-402.1	Explain the working of 3-phase induction motors and understand equivalent circuit parameters, power, torque, efficiency.
	CO2	EE-402.2	Explain the working of fractional Horse power motors
	CO3	EE-402.3	Describe construction and working principle of Alternator.
	CO4	EE-402.4	Manipulate paralleling and synchronisation methods of Alternators.
	CO5	EE-402.5	Explain the working of Synchronous motors

Learning outcomes:

1. Three-phase Induction Motors

1.1 Principle of Production of Rotating Magnetic Field in 3-phaseSystem.
1.2 Explain the construction of Induction motor- slip ring and squirrel cage
1.3 Compare Slip ring & Squirrel cage Induction motors.
1.4 State the working principle of 3 phase induction motor.
1.5 Explain working of 3 phase induction motor on (i) no-load (ii) Load.
1.6 Derive the expression relating to TORQUE, POWER and SLIP and solve simple problems.
1.7 Draw Torque – Slip curves.
1.8 Explain (i) No-load test (ii) Blocked rotor test
1.9 State the Starters used for different ratings of induction motors.
1.10 Explain the working of the following starters with the help of circuit diagram.
(i) D.O.L. starter (ii) Star/Delta Starter
(iii) Auto – Transformer starter (iv) Rotor resistance starter
1.11 Explain the speed control of inductor motors by
(i) Frequency changing method (ii) Pole changing method (iii) Injecting voltage in rotor circuit (iv)Cascading

1.12 State the advantages of induction motors
1.13 List at least six applications of induction motors

2. Fractional H.P motors.

2.1 List the types of 1- phase motors.
2.2 Explain why a Single-phase Induction motor is not a Self-starting motor.
2.3 Explain the working principle of 1 – phase Induction motor by Double field revolving theory.
2.4 Explain the working of the following 1-phase induction motors with legible sketch
(i) Split phase motor (ii) capacitor start motor (iii) shaded pole motor
2.5 Explain the working of the universal motor.
2.6 Explain the working of Stepper motor and list different types.
2.7 List applications of
(i) 1-phase induction motors (ii) 1-phase Commutator motors (iii) Stepper motors.

3. Alternators

3.1 Explain the working principle of Alternators.

3.2 Describe the Constructional details of Alternators with legible sketch.

3.3 Classify the Alternators based on rotor construction.

3.4 State the advantage of Stationary Armature.

3.5 Define Chording and Distribution factor

3.6 Derive EMF equation of an alternator taking into account distribution factor and pitch factor and solve problems

3.7 State the need for an exciter in an Alternator and list various types of exciters.

3.8 Explain Armature Reaction of Alternator at different P.F's.

3.9 Define the term synchronous impedance and state its effects on operation of an alternator.

3.10 Define voltage regulation of an alternator

3.11 List the different methods of finding the regulation of alternator.

4. Parallel operation of Alternators

4.1 Explain the necessity for parallel operation of alternators
4.2 State the conditions for synchronisation
4.3 Explain the procedure of synchronisation by using lamps and synchro scope methods.
4.4 Explain the method for adjusting the loads shared by two alternators (or one Alternator with infinite bus bar).

5. Synchronous motors

5.1 Explain the working principles of synchronous motors.
5.2 Explain the effects of varying excitation at constant load with phasor diagrams
5.3 Explain 'V' and inverted 'V' curves with neat sketch.
5.4 Explain how a Synchronous motor can be used as a Synchronous condenser.
5.5 Explain the phenomenon of HUNTING and how HUNTING can be prevented.
5.6 List the applications of synchronous motor.
5.7 Compare synchronous motors with induction motors.

CO-PO/PSO MATRIX

CO No	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PSO1	PSO2	PSO3
EE-402.1	3	2		2				3	2	
EE-402.2	3		1	1		2		3		1
EE-402.3	3	2	1	1	1	2		3		1
EE-402.4	3		1	1	1	1		3		1
EE-402.5	3			1	1	2		3		
Average	**3**	**2**	**1**	**1.2**	**1**	**1.75**		**3**	**2**	**1**

3-Strongly Mapped 2- Moderately Mapped 1- Slightly Mapped

Note:
The gaps in CO and PO mapping will be achieved by one or more appropriate activities from the following:
(i) Assignments (ii) Tutorials (iii) Seminars (iv) Guest Lectures (v) Group Discussions (vi) Quizzes (vii) Industrial Visits (viii) Tech Fests (ix) Mini Projects (x) Library Visits

HYPONATED COURSE CONTENT

1. **Three Phase Induction Motors**

Introduction – Rotating Magnetic field - Construction of Induction motors – Comparison – working principle of three phase Induction motor – working of Induction motor at different conditions (Starting and Running) - Derive the relationship between Torque, Power and slip of Induction motor, problems – Torque-slip characteristics –Testing of Induction motors - Types of starters – Methods of speed control of Induction motor – Advantages and applications of Induction motors.

2. Fractional Horse Power Motors

Types of 1-phase motors – Reasons for not self starting - working principle of 1-phase induction motors - Double field revolving theory - Working of split phase, capacitor start and shaded pole types – principles of working – Universal motor - principle of working- Stepper motor – types - Applications of 1-phase motors.

3. Alternators

Classification of alternators - Brief description of parts with sketches and function of each part, construction, Exciter and pilot exciter – Stationary armature type construction – Advantages**,** Concentrated and distributed windings - short pitch and full pitch coils - Effect of chording and distribution factors - EMF equation - Derivation – Problems **-** Armature reaction - Synchronous impedance concepts - phasor diagram for unity, lagging and leading power factor loads - Regulation definition - Different methods of finding regulation.

4. Parallel operation of alternators

Necessity for parallel Operation - condition to be fulfilled for synchronisation - Synchronisation by lamps & synchro scope methods - Load sharing.

5. Synchronous Motors

Introduction - synchronous speed – Excitation of rotor - working Principle – Effects of change of Excitation at constant Load, Vector diagrams for (a) Normal, (b)Under and c)Over excitation conditions- V – Curves and inverted V –curves – Synchronous motor as synchronous condenser - Hunting phenomenon – prevention of Hunting - Applications of synchronous motor - Comparison with Induction motor.

REFERENCE BOOKS:

1. B.L. Theraja-Electrical Technology - Vol –II S.Chand &Co.
2. M.G Say –AC machines
3. DP Kothari, IJ Nagrath – Electric Machines-Mc.Graw.Hill
4. P.S. Bhimbra -Electrical machines – Khanna Publishers
5. MV Deshpande-Electric machines – Wheelerpublishing.

Blue print:

S. No.	Unit Title	No. of periods	Weightage allocated	Marks wise distribution of			Question wise distribution of			CO'S mapped
				R	U	Ap	R	U	Ap	
1	Three Phase Induction Motors	**20**	29	13	13	3	2	2	1	**O1**
2	Fractional H.P. motors	**12**	13	3	10	0	1	1	0	**CO2**
3	Alternators	**16**	29	13	6	10	2	2	1	**CO3**
4	Parallel operation of Alternators	**12**	13	3	10	0	1	1	0	**CO4**
5	Synchronous motors	**15**	26	13	13	0	2	2	0	**CO5**
Total		**75**	**110**	45	52	13	8	8	2	

R - Remember; U - Understanding; Ap - Application; An - Analysing

Syllabus for Unit Tests

Unit Test	Learning Outcomes to be Covered
Unit Test - I	From 1.1 to 3.6
Unit Test - II	From 3.7 to 5.7

MODEL PAPER – FORMATIVE ASSESSMENT-1

C-23-EE-402

BOARD DIPLOMA EXAMINATION, (C-23)

DEEE – FOURTH SEMESTER EXAMINATION

EE-402 : ELECTRICAL MACHINES – II

Time: 90 Minutes Total Marks: 40

PART-A **(1 x 4) + (4 x 3) = 16**

Instructions:

i. **Answer all five questions.**
ii. **First question carries four marks and remaining each question carries three marks.**
iii. **Answers should be brief and straight to the point and shall not exceed five simple sentences**

1. (a) The speed of 3 induction motor is always less than Synchronous speed (True/False)

   (b) DOL starters generally used for the starting of Induction motors rated up to _____

   (c) The _____ Induction motors are not self starting. (True/False)

   (d) 3 phase A.C generators are also know as Alternators

2. Compare three phase slip ring and squirrel cage Induction motors (CO1)
3. List at least six applications of three phase Induction motors. (CO1)
4. List the different types of single phase motors. (CO2)
5. Define Chording and Distribution factor (CO3)

PART-B **3 X 8 = 24**

Instructions:

i. **Answer all three questions.**
ii. **Each question carries eight marks.**
iii. **The answers should be comprehensive and the criteria for valuation are the content but not the length of the answer.**

6. (a) Explain the working principle of 3-phase Induction motor in detail. (CO1)

   (OR)

   (b) Explain in detail the relation between torque and slip of 3-phase Induction motor and also draw the torque-slip curve. (CO1)

7. (a) Explain the working principle of split-phase 1-phase Induction motor with neat diagram and also draw the phasor diagram. (CO2)

(OR)

(b) Explain the working principle of operation of Shaded pole type 1-phase Induction motor with neat diagrams. (CO2)

8. (a) Explain the working of Alternator (CO3)

(OR)

(b) Derive EMF equation of an alternator taking into account distribution factor and pitch factor (CO3)

MODEL PAPER – FORMATIVE ASSESSMENT-2

C-23-EE-402

BOARD DIPLOMA EXAMINATION, (C-23)

DEEE – FOURTH SEMESTER EXAMINATION

EE-402 : ELECTRICAL MACHINES – II

Time: 90 Minutes Total Marks: 40

PART-A **(1 x 4) + (4 x 3) = 16**

Instructions:

i. **Answer all five questions.**
ii. **First question carries four marks and remaining each question carries three marks.**
iii. **Answers should be brief and straight to the point and shall not exceed five simple sentences**

1. (a) Synchronous Motor is a self starting motor : (True/False)

   (b) Power factor of a Synchronous Motor with under excitation is _____

   (c) Speed equation of Synchronous Motor is _____

   (d) Synchronous motor is a constant speed motor (True/False) (CO3)

2. Define Voltage Regulation of an Alternator. (CO3)

3. State the conditions for synchronization of alternators . (CO4)

4. State the necessity for parallel operation of alternators. (CO4)

5. What is synchronous condenser? (CO5)

PART-B **3 X 8 = 24**

Instructions:

i. **Answer all three questions.**
ii. **Each question carries eight marks.**
iii. **The answers should be comprehensive and the criteria for valuation are the content but not the length of the answer.**

6. (a) A 3-phase , 16 pole alternator has a star connected winding with 144 slots and 10 conductors per slots. The flux per pole is 30 m wb sinusoidally distributed. Find the phase and line voltages if the speed is 375 rpm. (CO3)

(or)

(b) Explain armature reaction of Alternator at different power factors. (CO3)

7. (a) Explain the procedure of synchronization of alternators using Dark lamp and Bright lamp method (CO4)

(or)

(b) Two 25 MVA, 3-phase alternators operate in parallel to supply a load of 35 MVA at 0·8 p.f. lagging. If the output of one machine is 25 MVA at 0·9 p.f. lagging, find the output and p.f. of the other machine. (CO4)

8. (a) Explain the Phenomenon of Hunting and how it can be prevented (CO5)

(or)

(b) Explain the effects of varying excitation at constant load with phasor diagrams (CO5)

MODEL PAPER – SUMMATIVE EXAMINATION
C-23-EE-402
BOARD DIPLOMA EXAMINATION, (C-23)
DEEE – FOURTH SEMESTER EXAMINATION
EE-402 : ELECTRICAL MACHINES – II

Time: 3 hours Total marks: 80

PART-A **10 X 3 = 30**

Instructions:

i. Answer all questions.
ii. Each question carries three marks.
iii. Answers should be brief and straight to the point and shall not exceed five simple sentences

1. Compare three phase slip ring and squirrel cage Induction motors. (CO1)

2. List at least six applications of three phase Induction motors. (CO1)

3.List different speed control techniques of 3 ph induction motor (CO1)

4. List the different types of single phase motors. (CO2)

5. State the need of an exciter in an alternator (CO3)

6. Define Chording factor and Distribution factor of a Synchronous generator. (CO3)

7. State the advantage of Stationary Armature (CO3)

8. What is need for parallel operation of Alternators (CO4)

9. Mention four applications of synchronous motor with reasons. (CO5)

10. What is synchronous condenser. (CO5)

PART-B **5 X 8 = 40**

Instructions:

i. **Answer all five questions.**
ii. **Each question carries eight marks.**
iii. **The answers should be comprehensive and the criteria for valuation are the content but not the length of the answer.**

11. Explain the working principle of 3-phase Induction motor in detail. (CO1)

12. Explain the speed control of inductor motors by (i) Frequency changing method (ii) Pole changing method (CO1)

13. Explain the working principle of split-phase 1-phase Induction motor with neat diagram and also draw the phasor diagram (C02)

14. A 3-phase , 16 pole alternator has a star connected winding with 144 slots and 10 conductors per slots. The flux per pole is 30 m wb sinusoidally distributed. Find the phase and line voltages if the speed is 375 rpm. (CO3)

15.Explain armature reaction of Alternator at different power factors. (CO3)

16. Explain the procedure of synchronization of alternators using Dark lamp and Bright lamp method (CO4)

17. Explain the phenomenon of HUNTING and how it can be prevented (CO5)

18. Explain the effects of varying excitation at constant load with phasor diagrams (CO5)

EE-403 POWER SYSTEMS – I

Course code	Course title	No. Of periods/week	Total No. of periods	Marks for FA	Marks for SA
EE-403	POWER SYSTEMS - I	4	60	20	80

S.No.	Unit Title	No. of Periods	CO'S Mapped
1.	Sources of Electrical Energy	10	CO1
2.	Thermal, Hydro Electrical, Nuclear & Gas Power Stations	18	CO2
3.	Combined Operation and Economics	12	CO3
4.	Switchgear and Reactors	10	CO4
5.	Protective relays, Protection of Alternators and Transformers	10	CO5
Total		60	

Course Objectives	(i) To understand the need for non-conventional method of power generation (ii) To analyse the working of various power generation stations. (iii) To familiarise the fundamental concepts of combined operation and economics (iv) To understand the role of circuit Breakers and relays in power system protection and to analyse the protection of transformers and alternators.

Course outcomes	**CO1**	**EE-403.1**	Recognizing of various sources of power generation
	CO2	**EE-403.2**	Analyze the working of Thermal, Hydro, Nuclear and Gas power stations.
	CO3	**EE-403.3**	Understand the concept of load dispatching and Analyse various tariffs.
	CO4	**EE-403.4**	Analyse the working of various circuit breakers
	CO5	**EE-403.5**	Interpret the applications of relays and analyse various protection schemes used for protection of alternators and transformers.

LEARNING OUTCOMES

1. Sources of Electrical Energy

1.1 Know the different sources of energy and classify them into conventional and Non-conventional types.

1.2 State necessity of developing non-conventional methods of power generation.

1.3 Describe the method of power generation by (i) Solar Power plant (ii) Tidal Power plant (iii) Wind Power plant (iv) Biomass Power plant

1.4 State the relative merits and limitations of Conventional and Non- Conventional types of sources

1.5 Appreciate the need of energy conservation and its methods.

2. Thermal, Hydro Electrical, Nuclear & Gas Power Stations

2.1 State working principle of Thermal power plant.

2.2 State the factors required for selection of site.

2.2 Draw the detailed line diagram of a condensing type thermal power station and explain the working of each component of thermal power station.

2.3 State the advantages of (i) Pulverisation and the machine used for it (ii) Cooling towers and their types.

2.4 State the causes of pollution and methods to control them.

2.5 State the advantages and disadvantages of Thermal power plants.

2.6 State the principle of working of Hydro power station.

2.7 State the factors required for selection of site for Hydro power station.

2.8 Explain Hydrograph.

2.9 Define various hydraulic terms

2.10 Write water power equation

2.11 Classify the Hydro Electric Plants based upon head, duty, location and hydraulic considerations.

2.12 Explain with layout diagram working of i) High Head ii) Medium Head iii) Low Head Power stations.

2.13 Explain the need and working of (i) Surge Tank ii) Forebay iii) Spill gates.

2.14 State the advantages and disadvantages of hydroelectric power station.

2.15 State merits and risks involved in using nuclear energy

2.16 List out the nuclear fuels.

2.17 Explain fission and fusion reactions.

2.18 Explain sustained chain reaction.

2.19 Explain the working of a moderate type nuclear power station with a block diagram.

2.20 Explain the need and working of coolant, reflector, and control rods. Mention the materials used for them

2.21 List the types of Reactors used in Nuclear Power Station

2.22 Explain the principle of working of gas power station with the help of schematic diagram and mention its merits and demerits

3. Combined Operation and Economics of Power Stations.

3.1 State the need for integrated operation of power plants and list the merits of it.
3.2 Differentiate between isolated operation and integrated operation of power stations
3.3 Understand the concept of load dispatching and its process.
3.4 List the various charges and expenses in power station and classify them as fixed and running.
3.5 Define the terms load curve, connected load, Maximum demand, Demand factor, load factor, diversity factor, capacity factor and plant use factor.
3.6 Comprehend the cost of generation and effects of load factor and diversity factor on it.
3.7 Solve problems on above topics.
3.8 Explain various types of consumer tariffs and compare them.
3.9 List the causes of lower power factor
3.10 State the effects of power factor (p.f.) on electricity charges and mention the methods to improve it.

4. Switchgear and Reactors

4.1 Define faults and list types if faults in power systems.
4.2 Define and classify switch gear.
4.3 Define isolators, air break switches, their uses and limitations.
4.4 Explain the phenomenon of arc, arc voltage, arc current and its effects.
4.5 List the methods of arc quenching.
4.6 Classify the circuit breakers based upon medium of arc quenching.
4.7 State the principle of M.O.C.B and explain its working.
4.8 State properties of SF_6 gas and explain the working of SF_6 circuit breaker.
4.9 Explain working principle of Vacuum circuit breaker (V.C.B).
4.10 Define current limiting reactors and state their importance.

5. Protective relays, Protection of Alternators and Transformers

5.1 Define relay and State the basic requirements of relays.

5.2 Classify the relays based upon (i) Principle of operation (ii) Time of operation (iii) Duty

5.3 Define current setting and time setting.

5.4 State the applications of (i) Induction type over current relay (ii) Directional over current induction type relay (iii) Distance relay (iv) Differential Relay

5.5 List the probable faults in Stator and rotor of Alternator.

5.6 Explain the differential protection for alternator stator.

5.7 List the possible faults and their types in a transformer.

5.8 Explain the working of Buchholz relay in a transformer.

CO-PO/PSO MATRIX

CO NO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
EE-403.1	3		1	1	2	2	2	3	1	
EE-403.2	3			1	1	1	1	3	1	
EE-403.3	3	2					1	3	1	
EE-403.4	3		2	2			1	3	2	
EE-403.5	3		2	2			1	3	2	
Average	3	1	1	2	1	1	1	3	2	

3-Strongly Mapped 2- Moderately Mapped 1- Slightly Mapped

Note:
The gaps in CO and PO mapping will be achieved by one or more appropriate activities from the following:
(i) Assignments (ii) Tutorials (iii) Seminars (iv) Guest Lectures (v) Group Discussions (vi) Quizzes (vii) Industrial Visits (viii) Tech Fests (ix) Mini Projects (x) Library Visits

HYPONATED COURSE CONTENTS

1. Sources of Electrical Energy

Different sources of energy – Conventional and Non-conventional sources – Methods of generation of energy from different sources of power - Working principle of Solar, Tidal, Wind and Biomass power plants - Merits and limitations of conventional and Non- conventional sources - Need for energy conservation and their methods.

2. Thermal, Hydro Electrical, Nuclear & Gas Power Stations

Thermal PowerStation – Principle of working – Factors for selection of site - Block diagram of condensing type thermal power station - Components and its working - pulverization, Cooling towers and their types - Causes of pollution and methods to control them.

Principle of working of hydroelectric power station – limitations in location and operation. Hydraulic terms used – Water power equation – Classification of hydroelectric power stations based on head, duty, location and hydraulic considerations - Layout diagram of i)High Head ii) Medium Head iii) Low Head Power Stations - Working of surge tank, fore bay, spill gates.

Nuclear fuels - Fission and fusion reactions with mass energy balance, sustained chain reaction – Working of moderate type nuclear power station with a block diagram - Need and working of coolant, reflector, control rods – Materials used for them – reactors used in nuclear power plant- Principle and working of gas power plant.

3. Combined Operation and economics of Power Stations

Isolated operation and integrated operation of power stations –– Load dispatching and its process –Charges/Expenses involved in power station – Their classification as fixed and running-Load curve, load factor, diversity factor and maximum demand – Effects of load factor and diversity factor in power generation – Solve numerical problems. Consumer tariffs and their comparison – Effect of power factor on the electricity charges and methods to improve it.

4. Switch Gear and Reactors

Faults in power systems - Switch gear and their classification – Isolators, air break switches and explain the phenomenon of arc, arc voltage, arc current and their effects – methods of arc quenching. Circuit breakers and their classification based on the medium of arc quenching – , M.O.C.B – Properties of SF_6 gas and working of SF_6 circuit breakers – Working of V.C.B, M.O.C.B, SF_6 C.B. Reactors – Current limiting reactors and their importance.

5. Protective relays, Protection of Alternators and Transformers

Requirements of relays – Classifications based on duty, principle of operation and time of operation – Construction and working of induction type over current relays – applications of induction type over current relay, directional over current relay, distance relay and differential relay Faults in Alternator stator and rotor- its effects – differential protection for alternator stator- Possible faults and their types in the transformer – buchholz relay in transformers.

REFERENCE BOOKS

1. Electrical Power by S.L.Uppal
2. Generation, Transmission and Utilisation by A.T.Starr
3. Power System by C.L.Wadhwa
4. Electrical power plants by J B Guptha
5. Switch gear and protection by Sunil S. Rao

Blue print

S.NO.	Unit title	No. of periods	weightage allocated	marks wise distribution of Weightage			Question wise distribution of weightage			CO'S Mapped
				R	U	Ap	R	U	Ap	
1	Sources of Electrical Energy	10	16	6	10	-	2	1	0	**CO1**
2	Thermal, Hydro Electrical, Nuclear & Gas Power Stations	18	36	3	33	0	1	4	0	**CO2**
3	Combined Operation and Economics	12	26	3	13	10	1	2	1	**CO3**
4	Switchgear and Reactors	10	16	3	13	0	1	2	0	**CO4**
5	Protective relays, Protection of Alternators and Transformers	10	16	3	13	0	1	2	0	**CO5**
Total		60	110	18	*82*	10	6	11	1	

R-Remembering U-Understanding AP-Application

Syllabus to be covered for Unit Tests

Unit Test	Learning Outcomes to be Covered
Unit Test - 1	From 1.1 to 2.22
Unit Test – 2	From 3.1 to 5.8

MODEL PAPER – FORMATIVE ASSESSMENT-1

C-23-EE-403

BOARD DIPLOMA EXAMINATION, (C-23)

DEEE – IV SEMESTER EXAMINATION

EE-403, POWER SYSTESMS –I

Time: 90 Minutes Total Marks: 40

PART – A **(1 x 4) + (4 x 3) = 16**

Answer all five questions. First question carries 4 marks and remaining questions carries 3 marks

1. a) Wind power plant is a _____ source of energy. (CO1)
   b) Biogas is an example of renewable energy source. State true or false. (CO1)
   c) The amount of electrical energy that can be generated by hydroelectric power plant depends on _____.
   i) Head of water ii) Quantity of water (CO2)
   d) Uranium and plutonium are nuclear fuels. State true or false. (CO2)
2. List the merits of non-conventional energy sources. (CO1)
3. State the advantages of thermal power plants. (CO2)
4. Write the water power equation. (CO2)
5. State the use of control rods in nuclear power plant. (CO2)

PART-B **3 X 8 = 24**

Answer all three questions. Each question carries 8 marks

6. a) State the need for energy conservation and State its methods. (CO1)
   (or)
   b) Explain the working of roof top solar power generation with a block diagram. (CO1)
7. a) Explain the working of each component of thermal station with line diagram. (CO2)
   (or)
   b) Explain the working of high head hydro power station with line diagram. (CO2)
8. a) Explain fission and fusion reactions of nuclear energy. (CO2)
   (or)
   b) Explain the working of gas power plant with schematic diagram. (CO2)

MODEL PAPER – FORMATIVE ASSESSMENT-2

C-23-EE-403

BOARD DIPLOMA EXAMINATION, (C-23)

DEEE – IV SEMESTER EXAMINATION

EE-403, POWER SYSTESMS –I

Time: 90 Minutes Total Marks: 40

PART – A **(1 x 4) + (4 x 3) = 16**

Answer all five questions. First question carries 4 marks and remaining questions carries 3 marks

1. a) Load factor is defined as the ratio of _____. (CO3)

   b) The rate at which the electrical energy is supplied to the Consumer is called TARIFF. State true or false. (CO3)

   c) Isolator is operated on _____ load. (CO4)

   d) Buchholz Relay is used for the protection of transformers. State true or false.(CO5)
2. Write any three merits of integrated operation of power stations. (CO3)
3. List the types of faults in power systems. (CO4)
4. List the possible faults in transformer. (CO5)
5. State the basic requirements of relays. (CO5)

PART-B **3 X 8 = 24**

Answer all three questions. Each question carries 8 marks

6. a) State the effect of power factor on electricity charges and mention the methods to improve the power factor. (CO3)

   (or)

   b) Explain the effects of load factor and diversity factor on the cost of generation of electrical energy. (CO3)
7. a) Explain the working principle of Minimum Oil Circuit Breaker (MOCB) with a neat sketch. (CO4)

   (or)

   b) Explain the working of Vacuum Circuit Breaker with a neat sketch. (CO4)
8. a) Explain the differential protection for alternators. (CO5)

   (or)

   b) State the applications of distance relay and differential relay. (CO5)

SUMMATIVE ASSESSMENT

BOARD DIPLOMA EXAMINATION, (C-23)

MODEL QUESTION PAPER

DEEE - FOURTH SEMESTER EXAMINATION

POWER SYSTEMS – I

Time: 3 hours **Total Marks : 80**

PART-A **10 X 3 =30**

Instructions:

(i) Answer all questions.
(ii) Each question carries three marks.
(iii) Answer should be brief and straight to the point and shall not exceed five simple sentences.

1. State the need of non-conventional energy sources.
2. List the different methods of energy conservation.
3. List the requirements for site selection of hydro power plant.
4. State the methods to control the pollution in thermal power plant.
5. Write any three merits of integrated operation of power stations.
6. Define *(a)* load factor and *(b)* maximum demand.
7. Define and classify the Switch gear.
8. State any three properties of SF_6 gas.
9. State any six features of a relay.
10. State the probable faults in alternator stator and rotor.

PART-B **5 X10 = 50**

Instructions:

(i) Answer any five questions.
(ii) Each question carries eight marks
(iii) Answers should be comprehensive and the criterion for valuation is the content but not the length of the answer.

11. Explain the working of thermal power station with a line diagram and the write function of each component.
12. Briefly explain the functions of fore bay and spill gates.
13. Explain the working of a moderate type nuclear power station with a block diagram.
14. Explain the working of roof top solar power generation with a block diagram.
15. Explain the effects of load factor and diversity factor on the cost of electrical energy generation.
16. State the effects of low power factor on electricity charges and mention the methods to improve it.
17. Explain the working of a minimum oil circuit breaker.
18. Explain the differential protection for alternator stator.

Course code	Course title	No. Of periods/week	Total No. of periods	Marks for FA	Marks for SA
EE-404	POWER ELECTRONICS & PLC	4	60	20	80

S.No.	Unit Title	No. of Periods	CO'S Mapped
1.	Power Electronic devices	12	CO1
2.	Power Transistors	8	CO2
3.	Converters, AC Voltage controllers & Inverters	14	CO3
4.	Applications of Power Electronic circuits	14	CO4
5.	PLC and SCADA	12	CO5
Total		**60**	

Course Objectives	(i) To introduce the basic theory of power semiconductor devices. (ii) To familiarize with the principle of operation, design and synthesis of different power conversion circuits and their applications. (iii) To provide strong foundation for further study of power electronic circuits and systems and To maintain PLCs and SCADA systems used in different applications.

Course outcomes	**CO1**	**EE-404.1**	Describe the operation of SCR, TRIAC and DIAC, SCR Commutation circuits.
	CO2	**EE-404.2**	Describe the operation of IGBT, Power MOSFET and MCT
	CO3	**EE-404.3**	Design and Analyze power converter circuits, A.C Voltage controllers and Inverters.
	CO4	**EE-404.4**	Analyse the speed control of AC motors and DC motors using power semiconductor devices.
	CO5	**EE-404.5**	Develop PLC ladder programs for the given applications and understand the necessity of SCADA and its applications

LEARNING OUTCOMES

1. Power Electronic Devices

1.1 List different thyristors family devices and draw the circuit symbols for each device.
1.2 Describe constructional details and operation of SCR
1.3 Explain the Volt – Ampere characteristics of SCR with the help of a diagram.
1.4 Draw the Gate characteristics of SCR
1.5 Mention the ratings of SCR.
1.6 Give the advantages of SCR as a switch.
1.7 List ten applications of SCR.
1.8 Explain the Volt-ampere characteristics of Diac under forward / reverse bias.
1.9 Explain the Volt-ampere characteristics of Triac under forward / reverse bias.
1.10 State the necessity of Commutation in SCR's and list different methods of commutation

2. Power Transistors

2.1 Classify power transistor.
2.2 Describe the basic structure and operation of IGBT.
2.3 Explain the characteristics of IGBT.
2.4 Mention the applications of IGBT.
2.5 List the types of MOSFETs.
2.6 Describe the working of Power MOSFET.
2.7 Explain the characteristics of MOSFET.
2.8 Mention the applications of MOSFET.
2.9 Compare MOSFET with BJT.
2.10 Compare IGBT with MOSFET.
2.11 Describe the basic structure and operation of MOS –Controlled Thyristor (MCT).

3. Converters, AC Voltage Controllers and Inverters

3.1 Define rectifier, AC voltage controller, inverter, chopper and cyclo converter
3.2 Explain the working of single-phase half wave converter with resistive and R-L loads.
3.3 Understand need for free wheeling diode.
3.4 Explain the working of single phase full wave converter with resistive and R- L loads.
3.5 Explain the working of three-phase half wave converter with resistive load
3.6 Explain the working of three phase full wave converter with resistive load.
3.7 Explain the working of single phase AC voltage controller with resistive load.
3.8 Explain the working of three phase AC voltage controller with resistive load.
3.9 Compare AC voltage controller with transformer.
3.10 Classify inverters.
3.11 Explain the working of single-phase bridge inverter.
3.12 Explain the working of three-phase bridge inverter.
3.13 State the advantages of MOSFET based inverters over SCR based inverters.
3.14 List the applications of Inverters.

4. Applications of Power Electronic Circuits

4.1 List applications of power electronic circuits.
4.2 Mention the factors affecting the speed of DC Motors.
4.3 Explain the speed control of DC Shunt motor using converter.

4.4 Explain the speed control of PMDC motor using converter.
4.5 List the factors affecting speed of the AC Motors.
4.6 Explain the speed control of induction motor by using AC voltage controller.
4.7 Explain the speed control of induction motor by using converter and inverter (V/F control).
4.8 Devices used to suppress the spikes in supply system.
4.9 Working of UPS with block diagram.
4.10 Explain the illumination control circuit using TRIAC and DIAC with the help of a legible sketch.
4.11 Explain the anti-theft alarm circuit using SCR with the help of a diagram.
4.12 Explain the emergency lamp circuit using SCR with the help of a diagram.
4.13 Explain the battery charger circuit using SCR with the help of a diagram.
4.14 Explain the power factor improvement circuit using SCR with the help of a diagram.
4.15 Explain the DC circuit breaker using SCR with the help of a diagram.

5. PLC and SCADA

5.1 Need for automation and advantages of automation.
5.2 Define Programmable Logic Controller(PLC) and state the advantages of PLC
5.3 Explain the different parts of PLC by drawing the Block diagram and state the purpose of each part.
5.4 State the applications of PLC
5.5 Explain Ladder diagram
5.6 Explain contacts and coils used in PLC
5.7 Draw ladder diagrams for
(i)AND gate (ii)OR gate (iii) NOT gate
(iv) NAND gate (iv) NOR gate (iv) X-OR gate
5.8 Explain the following Timers and counters
(i)TON (ii)T OFF (iii) Retentive timer (iv) CTU (v) CTD
5.9 Draw ladder diagrams using Timers and counters
5.10 Explain PLC Instruction set
5.11 Explain ladder diagrams for following
(i) DOL starter and STAR-DELTA starter (ii) Stair case lighting
(iii) Traffic light control (iv) Temperature Controller
5.12 Explain the need of data acquisition.
5.13 State the advantages of supervisory control.
5.14 List the softwares used for SCADA and explain them.
5.15 State various communication methods used in SCADA.
5.16 Explain the working of SCADA with PLC and applications of SCADA.

CO-PO/PSO MATRIX

CO NO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
EE-403.1	3							3		
EE-403.2	3							3		
EE-403.3	3	2	2				1	3	2	
EE-403.4	3		2				1	3	2	
EE-403.5	3		3				1	3	2	
Average	3	1	2				1	3	2	

3-Strongly Mapped 2- Moderately Mapped 1- Slightly Mapped

Note:
The gaps in CO and PO mapping will be achieved by one or more appropriate activities from the following:
(i) Assignments (ii) Tutorials (iii) Seminars (iv) Guest Lectures (v) Group Discussions (vi) Quizzes (vii) Industrial Visits (viii) Tech Fests (ix) Mini Projects (x) Library Visits

HYPONATED COURSE CONTENTS

1. Power Electronic Devices

Types of power semiconductor devices – SCR, DIAC, TRIAC - Construction, Working principle of all devices, symbols - Two transistor analogy for SCR – V-I & Gate characteristics, Forward break over voltage, latching current, holding current, turn on triggering time, turn off time - triggering of SCR using UJT- Necessity of Commutation- various methods of Commutation.

2. Power Transistor

Classification of power transistor - basic structure and operation of IGBT - characteristics of IGBT - applications of IGBT - types of MOSFETs - working of Power MOSFET - characteristics of MOSFET - applications of MOSFET – Comparison of MOSFET with BJT – Comparison of IGBT with MOSFET - basic structure and operation of MOS –Controlled Thyristor (MCT).

3. Converters, AC Voltage Controllers and Inverters

Classification of converters - single phase half wave converter - freewheeling diode- single phase full wave converter- three phase half wave converter- full wave converter - single phase ac voltage controller- three phase ac voltage controller - Classification of Inverters - Single Phase bridge Inverter – Three phase bridge Inverter – applications of inverter.

4. Application of Power Electronic Circuits

DC Motor control - Speed control of DC shunt Motor by using converters - AC Motor Controls - speed control of induction Motor by using AC voltage controllers - V/F control (Converters and invertors control) - Devices used to suppress spikes in supply system.- Working of UPS with block diagram – Illumination Control Circuit - Anti theft alarm circuit - Emergency lamp - Battery charger Circuit using SCR - power factor improvement circuit - DC circuit breaker.

5. PLC and its applications

PLC Definition-advantages-Block diagram-Ladder diagrams for AND, OR, NOT, NAND, NOR - Instruction set-Ladder diagram for DOL starter, Star-Delta Starter, Stair case lighting, Traffic light control, Temperature controller – Data Acquisition – Supervisory Control – SCADA softwares – Communication methods – SCADA with PLC - Applications of SCADA.

REFERENCE BOOKS

1. Power Electronics – P.S. Bimbhra
2. Jamil Asghar -Power Electronics– PHI, NewDelhi.
3. P.C.Sen.-Advanced Power Electronics
4. S.K.Bhattacharya -Control of Electrical Machines
5. John W.Webb -Programmable Logic controllers

Blue Print

S.NO.	Unit title	No. of periods	weightage allocated	marks wise distribution of Weightage			Question wise distribution of weightage			CO'S Mapped
				R	U	Ap	R	U	Ap	
1	Power Electronic devices	12	26	6	20	-	2	2	-	**CO1**
2	Power Transistors	8	13	3	10	-	1	1	-	**CO2**
3	Converters, AC Voltage controllers & Inverters	14	29	3	26	-	1	4	-	**CO3**
4	Applications of Power Electronic circuits	14	26	3	23	-	1	3	-	**CO4**

5	PLC and SCADA	12	16	3	3	10	1	1	1	**CO5**
Total		60	110	18	82	10	6	11	1	

R-Remembering U-Understanding AP-Application

Syllabus to be covered for Unit Tests

Unit Test	Learning Outcomes to be Covered
Unit Test – 1	From 1.1 to 3.14
Unit Test – 2	From 4.1 to 5.16

MODEL PAPER – FORMATIVE ASSESSMENT-1

C-23-EE-404

BOARD DIPLOMA EXAMINATION, (C-23)

DEEE – IV SEMESTER EXAMINATION

EE-404, POWER ELECTRONICS AND PLC

Time: 90 Minutes Total Marks: 40

PART – A **(1 x 4) + (4 x 3) = 16M**

Answer all five questions. First question carries 4 marks and remaining questions carries 3 marks

1. a) Draw the ISI circuit symbol for LASCR. (CO1)
   b) IGBT has the capability of handling very high voltage than MOSFET. State true or false. (CO2)
   c) Inverter is device which converts _____. (CO3)
   d) A chopper is a device that converts fixed DC input to a variable DC output voltage. State true
   or false. (CO3)
2. List the applications of SCR. (CO1)
3. List the applications of MOSFET. (CO2)
4. State the need of freewheeling diode in converters. (CO3)
5. Classify different types of inverters. (CO3)

PART – B **3 X 8 = 24M**

Answer all three questions. Each question carries 8 marks

6. a) Explain the working of SCR and draw its V-I characteristics. (CO1)

(or)

b) Explain class C (complementary) communication of SCR with neat diagram. (CO1)

7. a) Explain the operation of IGBT and state its applications. (CO2)

(or)

b) Explain the working of Power MOSFET and draw its characteristics. (CO2)

8. a) Explain the working of single-phase full-wave fully-controlled converter with RL load along with neat waveforms. (CO3)

(or)

b) Explain the working of a single phase bridge inverter with a neat sketch. (CO3)

MODEL PAPER – FORMATIVE ASSESSMENT-2

C-23-EE-404

BOARD DIPLOMA EXAMINATION, (C-23)

DEEE – IV SEMESTER EXAMINATION

EE-404, POWER ELECTRONICS AND PLC

Time: 90 Minutes Total Marks: 40

PART – A **(1 x 4) + (4 x 3) = 16M**

Answer all five questions. First question carries 4 marks and remaining questions carries 3 marks

1. a) Anti theft alarm circuit can be designed using SCR. State true or false. (CO4)
   b) The speed of a DC shunt motor can be controlled by_____. (CO4)
   c) Logic gate used in Ladder Diagram of DOL Starter is OR gate. State true or false. (CO5)
   d) Abbreviation of SCADA is _____. (CO5)
2. List the factors affecting speed of a DC Motor. (CO4)
3. List the devices used to suppress the spikes in supply system. (CO4)
4. Draw ladder diagram for AND, OR and NOT gates. (CO5)
5. State any three applications of PLC. (CO5)

PART – B **3 X 8 = 24M**

Answer all three questions. Each question carries 8 marks

6. a) Explain the speed control of PMDC motor by using converters. (CO4)
   (or)
   b) Explain the illumination control circuit using TRIAC and DIAC with a neat sketch. (CO4)

7. a) Draw the block diagram of PLC and Explain the purpose of each part. (CO5)
   (or)
   b) Draw the ladder diagram for star-delta starter and write its operation in brief. (CO5)

8. a) Explain count up instruction (CTU) of counters used in ladder diagrams. (CO5)
   (or)
   b) Explain the speed control of induction motor by using converter and inverter. (CO4)

C23-EE-404

SUMMATIVE ASSESSMENT
BOARD DIPLOMA EXAMINATION, (C-23)
MODEL QUESTION PAPER
DEEE - FOURTH SEMESTER EXAMINATION
POWER ELECTRONICS AND PLC

Time: 3 hours **Total Marks : 80**

PART-A **10 X 3 =30**

Instructions:

(i) Answer all questions.
(ii) Each question carries three marks.
(iii) Answer should be brief and straight to the point and shall not exceed five simple sentences.

1. Draw the symbols of the following :
   (a) GTO SCR
   (b) SUS
   (c) LASCR
2. Define turn-on time and turn-off time of SCR.
3. Compare MOSFET and IGBT in any three aspects.
4. Define an inverter and state any four applications.
5. Define Chopper and Cyclo converter.
6. State the need for free wheeling diode.
7. List any three devices used to suppress spikes in power supply system.
8. State the factors affecting the speed of dc motors.
9. Draw ladder diagram for NAND gate and NOR gate.
10. Draw the block diagram of PLC and label its parts.

PART – B **5 X 10 = 50**

Instructions:

(i) Answer any five questions.

(ii) Each question carries ten marks.

(iii) Answers should be comprehensive and the criterion for valuation is the content but not the length of the answer.

11. Explain the construction and working of SCR with neat diagrams.
12. Explain complementary and natural commutation of SCR with the help of a neat circuit sketch.
13. Explain the working of Power MOSFET and draw its characteristics.
14. Explain the working of single-phase full-wave fully-controlled converter with resistive load along with neat waveforms.
15. Explain the working of three phase bridge inverter.
16. Explain the speed control of 3-phase induction motor by using voltage-frequency (V/F) control.
17. Explain the working of UPS with a neat block diagram.
18. Explain the ladder diagram of DOL starter with neat diagram.

Course code	Course Tilte	No. of periods /week	Total No. of periods	Marks for FA	Marks for SA
EE-405	GENERAL MECHANICAL ENGINEERING	4	60	20	80

S.No	Unit Title	No. of periods	CO's Mapped
1	Simple Stresses and Strains	10	CO1
2	Torsion in Shafts	10	CO2
3	I.C. Engines	12	CO3
4	Boilers and Turbines	18	CO4
5	Pumps	10	CO5
	Total	**60**	

Upon completion of the course the student shall be able to	
Course Objectives	i) Understand Stress, Strain and Torsional Stress
	ii) Understand the working of I.C.Engines, Boilers, Turbines and pumps

Course Outcomes:

Course Outcomes	**CO1**	**EE-405-1**	Understand the concept of stress and strain and various constituent relations
	CO2	**EE-405-2**	Understand the Torsional Stresses in circular shafts and find them in solid and circular shafts
	CO3	**EE-405-3**	Analyze the Working of I C Engine Systems
	CO4	**EE-405-4**	Analyze the Working of Boilers and Turbines
	CO5	**EE-405-5**	Analyze the Working of Pumps

Learning Objectives:

1.0. **Simple Stress and Strain**

1.1. Definitions of Tensile stress, Compressive stress, Shear stress, Linear strain, lateral strain and, Poisson's ratio, elastic limit, Identify the different types of stresses and Strains
1.2. State Hooke's law
1.3. Draw stress-strain curves for ductile and brittle materials under tension
1.4. Define a) Working stress, ultimate stress, yield stress, factor of safety and Young's modulus. solve simple problems on above topics
1.5. State the factors to be considered in selecting factor of safety
1.6. Solve Simple problems on uniform bars subjected to loads

2.0 Torsion in Shafts

2.1. State the function of shafts
2.2. Classify shafts
2.3. Specify the standard sizes of shafts
2.4. Write the torsion equations with usual notations
2.5. State the procedural steps in design of shaft (both solid and hallow types)
2.6. Design a shaft from given data on the basis of strength and solve problems.

3.0 I.C. Engines

3.1 Classify I.C. Engines
3.2 Functions of main components of an I.C.Engine
3.3 Illustrate the working of four stroke petrol engine
3.4 Illustrate the working of four stroke diesel engine
3.5 Illustrate the working of two stroke petrol engine
3.6 Compare four stroke and two stroke engines
3.7 Compare petrol engine and diesel engine

4.0. Boilers and Turbines

4.1. Classify steam boilers
4.2. Compare fire tube and water tube boilers
4.3. Differentiate between boiler mountings and accessories
4.4. List out a) Popular boiler mountings b) Popular boiler accessories
4.5. Illustrate the working of Lamont boiler
4.6. State the working principle of steam turbine
4.7. Classify steam turbines
4.8. Explain the working of a) De-laval steam turbine, b) Parson's reaction turbne
4.9. Compare impulse and reaction turbines
4.10. Classify hydraulic turbines
4.11. Explain the working of
(i) Pelton wheel
(ii) Francis turbine
(iii) Kaplan turbine

5.0. Pumps

5.1. Classify hydraulic pumps

5.2. Compare between centrifugal and reciprocating pumps

5.3. Illustrate the working of

(i) Single acting and Double acting reciprocating pump

(ii) Single stage centrifugal pump

(iii) Jet pump

(iv) Submersible pump

CO-PO/PSO MATRIX

CO.No	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PS01	PS02	PS03
EE-405-1	3	2								
EE-405-2	3	2			1		1	3		
EE-405-3	3		2			1		3	2	
EE-405-4	3			2				3	2	
EE-405-5	3			2	1	1	1	3	2	
Average	**3**	**2**	**2**	**2**	**1**	**1**	**1**	**3**	**2**	

3-Strongly Mapped 2- Moderately Mapped 1- Slightly Mapped

Note:

The gaps in CO and PO mapping will be achieved by one or more appropriate activities from the following:

(i) Assignments (ii) Tutorials (iii) Seminars (iv) Guest Lectures (v) Group Discussions (vi) Quizzes (vii) Industrial Visits (viii) Tech Fests (ix) Mini Projects (x) Library Visits

Note : 1. This subject is to be taught by Mechanical Engineering Faculty.

2. Paper setting and paper evaluation is also to be done by Mechanical Engineering Faculty.

HYPONATED COURSE CONTENT

1. Simple stress and strains

Definitions of Tensile stress, Compressive stress, Shear stress, Linear strain, lateral strain and, Poisson's ratio, elastic limit, Hook's law - stress-strain diagram for ductile and brittle materials under tension - Working stress, Ultimate stress, yield stress - Factor of safety – selection of factor of safety-Young's modulus - Simple problems on bars of uniform section subjected to external loading.

2. Torsion in Shafts

Function of shafts – classification of shafts - standard shaft sizes - Torsion equation (derivation omitted) – simple problems on its application - Step by step procedure of designing a shaft- Problems on design of shaft based on strength.

3. I.C. Engines

Classification of I.C Engines - Main components of IC Engine - Sketch and description of four stroke petrol engine - Sketch and description of four stroke diesel engine - Sketch and description of two stroke petrol engine - Comparison between two stoke and four stroke engines - Comparison between petrol and diesel engine.

4. Boilers and Turbines

Classification of boilers - Comparison between fire tube and water tube boilers - Difference between Boiler Mountings and Accessories – Functions of popular mountings and accessories (without sketches) - Sketch and description of Lamont high pressure boiler - Classification of steam turbines - Sketch and description of a De-Laval impulse turbine - Sketch and description of Parson‘s reaction turbine - Comparison between impulse and reaction turbines - Classification of hydraulic turbine - Sketch and description of Pelton wheel - Sketch and description of Francis turbine - Sketch and description of Kaplan turbine.

5. Pumps

Classification of hydraulic pumps - Comparison between Centrifugal and Reciprocating pumps - Sketch and description of a single acting and double acting reciprocating pump - Sketch and description of single stage centrifugal pump - Sketch and description of a jet pump - Sketch and description of a submersible pump

REFERENCES

1. Surender Singh- Strength of materials - Vikas publishing
2. R.K. Rajput - Strength of Materials- S.Chand & CO
3. R.S. Kurmi - Strength of Materials- S.Chand & CO
4. P.K. Nag, K,Tripathi, C B Pawar – Basic Mechanical Engineering – McGraw Hill
5. Pravin Kumar – Basic Mechanical Engineering - Pearson

Blue Print:

S.No	Unit Title	No. of Periods	Weightage Allocated	Marks wise distribution of weightage			Question wise distribution of weightage			CO'S Mapped
				R	U	AP	R	U	AP	
1	Simple Stresses and Strains	10	16	03	03	10	01	01	01	CO1
2	Torsion in Shafts	10	16	03	03	10	01	01	01	CO2
3	I.C. Engines	12	26	13	13	-	02	02	-	CO3
4	Boilers and Turbines	16	26	13	13	-	02	02	-	CO4
5	Pumps	12	26	13	13	-	02	02	-	CO5
Total		**60**	**110**	**45**	**45**	**20**	**08**	**08**	**02**	

R-Remembering; U-Understanding; AP-Application

Syllabus to be covered for Unit Tests

Unit Test	Learning Outcomes to be Covered
Unit Test - 1	From 1.1 to 3.7
Unit Test – 2	From 4.1 to 5.3

MODEL PAPER – FORMATIVE ASSESSMENT-1
C23-EE-405
BOARD DIPLOMA EXAMINATION, (C-23)
DEEE – FIFTH SEMESTER EXAMINATION
EE-405: GENERAL MECHANICAL ENGINEERING

Time: 90 Minutes Total marks: 40

PART-A **(1X4) + (4X3) = 16 M**

Instructions:

i. Answer all five questions.

ii. First question carries four marks and remaining each question carries three marks.

iii. Answers should be brief and straight to the point and shall not exceed five simplesentences

1. a) Define Poisson's ratio
   b) state function of spark plug.
   c) Write Torsion Equation
   d) Define Young's Modulus CO1, CO2
2. Write any the relations between Elastic constants (E, G and K) CO1
3. Classify the shafts. CO2
4. Mention the main components of IC Engine CO3
5. Define Yield stress. CO1

PART-B **(3X8) = 24 M**

Instructions:

i. Answer all three questions.

ii. Each question carries eight marks.

iii. The answers should be comprehensive and the criteria for valuation are the content butnot the length of the answer.

6. (a) Draw the Stress –Strain diagram for a typical Ductile and brittle material and locate the Salient points on it. CO1

(or)

(b) A steel bar 350 mm long is 20 mm in diameter for 200 mm of length and 15 mm diameter for the remainder. If the tensile load of 20kN is applied on a bar, calculate the total elongation of the rod. Take $E=2*10^5$ N/mm^2 CO1

7. (a) Write the procedural steps involved in design of a shaft CO2

(OR)

(b)) Find the diameter of solid circular shaft required to transmit 750 KW at 250 rpm. It specified that the maximum shear stress must not exceed 50 N/mm^2 and the angle of twist must not exceed 2 degree in a length of 2 m. Take G = $0.8x10^5$ N/mm^2. CO2

8. (a) Explain the working of four stroke Diesel Engine. CO3

(OR)

(b) Explain about Functions of main components of an IC Engine CO3

MODEL PAPER – FORMATIVE ASSESSMENT-2

C23-EE-405

BOARD DIPLOMA EXAMINATION, (C-23)

DEEE – FIFTH SEMESTER EXAMINATION

EE-405: GENERAL MECHANICAL ENGINEERING

Time: 90 Minutes Total marks: 40

PART-A **(1X4) + (4X3) = 16 M**

Instructions:

i. Answer all five questions.

ii. First question carries four marks and remaining each question carries three marks.

iii. Answers should be brief and straight to the point and shall not exceed five simplesentences

1 (a) Priming is done for Reciprocating pump (True/False)
(b) Direction of flow in Kaplan Turbine is (Tangential flow/ Axial flow)
(c) Super Heater is a Boiler ------ (Accessories/ Mountings)
(d) State the function of Blow Off cock. CO4, C05

2. Write any three differences between Fire tube and water tube Boilers CO4
3. Explain working of Fusible Plug and Air pre heater. CO4
4. Difference between reciprocating pump and Centrifugal Pump. CO5
5. Explain working of Jet Pump. CO5

PART-B **3X8 = 24 M**

Instructions:

i. Answer all three questions.

ii. Each question carries eight marks.

iii. The answers should be comprehensive and the criteria for valuation are the content butnot the length of the answer.

6. (a) Explain working of DE- LAVAL Turbine with neat sketch

(or)

(b) Describe the working of Lamont high pressure boiler with a neat sketch. CO4

7. (a) Explain working principle of Pelton wheel with neat sketch?

(or)

(b) Explain working principle of Kaplan Turbine with neat sketch? CO4

8. (a) Explain working Single acting reciprocating pump with neat sketch CO5

(or)

(b) Explain working of submersible pump with neat sketch CO5

C23-EE-405

SUMMATIVE ASSESSMENT
BOARD DIPLOMA EXAMINATION, (C-23)
MODEL QUESTION PAPER
DEEE - FOURTH SEMESTER EXAMINATION
GENERAL MECHANICAL ENGINEERING

Time: 3 hours **Total Marks : 80**

PART-A **10 X 3 =30M**

Instructions:

(i) Answer all questions.

(ii) Each question carries three marks.

(iii) Answer should be brief and straight to the point and shall not exceed five simple sentences.

1. Define the terms (a) linear Strain, (b) lateral Strain
2. Define factor of safety
3. State the functions of shaft
4. Find the power transmitted by a 75 mm diameter shaft rotating at 140 RPM , if the maximum shear stress is 60 N/mm^2.
5. List out the various components of an I.C.Engines.
6. State any three differences between 2-stroke and 4-stroke engines.
7. Classify steam turbine.
8. List various Boiler Mountings and Accessories
9. List out different types of hydraulic turbines.
10. Differentiate between Pelton turbine and Kaplan turbine.

PART-B **5 X10 = 50M**

Instructions:

(i) Answer any five questions.

(ii) Each question carries Ten marks.

(iii) Answers should be comprehensive and the criterion for valuation is the content but not the length of the answer.

11. A cylindrical bar is of 25 mm diameter and 1·25 m long. The linear strain is 4 times the lateral strain. Calculate the shear modulus and bulk modulus if the bar is elongated by 0·06 mm under an axial load of 50 kN.
12. Find the diameter of solid shaft required to transmit 750 kW power at 250 RPM. The maximum allowable shear stress is not exceeded 50 N/mm^2 and twist is not exceeded 2^o in a length of 2m. Take Modulus of rigidity $G=0.8X10^5 N/mm^2$.
13. Explain the functions of main components of IC Engine.
14. Elucidate the working principle of 4-stroke petrol engine.
15. Explain various popular boiler accessories.
16. Describe the working of Francis turbine.
17. Explain the working of single stage centrifugal pump.
18. Describe the working of submersible pump.

ELECTRICAL ENGINEERING DRAWING

Course code	Course title	No.of periods / week	Total no. of periods	Marks for FA	Marks for SA
EE-406	ELECTRICAL ENGINEERING DRAWING	6	90	40	60

S.no	Unit Title	No.of Periods	CO'S Mapped
1	Graphical symbols, couplings, and Guarding systems	15	**CO1**
2	D.C. Machines	24	**CO2**
3	Induction Motors	15	**CO3**
4	Transformers	15	**CO4**
5	D.C and A.C Windings	21	**CO5**
TOTAL		**90**	

Course Objectives	(i) To familiarise with the different electrical symbols, couplings and guarding systems. (ii) To draw the views of D.C. machine, induction motors and Transformers. (iii) To draw different winding diagrams of DC and AC machines.

Course outcomes	**CO1**	**EE-406.1**	Understand different types of symbols, couplings and guarding system in electrical drawing.
	CO2	**EE-406.2**	Comprehend and draw different views of DC machine.
	CO3	**EE-406.3**	Comprehend and draw different views of Induction motors.
	CO4	**EE-406.4**	Comprehend and draw different views of Transformers.

	CO5	**EE-406.5**	Design the different types of DC and AC machine windings.

LEARNING OUTCOMES

1. Graphical symbols, couplings and Guarding systems.

1.1 Draw the standard symbols of electrical components and fixtures.

1.2 Draw sectional elevation and end views of a Protected type and Unprotected type shaft couplings.

1.3 Draw the views of the guarding systems in the following cases.

(i) Telephone lines under power lines (ii) H.V. line over L.V. line crossing

(iii) H.V. Line over L.V. line on same supports (iv) H.V. Line crossing over railway lines.

2. DC machines.

2.1 Draw the assembled sectional views of Pole and Field coils.

2.2 Draw the half sectional end view and elevation of armature of DC machine with the given data.

2.4 Draw the end view of commutator in a DC Machine with the given data.

2.5 Draw the Half sectional End view and Elevation of a D.C machine from the given data.

3. Induction Motors.

3.1 Draw the Half - sectional elevation and end views of an assembled 3-phase squirrel cage induction motor from the given data.

3.2 Draw the Half - sectional elevation and end views of an assembled 3-phase slip ring induction motor from the given data.

4. Transformers.

4.1 Draw different plan and elevational views of core stepping sections (one, two, three and four stepped cores) of a Transformer.

4.2 Draw sectional plan and elevation of a 1-phase core type transformer from the given data.

4.3 Draw sectional plan and elevation of a 3-phase core type transformer from the given data.

5. D.C and A.C Windings.

5.1 Draw the development winding diagrams of a Single Layer Lap and wave connected D.C Machines with the given data with ring diagram showing brush positions and winding table.

5.2 Draw the developed winding diagrams of a 3-phase, single layer lap and wave windings with winding table from the given data.

CO-PO/PSO MATRIX

CO.NO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PS 01	PS 02	PS 03
EE-406.1	3							3		
EE-406.2	3	2					1	3	1	
EE-406.3	3	2			1	1		3	1	**1**
EE-406.4	3			1		1	1	3		
EE-406.5	3		2		1			3		
Average	**3**	**2**	**2**	**1**	**1**	**1**	**1**	**3**	**1**	**1**

3-Strongly Mapped 2- Moderately Mapped 1- Slightly Mapped

Note:

The gaps in CO and PO mapping will be achieved by one or more appropriate activities from the following:

(i) Assignments (ii) Tutorials (iii) Seminars (iv) Guest Lectures (v) Group Discussions (vi) Quizzes (vii) Industrial Visits (viii) Tech Fests (ix) Mini Projects (x) Library Visits.

HYPONATED COURSE CONTENTS

1. **Graphical symbols, couplings and Guarding systems**

   Graphical symbols as per ISI standards, Shaft coupling (Protected and unprotected type) - Guarding Systems employed for the Poles while crossing the Roads and Railway Lines.

2. **DC machines**

   Stator pole and field coil assembly, Armature of a small DC machine, Commutator of DC machine - Half sectional end view and elevation of D.C machine.

3. **Induction Motors**

   Sectional elevation and end views of 3 - phase Squirrel Cage Induction Motor and 3 - Phase Slip Ring Induction motor.

4. **Transformers**

   Core stepping sections - Sectional views of single-phase core type and three phase core type transformers.

5. **D.C and AC Windings**

   Single Layer Lap and Wave DC Windings - Winding tables- -Brush location – Equalizer rings - Three phase single Layer Lap and Wave AC Windings - Winding tables.

REFERENCE BOOKS

1. Simpson - Electrical Engineering Drawing
2. Dargon. - Electrical Engineering Drawing
3. K.L.Narang - Electrical Engineering Drawing
4. Surjit singh - Electrical Engineering Drawing
5. Dr. SK Bhattacharya - Electrical Engineering Drawing

Blue print:

Sl. No.	Unit title	No. of periods	Weightage allocated	Marks wise distribution of weightage			Question wise distribution of weightage			CO'S mapped
				R	U	Ap	R	U	Ap	
1.	Graphical symbols, couplings, and Guarding systems	15	10	5	5	0	1	1	0	**CO1**
2.	D.C. Machines	24	25	5	0	20	1	0	1	**CO2**
3.	Induction Motors	15	25	5	0	20	1	0	1	**CO3**
4.	Transformers	15								**CO4**
5.	D.C and AC Windings	21	20	0	0	20	0	0	1	**CO5**
Total		**90**	80	15	05	60	03	01	03	

Syllabus to be Covered for Unit Tests

Unit Test	Learning Outcomes to be Covered
Unit Test-I	From 1.1 to 3.1
Unit Test-II	From 3.2 to 5.2

MODEL PAPER – FORMATIVE ASSESSMENT-1

C-23-EE-406

BOARD DIPLOMA EXAMINATION, (C-23)

DEEE – FOURTH SEMESTER EXAMINATION

EE-406 : ELECTRICAL ENGINEERING DRAWING

Time:90 Minutes Total Marks: 40 Marks

PART-A **2 x 10 = 20**

Instructions:

i. Answer all questions and each question carries ten marks.

1. Draw half sectional end view and elevation of a Protected type shaft coupling with shaft diameter as 50 mm. (CO1)
2. Draw the half sectional end view of armature core with diameter of the shaft as 130 mm and diameter of the core as 900 mm. Assume the missing dimensions. (CO2)

PART-B **1 X 20 = 20**

Instructions:

i. Answer the following question which carries twenty marks.

3. (a) Draw the half sectional end view and elevation of a 50 kW D.C. Generator with the main dimensions as given below: (CO2)

External diameter of armature stamping	: 380 mm
Internal diameter of armature stamping	: 200 mm
No. of slots	: 32
Size of slot	: 35×15 mm
Total height of main pole including pole shoe	: 140 mm
No. of main poles	: 4
Main pole size	: 70 x 30 mm
Length of main pole	: 190 mm
No. of inter poles	: 4
Inter pole size	: 100×40 mm
Air gap	: 4 mm
Length of the armature core	: 240 mm
Thickness of yoke	: 50 mm
Diameter of commuter up to contact surface	: 220 mm
Diameter of commuter up to riser	: 240 mm
Shaft diameter at coupling end	: 60 mm
Total length of the shaft	: 600 mm

Take a suitable scale and assume any missing data.

(OR)

Draw the half-sectional end view and elevation of 5 HP, 440 V, 50 Hz, 1440 RPM, 3-phase squirrel cage induction motor with following main dimensions. (CO3)

Outside diameter of the stator stampings : 230
Inside diameter of the stator stampings : 164
Thickness of the stator frame : 25
Slots:
- Types : open type
- Number : 36
- Size : 15 × 8

Air gap : 2
Outer diameter of the rotor stamping : 160
Inside diameter of the rotor stamping : 35
Shaft diameter:
- At centre : 35
- At bearing : 30

The rotor has totally closed type slots and contains bare conductors which are short circuited at both sides. Assume suitable scale. All dimensions are in mm and assume other missing data if any.

MODEL PAPER – FORMATIVE ASSESSMENT-2
C-23-EE-406
BOARD DIPLOMA EXAMINATION, (C-23)
DEEE – FOURTH SEMESTER EXAMINATION
EE-406 : ELECTRICAL ENGINEERING DRAWING

Time:90 Minutes Total Marks: 40 Marks

PART-A **2 x 10 = 20**

Instructions:

i. Answer all questions and each question carries ten marks.

1. Draw the plan and elevations of four stepped core section with diameter of core as 50 mm. (CO4)
2. Draw the sectional plan of one limb of a single-phase, single-stepped, core-type transformer with the following dimensions: (CO4)
   Core circle diameter : 65 mm

LT winding inner diameter : 70 mm
LT winding outer diameter : 120 mm
HT winding inner diameter : 125 mm
HT winding outer diameter : 170 mm

PART-B **1 X 20 = 20**

Instructions:

i. Answer the following question which carries twenty marks.

3. (a) Draw the half-sectional end view and elevation of 5 HP, 400 V, 50 Hz, 1440 RPM, 3-phase slip ring induction motor with the following main dimensions. (CO3)

Outside diameter of the stator stampings = 320
Inside diameter of the stator stampings = 195
Thickness of the stator frame = 25
Stator Slots :
- Types = open type
- Number = 36
- Size = 18 × 10

Rotor Slots:
- Types = open type
- Number = 36
- Size = 15 × 8

Air gap = 2
Outer diameter of the rotor stamping = 200
Inside diameter of the rotor stamping = 35
Shaft diameter :
- At centre = 35
- At bearing = 30

All dimensions are in mm. Assume suitable scale. Assume other missing data if any.

(OR)

(b) Develop a Three-phase single-layer Lap winding for a 4-pole AC machine having 24 slots. (CO5)

MODEL PAPER – SUMMATIVE EXAMINATION

C-23-EE-406

BOARD DIPLOMA EXAMINATION, (C-23)

DEEE – FOURTH SEMESTER EXAMINATION

EE-406 : ELECTRICAL ENGINEERING DRAWING

Time: 3 hours Total marks: 60

PART-A **4 x 5 = 20**

Instructions:

i. Answer all questions.

ii. Each question carries five marks.

1. Draw the following Symbols
   (a) Lamp (b)Moving Coil Instrument (c).Buzzer (d). Lightning Arrestor (e) Fan (CO1)
2. Draw the guarding systems for telephone lines under power lines. (CO1)
3. Draw the half sectional end view of the armature core with diameter of the shaft : 130 mm, diameter of the core : 900 mm, diameter of the hub : 770 mm. Assume missing data. (CO2)
4. Draw the plan and elevation of four stepped core section with diameter of core as 50 mm. (CO4)

PART-B **2 x 20 = 40**

Instructions:

i. Answer any two questions.

ii. Each question carries twenty marks.

5. Draw the half sectional end view and elevation of a 50 kW D.C. Generator with the main dimensions as given below: (CO2)

External diameter of armature stamping	: 380 mm
Internal diameter of armature stamping	: 200 mm
No. of slots	: 32
Size of slot	: 35×15 mm
Total height of main pole including pole shoe	: 140 mm
No. of main poles	: 4
Main pole size	: 70 x 30 mm
Length of main pole	: 190 mm
No. of inter poles	: 4
Inter pole size	: 100×40 mm
Air gap	: 4 mm
Length of the armature core	: 240 mm
Thickness of yoke	: 50 mm

Diameter of commuter up to contact surface : 220 mm
Diameter of commuter up to riser : 240 mm
Shaft diameter at coupling end : 60 mm
Total length of the shaft : 600 mm
Assume any missing data.

6. Draw the sectional Plan and Elevation of single-phase, single-stepped, core-type transformer with the following dimensions: (CO4)

Core circle diameter : 65 mm
Spacing between core centres : 185 mm
LT winding inner diameter : 70 mm
LT winding outer diameter : 120 mm
HT winding inner diameter : 125 mm
HT winding outer diameter : 170 mm
Height of core : 360 mm
Height of Yoke : 60 mm
Height of Bakelite ring : 20 mm
Assume any missing data in proportionate with above dimensions.

7 Draw the winding diagram and ring diagram for lap winding which has the following data. Also place brushes and equalizer rings. (CO5)

i. No. of poles = 4
ii. No. of slots = 20
iii. No. of conductors/slots = 2
iv. No. of conductors = 40
v. No. of commutator segments = 20

ELECTRICAL MACHINES – II LABORATORY

Course code	Course title	No.of periods/week	Total no. of periods	Marks for FA	Marks for SA
EE-407	ELECTRICAL MACHINES – II LABORATORY	3	45	40	60

S.No.	Unit Title	No.of Periods	CO'S Mapped
1	Tests on 3-phase Induction Motors	18	**CO1**
2	Tests on 1-Ph Fractional Motors	9	**CO2**
3	Tests on Alternators and Synchronous Motors	18	**CO3**
Total Periods		**45**	

Course Objectives:

Course Objectives	(i) To conduct tests and estimate the parameters of three phase induction motors and predict the performance (ii) To operate fractional horse power Motors and analyse their performance (iii) To conduct tests and interpret the performance of three phase Alternators and Synchronous motors

Course outcomes:

Course outcomes	**CO1**	EE-407.1	Demonstrate the skill of planning and organising experimental setup for three phase Induction Motors and observe various parameters, their variations, sketch them graphically and draw the circle Diagram.
	CO2	EE-407.2	Analyse the experimental results from the load test data of 1 phase induction motors to calculate the machine parameters
	CO3	EE-407.3	Conduct of various tests on Alternators and Synchronous Motors to know their performance

Learning outcomes:

1. Tests on 3-phase Induction Motors

1. Conduct brake test on 3-phase squirrel cage induction motor.
2. Conduct Brake test on 3-phase slip ring induction motor.
3. Conduct suitable tests and draw circle diagram for a squirrel cage induction motor.
4. Conduct suitable tests and draw circle diagram for a slip ring induction motor.

2. Tests on Fractional H.P Motors

1. Perform Load test on single phase capacitor start motor.
2. Perform Load test on single phase split phase induction motor.
3. Perform Load test on a single-phase Universal motor.

3. Tests on Alternators and Synchronous Motors

1. Conduct (direct) load test on Alternator and obtain voltage regulation.
2. Obtain the regulation of Alternator by using synchronous impedance method.
3. Conduct load test on synchronous motor and draw 'V' and inverted 'V' curves.

Competencies & Key competencies to be achieved by the student

S.No	Experiment Title	Competencies	Key competency
1	Brake test on 3-phase squirrel cage induction motor.	▪ Draw the circuit diagram ▪ Identify the different terminals of 3-ph induction motor ▪ Select the suitable starter. ▪ Identify the terminals of the starter. ▪ Select the range and type of the meters ▪ Make the connections as per the circuit diagram ▪ Start the motor using a starter Apply the load up to full load insteps ▪ Pour water in the brake drum ▪ Note down the readings of ammeter and voltmeter for each load. ▪ Calculate the output, torque and efficiency etc ▪ Plot the performance characteristics ▪ Verify the performance of the machine.	▪ Apply the load up to full load in steps ▪ Pour water in the brake drum ▪ Before Switching off the motor remove the load

2	Brake test on 3-phase slip ring induction motor.	▪ Draw the circuit diagram ▪ Interpret the name plate details ▪ Identify the different terminals of the 3-ph induction motor ▪ Select the suitable starter. ▪ Identify the terminals of the starter. ▪ Select the range and type of the meters ▪ Make the connections as per the circuit diagram ▪ Start the motor using a starter	▪ Before giving supply Slip rings must be short circuited ▪ Speed shouldbe ▪ measured
		▪ Verify the performance of the machine.	accurately
3,4	Conduct suitable tests and draw circle diagram of a)squirrel cage induction Motor b)slip ring induction Motor	▪ Draw the circuit diagram for No-load test and Blocked rotor test ▪ Make the connections for no-load test and Blocked rotor test as per the circuit diagram ▪ Start the motor with out load ▪ Apply the rated voltage to the motor in the no-load test and rated current to the blocked rotor test. ▪ During the Blocked rotor test fully tighten the rotor shaft ▪ Record the meter readings ▪ Calculate the output, torque , efficiency etc. ▪ Plot the performance characteristics. ▪ Verify the performance of the machine. ▪ Draw the circle diagram on a graph sheet using the test data ▪ Select proper scale to draw the circle diagram	▪ Apply the rated voltage to the motor in the no- load test ▪ and rated current to the blocked rotor test. ▪ During the Blocked rotor test fully tighten the rotor
5,6	Load test on a) split phase induction motor. b) Capacitor start induction motor	▪ Draw the circuit diagram ▪ Identify the different terminals of the 1-ph split phase induction motor /1-ph capacitor type induction motor and the starter ▪ Select the ranges and type of the meters ▪ Make the connections as per circuit diagram ▪ Start the motor using a starter ▪ Apply the load in steps ▪ Record the meter readings ▪ Verify the performance of the machine.	▪ Start the motor using a ▪ starter without load ▪ Apply the load up to full load in steps

7	Load test on single-phase Universal motor.	▪ Draw the circuit diagram ▪ Identify the different terminals of the 1-ph universal motor ▪ Select the range and type of the meters ▪ Make the connections as per the circuit diagram ▪ Start the motor using a starter ▪ Apply the brake load lightly ▪ Verify the performance of the machine	▪ Apply the brake load lightly ▪ Take the readings properly
8	Conduct (direct) load test on Alternator and Obtain the regulation And by synchronous impedance method	▪ Draw the circuit diagram ▪ Identify different terminals of the 3-ph alternator ▪ Select the range and type of the meters ▪ Make the connections as per the circuit ▪ Start the alternator as per the procedure ▪ Increase the load and take the readings ▪ Reduce the load to zero gradually. ▪ Switch off the alternator. ▪ Disconnect the circuit. ▪ Plot the performance characteristics.	▪ Switch on the excitation at correct time ▪ Apply the brake load lightly Take the readings properly
9	Conduct load test on synchronous motor and draw V and inverted V curves	▪ Draw the circuit diagram ▪ Identify different terminals of the 3-ph synchronous motor ▪ Select the range and type of the meters ▪ Make the connections as per the circuit ▪ Start the motor as per the procedure ▪ Switch on the excitation at correct time ▪ Vary the excitation insteps ▪ Pour water in the brake drum for cooling. ▪ Reduce the load to zero gradually. ▪ Switch off the motor. ▪ Disconnect the circuit. ▪ Calculate the output, torque ,efficiency etc. ▪ Plot the performance characteristics. ▪ First switch off the excitation and then only switch off the mains ▪ Draw the V and inverted V curves on a single graph sheet	▪ Switch on the excitation at correct time ▪ Vary the excitation insteps ▪ First switch off the excitation and then only switch ▪ off mains

CO-PO/PSO MATRIX

CO No	PO 1	PO 2	PO3	PO 4	PO 5	PO 6	PO 7	PSO1	PSO2	PSO3
EE-407.1	3	1						3		
EE-407.2	3	1		1		2	1	3	1	1
EE-407.3	3	1		1		2	1	3		1
Average	**3**	**1**	**1**	**1**	**1**	**2**	**1**	**3**	**1**	**1**

3-Strongly Mapped 2- Moderately Mapped 1- Slightly Mapped

Note:
The gaps in CO and PO mapping will be achieved by one or more appropriate activities from the following:
(i) Assignments (ii) Tutorials (iii) Seminars (iv) Guest Lectures (v) Group Discussions (vi) Quizzes (vii) Industrial Visits (viii) Tech Fests (ix) Mini Projects (x) Library Visits

Hyponated Course Contents:

Test on three phase Induction Motors

Brake test on three phase squirrel cage induction motor and slip ring induction motor, calculate the efficiency and plot the torque slip characteristics**.** No-load test and blocked rotor test on squirrel cage and slip ring induction motor, calculate output power, Torque, Efficiency, calculate the machine parameters, Draw the circle diagram, estimate the performance and verify the performance.

Load Test on Fractional Horse Power Motors

Load test on – split-phase induction motor, single phase capacitor start induction motor- universal motor - calculate output power, Torque, Efficiency, calculate the machine parameters

Tests on Alternators and Synchronous Motors

Load test on Alternator – obtain the regulation of alternator by using synchronous Impedance method – Draw the v curves and inverted v curves

COMMUNICATION SKILLS

Course code	Course title	No. Of periods/week	Total No. of periods	Marks for FA	Marks for SA
EE-408	COMMUNICATION SKILLS	3	45	40	60

Course Title : Communication Skills	Course code: C23-Common- 408 { Common to all Branches}
Year/ Semester : IV Semester	Number of Periods : 45 (3 hrs per week)
Type of Course : Practical	Max Marks : 100 { Internal 40 + External 60 }

Course Objectives: The students shall

- communicate effectively in diverse academic, professional and everyday situations
- exhibit appropriate body language and etiquette at workplace
- be employable through preparing appropriate job applications and attend interviews confidently with all necessary skills

Course Outcomes: The students shall

CO1: Listen and comprehend the listening inputs related to different genres effectively

CO2: Communicate effectively in interpersonal interactions, interviews, group discussions and presentations

CO3: Acquire employability skills: job hunting, resume writing, attending interviews

CO4: Practise appropriate body language and professional etiquette

Course Delivery: Text book: **"Communication Skills"**
by State Board of Technical Education and Training, AP

Sl No	Unit	Teaching Hours
1	Listening Skills	6
2	Work place Etiquette	3
3	Introduce oneself	3
4	Short presentation (JAM)	6
5	Group Discussion	6
6	Resume Writing and Cover Letter	3
7	Interview Skills	9
8	Presentation Skills	9
Total		*45*

Course Content:

UNIT I: Listening Skills **6 periods**

Pre – While- Post-listening activities- Listening to audio content (dialogues/ speech/ narrations) - answering the questions and fill in the blanks- vocabulary

UNIT 2: **Work place Etiquette** **3 periods**

Basics of Etiquette- politeness/ courtesy, good manners- features of work place etiquette- adaptability, positive attitude, body language.

UNIT 3: Introducing Oneself **3 periods**

Speak about oneself - introduce oneself to a gathering/ formal & informal situations- Know about others- filling in the grid- introducing oneself in interviews

UNIT 4: Short Presentation **6 periods**

Dos and Don'ts in short presentation- speak for a minute without repetition, deviation & hesitation - the techniques to speak fluently – defining and describing objects, people, phenomena, events.- speaking on randomly chosen topics.

UNIT 5: Group Discussion **6 periods**

Fundamentals of Group Discussion- Dos and Don'ts- filling the Grid- possible list of topics- practice sessions- sample videos-Group activity

UNIT 6: Resume Writing and Cover Letter **3 periods**

Pre activity: answer the questions- jotting down biographical information- sample resumes- tips, Dos and Don'ts- model resumes- practice exercises on Resume writing

UNIT 7: Interview Skills **9 periods**

Pre –while-post activities: - things to do at three stages – respond to notifications- know the information about the organisation-practice FAQs - preparation of good/ suitable C V, Body language, tips for success in interviews, model / mock interviews.

UNIT 8: Presentation Skills **9 periods**

Preparatory work: observe pictures and answer questions- different kinds of presentations- PPTs, Flash cards, Posters, Charts. - tips to prepare aids, slide show, model PPTs, - checklist on pre, while and post presentations.

Mapping Course Outcomes with Programme Outcomes:

PO	1	2	3	4	5	6	7
CO	POs 1 to 5 are applications of Engineering Principles, can't be directly mapped to Communication Skills					1,2,3,4	1,2,3,4

CO –PO Mapping

CO	Course Outcome	Cos / Unit Mapped	POs mapping	Cognitive levels as per Bloom's Taxonomy R/U/A/An (Remembering / Understanding / Applying/ Analyising)
CO 1	Listen and comprehend listening inputs related to different genres effectively	Unit 1	6,7	R/U/A
CO2	Communicate effectively in interpersonal interactions, interviews, group discussions and presentations	3,4,5,7,8	6,7	R/U/A/An
CO3	Acquire employability skills: job hunting, resume	6,7	6,7	R/U/A/An

	writing, attending interviews			
CO4	Practise appropriate body language and professional etiquette	2, 3, 4,5,7,8	6,7	R/U/A

ASSESSMENT

C23-Common-408: English Communication Skills Lab

- The assessment for C23-Common 408 : 'English Communication Skills' is on par with all other practical subjects comprising 40 marks for Internal assessment and 60 marks for External examination attaining the final total of 100 Marks.
- The Internal Assessment can be conducted in the form of Assignments in all the 8 Units. One or Two assignments can be conducted in each Unit, awarding 10 marks for each assignment and the total marks can be averaged to 40 marks as suggested below.
- These assignments should focus mostly on LISTENING and SPEAKING skills rather than writing. However, for the practice sake, students can write down their assignments in a separate note book to enable them speak/present in the end exam fluently. The students should submit these assignment note books to the teacher.
- Questioning styles vary from Unit to Unit as different skills are assessed in each Unit with specific parameters as given in the workbook.
- Listening skills can be tested by playing different Audio/ Video clips (appropriate in content and language, preferably without subtitles) and test their skill of listening comprehension . Follow pre-while-post stages of listening activity and students should answer general, specific, inferential, vocabulary questions.
- Personal profile, describing a place/a thing/ a person/ an event / a picture, JAM, presentations, Direct interaction with the teacher/ examiner are the topics for individual speaking skills.
- Role plays, GD and Interview skills should be made as group activities and the teacher assesses various skills of the students as given in the workbook.
- Teacher should maintain a record of the following Assessment sheet (one for each student) to award Internal marks.

Calculating Internal marks through Assignments :				
Name of the Student: PIN: Branch: Academic Year:				
S. No.	Title of the Unit	Assignment 1: 10 Marks	Assignment 2: 10 Marks	Total Marks in each Unit (Average for 10 Marks)

1	Listening Skills			
2	Workplace etiquette			
3	Introducing Oneself			
4	Short Presentations (JAM)			
5	Group Discussion			
6	Resume & Cover Letter			
7	Interview Skills			
8	Presentation Skills			
	Marks Scored			Ex: 65
	Total No. of Units			8
	Internal Assessment : Average for 40 Marks	(65/8) X4 = 32.5		33 (for 40 Marks)

End Exam Model paper: C23-Common-408 : Communication Skills Lab

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Guidelines to prepare the question paper of the Lab End exam for 60 marks:

I. Listening Skills:

Students listen to the audio / watch the video clip (without subtitles) and answer the questions supplied to them in advance; observe the three stages of the Listening activity.
: 10 Marks

II. Individual Speaking skills:

a) Speak for a minute (JAM) on the given topic, can be allotted through chits/lots: 10 M. b) Individual speaking skills on any given topic ….descriptions / role play etc: 10 Marks

c) Direct Interaction/ dialogue with the examiner to test his/her speaking skills : 10 M.

III. Pair / Group Speaking Activities. : 20 Marks

a) Role Plays / dialogue making

b) Group Discussion

c) Interview skills

Note: If the students are more in number and the time is not sufficient to conduct the Viva for all the students in a single spell, the examiner can also adapt the blended mode of exam. A few significant questions can be tested orally and one or two questions can be answered in writing. (Ex: Resume, cover letter, FAQs in Interview skills etc.) along with the answers of Listening Test.

Aspects to be evaluated to test speaking skills			
S.No	**Language Aspects**	**Organising Aspects**	**Body Language aspects**
1	Content: Quality, clarity and relevance of ideas	Coherence, cohesion of relevant ideas	Postures
2	Fluency	Proper beginning, topic sentence, expansion/details, conclusion	Gestures,
3	Vocabulary	Using proper Linkers	Eye contact
4	Pronunciation	Avoid repetitions, clichés, fillers	Audibility, pitch, Permissible pauses
5	Grammar (Syntax, semantics)		Other Permissible body movements

POWER ELECTRONICS LABORATORY

Course code	Course title	No. Of periods/week	Total No. of periods	Marks for FA	Marks for SA
EE-409	POWER ELECTRONICS LABORATORY	3	45	40	60

S.No.	Unit Title	No. of Periods	CO'S Mapped
1.	Characteristics of Power Electronic Devices - SCR, DIAC and TRIAC	6	CO1
2.	Characteristics of Power Transistors – IGBT and Power MOSFET	6	CO2
3.	Performance of different converter circuits	12	CO3
4.	Speed control of the electrical motors using the Power Electronic Devices	12	CO4
5.	Power Electronic circuits	9	CO5
Total		**45**	

Course Objectives	i) To understand the operation and characteristics of SCR, DIAC, TRIAC, IGBT and Power MOSFET. ii) To provide a practical exposure to operating principles, design and synthesis of different power electronic converters. iii) To perform the speed control of electric motors by using power electronic circuits.

Course outcomes	**CO1**	**EE-409.1**	Understand the operation of SCR, DIAC and TRIAC, Plot their characteristics.
	CO2	**EE-409.2**	Understand the operation of IGBT and Power MOSFET, Plot their characteristics.
	CO3	**EE-409.3**	Analyse the performance of different converter circuits.
	CO4	**EE-409.4**	Controlling the speed of electrical motors by using power electronic circuits.
	CO5	**EE-409.5**	Designing of power electronic circuits for practical applications.

LEARNING OUTCOMES

1. Characteristics of Power Electronic Devices - SCR, DIAC and TRIAC

1. Plot the Characteristics of SCR
2. Plot the Characteristics of DIAC and TRIAC.

2. Characteristics of Power Transistors – IGBT and Power MOSFET

1. Plot the Characteristics of IGBT.
2. Plot the Characteristics of Power MOSFET.

3. Performance of different converter circuits

1. Perform the experiment on single phase half wave-controlled converter and draw its waveforms at different firing angles.
2. Perform the experiment on single phase full wave fully controlled centre tapped converter and draw its waveforms at different firing angles.
3. Perform the experiment on single phase full wave fully controlled bridge converter and draw its waveforms at different firing angles.

4. Speed control of the electrical motors using the Power Electronic Devices

1. Perform speed Control of DC motor by using single phase bridge converter.
2. Perform speed Control of 1-phase AC induction motor using AC voltage controller.

5. Power Electronic circuits

1. Illumination control circuit using TRIAC and DIAC.
2. Ceiling fan regulator circuit using TRIAC.

CO-PO/PSO MATRIX

CO NO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
EE-409.1	3			2		1		3	1	
EE-409.2	3			2				3	1	1
EE-409.3	3	2	1	2	1		1	3	1	1
EE-409.4	3	2	1	2	1	1		3	1	
EE-409.5	3	2	1	2	1		1	3	2	
Average	**3**	**2**	**1**	**2**	**1**	**1**	**1**	**3**	**1**	**1**

3-Strongly Mapped 2- Moderately Mapped 1- Slightly Mapped

Note:

The gaps in CO and PO mapping will be achieved by one or more appropriate activities from the following:

(i) Assignments (ii) Tutorials (iii) Seminars (iv) Guest Lectures (v) Group Discussions (vi) Quizzes (vii) Industrial Visits (viii) Tech Fests (ix) Mini Projects (x) Library Visits

HYPONATED COURSE CONTENTS

1. **Characteristics of Power Electronic Devices - SCR, DIAC and TRIAC**

   Plot the Characteristics of SCR, DIAC and TRIAC.

2. **Characteristics of Power Transistors – IGBT and Power MOSFET**

   Plot the Characteristics of IGBT and Power MOSFET.

3. **Performance of different converter circuits**

   Single phase half wave controlled converter, single phase full wave fully controlled converter and single phase full wave fully controlled bridge converter.

4. **Speed control of the electrical motors using the Power Electronic Devices**

   Speed Control of DC motor by using single phase bridge converter and speed Control of 1-phase AC induction motor using AC voltage controller.

5. **Power Electronic circuits**

   Illumination control circuit using TRIAC and DIAC, Ceiling fan regulator circuit using TRIAC.

Competencies & Key competencies to be achieved by the student

S. NO.	Experiment Title	Competencies	Key competencies
1	i) Characteristics of SCR, DIAC and TRIAC ii)Characteristics of IGBT and Power MOSFET	Identify the different Power electronic devices available in the laboratory like SCR, DIAC,TRIAC, IGBT and Power MOSFET.	Identify the different terminals; Make the connections of the circuit as per the circuit diagram.
		Draw the symbols of the above devices.	
		Identify the different terminals.	
		Draw the necessary circuit diagram and identify the apparatus required	
		Make the connections of the circuit as per the circuit diagram	
		Record the different values of voltage and current	

		Plot the characteristics on a graph sheet	
2	i) single phase half wave converter ii) single phase full wave fully controlled converter iii) single phase full wave fully controlled bridge converter	Draw the circuit diagram for the single phase half wave controlled converter	Verify the waveforms in the CRO at different firing angles
		Identify the different components and apparatus required for the circuit	
		Make the necessary connections as per the circuit diagram with resistive load.	
		Verify the waveforms in the CRO at different firing angles	
		Change the R- load with R-L load and observe the waveforms at different firing angles	
		Implement the same for single phase full wave fully controlled converter with R load and R-L load	
		Implement the same for single phase full wave fully controlled bridge converter with R load and R-L load	
3	i) speed Control of DC motor by using single phase bridge converter ii) speed Control of 1-phase AC induction motor using AC voltage controller	Draw the circuit diagram for the speed control of the DC motor using the single phase bridge convertor	change the triggering angles. Draw the graph between Speed Vs Triggering Angles
		Identify the different apparatus required from the circuit diagram	
		Make the necessary connections according to the circuit	
		Change the triggering angles and Note down the readings of the speed of the DC motor	
		Plot the graph Speed Vs Triggering Angles	
		Implement the same procedure for speed control of single phase AC induction motor using AC voltage controller	
4	i) Illumination control circuit using TRIAC and DIAC ii) Ceiling fan regulator circuit using TRIAC.	Draw the circuit diagram for Illumination control circuit using TRIAC and DIAC	i)change the firing angles and observe the illumination of the lamp ii) observe the speed of the ceiling fan
		Identify the different apparatus required from the circuit diagram	
		Make the necessary connections according to the circuit	
		Change the triggering angles and Note down the readings of voltage across the load. Note down the firing angles	
		Implement the same procedure for Ceiling fan regulator circuit using TRIAC	

HYBRID POWER SYSTEMS LABORATORY

Course code	Course title	No. of periods/week	Total no. of periods	Marks for FA	Marks for SA
EE-410	HYBRID POWER SYSTEMS LABORATORY	03	45	20	30

S.No.	Unit Title	No. of Periods	CO'S Mapped
1.	Identify various switchgear equipment and write their specifications	3	**CO1**
2.	Dismantle MCCB/ELCB and identify various parts	3	**CO1**
3.	Test fuse, MCB and electromagnetic over-current relay by performing the load test	6	**CO2**
4.	Test the working of the single phasing preventer using a three phase induction motor	3	**CO1**
5.	Perform plug setting and Time setting in induction type electromagnetic relay	3	**CO1**
6.	Knowledge on electrical load survey in institution campus/hostel building and electrical/mechanical workshop	6	**CO2**
7.	Knowledge on different maintenance works such as Earth Pit, Distribution Transformer yard.	6	**CO2**
8.	Fire extinguishers used for different fire accidents with demonstration	6	**CO2**
9.	Visit to any Industry or any power station and Electrical Sub substation	9	**CO3**
TOTAL		**45**	

Course Objectives:

Course Objectives	(i) To acquire knowledge on different switchgear equipment used in electrical power systems. (ii) To perform the required load survey, load tests and able to judge its performance. (iii) To explore the practical knowledge in industries by visits.

Course outcomes:

Course outcomes	**CO1**	EE-410.1	Identify and testing of different switch gear equipment
	CO2	EE-410.2	Gain knowledge about electrical load survey, maintenance works and safety apparatus
	CO3	EE-410.3	Co relates the theoretical knowledge with real life practical environment in electrical engineering context.

Learning outcomes

1. Switchgear Equipment

1. Carry out the identification of different electrical switch gear equipment.
2. Test the operation of a miniature circuit breaker (MCB) by connecting to a load.
3. Carry out the testing of single phasing preventer for a three-phase induction motor.
4. Carry out the Plug setting and Time setting in induction type electromagnetic relay by connecting to a load.

2. Electrical Load survey, maintenance and safety

5. Conduct load survey at your institute main building/hostel and submit a brief report.
6. Conduct load survey of electrical labs/mechanical workshop and submit a brief report.
7. Conduct load survey of your institution class rooms/office/other room and submit a brief report.
8. Identify the faults in electrical circuit of your institution and perform necessary electrical maintenance works.
9. Identify the fire-extinguishers to be used for different fire accidents and demonstrate its operation to extinguish fire.

3. Industrial visits

1. Demonstrate different types of insulators and cables used in power system and understand its applications in power system.
2. Visit any nearby power plant to observe protection systems and submit a brief report on industrial visit.
3. Visit nearby relevant industry to observe latest trends related to protection of electrical equipment and submit a brief report on industrial visit.
4. Visit any electrical substation/electrical traction substation to observe different power system protection schemes for different faults and submit a brief report.

Hyponated Course Contents

1. Switchgear Equipment

Identification of different electrical switch gear equipment – testing of fuse, MCB and electromagnetic over-current relay by performing the load test - testing the working of single phasing preventer using a three phase induction motor- Plug setting and Time setting in induction type electromagnetic relay.

2. Electrical Load survey, maintenance and safety

Electrical load survey in institution campus/hostel building, institution main building/classrooms/office and electrical/mechanical workshop etc - maintenance works to be carried out periodically at Earth Pit, Distribution Transformer yard, - Fire extinguishers used for different fire accidents.

3. Industrial visits

Visiting to any Industry or any power station - Visiting to any Electrical Sub substation.

CO-PO/PSO MATRIX

CO No.	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
EE-410.1	3	1		1		1		3	2	1
EE-410.2	3	2	2		2	1	1	3	2	1
EE-410.3	3	2	1	1		2	2	3		
Average	**3**	**1.6**	**1.5**	**1**	**2**	**1.3**	**1.5**	**3**	**2**	**1**

3-Strongly Mapped 2- Moderately Mapped 1- Slightly Mapped

Note:
The gaps in CO and PO mapping will be achieved by one or more appropriate activities from the following:
(i) Assignments (ii) Tutorials (iii) Seminars (iv) Guest Lectures (v) Group Discussions (vi) Quizzes (vii) Industrial Visits (viii) Tech Fests (ix) Mini Projects (x) Library Visits

Competencies & Key competencies to be achieved by the student

Sl. No	Experiment title	Competencies	Key Competencies
1.	Identification of various switchgear equipment and writing their specifications	• Identify the various switch gear equipment like fuses, switches, relays, isolators , circuit breakers, current transformers, potential transformers • Identify specifications of various switch gear equipment used in power system protection.	• Understand the purpose of different equipment. • Understand the usage and operating principle of different equipment.
2.	Dismantle MCCB/ELCB and identify various parts	•Identify MCCB equipment •Dismantle MCCB •Identify its various parts •Identify ELCB equipment •Dismantle ELCB •Identify its various parts	• Knowing safety precautions in dismantling the MCCB/ELCB • Assembling the dismantled parts in their correct position
3.	Test fuse , MCB and electromagnetic over-current relay by performing the load test	• Draw the relevant circuit diagram for performing load test. • Select a fuse of proper rating/MCB of particular current rating/presetted relay of particular current value. • Apply load gradually until it reaches slightly above the rated value of fuse/MCB current rating/above the preset value of over current relay • Observe whether fuse melts or not/ MCB trips or	• Slowly increase the load current • Observe the operation of relay while load is increasing, at what value, the relay is starting to operate, performs its tripping mechanism.

		not/over current relay operates or not when the load applied is greater than the rated current value	
4.	Test the working of the single phasing preventer using a three phase induction motor	• Draw the relevant circuit diagram for testing the working of single phasing preventer. • Give three phase supply to the induction motor • Start the running of induction motor by operating suitable starter • Observe the running of induction motor, note down torque developed by the motor for particular load current • Observe any severe vibrations are occurring or not • Observe any abnormal noise is coming or more heat is developed or any smoke is releasing or not • Now, suddenly open one of the lines by removing fuse in any one line or by any means • Now, observe for any of the above mentioned abnormalities like drawing more current in remaining lines, severe vibrations occurrence, more noise etc., • Give normal three phase supply immediately after	• Know the connection of single phasing preventer in the supply circuit • Know that single phasing preventer consists of phase failure relay and this relay detects the single phasing condition and trips the circuit breaker or contactor in the motor control circuit • Observe the noise or sound of motor, torque developed, occurrence of severe vibrations rotor gets heated, draws more current from remaining two phases.

		observing the abnormalities	
5.	Plug setting and Time setting in induction type electromagnetic relay	• To understand the significance of plug setting and time setting in induction type electromagnetic relay • Know about the PSM and TSM facilities provided in the induction type electromagnetic relay set the values • set PSM for any arbitrary value • set time setting • to know the setting of time of operation of relay	• Know that operating time of relay would be multiplied with time setting multiplier in order to get actual time of operation of relay. for example if say that time setting of the relay is 0.1, therefore, the actual time of operation of the relay for PSM 10 is 3x0.1=0.3 sec or 300ms.
6.	Electrical Load Survey	• Record the details of total load and layout of the Electrical installation. • Prepare the Electrical circuit layout. • List the quantity required and specifications of electrical material. • List the different tools required to execute the installation work. • Prepare the work schedule and identify the Vendors. • Estimate the cost of material and labour. • Execute the Electrical installation.(with dummy loads)	• Draw the Electrical wiring diagram. • Estimate the Materials, tools and labour cost for the work. • Identify the vendors. • Execute work schedules.

7.	Maintenance works such as Earth Pit, Distribution Transformer yard, Measurement of Insulation resistance etc.,	• Identify the different locations of earth pits in the institution • Know which type of earthing is done • Know the details of required quantity and arrangement method of sand, coal to be arranged in earth pit • Water is to poured at periodical intervals of maintenance to maintain the desired earth resistance value • To observe the layout of Distribution Transformer yard present in the institution • Keep the complete details of the items to be inspected in a chart • Checking of oil leakages, bushings, breather, oil level, fuses etc., is t be done keeping in view of monthly, quarterly schedules • To know about routine DGA testing of plinth mounted transformer yard • To know about the external inspection. This is to be carried out regularly and at minimum, at least quarterly. • To know the importance of insulation resistance and how it is to be measured • To know the usage of megger in measuring insulation resistance of the electrical machinery or system.	• Execute the work with safety precautions • Perform the work of earth pit by own • Able to carry out the maintenance schedule of pole and plinth mounted transformer yards • To be well versed with the usage of megger for measuring insulation resistance, rotating the megger handle with rated speed and giving its connections correctly.
8.	Fire extinguishers used for different fire accidents with demonstration	• Identification of type of Extinguisher • Study different types of classes of fires (class A, class B, class C, class D fires) and fire Extinguishers • To know the applications of different fire extinguishers • Usage of extinguishers for particular situation.	• Identify the type of fire accident and take necessary action

9.	Visit to any Industry or any power station and any Electrical Sub substation	• Draw the layout of Industry or any power station and any Electrical Sub substation to be visited • Obtain the knowledge of every equipment used in substations. • Record the technical specifications of each equipment (Incoming and outgoing feeders, Bus-bar, Lightning arrester, Circuit breakers, Isolators, Protective relays, Current transformers, Potential transformers, Metering and Indicating instruments used, Distribution Transformers, Wave trappers, capacitor banks, Batteries, Earth switches etc. in case of substations) • Note the staff structure and duties of each staff and day to day activities carried by staff. • Record the maintenance procedures adopted as per IS code and note typical earth resistance values. • Record the preventive maintenance schedule of all industrial equipment/substation equipment • Record the details of frequent faults/breakdowns that had occurred. • Note the safety equipments used and precautions to be taken. • Understand the various faults occurring	• Understand the common rules and procedural steps/layouts to be followed while walking through the industry • Understand the various faults occurring frequently and safety equipments used. • Understand the working culture /environment of the industry/power station/substation

		frequently and safety equipments used.	

V SEMESTER

DIPLOMA IN ELECTRICAL & ELECTRONICS ENGINEERING
SCHEME OF INSTRUCTIONS AND EXAMINATIONS
(V SEMESTER)

Subject Code	Name of the Subject	Instruction period /week		Total Period /year	Scheme of Examination			
		Theory	Practical/ Tutorial		Duration (hours)	Sessional Marks	End Exam Marks	Total Marks
THEORY								
EE 501	Industrial Management &Smart Technologies	4	-	60	3	20	80	100
EE-502	Electric Vehicle Technology	5	-	75	3	20	80	100
EE-503	Power Systems - II	5	-	75	3	20	80	100
EE-504	Digital Electronics & Micro Controllers	5	-	75	3	20	80	100
EE-505	Electrical Utilisation & Traction	5	-	75	3	20	80	100
PRACTICAL								
EE-506	MATLAB Practice Laboratory	-	3	45	3	40	60	100
EE-507	PLC & SCADA Laboratory	-	3	45	3	40	60	100
EE-508	Life Skills	-	3	45	3	40	60	100
EE-509	Digital Electronics & Micro Controllers Laboratory	-	3	45	3	40	60	100
EE-510	Project Work	-	3	45	3	40	60	100
	TOTAL	**24**	**15**	**585**	**30**	**300**	**700**	**1000**

NOTE: 03 periods per week are allotted to Student Centric Activity (Library, Sports & Games, Clean & Green, Preparation for placements etc)

INDUSTRIAL MANAGEMENT & SMART TECHNOLOGIES

Course Code	Course Title	No of Periods/ Week	Total Number of Periods	Marks for FA	Mark s for SA
EE-501	Industrial Management & Smart Technologies	4	60	20	80

S.no	Unit Title	No.of Periods	CO'S Mapped
1	Basics of Industrial Management and Organisation structure	**17**	CO1
2	Material management and industrial safety management	**17**	CO2
3	Entrepreneurship Development	**8**	CO3
4	Total Quality Management	**8**	CO4
5	Smart technologies	**10**	CO5
Total Periods		**60**	

COURSE OBJECTIVES:

COURSE OBJECTIVES	i. To familiarise the concepts of management, ownership styles and organisation structures. Ii. To get Exposure to organisational behavioural concepts, basics of Production management and materials management in industries. Iii. To Understand the modern trends of management in industries using Smart technologies and maintaining quality systems.

COURSE OUT COMES:

COURSE OUT COMES	**CO1**	EE-501.1	Understand the concept of management, organizations applied to industry,
	C02	EE-501.2	Describe the different aspects of production, materials and safety management activities at industries.
	C03	EE-501.3	Describe the role of entrepreneur in economic development and in improving the quality of life
	CO4	EE-501.4	Analysing and maintaining the quality standards of the product
	CO5	EE-501.5	Understand and applying smart technologies

Learning Objectives

1. Basics of Industrial Management and Organisation Structure

1.1 Define industry, commerce (Trade) and business.
1.2 Know the need for management.
1.3 Explain the principles of scientific management.
1.4 Differentiate between supervisory, middle and Top-level management
1.5 Explain the importance of managerial skills (Technical, Human, Conceptual)
1.6 Understand the philosophy and need of organisation structure of an industry.
1.7 Understand the line, staff and Line & staff (Functional) organisations
1.8 Explain the factors of effective organisation.
1.9 State motivation theories.
1.10 State Maslow's Hierarchy of needs.
1.11 Explain the process of selection, recruitment, training and development
1.12 Explain types of business ownerships
1.13 Explain the meaning and definition of social responsibilities
1.14 Need for corporate social responsibility

2. Material management and industrial safety management

2.1 Define production
2.2 Explain the stages of Production, planning and control.
2.3 Know the basic methods demand forecasting
2.4 Explain Break Even Analysis
2.5 Draw PERT/CPM networks.
2.6 Solve the critical path in simple project
2.7 Know Functions of Materials Management
2.8 Explain ABC analysis.
2.9 Define safety stock and reorder level.

2.10 Explain the importance of safety at Work place.
2.11 Explain hazard and accident.
2.12 List out different hazards in the Industry.
2.13 Explain the causes of accidents.

3. Entrepreneur ship Development.

3.1 Define the word entrepreneur.
3.2 Explain the requirements of an entrepreneur.
3.3 Determine the role of entrepreneurs in promoting Small Scale Industries.
3.4 Describe the details of self-employment schemes.
3.5 List out the organisations that help an entrepreneur
3.6 Understand the concept of make in India, Zero defect and zero effect
3.7 Understand the importance of startups
3.8 Explain the conduct of demand and market surveys
3.9 Prepare feasibility report of any start-up plant/processing industry

4. Total Quality Management.

4.1 Explain the concept of quality.
4.2 List the quality systems and elements of quality systems.
4.3 State the principles of quality Assurance.
4.4 Understand the basic concepts of TQM
4.5 Know the Pillars of TQM
4.6 Explain ISO standards and ISO 9000 series of quality systems.
4.7 List the beneficiaries of ISO 9000.
4.8 Explain the concepts of ISO 14000

5. Smart Technologies

5.1 Get an overview of IoT
5.2 Define the term IoT
5.3 Know how IoT work
5.4 List the key features of IoT
5.5 List the components of IoT : hardware, software, technology and protocols
5.6 List the advantages and disadvantages of IoT
5.7 Smart Energy and the Smart Grid

CO-PO/PSO MATRIX

CO No	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PS O1	PS O2	PS O3
EE-501.1	3					1		3		
EE-501.2	3		1		1	1		3		1
EE-501.3	3					1	1	3		
EE-501.4	3	2			1	1		3	1	
EE-501.5	3		2	1		1	1	3		1
Average	**3**	**2**	**1.5**	**1**	**1**	**1**	**1**	**3**	**1**	**1**

3-Strongly Mapped 2- Moderately Mapped 1- Slightly Mapped

Note:
The gaps in CO and PO mapping will be achieved by one or more appropriate activities from the following:
(i) Assignments (ii) Tutorials (iii) Seminars (iv) Guest Lectures (v) Group Discussions (vi) Quizzes (vii) Industrial Visits (viii) Tech Fests (ix) Mini Projects (x) Library Visits

Course Content

1. Basics of Industrial Management and Organisation Structure

Introduction - Industry, Commerce and Business - Definition of management - Principles of scientific management – F.W.Taylor, Nature of management - levels of management - managerial skills - Organizing - Process of Organizing; Line/Staff and functional Organizations, Effective Organizing; Motivational Theories; Leadership Models and types of leadership styles Forms of Business ownerships: Types – Sole proprietorship, Partnership, Joint Stock Companies, Cooperative types of Organizations; Employee participation in management; Corporate Social responsibility

2. Material management and industrial safety management

Definition of production PPC - job, batch and mass; production Planning and Control: Demand forecasting, Break even analysis; CPM and PERT techniques; simple numerical problems-Materials in industry, ABC Analysis, Safety stock, re-order level - Importance of Safety at work places; Causes of accidents - different hazards- different emissions from industries – their effects on environment – control methods.

3. Entrepreneurship Development.

Definition of Entrepreneur - Role of Entrepreneur - Concept of Make In India, ZERO defect, Zero Effect - Concept of Start-up Company - Entrepreneurial Development - Role of SSI, MSME, DICs, Entrepreneurial development schemes - Institutional support, Market survey and Demand survey - Preparation of Feasibility study reports.

4. Total Quality Management:

Introduction to Total Quality Management (TQM) - Concept of quality discussed by B. Crosby W. Edward, Deming, Joseph M. Juran, Kooru Ishikawa, Genichi Taguchi, Shigco Shingo. Quality systems – Definitions of the terms used in quality systems like, quality policy, quality management, quality systems, Stages of development of ISO 9000 series, ISO-14000,

5. Smart Technologies :

Overview of IoT - Define IoT, how IoT work, key features of IoT, components of IoT - hardware, software, technology and protocols - advantages and disadvantages of IoT - IoT Applications - Smart Cities, Smart Energy and the Smart Grid, Smart Transportation and Mobility, Smart Home, Smart Buildings and Infrastructure, Smart Factory and Smart Manufacturing, Smart Health, Food and Water Tracking and Security, Participatory Sensing, Social Networks and IoT.

REFERENCE BOOKS

1. Industrial Engineering and Management-by O.P Khanna
2. Production Management- by Buffa.
3. Engineering Economics and Management Science - by Banga & Sharma.
4. Production and Operations Management –S.N. Chary

Blue Print of the Question Paper

.No	Unit Title	No. of Periods	Weightage Allocated	Marks wise distribution of weightage			Question wise distribution of weightage			CO'S Mapped
				R	U	AP	R	U	AP	
1	Basics of Industrial Management and Organisation structure	**17**	**29**	6	23		2	3		CO1
2	Material management and industrial safety management	**17**	**26**	3	13	10	1	2	1	CO2
3	Entrepreneurship Development	**8**	**16**	3	13		1	2		CO3
4	Total Quality Management	**8**	**16**	6	10		2	1		CO4
5	Smart technologies	**10**	**23**	3	20		1	2		CO5
Total		60	**110**	21	79	10	7	10	1	

R - Remember; U - Understanding; Ap - Application; An – Analysing

Mdel Papers: Syllabus to be Covered for Unit Tests

Unit Test	Learning Outcomes to be Covered
Unit Test-I	From 1.1 to 2.13
Unit Test-II	From 3.1 to 5.7

MODEL PAPER – FORMATIVE ASSESSMENT-1

C-23-EE-501

BOARD DIPLOMA EXAMINATION, (C-23)

DEEE – FIFTH SEMESTER EXAMINATION

EE-501 : INDUSTRIAL MANAGEMENT AND SMART TECHNOLOGIES

Time: 90 Minutes Total Marks: 40

PART-A **(1 x 4) + (4 x 3) = 16**

Instructions:

i. **Answer all five questions.**
ii. **First question carries four marks and remaining each question carries three marks.**
iii. **Answers should be brief and straight to the point and shall not exceed five simple sentences**

1. Define the terms (a) Industry (b) Business (c) Management (d) Commerce. (CO1)
2. List the advantages of line organization. (CO1)
3. State the functions of material management (CO2)
4. List different types of business ownerships.
5. List out any four difference between PERT and CPM (CO2)

PART-B **3 X 8 = 24**

Instructions:

i. **Answer all three questions.**
ii. **Each question carries eight marks.**
iii. **The answers should be comprehensive and the criteria for valuation are the content but not the length of the answer.**

1. (a) Explain the types of business ownerships. (CO1)

(OR)

(b) State the principles of scientific management. (CO1)

2. (a) Explain the different process of recruitments. (CO1)

(OR)

(b) State the advantages and disadvantages staff organization. (CO1)

3. (a) Explain break-even analysis. (CO2)

(OR)

(b)

A Project has following activities. The expected time for each activity is also given below

i) Draw the project network ii)Identify the critical path iii)Find the project duration iv)slack (CO2)

S. NO	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**
Activity	1-2	1-3	1-4	2-4	2-5	3-6	4-6	5-6
Duration in days	6	8	5	3	5	12	8	6

MODEL PAPER – FORMATIVE ASSESSMENT-2

BOARD DIPLOMA EXAMINATION, (C-23)

DEEE – FIFTH SEMESTER EXAMINATION

EE-501 : INDUSTRIAL MANAGEMENT & SMART TECHNOLOGIES

Time: 90 Minutes **Total Marks: 40**

PART-A **(1 x 4) + (4 x 3) = 16**

Instructions:

i. Answer all **five** questions.
ii. First question carries **four** marks and remaining each question carries **three** marks.
iii. Answers should be brief and straight to the point and shall not exceed five simple sentences

1. (a) Define Entrepreneur.
   (b) TQM stands for _____
   (c) Define Quality system.
   (d) Define IoT (Internet of Thing) (CO3, CO4,CO4,CO5)

2. List out the organisations that help an entrepreneur. (CO3)

3. State the requirements of Entrepreneur. (CO3)
4. List the beneficiaries of ISO 9000. (CO4)
5. Write short notes of SMART transportation system using IoT. (CO5)

PART-B **3 X 8 = 24**

Instructions:

i. Answer all **three** questions.
ii. Each question carries **eight** marks.
iii. The answers should be comprehensive and the criteria for valuation are the content but not the length of the answer.

6. (a) Explain the role of entrepreneur in national development (CO3)

(or)

(b) Explain any two self employment schemes (CO3)

7. (a) What is quality system and also explain various elements of quality system (CO4)

(or)

(b) Explain ISO standards and ISO 9000 series of quality system. (CO4)

8. (a) List the advantages and disadvantages of IoT. (CO5)

(or)

(b) Explain the application of SMART Energy system . (CO5)

MODEL PAPER – SUMMATIVE EXAMINATION
C-23-EE-501
BOARD DIPLOMA EXAMINATION, (C-23)
DEEE – FIFTH SEMESTER EXAMINATION
EE-501 : INDUSTRIAL MANAGEMENT AND SMART TECHNOLOGIES

Time: 3 hours Total marks: 80

PART-A **10 X 3 = 30**

Instructions:

i. Answer all questions.
ii. Each question carries three marks.
iii. Answers should be brief and straight to the point and shall not exceed five simple sentences

1. Define Industry and Business. (CO1)
2. State the advantages of line organization. (CO1)
3. State Traits theory of leader ship (CO1)
4. State the functions of material management. (CO2)
5. State the causes of accidents in industries. (CO2)
6. . State the requirements of Entrepreneur (CO3)
7. State the characteristics of successful entrepreneur. (CO3)
8. Define quality and quality system. (CO4)
9. List the beneficiary companies of ISO 9000. (CO4)
10. List the components of IoT. (CO5)

PART-B **5 X 10 = 50**

Instructions:

i. Answer any five questions.
ii. Each question carries 10 marks.
iii. The answers should be comprehensive and the criteria for valuation are the content but not the length of the answer.

11. Explain the principles of management. (CO1)
12. Explain the advantages and disadvantages of line and staff organization. (CO1)
13. Explain the ABC analysis in material management. (CO2)
14 . For a certain project the data is given below (CO2)

S.No.	1	2	3	4	5	6	7	8
Activity	1-2	1-3	1-4	2-4	2-5	3-6	4-6	5-6
Duration (months)	6	8	5	3	5	12	8	6

*

(i) Draw the network diagram.

(ii) Identify the critical path.

(iii) Find the project duration

15 Explain any two self employment schemes. (CO3)

16 Explain ISO standards and ISO 9000 series of quality system (CO4)

17 Explain the application of IoT in smart home. (CO5)

18 Explain the application of smart energy system. (CO5)

Course Code	Course Title	No. of periods / Week	Total No.of Periods	Marks for FA	Marks for SA
EE-502	ELECTRIC VEHICLE TECHNOLOGY	5	75	20	80

COURSE OUTCOMES MAPPING

S.No	Unit Titles	No. of periods	CO's Mapped
1.	Environmental impact, History and Electric vehicle Types	17	CO1
2.	Hybrid Electric Vehicle	13	CO2
3.	Energy Storages	17	CO3
4	Charging techniques and Battery Management system	13	CO4
5.	Electrical Drives and Braking of electric motors	15	CO5
	Total	**75**	

COURSE OBJECTIVES	i). To understand the concept of electric vehicles and Hybrid Electric Vehicle.
	ii). To understand the different types of energy storage system and Charging techniques for Electric vehicles .
	iii). To understand about Electrical drives for Electric vehicles and braking of electric motors.

COURSE OUTCOMES	CO1	EE502.1	Understand the Impacts of Conventional Vehicles on the Society and Different Types of electric vehicles.
	CO2	EE502.2	Understand the architecture of different hybrid vehicles
	CO3	EE502.3	Demonstrate the concepts of energy storage and energy management in electric vehicles.
	CO4	EE502.4	Analyze various Charging techniques in electric vehicles
	CO5	EE502.5	Analyzing the different types of electric drives and different types of electric braking

LEARNING OUTCOMES

1. Environmental impact, History and Electric vehicle Types

1.1 List different pollutants produced due to IC engine vehicle (ICEV) and state their effect on human health.

1.2 State historical journey of electric vehicle.

1.3 Define Electric vehicle and state the need of electric vehicle.

1.4 Briefly explain the problems of Electric vehicles.

1.5 List the Advantages and disadvantages of electric vehicles.

1.6 Compare Battery Electric Vehicle (BEV) & conventional vehicles.

1.7 Draw the block diagram of electric vehicles and explain the major components.

1.8 Classification of electric vehicles according to the source of power as BEV, HEV , PHEV and FCEV.

1.9 Explain Battery Electric Vehicle (BEV) with a neat block diagram.

1.10 Explain Hybrid electric Vehicle (HEV) with a neat block diagram.

1.11 Explain Plug-in Hybrid Electric Vehicle (PHEV) with a neat block diagram.

1.12 Explain Fuel Cell Electric Vehicle (FCEV) with a neat block diagram.

2. Hybrid Electric Vehicle

2.1 What is hybrid electric vehicle and state its necessity.

2.2 Classification of hybrid vehicles.

2.3 Explain series hybrid electric vehicle with a neat block diagram.

2.4 State the advantages and disadvantages of series hybrid system.

2.5 Explain the different power flow control modes of a series hybrid system with the help of block diagrams

2.6 Explain parallel hybrid electric vehicle with a neat block diagram.

2.7 Advantages and disadvantages of parallel hybrid system.

2.8 Explain the different power flow control modes of a parallel hybrid system with the help of block diagrams

2.9 Explain series-parallel hybrid electric vehicle with a neat block diagram.

2.10 List the impacts of EVs/HEVs on the power grid, environment and economy.

3. Energy Storages

3.1 State cell and battery

3.2 Classify cells as Primary and Secondary cells

3.3 Classify storage cell as Lead Acid Battery, Nickel based batteries, Sodium based batteries, Lithium based batteries – Li-ion & Li-poly,

3.4 Define the terms related to batteries (i) Battery Capacity (ii) Specific Energy Density (iii) State Of Charge (iv) State Of Discharge (v) Cycle Life (vi) Efficiency.

3.5 List main Requirements of EV batteries.

3.6 Explain Nickel -Cadmium battery system with a neat sketch.

3.7 Explain Lithium-Ion (Li-Ion) battery system with a neat sketch.

3.8 List different alternative energy storage devices for EVs as Ultracapacitor, flywheel, Fuel cell.

3.9 Explain Ultracapacitor storage system with a neat sketch.

3.10 Explain flywheel storage system with a neat sketch.

3.11 Explain Fuel cell storage system with a neat sketch.

3.12 List Advantages and disadvantages of (i) Ultracapacitor (ii) flywheel (iii) Fuel cell .

4. Charging techniques and Battery Management system

4.1 List the basic requirements for charging system as Safety , Reliability , User-friendliness , Power levels and charging times , Communication , Standardization.

4.2 List the Battery charging techniques as Constant voltage, Constant current, Trickle Charging, Battery swapping techniques, Conductive DC Charging, Conductive Ac charging, Inductive charging or Wireless charging.

4.3 State the Constant voltage, Constant current and Trickle Charging methods.

4.4 Explain about Battery swapping techniques in Electric vehicles.

4.5 Explain about Conductive DC Charging in Electric vehicles.

4.6 Explain about Conductive AC charging in Electric vehicles.

4.7 Explain about Inductive charging or Wireless charging in Electric vehicles.

4.8 List the advantages and disadvantages of Wireless charging.

4.9 Explain the concept of V2G Technology (Vehicle-to-Grid).

4.10 List types of (i) AC connectors (ii) DC connectors.

4.11 Need of battery management system.

4.12 Explain the Block diagram of Battery Management system (BMS).

5. Electrical Drives and Braking of electric motors

5.1 Define an Electric Drive and explain the concept of electric drive.

5.2 List the advantages of Electric Drives.

5.3 Draw the block diagram of an Electric drive and state the function of each block.

5.4 List the factors governing the selection of electric drive.

5.5 Classify the drives based on (i) Operation (ii) Application

5.6 List the Major requirements of Electric vehicle motor drive.

5.7 Explain Brushless DC (BLDC) motor with a neat sketch.

5.8 Explain Switched Reluctance motor with a neat sketch.

5.9 State the advantages of electric braking over other methods of braking.

5.10 List different methods of electric braking.

5.11 Explain the methods of plugging, Rheostatic and Regenerative braking.

5.12 List the advantages of Regenerative Braking System.

CO'S – PO'S – PSO'S MAPPING STRENGTH

CO No	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
EE502.1	2	1						2	1	
EE502.2	3	1						2	1	
EE502.3	2	1						2	1	
EE502.4	3	1	1					2	1	
EE502.5	3	1	1					2	1	
Average	**2.6**	**1**	**1**					**2**	**1**	

Note:

The gaps in CO and PO mapping will be achieved by one or more appropriate activities from the following:(i) Assignments (ii) Tutorials (iii) Seminars (iv) Guest Lectures (v) Group Discussions (vi) Quizzes (vii) Industrial Visits (viii) Tech Fests (ix) Mini Projects (x) Library Visits

HYPONATED COURSE CONTENTS

1. Environmental impact, History and Electric vehicle Types

Pollutants produced due to IC engine vehicle (ICEV) and their effect on human health, Historical journey of electric vehicle ,Need of electric vehicles , Problems of Electric vehicles, major components in electric vehicles, Classification of electric vehicles Battery, Electric Vehicle (BEV) ,Hybrid electric Vehicle (HEV) Plug-in Hybrid Electric Vehicle (PHEV) ,Fuel Cell Electric Vehicle (FCEV)

2. Hybrid Electric Vehicle

History of hybrid electric vehicle, Classification of hybrid vehicles, block diagram of series hybrid electric vehicle, power flow control modes of a series hybrid system , block diagram of parallel hybrid electric vehicle , power flow control modes of a parallel hybrid system , block diagram of series parallel hybrid electric vehicle, power flow control modes for a series hybrid vehicle, impacts of EVs/HEVs on the power grid, environment and economy.

3. Energy Storages

cell and battery , Classify cells , Battery parameters : Battery Capacity , Specific Energy Density , State Of Charge , State Of Discharge , ,Cycle Life, Efficiency, main Requirements of EV batteries ,Nickel -Cadmium battery system ,Lithium-Ion (Li-Ion) battery system alternative energy storage devices for EVs as Ultracapacitor, flywheel, Fuel cell , Advantages and disadvantages of Ultracapacitor, flywheel, Fuel cell

4. Charging techniques and Battery Management system

Basic Requirements for Charging System as Safety ,Reliability , User-friendliness , Power levels and charging times , Communication , Standardization Battery charging techniques as Constant voltage, Constant current , Trickle Charging, Battery swapping techniques, Conductive DC Charging, Conductive Ac charging , Inductive charging or Wireless charging , V2G Technology (Vehicle-to-Grid) , types of AC connectors ,types of DC connectors, Battery Management system (BMS)

5. Electrical Drives and Braking of electric motors

Electric Drive, advantages of Electric Drives, block diagram of an Electric drive, factors governing the selection of electric drive, Classify the drives, Major requirements of Electric vehicle motor drive, (Brushless DC)BLDC motor ,Switched Reluctance motor, advantages of electric braking ,methods of electric braking, plugging, Rheostatic and Regenerative braking, Advantages of Regenerative Braking System

REFERENCE BOOKS

1. Iqbal Hussein, Electric and Hybrid Vehicles: Design Fundamentals, CRC Press, 2003.
2. Mehrdad Ehsani, Yimi Gao, Sebastian E. Gay, Ali Emadi, Modern Electric, Hybrid Electric and Fuel Cell Vehicles: Fundamentals, Theory and Design, CRC Press, 2004.
3. James Larminie, John Lowry, Electric Vehicle Technology Explained, Wiley, 2003.tbook / Refences.
4. Sandeep Dhameja, "Electric Vehicle Battery Systems", Newnes, 2001
5. Prof. Ahok Jhunjhunwala, IITM – Fumdamentals of Electrical Vehicles (MPTEL VIDEOS)

BLUE PRINT

S.No	Unit Title	No. of Periods	Weightage Allocated	Marks wise distribution of weightage			Question wise distribution of weightage			CO'S Mapped
				R	U	AP	R	U	AP	
1	Environmental impact, History and Electric vehicle Types	17	26	6	20		2	2		CO1
2	Hybrid Electric Vehicle	13	16	3	13		1	2		CO2
3	Energy Storages	17	26	6	20		2	2		CO3
4	Charging techniques and Battery Management system	13	16	6	10		2	1		CO4
5	Electrical Drives and Braking of electric motors	15	26	6	20		2	2		CO5
Total		**75**	**110**	**27**	**83**		**9**	**9**		

Model Papers: Syllabus to be Covered for Unit Tests

Unit Test	Learning Outcomes to be Covered
Unit Test-I	From 1.1 to 3.4
Unit Test-II	From 3.5 to 5.12

MODEL PAPER – FORMATIVE ASSESSMENT-1
C-23-EE-502
BOARD DIPLOMA EXAMINATION, (C-23)
DEEE – FIFTH SEMESTER EXAMINATION
EE-502 : ELECTRICAL VEHICLE TECHNOLOGY

Time: 90 Minutes Total Marks: 40

PART-A **(1 x 4) + (4 x 3) = 16**

Instructions:

iv. Answer all five questions.
v. First question carries four marks and remaining each question carries three marks.
vi. Answers should be brief and straight to the point and shall not exceed five simple sentences

1. Expand the terms (a) BEV (b) HEV (c) PHEV (d) FCEV. (CO1)
2. Compare BEV & conventional vehicles (CO1)
3. List different pollutants produced due to IC engine vehicle (ICEV) (CO1)
4. List the advantages of series hybrid Electric vehicle. (CO2)
5. Classification of hybrid vehicles (CO2)

PART-B **3 X 8 = 24**

Instructions:

iv. Answer all three questions.
v. Each question carries eight marks.
vi. The answers should be comprehensive and the criteria for valuation are the content but not the length of the answer.

6. (a) Draw the block diagram of electric vehicles and explain major components. (CO1)

(OR)

(b) Explain with a neat block diagram of Plug-in Hybrid Electric Vehicle (PHEV). (CO1)

7. (a) Explain with a neat block diagram of Fuel Cell Electric Vehicle (FCEV) (CO1)

(OR)

(b) Draw and explain architecture of series parallel hybrid electric vehicle. (CO2)

8. (a) Explain the different power flow control modes of a parallel hybrid system with the help of block diagrams.
(CO2)

(OR)

(b) Draw and explain architecture of series hybrid electric vehicle (CO2)

MODEL PAPER – FORMATIVE ASSESSMENT-2
C-23-EE-502
BOARD DIPLOMA EXAMINATION, (C-23)
DEEE – FIFTH SEMESTER EXAMINATION
EE-502 : ELECTRICAL VEHICLE TECHNOLOGY

Time: 90 Minutes Total Marks: 40

PART-A **(1 x 4) + (4 x 3) = 16**

Instructions:

iv. Answer all **five** questions.
v. First question carries **four** marks and remaining each question carries **three** marks.
vi. Answers should be brief and straight to the point and shall not exceed five simple sentences

1. (a) The capacity of a battery is expressed in _____.
   (b) Battery converts chemical energy to_____ energy
   (c) Expand the term BMS .
   (d) Expand the term V2G (CO3, CO4,CO4,CO5)
2. List main Requirements of EV batteries (CO3)
3. List and the Basic Requirements for Charging System. (CO4)
4. Advantages and disadvantages of Wireless charging (CO4)
5. Define an Electric Drive. (CO5)

PART-B **3 X 8 = 24**

Instructions:

iv. Answer all **three** questions.
v. Each question carries **eight** marks.
vi. The answers should be comprehensive and the criteria for valuation are the content but not the length of the answer.

6. (a) Explain with a neat sketch of Ultracapacitor storage system (CO3)

(or)

(b) Explain with a neat sketch of Fuel cell storage system (CO3)

7. (a) Explain the concept of V2G Technology (Vehicle-to-Grid) (CO4)

(or)

(b) Explain the Block diagram of Battery Management system (BMS) (CO4)

8. (a) Explain with a neat sketch of Switched Reluctance motor.. (CO5)

(or)

(b) Explain with a neat sketch of (Brushless DC) BLDC motor. (CO5)

MODEL PAPER – SUMMATIVE EXAMINATION

C-23-EE-502

BOARD DIPLOMA EXAMINATION, (C-23)

DEEE – FIFTH SEMESTER EXAMINATION

EE-502 : ELECTRICAL VEHICLE TECHNOLOGY

Time: 3 hours Total marks: 80

PART-A **10 X 3 = 30**

Instructions:

iv. Answer all questions.
v. Each question carries three marks.
vi. Answers should be brief and straight to the point and shall not exceed five simple sentences

1. Classification of electric vehicles according to the source of power. (CO1)
2. List Advantages of electric vehicles (CO1)
3. List the impacts of EVs/HEVs on the power grid, environment and economy (CO2)
4. Classify hybrid vehicles (CO2)
5. List main Requirements of EV batteries (CO3)
6. List Advantages and disadvantages of Ultracapacitor (CO3)
7. State the Constant voltage method of charging . (CO4)
8. List and the Basic Requirements for Charging System (CO4)
9. State advantages of electric braking over other forms of brake. (CO5)
10. List the factors governing the selection of electric drive. (CO5)

PART-B **5 X 10 = 50**

Instructions:

iv. Answer any five questions.
v. Each question carries 10 marks.
vi. The answers should be comprehensive and the criteria for valuation are the content but not the length of the answer.

11. Explain with a neat block diagram of Battery Electric Vehicle (BEV) (CO1)
12. Explain with a neat block diagram of Plug-in Hybrid Electric Vehicle (PHEV) (CO1)
13. Explain the different power flow control modes of a series hybrid system with the help of block diagrams. (CO2)
14 . Explain with a neat sketch of Ultracapacitor storage system (CO3)
15. Explain with a neat sketch of Lithium-Ion (Li-Ion) battery system (CO3)
16. Explain about Inductive charging or Wireless charging in Electric vehicles (CO4)
17. Explain the method of Regenerative braking (CO5)
18. Explain with a neat sketch of (Brushless DC) BLDC motor. (CO5)

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EE-503: POWER SYSTEMS – II

Course code	Course title	No. of periods/week	Total no. of periods	Marks for FA	Marks for SA
EE-503	POWER SYSTEMS – II	5	75	20	80

S.no	Unit Title	No. of Periods	CO'S Mapped
1	Transmission lines	**20**	**CO1**
2	Line structures for transmission and Underground cables	**25**	**CO2**
3	Substations and Distribution	**15**	**CO3**
5	Protection of Transmission lines	**7**	**CO4**
6	Modern Trends in power systems	**8**	**CO5**
Total Periods		**75**	

Course Objectives	I) To understand the concept of transmission and distribution ii) To Analyse different methods to solve transmission and distribution problems iii) To acquaint knowledge of substation equipment, cables and Distribution systems iv) To summarize key forces driving transformation in the power sector around the world

Course outcomes	**CO1**	EE-503.1	Describe the concepts of power transmission, distribution systems and HVDC transmission systems
	CO2	EE-503.2	Explain different structures, insulators, laying of lines including calculation of Sag and evaluation of underground cables
	CO3	EE-503.3	Explain various substations and basic concepts of distribution
	CO4	EE-503.4	Understand basic concepts of transmission line protection
	CO5	EE-503.5	Enhance the knowledge of the students with the recent trends in emerging power system operation

LEARNING OUTCOMES

1. Transmission Lines

1.1 State the need of transmission lines and distribution lines
1.2 Explain A.C and D.C transmission supply systems and state its advantages and disadvantages
1.3 State the various supply systems.
1.4 Compare the supply systems based on the conductor material required for overhead lines and underground cables for the following systems:

i) DC – 2 wire system
ii) AC - 1 ph 2 wire system
iii) AC - 3 ph 3 wire system

1.5 Explain the effects of supply frequency on Transmission lines
1.6 State the effects of using higher transmission voltage on

(i) Line efficiency (ii) Voltage drop iii)Line loss
(iv) Active & reactive Power (v) Volume of conductor material
(vi) Cost of-transformers, insulators, switchgear, supports etc.

1.7 State the empirical formula for determining the system voltage
1.8 State the relative merits and demerits for the following conductors;
a) Solid b) Stranded c) Hollow d) Bundled conductors
1.9 Explain the current distortion effects
(i) Skin effect (ii) Proximity effect (iii) Spirality effect
1.10 Give expression for inductance of 1- phase system and 3-phase system
1.11 Give the expressions for capacitance of 1 phase system and 3-phase system
1.12 State the need for transposition of overhead lines and explain its effects.
1.13 Define short, medium and long lines.
1.14 Define `regulation' and derive the approximate formula for percentage regulation.
1.15 Explain short transmission lines
1.16 Solve simple problems on regulation and efficiency for short line
1.17 Explain (i) Nominal T- method (ii) Nominal π –method for a medium transmission lines and solve simple problems.
1.18 State `Ferranti' effect
1.19 Define Corona, State the factors affecting it and list the methods of reducing corona

1.20 Explain the concept and applications of hot line technique

1.21 State basic concepts of HVDC transmission

1.22 List the types of HVDC transmission systems.

1.23 State the advantages and disadvantages of HVDC transmission

2. Line structures and Underground Cables

2.1 State the main components of overhead lines

2.2 State the requirements of line supports and List the types of line supports

2.3. List the common conductor spacing and ground clearances adopted for 66 kV, 33kV, 11 kV and LT line

2.4 Define `sag' and state the factors affecting the sag

2.5 Derive an equation for the approximate method of calculating sag when the supports are at the same level (a) in still air (b) with the effect of wind and ice and solve problems.

2.6 State the disadvantages of loose spans (sag more than prescribed value)

2.7 State the purpose of insulators and its requirements.

2.8 State applications of the following insulators.

(i) Pin type (ii) Strain type (iii) Suspension type (iv) Shackle type

2.9 Comparison pin type insulator and suspension type insulators.

2.10 Define the terms (i) Flashover (ii)Puncture (iii)String-efficiency

2.11 Solve problems on distribution of voltage across string and string efficiency

2.12 List the methods of improving string efficiency

2.13 State the need for arcing horns and guard rings

2.14 List causes of failure of insulators in transmission and distribution lines

2.15 Define cables and explain the general construction of cables.

2.16 Compare overhead lines with underground cables

2.17 Classify the cables based on

(i) Number of conductors (ii) Voltage (iii) Insulation and lead sheathing

(iv) The methods of improving the dielectric stress

2.18 Derive an equation for the insulation resistance of a cable

2.19 Solve problems on insulation resistance.

3. Substations and Distribution

3.1 Explain the need for substations

3.2 State the merits of indoor substation and outdoor substation

3.3 State the purpose of the following equipment used in substation.

(i) Bus bars (ii) Insulators (iii)Transformers

(iv) Switch gear (v) Indicating and Metering equipment (vi) Protective relays

(vii) Lightning arrestors (viii) C a b l e s (ix) Fire fighting equipment

3.5 State the need for auxiliary supply in Substations

3.6 Draw the schematic diagram of 33kV / 11kV substation and label the parts.

3.7 Draw the schematic diagram of 220kV / 132kV substation and label the parts.

3.8 Define Feeder, distributors and service mains

3.9 Explain radial and ring-main distribution systems and state their advantages and disadvantages

4. Protection of Transmission Lines

4.1 State the necessity of bus-bar protection, causes of bus-bar faults.
4.2 Describe the transmission line protection.
4.3 Explain the protection of transmission lines using distance relays.
4.4 Explain pilot wires

5. Modern trends in power systems

5.1 Define Smart Grid and state its need
5.2 Explain the working of SMARTGRID
5.3 Define Micro Grid and explain its operation
5.4 Define FACTS (Flexible AC transmission systems) and state its applications
5.5 State the Basic concept of WiTricity (wireless power transmission)
5.6 Define distributed generation (Distributed energy resources).

CO-PO/PSO MATRIX

CO No	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
EE-503.1	3		1	1				3	1	
EE-503.2	3	2			1			3	1	
EE-503.3	3	2	1		1	1	1	3	1	1
EE-503.4	3							3	1	
EE-503.5	3	2	1	1	1	1	1	3	1	
Average	**3**	**2**	**1**	**1**	**1**	**1**	**1**	**3**	**1**	**1**

3-Strongly Mapped 2- Moderately Mapped 1- Slightly Mapped

Note:
The gaps in CO and PO mapping will be achieved by one or more appropriate activities from the following:
(i) Assignments (ii) Tutorials (iii) Seminars (iv) Guest Lectures (v) Group Discussions (vi) Quizzes (vii) Industrial Visits (viii) Tech Fests (ix) Mini Projects (x) Library Visits

HYPONATED COURSE CONTENTS

1. Transmission Lines

Need for transmission lines-Transmission supply systems, Relative advantages and disadvantages of AC & DC Transmission, Choice of frequency, Choice of voltage, Effect of voltage, Empirical formula for determining the system voltage-Types of conductor-Solid-Stranded-Hollow- Bundled conductors -Relative merits of different types of conductors-Transmission parameters: Resistance, Inductance

capacitance-skin effect, proximity effect, spirality effect- inductance of Round and Parallel Conductors ,Transposition of O.H. lines-Effect of transposition on Inductance calculations in transposed lines, capacitance in round and parallel conductors -Regulation and efficiency-Approximate formula for Regulation-Short line calculation of-Efficiency-Regulation-Sending end voltage-sending end p.f. for the given receiving end conditions -Regulation-Sending end voltage-sending end p.f. for the given receiving end conditions in medium transmission lines using Nominal pie method-Nominal T method -Vector diagrams in the above methods- -Ferranti's effect- Corona in transmission lines -Effects of corona – methods of reducing corona-Hot line technique - concept and application-High voltage DC Transmission**:** Basic Concepts and Types of HVDC transmission-Advantages and disadvantages of HVDC transmission.

2. Line structures and Cables:

Requirements of line supports-Types of lines supports- Conductors spacing and ground clearance - lines spaces-Approximate ground clearance- Sag, Factors affecting sag, calculating sag. Disadvantages of loose span, Insulators, Requirements of insulators , Materials used , Types of Insulators, Voltage distribution across string of suspension Insulators, Flashover, Puncture, string efficiency, improving string efficiency, , Arcing horns and guard rings, Causes for failure of insulators-Cables, Comparison between O.H. Lines and underground cables, Classification of cables, General construction of cables, Insulation resistance of cables and problems.

3. Sub-stations and Distribution

Definition and classification of sub-stations, Relative merits of indoor and outdoor sub- stations equipment in sub-stations Bus-bars, Insulators, Switch gear, Transformer, Protective relays, Meters, Lightning arrestors, Cables, Fire fighting equipment-Schematic diagrams- Feeders, distributors and service mains, Classification of Distribution systems- Radial and Ring system of Distribution.

4. Protection of Transmission Lines and Feeders,

Transmission line protection –Busbar protection-transmission line protection using distance relays. - Pilot wires

5. Modern trends in power systems

Smart Grid – Micro Grid – FACTS (Flexible AC transmission systems) – Witricity (Wireless power Transmission), Distributed Generation

Reference Books:

1. V.K. Mehta -Principle of Power systems
2. S.L. Uppal - Electrical power
3. Sony, Gupta & Bhattnagar -Text book of Elect. Power
4. CL Wadhwa -Electrical power Systems - New Age International(P) limited.
5. KR Padiyar - HVDC Power Transmission system Technology .

Blue print:

S.No	Chapter title	No. of periods	Weightage Allocated	Marks wise distribution of weightage				Question wise distribution of weightage				CO's Mapped
				R	U	Ap	An	R	U	AP	AN	
1	Transmission lines	20	29	6	3	20		2	1	2		CO1
2	Line Structures and Underground cables	25	29	6	13	10		2	1	2		CO2
3	Substations and Distribution	15	26	3	23	0		1	3	0		CO3
4	Protection of Transmission Lines	7	13	3	10	0		1	1	0		CO4
5	Modern Trends in Power System	8	13	0	13	0		0	2	0		CO5
Total		75	110	18	62	30		6	8	4		

Syllabus to be Covered for Unit Tests

Unit Test	Learning Outcomes to be Covered
Unit Test - I	From 1.1 to 2.14
Unit Test - II	From 2.15 to 5.6

MODEL PAPER – FORMATIVE ASSESSMENT-1

C-23-EE-503

BOARD DIPLOMA EXAMINATION, (C-23)

DEEE – FOURTH SEMESTER EXAMINATION

EE-503 : POWER SYSTEMS – II

Time: 90 Minutes Total Marks: 40

PART-A **(1 x 4) + (4 x 3) = 16**

Instructions:

i. **Answer all five questions.**
ii. **First question carries four marks and remaining each question carries three marks.**
iii. **Answers should be brief and straight to the point and shall not exceed five simple sentences**

1. Define Ferranti effect. (CO1)
2. Define corona. (CO1)
3. State the advantages of HVDC transmission lines. (CO1)
4. List the factors affecting corona. (CO1)
5. List any six requirements of line supports. (CO2)

PART-B **3 X 8 = 24**

Instructions:

i. **Answer all three questions.**
ii. **Each question carries eight marks.**
iii. **The answers should be comprehensive and the criteria for valuation are the content but not the length of the answer.**

6. (a) Explain the concept and applications of Hot line technique. (CO1)

(or)

(b) A three phase short transmission line with an impedance of 6+j8 ohm per phase as sending end and receiving end voltage of 120 kV which is operating at a power factor of 0.9 lagging. Determine (i) power output (ii) sending end power factor. (CO1)

7. (a) Define Corona, state the factors affecting corona and list the methods to reduce the same. (CO1)

(or)

(b) Derive the expression for computing regulation and efficiency of medium transmission line using nominal T-method. (CO1)

8. (a) State the advantages and disadvantages of HVDC transmission and list the types of HVDC systems. (CO1)

(or)

(b) Derive an expression calculating sag of a transmission line when the line supports are at same level. (CO2)

C-23-EE-503

MODEL PAPER – FORMATIVE ASSESSMENT-2

BOARD DIPLOMA EXAMINATION, (C-23)

DEEE – FOURTH SEMESTER EXAMINATION

EE-503 : POWER SYSTEM – II

Time: 90 Minutes **Total Marks: 40**

PART-A **1X4+4X3 = 16**

Instructions:

i. Answer all **five** questions.
ii. First question carries **four** marks and remaining each question carries **three** marks.
iii. Answers should be brief and straight to the point and shall not exceed five simple sentences

1. State the disadvantages of Loose spans (CO2)

2. Distinguish Overhead lines and Underground Cables in any three aspects (CO2)

3. State the need of Substations. (CO3)

4. State the function of pilot wires (CO4)

5. What is meant by micro-grid? (CO5)

PART-B **3 X 8 = 24**

Instructions:

i. Answer all **three** questions.
ii. Each question carries **eight** marks.
iii. The answers should be comprehensive and the criteria for valuation are the content but not the length of the answer.

6. (a) An insulator string consists of 3-Units, each having a safe working Voltage of 15KV. The ratio of Self-Capacitance to shunt Capacitance of each unit is 8:1. Find the maximum safe working Voltage of String. Find the string efficiency . (CO2)

(or)

(b) Derive an expression for insulation resistance of a cable (CO2)

7. (a) State the use and application of substation equipment. (CO3)

(or)

(b) Explain the protection of transmission lines using distance relays. (CO4)

8. (a) Explain the advantages and disadvantages of radial and ring main distribution systems. (CO5)

(or)

(b) Compare distributed generation with central generation (CO5)

C-23-EE-503

BOARD DIPLOMA EXAMINATION, (C-23)

DEEE – FOURTH SEMESTER EXAMINATION

EE-503 : POWER SYSTEMS – II

Time: 3 hours Total marks: 80

PART-A **10 X 3 = 30**

Instructions:

i. **Answer all questions.**
ii. **Each question carries three marks.**
iii. **Answers should be brief and straight to the point and shall not exceed five simple sentences**

1. List any six advantages of AC transmission system. (CO1)

2. List the types of HVDC transmission system. (CO1)

3. List the factors affecting corona. (CO1)

4. List any three applications of hot line technique. (CO1)

5. State the causes for the failure of insulators. (CO2)

6. Define string efficiency. (CO2)

7. Distinguish overhead lines with underground cables in any three aspects. (CO2)

8. Define substation and state its functions. (CO3)

9. What is pilot wire? (CO4)

10. State the need of a smart-grid. (CO5)

PART-B **5 X 10 = 50**

Instructions:

i. **Answer any five questions.**
ii. **Each question carries Ten marks.**
iii. **The answers should be comprehensive and the criteria for valuation are the content but not the length of the answer.**

11. A three phase short transmission line with an impedance of 6+j8 ohm per phase as sending end and receiving end voltage of 120 kV which is operating at a power factor of 0.9 lagging. Determine (i) power output (ii) sending end power factor. (CO1)

12. A three phase 50 Hz 150 km line has a resistance, inductive reactance and shunt admittance 0.1 ohm, 0.5 ohm and $3x10^{-6}$ mho per km per phase respectively. If the line delivers 50 MW at 110 kV and 0.8 p.f. lagging. Determine the sending end voltage and current. Assume nominal π circuit for the line. (CO1)

13. Derive an expression for calculating the sag of a transmission line when the line supports are at same level. (CO2)
14. An insulator string consists of three units each having a safe working voltage of 15 kV. The ratio of self-capacitance to shunt capacitance of each unit is 8:1. Find the maximum safe working voltage of string and string efficiency. (CO2)
15. State the merits and demerits of indoor substation over outdoor substation. (CO3)
16. Define service mains and distributor and Compare between radial and ring distribution systems on any three aspects. (CO3)
17. Explain the protection of transmission lines using definite distance and time distance relays with neat diagram (CO4)
18. Define FACTS controllers. State the types of FACTS controllers. State any three applications of FACTS controllers.

DIGITAL ELECTRONICS AND MICRO CONTROLLERS

Course Code	Course Title	No. of periods /Week	Total No.of Periods	Marks for FA	Marks for SA
EE-504	DIGITAL ELECTRONICS AND MICRO CONTROLLERS	5	75	20	80

COURSE OUTCOMES MAPPING

S.No	Unit Title	No. of periods	CO's Mapped
1.	Basics of Digital Electronics	10	CO1
2.	Combinational Logic circuits	17	CO2
3.	Sequential Logic Circuits	15	CO3
4	8051 Microcontroller	15	CO4
5.	8051 instruction set and programming	18	CO5
	Total	**75**	

COURSE OBJECTIVES	i) To introduce students to the basic theory of digital electronics, their practical applications.
	ii) To familiarize students to the principle of operation, design and synthesis of different digital electronic circuits.
	iii) To provide strong foundation for further study of digital electronic circuits and systems
	iv) To understood different applications microcontrollers

COURSE OUTCOMES	**CO1**	EE505.1	Understand number systems, basic operation and compare performance of various digital electronic circuits.
	CO2	EE505.2	Design and analyse digital electronic circuits and learn to select suitable circuits by assessing the requirements of application fields.
	CO3	EE505.3	Identify the critical areas in application levels and derive typical alternative solutions, select suitable digital electronic circuits to control industry grade apparatus.
	CO4	EE505.4	Select 8051 microcontroller for given application and develop assembly program for a given application
	CO5	EE505.5	Describe 8051 microcontrollers as per requirement and develop a simple real time application.

LEARNING OUTCOMES

1. Basics Of Digital Electronics

1.1 Explain Binary, Octal, Hexadecimal number systems and compare them with Decimal system.
1.2 Perform binary addition, subtraction, Multiplication and Division.
1.3 Explain about BCD.
1.4 Write 1‘s complement and 2‘s complement numbers for a given binary number
1.5 Perform subtraction of binary numbers in 2‘s complement method.
1.6 Explain the importance of parity Bit.
1.7 State different postulates and De-Morgan‘s theorems in Boolean algebra.
1.8 Explain AND, OR, NOT, NAND, NOR and EX-OR gates with truth table.
1.9 Realize AND, OR, NOT operations using NAND, NOR gates.
1.10 Classify digital logic families.
1.11 Give IC numbers for different digital Logic gates.

2. Combinational Logic Circuits

2.1 Give the concept of combinational logic circuits.
2.2 Draw the Half adder circuit and verify its functionality using truth table.
2.3 Realize a Half-adder using NAND gates only.
2.4 Draw the full adder circuit and explain its operation with truth table.
2.5 Realize full-adder using two Half-adders and an OR – gate and write truth table
2.6 Draw and explain a 4 Bit parallel adder using full – adders.
2.7 Explain the working of a serial adder with a Block diagram.
2.8 Draw and explain the operation of 4 X 1 Multiplexers

2.9 Draw and explain the operation of 1 to 4 demultiplexer.
2.10 Draw and explain 3 X 8 decoder.
2.11 List any three applications of multiplexers and decoders.
2.12 Draw and explain One-bit digital comparator.

3. Sequential Logic Circuits

3.1 Give the idea of Sequential logic circuits.
3.2 Explain NAND and NOR latches with truth tables
3.3 State the necessity of clock and give the concept of level clocking and edge triggering,
3.4 Draw and explain clocked SR flip flop with preset and clear inputs.
3.5 Construct level clocked JK flip flop using S-R flip-flop and explain with truth table
3.6 Write the truth tables of edge triggered D and T flip flops and draw their symbols.
3.7 List the applications of flip flops.
3.8 Define modulus of a counter
3.9 Explain with block diagrams and timing diagrams
(i) 4-bit asynchronous counter
(ii) 4-bit synchronous counter.
3.10 State the need for a Register and list the types of registers.
3.11 Draw and explain the working of 4 bit shift left and shift right registers
3.12 Explain the working of ring counter and list its applications
3.13 State memory read operation, write operation, access time, memory capacity, address lines and word length.
3.14 Distinguish between (a) EEPROM and UVEPROM (b) static RAM and dynamic RAM

4. Micro controller

4.1 Explain the concept of Micro controllers.
4.2 Compare Embedded with External memory devices.
4.3 List the three commonly used Commercial Microcontroller Device families.
4.4 Draw the block diagram of a microcontroller and explain the function of each block.
4.5 Explain the register structure of 8051.
4.6 Explain the functions of various special function registers.
4.7 Draw the pin diagram of 8051 micro controller and specify the purpose of each pin.
4.8 Explain internal memory, external memory and ports of 8051.
4.9 List interrupts in 8051

5. Instruction set and Programming

5.1 State the need for an instruction set.
5.2 Explain the instruction format of 8051.
5.3 Explain fetch cycle, execution cycle and instruction cycle.
5.4 Define the terms machine language, assembly language, and mnemonics.
5.5 Differentiate between machine level and assembly level programming.
5.6 List the major groups in the instruction set along with examples.

5.7 Explain the terms operation code, operand and illustrate these terms by writing an instruction.

5.8 Explain the data manipulation functions data transfer, arithmetic, logic and branching.

5.9 Explain the addressing modes of 8051.

5.10 Explain data transfer instructions of 8051.

5.11 Explain the arithmetic instructions and recognize the flags that are set or reset for given data conditions.

5.12 Explain the logic instructions and recognize the flags that are set or reset for given data conditions.

5.13 Explain unconditional and conditional jump and how flags are used to change the sequence of program.

5.14 Define subroutine and explain its use.

5.15 Write program to perform

(i) Single byte & Multi byte addition

(ii) Summing-up of given N numbers

(iii) Multiplication of two 8-bit numbers using MUL instruction

CO-PO/PSO MATRIX

CO No	**PO 1**	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PSO1**	**PSO2**	**PSO3**
EE505.1	3						1	3		
EE505.2	3	2	2	2	1	1		3	2	
EE505.3	3	2						3		1
EE505.4	3					1	1	3		
EE505.5	3	2	2	2	1	1		3	2	
Average	**3**	**2**	**2**	**2**	**1**	**1**	**1**	**3**	**2**	**1**

3-Strongly Mapped 2- Moderately Mapped 1- Slightly Mapped

Note : 1. This Subject is to be taught by Electronics & Communication Engg. faculty

2. Paper setting and paper evaluation is also to be done by Electronics & Communication Engg Faculty.

Note:

The gaps in CO and PO mapping will be achieved by one or more appropriate activities from the following:
(i) Assignments (ii) Tutorials (iii) Seminars (iv) Guest Lectures (v) Group Discussions (vi) Quizzes (vii) Industrial Visits (viii) Tech Fests (ix) Mini Projects (x) Library Visits

HYPONATED COURSE CONTENTS

1. Basics Of Digital Electronics

Binary, Octal. Hexadecimal number systems - Logic gates : AND, OR, NOT, NAND, NOR, Exclusive-OR- Boolean algebra, Boolean expressions – De-Morgan's Theorems - Characteristics of digital circuits .

2. Combinational Logic Circuits

Implementation of arithmetic circuits, Half adder, Full adder, Serial and parallel Binary adder. Parallel adder/subtractor, Multiplexer, demultiplexer, decoder

3. Sequential Logic Circuits

Principle of flip-flops operation, Concept of edge triggering, level triggering, RS, D, JK, T, flip-flops - Applications of flip flops,. Binary counter- ripple counter, synchronous counter, up-down counter- Shift Registers – ring counter and its applications- Memories-terminology related to memories, RAM, ROM, EEPROM, UVEPROM, static RAM, dynamic RAM

4. Micro Controllers

Block diagram of 8051- Pin out diagram of 8051, registers, interrupts.

5. Instruction Set And Programming

Instruction set of 8051, instruction format, fetch cycle, execution cycle, instruction cycle, machine cycle, timing diagrams, classification of instructions, addressing modes- Groups of instructions, Opcode, operand - Data transfer, subroutines – Assembly level programming.

REFERENCE BOOKS

1. Digital Computer Electronics by Malvino and leach TMH
2. Modern Digital Electronics By RP Jain TMH
3. Digital Electronics Tokhem TMH
4. Digital Design by Morris Mano, PHI
5. Kenneth J.Ayala. - 8051 Micro controller

BLUE PRINT

S. No	Chapter / Unit Title	No. of periods	Weightage Allocated	Marks wise Distribution of Weightage				Question wise Distribution of Weightage				CO's Mapped
				R	U	Ap	An	R	U	Ap	An	
1	Basics of Digital Electronics	10	16	3	3	10		1	1	1		CO1
2	Combinational Logic circuits	17	26	3	23	0		1	3	0		CO2
3	Sequential Logic Circuits	15	26	3	23	0		1	3	0		CO3
4	8051 Microcontroller	15	16	3	13	0		1	2	0		CO4
5	8051 instruction set and programming	18	26	3	3	20		1	1	2		CO5
	Total	**75**	**110**	**15**	**65**	**30**		**5**	**10**	**3**		

Model Papers: Syllabus to be Covered for Unit Tests

Unit Test	Learning Outcomes to be Covered
Unit Test-I	From 1.1 to 3.9
Unit Test-II	From 3.10 to 5.17

MODEL PAPER – FORMATIVE ASSESSMENT-1

C-23-EE-504

BOARD DIPLOMA EXAMINATION, (C-23)

DEEE – FIFTH SEMESTER EXAMINATION

EE-504 : DIGITAL ELECTRONICS AND MICROCONTROLLERS

Time: 90 Minutes Total Marks: 40

PART-A **(1 x 4) + (4 x 3) = 16**

Instructions:

i. **Answer all five questions.**
ii. **First question carries four marks and remaining each question carries three marks.**
iii. **Answers should be brief and straight to the point and shall not exceed five simple sentences**

1. (a) Binary equivalent of $(12.34)_8$ _____ .
   (b) One's Complement of $(1010)_2$ _____ .

   (c) Minimum number of Half Adders needed to make a Full Adder are four : True / False

   (d) Flip-Flop is used as _____ . (CO1)

2. State De-Morgan's theorems in Boolean algebra. (CO1)
3. Realize Half-Adder using NAND gates only. (CO2)
4. Draw the circuit diagram of 3x8 decoder (CO2)
5. Draw edge triggered D Flip-Flop and write its truth table. (CO3)

PART-B **3 X 8 = 24**

Instructions:

i. **Answer all three questions.**
ii. **Each question carries eight marks.**
iii. **The answers should be comprehensive and the criteria for valuation are the content but not the length of the answer.**

6. (a) Explain AND, OR, NAND, NOR gates with truth tables. (CO1)

   (OR)

   (b) Explain de-morgan's theorems in Boolean algebra. (CO1)

   (CO1)

7. (a) Explain the working a 4-Bit Parallel Adder comprised of Full-Adders, with legible sketches.

   CO2)

   (OR)

   (b) Draw and explain one bit digital comparator. (CO2)

8. (a) Explain the working of asynchronous decade counter with legible sketches. (CO3)

(OR)

(b) Explain the memory read operation, write operation, access time, memory capacity and word length. (CO3)

MODEL PAPER – FORMATIVE ASSESSMENT-2

C-23-EE-504

BOARD DIPLOMA EXAMINATION, (C-23)

DEEE – FIFTH SEMESTER EXAMINATION

EE-504 : DIGITAL ELECTRONICS AND MICROCONTROLLERS

Time: 90 Minutes Total Marks: 40

PART-A **(1 x 4) + (4 x 3) = 16**

Instructions:

i. **Answer all five questions.**
ii. **First question carries four marks and remaining each question carries three marks.**
iii. **Answers should be brief and straight to the point and shall not exceed five simple sentences**

1. (a) Ports which can be used as address bus in 8051 microcontroller are _____ .
   (b) 8051 microcontroller performs operations on _____ bit data.
   (c) P3.0 and P3.1 in 8051 microcontroller are used for Serial Communication : True / False
   (d) Opcode for the instruction $\mathrm{MOV\ A, R0}$ In 8051 microcontroller is _____ . (CO4, CO5)
2. State the need of registers in 8051 microcontroller. (CO4)
3. Draw the pin diagram of 8051 microcontroller. (CO4)
4. State the need for an instruction set to work with a microcontroller. (CO5)
5. List the major groups in the instruction set of 8051 microcontroller. (CO5)

PART-B **3 X 8 = 24**

Instructions:

i. **Answer all three questions.**
ii. **Each question carries eight marks.**
iii. **The answers should be comprehensive and the criteria for valuation are the content but not the length of the answer.**

6. (a) Draw the block diagram of micro controller and explain the function of each block. (CO4)

(OR)

(b) Explain the register structure of 8051. (CO4)

7. (a) Explain any four Logical Instructions of 8051 microcontroller with examples. (CO5)

(OR)

(b) Explain any four Conditional Jump Instructions of 8051 microcontroller with examples. (CO5)

8. (a) Write an assembly language program to sum up of given N numbers. (CO5)

(OR)

(b) Write an assembly language program to find the product of two eight bit numbers. (CO5)

MODEL PAPER – SUMMATIVE EXAMINATION

C-23-EE-504

BOARD DIPLOMA EXAMINATION, (C-23)

DEEE – FIFTH SEMESTER EXAMINATION

EE-504 : DIGITAL ELECTRONICS AND MICROCONTROLLERS

Time: 3 hours **Total marks: 80**

PART-A **10 X 3 = 30**

Instructions:

i. Answer all questions.
ii. Each question carries three marks.
iii. Answers should be brief and straight to the point and shall not exceed five simple sentences

1. Convert the following into binary: (a) $(67.89)_{10}$ (b) $(1F)_{16}$ (c) $(23.45)_{8}$. (CO1)
2. State De-Morgan's theorems in Boolean algebra. (CO1)
3. Realize Half-Adder using NAND gates only. (CO2)
4. Draw the Full-adder circuit (CO2)
5. Draw edge triggered D Flip-Flop and write its truth table. (CO3)
6. Classify various types of memories based on accessing modes. (CO3)
7. State the need of registers in 8051 microcontroller. (CO4)
8. Draw the pin diagram of 8051 microcontroller. (CO4)
9. State the need for an instruction set to work with a microcontroller. (CO5)
10. List the major groups in the instruction set of 8051 microcontroller. (CO5)

PART-B **5 X 10 = 50**

Instructions:

i. **Answer any five questions.**
ii. **Each question carries Ten marks.**
iii. **The answers should be comprehensive and the criteria for valuation are the content but not the length of the answer.**

11. Explain AND, OR, NAND, NOR gates with truth tables. (CO1)
12. (a) Subtract $(1011)_2$ from $(1100111)_2$ by using 2's compliment

    (b) Add $(1A3B)_{16}$ and $(3C4)_{16}$ (CO1)
13. Explain the working a 4-Bit Parallel Adder comprised of Full-Adders, with legible sketches.(CO2)
14. Realise full adder using two half adders and an OR gate and write truth table. (CO2)
15. Draw and Explain clocked SR flip-flop with preset and clear inputs. (CO3)
16. Explain internal memory and external memory of 8051 microcontroller. (CO4)
17. Explain any four Logical Instructions of 8051 microcontroller with examples. (CO5)
18. Explain any four Conditional Jump Instructions of 8051 microcontroller with examples. (CO5)

ELECTRICAL UTILIZATION AND TRACTION

Course code	Course Title	No. of periods /week	Total No. of periods	Marks for FA	Marks for SA
EE-505	**ELECTRICAL UTILIZATION AND TRACTION**	5	75	20	80

S.No	Unit Title	No. of periods	CO's Mapped
1	Electric Lighting	17	CO1
2	Electric Heating	14	CO2
3	Energy saving devices	12	CO3
4	Electric Traction	22	CO4
5	Traction Supply Systems	10	CO5
	Total	**75**	

Upon completion of the course the student shall be able to	
Course Objectives	i) Understand about terminology regarding illumination, understand about various lamps, Able to design simple lighting schemes.
	ii) Understand about different Electric Heating Methods, Ability to identify a heating scheme for a given application.
	iii) Understand different schemes of traction, its main equipments

Course Outcomes:

Course Outcomes	**CO1**	**EE-505-1**	Design lighting schemes for a given application
	CO2	**EE-505-2**	Ability to identify the type of Electric heating suitable for any specific application
	CO3	**EE-505-3**	Ability to draw Automatic Temperature and Illumination control circuits.

	CO4	**EE-505-4**	Understand the basic principle of electric traction including speed – time curves of different traction services and traction equipment
	CO5	**EE-505-5**	Analyze the operation of traction supply systems and train lighting systems

Learning Objectives:

1. Electric Lighting

1.1. Define the following terms related to electric lighting.
- a) Plane and solid angles, b) luminous flux, c) Luminous intensity,
- d) Lumen Illumination e) Candle power, f) Polar curve,
- g) Brightness, h) MHCP, i) MSCP,
- j) MHSCP k) Wave length, l) Glare

1.2. Explain the production of light by
- a) Excitation b) Ionisation c) Fluorescence and d) Phosphorescence

1.3. List the types of lamps used for illumination at different situations such as
- a) Domestic b) Industrial c) Decoration d) Advertisements e) Street lighting schemes

1.4. State the requirements of good lighting

1.5. List the lamp fittings used in domestic and industrial applications

1.6. State and explain the laws of Illumination

1.7. Solve problems on Illumination

1.8. Define the following terms
- a) Utilisation factor b) Depreciation factor c) Waste light factor
- d) Reflection factor e) Reduction factor f) Absorption factor
- g) Luminous efficiency h) Space height ratio i) Specific energy consumption

1.9. Design a simple lighting scheme for drawing hall

2. Electric Heating

2.1. State the advantages of electric heating

2.2. List the requirements of good heating material and state the materials employed for heating

2.3. Explain the following with legible sketch and state its industrial applications
- a) Direct resistance heating b) Indirect resistance heating

2.4. Explain the following with legible sketch and state its industrial applications
- a) Direct arc furnace b) Indirect arc furnace

2.5. Explain the following with legible sketch and state its industrial applications
- a) Core type Induction furnace b) Coreless type Induction furnace

2.6. State the principle of dielectric heating and list the industrial applications of the dielectric heating

3. Energy saving Devices

3.1 State the need of power saving devices

3.2 Draw Automatic temperature control circuits for (coolers, geysers, air conditioners and iron boxes)
3.3 Draw Automatic illumination control circuits using LDR's
3.4 List the advantages of Compact Fluorescent Lamps (CFL)
3.5 Explain the operating principle of Light Emitting Diode (LED)
3.6 List the advantages of LED lamps over other types of lamps
3.7 Compare LED lamps with Tungsten filament lamps

4. Electric Traction

4.1 Describe different methods of track electrification
4.2. List the types of traction services and sketch the speed-time curves
4.3. State each stage of the speed-time curve with appropriate speeds
4.4. Define Maximum speed, average speed and scheduled speed
4.5. List the factors affecting the scheduled speed
4.6. Sketch the simplified speed-time curves and state their practical importance
4.7. Derive the expression for maximum speed, acceleration and retardation for the following speed time curves and solve simple problems on it
a) Trapezoidal speed time curve b) Quadrilateral speed time curve
4.8. Explain the tractive effort
4.9. Derive the expression for tractive effort for acceleration to overcome gravity pull and train resistance and solve problems.
4.10. Explain the mechanics of transfer of power from motor to driving wheel
4.11. Define `Coefficient of adhesion' and list the factors affecting the coefficient of adhesion
4.12. Solve problems on calculation of number of axels required
4.13. State the methods of improving the coefficient of adhesion
4.14. Define specific energy consumption and list the factors affecting it
4.15. List the important Overhead Equipments (OHE) used in Traction
4.16. State the important requirements of traction motor
4.17. Explain the suitability of different motors (D.C., 1-Ø A.C, 3-Ø A.C., Composite & Kando systems) for traction
4.18. State the need for Booster Transformer in Traction

5. Traction Supply Systems

5.1. Describe the following major Equipment at traction Substation
a) Transformer b) Circuit Breaker c) Interrupter
5.2. State the importance of location and spacing of Substation
5.3. Explain End on Generation
5.4. Explain Mid on Generation
5.5. Explain Head on Generation
5.6. State the requirements of Train lighting
5.7. Mention the requirements of railway coach air conditioning

CO-PO/PSO MATRIX

CO.No	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PS01	PS02	PS03
EE-505-1	3	1	1			1		3		
EE-505-2	3				1		1	3		1
EE-505-3	3				1	1		3		
EE-505-4	3		1	2			1	3	1	1
EE-505-5	3	1		1	1	1		3	1	
Average	3	1	1	1.5	1	1	1	3	1	1

3-Strongly Mapped 2- Moderately Mapped 1- Slightly Mapped

Note:
The gaps in CO and PO mapping will be achieved by one or more appropriate activities from the following:

(i) Assignments (ii) Tutorials (iii) Seminars (iv) Guest Lectures (v) Group Discussions (vi) Quizzes (vii) Industrial Visits (viii) Tech Fests (ix) Mini Projects (x) Library Visits

HYPONATED COURSE CONTENT

1. Electric Lighting

Important terms and definitions of lighting - Plane and solid angles, luminous flux, Luminous intensity, Lumen Illumination, Candle power, Polar curve, Brightness, MHCP, MSCP, MHSCP, Wave length and Glare – Principle of production of light by Excitation, Ionisation, Fluorescence and Phosphorescence – Types of lamps – Requirements of good lighting – Different types of lamp fittings – Laws of Illumination – important terms used in designing of simple lighting scheme – Problems.

2. Electric Heating

Advantages of electric heating - requirements of good heating material - materials generally employed for Electric Heating, resistance heating - direct and indirect types - applications - Electric arc furnaces - direct and indirect types - applications - Induction furnace heating - core and coreless type - applications - Dielectric heating - principle – applications

3. Energy saving Devices

Need of power saving devices - Automatic temperature control circuits - Automatic illumination

control circuits using LDR's - Advantages of CF Lamps – Operating Principle of LED lamp - Advantages of LED lamps over other types of lamps - Compare LED lamps with tungsten filament lamps.

4. **Electric Traction**

Single-phase A.C. and Composite systems -Types of services (main line, suburban , Metro and urban) - speed-time curves for the above services - Maximum speed, average speed and scheduled speed - Factors affecting the scheduled speed - Simplified speed-time curves & its practical importance - Expression for maximum speed, acceleration and retardation for Trapezoidal & Quadrilateral speed time curves - numerical examples - Tractive effort & its derivation – Mechanism of transfer of power from motor to driving wheel - Coefficient of adhesion - factors affecting the coefficient of adhesion - problems on calculation of number of axles required - methods of improving the coefficient of adhesion - specific energy consumption - factors affecting specific energy consumption - Overhead Equipments (OHE) - State the important requirements of traction motor - suitability of different motors (D.C., 1-Ø A.C, 3-Ø A.C., Composite & Kando systems for traction – Need of Booster Transformer.

5. Traction Supply Systems

Major Equipment at traction Substation – Importance of Location and Spacing of Substations - End on Generation - Mid on Generation - Head on Generation - Requirements of Train lighting - requirements of railway coach air conditioning.

REFERENCES

1. J B Gupta – Utilisation of Electric Power and Electric Traction – Katson Books
2. R.K.Gang - Utilisation of Electric energy
3. H.Partab - Art and Science ofelectric power – Dhanpat Rai & Co
4. K.B.Bhatia – Study of electrical Appliances and devices – Khanna Publications
5. R.K.Rajput - Utilisation of Electric Power – Parag Enterprises

Blue Print:

S.No	Unit Title	No. of Periods	Weightage Allocated	Marks wise distribution of weightage			Question wise distribution of weightage			CO'S Mapped
				R	U	AP	R	U	AP	
1	Electric Lighting	17	26	06	10	10	02	01	01	CO1
2	Electric Heating	14	24	03	21	-	01	3.5	-	CO2
3	Energy saving devices	12	13	03	10	-	01	01	-	CO3
4	Electric Traction – Properties and Equipment	22	29	03	13	13	01	02	02	CO4
5	Traction supply systems and Train lighting systems	10	18	03	15	-	01	1.5	-	CO5
Total		**75**	**110**	**18**	**69**	**23**	**06**	**09**	**03**	

R-Remembering; U-Understanding; AP-Application

Syllabus to be covered for Unit Tests

Unit Test	Learning Outcomes to be Covered
Unit Test - 1	From 1.1 to 3.4
Unit Test – 2	From 3.5 to 5.7

MODEL PAPER – FORMATIVE ASSESSMENT-1
C23-EE-505
BOARD DIPLOMA EXAMINATION, (C-23)
DEEE – FIFTH SEMESTER EXAMINATION
EE-505 : ELECTRICAL UTILIZATION AND TRACTION

Time: 90 Minutes Total marks: 40

PART-A (1X4) + (4X3) = 16 M

Instructions:
i. Answer all five questions.
ii. First question carries four marks and remaining each question carries three marks.
iii. Answers should be brief and straight to the point and shall not exceed five simple sentences

1. i) State any Two power consuming device in day to day life.
   ii) The luminous efficiency of fluorescent lamp is _____.
   iii) The commercial name of Nickel chromium is _____.
   iv) Life span of LED lamps is _____. (C01, C02, CO3)
2. Define utilization factor. CO1
3. List any three requirements of good lighting. CO1
4. List any three advantages of electric heating. CO2
5. List any three industrial applications of Dielectric heating. CO2

PART-B (3X8) = 24 M

Instructions:
i. Answer all three questions.
ii. Each question carries eight marks.
iii. The answers should be comprehensive and the criteria for valuation are the content but not the length of the answer.

6. (a) State and explain Lamberts cosine law. CO1

   (OR)

   (b) In a street lighting scheme, lamps with candle power of 500 are hung at a height of 5 meters. The distance between the posts is 10 meters. Determine the illumination (i) under the lamps and (ii) at the midpoint between the posts. CO1

7. (a) Explain Indirect resistance heating with legible sketch. CO2

   (OR)

   (b) Explain Direct ARC furnace with legible sketch. CO2

8. (a) Explain in detail about automatic temperature control with block diagram. CO3

   (OR)

   (b) Explain in detail about automatic illumination control circuit using light dependent resistor (LDR) CO3

MODEL PAPER – FORMATIVE ASSESSMENT-2
C23-EE-505
BOARD DIPLOMA EXAMINATION, (C-23)
DEEE – FIFTH SEMESTER EXAMINATION
EE-505 : ELECTRICAL UTILIZATION AND TRACTION

Time: 90 Minutes Total marks: 40

PART-A (1X4) + (4X3) = 16 M

Instructions:

i. Answer all five questions.
ii. First question carries four marks and remaining each question carries three marks.
iii. Answers should be brief and straight to the point and shall not exceed five simple sentences

1. (a) The abbreviation for LED in LED lamps is _____. CO3
   (b) Define Tractive Effort CO4
   (c) The shunt motors are not suitable for parallel operation.(True/False) CO4
   (d) The circuit breakers used in traction are transformer circuit breaker and ____CO5
2. List the any three advantages of LED lamps over other types of lamps. CO3
3. Define schedule speed. CO4
4. List the factors affecting the coefficient of adhesion. CO4
5. State the requirements of train lighting system. CO5

PART-B (3X8) = 24 M

Instructions:

i. Answer all three questions ii. Each question carries eight marks.
iii. The answers should be comprehensive and the criteria for valuation are the content but not the length of the answer.

6.(a) Derive an expression for maximum speed, acceleration and retardation for Trapezoidal speed time curve. CO4

(OR)

(b) A train weighing 120 tonnes is to be driven up on an incline of 2 percent at a speed of 36 kmph.If the train resistance at this speed is 2 kg per tonne.Find the current required at 1500 V dc if the efficiency of the motors and gearing is 88 percent.If the current were cut off,how long would the train take to come to rest. CO4

7. (a) Explain in detail the speed time curve for Main line service. CO4

(OR)

(b) A electric train has an average speed of 42 kmph on a level track between two stops 1400m apart.It is accelerated at 1.7 kmphps and is braked at 3.3 kmphps. Draw the speed time curve for the run. CO4

8. (a) Explain Head on Generation with legible sketch. CO5

(OR)

(b) Describe the following equipments at traction substation: a) circuit breaker, b) Interrupter. CO5

C23-EE-505

SUMMATIVE ASSESSMENT
BOARD DIPLOMA EXAMINATION, (C-23)
MODEL QUESTION PAPER
DEEE - FIFTH SEMESTER EXAMINATION
ELECTRICAL UTILIZATION AND TRACTION

Time: 3 hours **Total Marks : 80**

PART-A **10 X 3 = 30M**

Instructions:

(i) Answer all questions.
(ii) Each question carries three marks.
(iii) Answer should be brief and straight to the point and shall not exceed five simple sentences.

1. Define a) Luminous Intensity and b) candle power	CO1
2. State the requirements of good lighting.	CO1
3. List the various materials required for electric heating.	CO2
4. Mention any three industrial applications of Dielectric heating	CO2
5. List the applications of direct arc furnaces in industry	CO2
6. Compare LED lamps with tungsten filament lamps	CO3
7. List out the factors effecting specific energy consumption	CO4
8. Define 'Coefficient of adhesion'	CO4
9. State the need for Booster Transformer	CO4
10. Mention the requirements of railway coach air conditioning	CO5

PART-B **5 X 10 = 50M**

Instructions:

(i) Answer any five questions.
(ii) Each question carries Ten marks.
(iii) Answers should be comprehensive and the criterion for valuation is the content but not the length of the answer.

11. a) State the laws of Illumination 4M
    b) A hall 50 m × 30 m is to be illuminated by 40 W double tube fluorescent fitting. Find the number of fittings to give a uniform Illumination of 80 lux. Take the efficiency of the lamps as 40 lumen per watt and utilization factor as 0·5. 6M CO1
12. Two lamps luminous intensity 150 candela and 200 candela are mounted at 10m and 15m respectively. The horizontal distance between the lamp posts is 30m. Calculate the illumination in the middle of the post. CO1
13. Explain Indirect type of electric arc furnace with legible sketches CO2
14. a) state the need of Power saving devices 4M
    b) Explain the operating principle of LED lamp 6M CO3
15 Describe different methods of track electrification CO4
16. An electric train has an average speed of 42 kmph on a level track between stops 1400 m apart. It is accelerated at 1·7 kmphps and it is braked at 3·3 kmphps. Draw the speed-time curve for the run. Estimate the energy consumption at the axis of the train per tonne per km. Tractive resistance constant is 50 Newton's per tonne and rotational inertia is 10%. CO4

17. Explain End on Generation with legible sketches CO5
18. a) A factory 33*13 mtr. is to be illuminated with an average illumination of 72 lumen/m2 by 200 watt lamps. The coefficient of utilization is 0.4 and the depreciation factor is 1.4. Calculate the no. of lamps required. The lumens output of 200 W lamps is 2730 lumens. 5M CO2
    b) State the importance of location and spacing of substations 5M CO5

MATLAB PRACTRICE LABORATORY

Course code	Course Title	No. of periods /week	Total No. of periods	Marks for FA	Marks for SA
EE-506	MATLAB PRACTRICE LABORATORY	3	45	20	80

COURSE OUTCOMES MAPPING

S.No	Major Topics	No. of periods	CO's Mapped
1	Familiarization with MATLAB	09	CO1
2	Simulation of DC Circuits	06	CO2
3	Simulation of AC Circuits	09	CO3
4	Simulation of Power Electronic Converter circuits	12	CO4
5	Simulation of DC and AC motor Drives	09	CO5
	Total	**45**	

Upon completion of the course the student shall be able to	
Course Objectives	i) Familiarize with the MATLAB software
	ii)Simulate the responses in DC, AC and Power Electronic Converter Circuits
	iii) Simulate the responses in DC and AC motor Drives

Course Outcomes:

Course Outcomes	**CO1**	**EE-506-1**	Ability to use command window and save files. Understands various blocks available in Simscape/SIM Power systems
	CO2	**EE-506-2**	Ability to find desired response in DC Circuits through MATLAB software

	CO3	**EE-506-3**	Ability to find desired response in AC Circuits through MATLAB software
	CO4	**EE-506-4**	Ability to find desired response in power electronics Circuits through MATLAB software
	CO5	**EE-506-5**	Understand the Voltage control method in speed control of DC and AC motor Drives through software simulation

LEARNING OUTCOMES

1. Familiarization with MATLAB software

1.1. Introduction to command window and perform simple math calculations
1.2. Introduction to Simscape/SIM Power systems
1.3. Working with different blocks of Simscape/SIM Power systems

2. Simulation of DC Circuits

2.1. Verify Thevenin's Theorem in a simple DC Circuit using SIMULINK
2.2. Verify Norton's Theorem in a simple DC Circuit using SIMULINK

3. Simulation of AC Circuits

3.1. Verify Thevenin's Theorem in a simple AC Circuit using SIMULINK
3.2. Verify Norton's Theorem in a simple AC Circuit using SIMULINK

4. Simulation of Power Electronic Converter circuits

4.1. Simulation of Single phase full wave converter circuit with R and RL loads
4.2. Simulation of Three phase full wave converter circuit with R load
4.3. Simulation of single phase bridge inverter circuit

5. Simulation of DC and AC motor Drives

5.1. Simulation of speed control of BLDC motor using single phase full wave rectifier
5.2. Simulation of speed control of PMSM motor using single phase full wave rectifier
5.3. Simulation of speed control of Induction Motor using Three phase AC Voltage controller.

CO-PO/PSO MATRIX

CO.No	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PS01	PS02	PS03
EE-506-1	3	-	-	-		1	3	-	2	
EE-506-2	3	3	-	3	1		3	2	2	1
EE-506-3	3	3	-	3	1	1	3	2	2	
EE-506-4	-	2	3	3	1		3	2	2	
EE-506-5	-	2	3	3		1	3	2	2	1
Average	**3**	**2.5**	**3**	**3**	**1**	**1**	**3**	**2**	**2**	**1**

3-Strongly Mapped 2- Moderately Mapped 1- Slightly Mapped

Note:

The gaps in CO and PO mapping will be achieved by one or more appropriate activities from the following:

(i) Assignments (ii) Tutorials (iii) Seminars (iv) Guest Lectures (v) Group Discussions (vi) Quizzes (vii) Industrial Visits (viii) Tech Fests (ix) Mini Projects (x) Library Visits

HYPONATED COURSE CONTENT

1. Familiarization with MATLAB software

Introduction to command window - perform simple math calculations (addition, multiplication, matrix formation) – Procedure to save Matlab files - Simscape/SIM Power systems – Introduction – Familiarization with different blocks available in Simscape/SIM Power systems

2. Simulation of DC Circuits

Verification of Thevenin's and Norton's Theorem in a simple DC Circuit using SIMULINK

3. Simulation of AC Circuits

Verification of Thevenin's and Norton's Theorem in a simple AC Circuit using SIMULINK

4. Simulation of Power Electronic Converter circuits

Simulation - Single phase full wave converter circuit with R and RL loads - Three phase full wave converter circuit with R load - single phase bridge inverter circuit

5. Simulation of DC and AC motor Drives

Simulation of speed control - BLDC motor using single phase full wave rectifier - PMSM motor using single phase full wave rectifier - Induction Motor using Three phase AC Voltage controller

Competencies & Key competencies to be achieved by the student

Sl.No.	Experiment Title	Competencies	Key Competencies
1	Familiarization with MATLAB software	• Opening of new command window • Understand about command window and workspace • Able to perform simple mathematical calculations • Able to perform matrix operations • Understanding the procedure to save mat lab files • Procedure to open new file in Simulink • Understand about different tabs in Simulink • To know about different blocks in Simulink library browser • To draw simple circuits by using different blocks in Simulink library browser • understand the functional block 'scope' and able to use it • able to save the work done in simulink	• perform simple math calculations by using command window • Familiarization with different blocks available in Simscape/SIM Power systems
2	Simulation of DC Circuits	• Opening of new file in Simulink • Adding of all electrical components required from Simulink library browser to form a desired DC circuit to verify Thevenin's & Norton's theorems • Give appropriate values to all electric components • Adding 'scope' to view response • Press the run icon to process the circuit and the response will be viewed in scope • Save the work done in simulink	• Identification of required DC electrical components from Simulink library browser • Drawing the desired circuit in Simulink • Interpreting the results obtained through scope
3	Simulation of AC Circuits	• Opening of new file in Simulink • Adding of all electrical components required from Simulink library browser to form a desired AC circuit to verify Thevenin's & Norton's theorems • Give appropriate values to all electric components • Adding 'scope' to view response • Press the run icon to process the circuit and the response will be viewed in scope • Save the work done in simulink	• Identification of required DC electrical components from Simulink library browser • Drawing the desired circuit in Simulink • Interpreting the results obtained through scope
4	Simulation of Power Electronic Converter circuits	• Opening of new file in Simulink • Adding the components required for single phase and three phase full wave rectifier for R load. • Adding the components for gate triggering pulses • Able to change the firing angle	• Identification of required Power electronic devices from Simulink library browser • Drawing of Single phase and three phase full wave converter circuit with R and RL loads.

		• Press the run icon to process the circuit and the response will be viewed in scope • Save the work done in simulink	• Analyze the waveforms for different triggering angles
5	Simulation of DC and AC motor Drives	• Opening of new file in Simulink • Adding the components required for single phase full wave rectifier and three phase AC Voltage controller. • Identifying the BLDC, PMSM and Induction motors in simulink library browser and adding to simulink • Press the run icon to process the circuit and the response will be viewed in scope • Save the work done in simulink	• Identification of required Power electronic devices and motors from Simulink library browser • Drawing of speed control circuit to BLDC, PMSM and Induction motors in simulink • Analyze the response for different triggering angles

PLC AND SCADA LABORATORY

Course code	Course title	No. Of periods/week	Total No. of periods	Marks for FA	Marks for SA
EE-507	PLC and SCADA LABORATORY	3	45	40	60

S.No.	Unit Title	No. of Periods	CO'S Mapped
1.	Basics of PLC	6	CO1
2.	Ladder Diagrams for logic gates, timers and counters	6	CO2
3.	Ladder Diagrams for domestic applications	12	CO3
4.	Ladder Diagrams for industrial applications	12	CO4
5.	Supervisory Control and Data Acquisition(SCADA)	9	CO5
Total		**45**	

Course Objectives	i) To acquire the knowledge for PLC programming and operating. ii) To develop ladder diagrams for domestic and industrial applications. iii) Apply PLC Timers and Counters for the control of industrial processes and to develop a coil and contact control to operate analog PLC operations. iv) To understand the fundamentals of SCADA and to design programs of automated applications.

Course outcomes	**CO1**	**EE-507.1**	Familiarise automation, its importance, expectations from automation and applications in industry. Analyze the working of PLC, I/O modules of PLC, Programming languages and instructions of PLC.
	CO2	**EE-507.2**	Design and writing ladder diagrams for logic gates, timers and counters.
	CO3	**EE-507.3**	Designing a small automated ladder diagrams for domestic applications.
	CO4	**EE-507.4**	Designing a small automated ladder diagrams for industrial applications.

	CO5	**EE-507.5**	Understand the fundamental of SCADA systems, design of ON and OFF switch in SCADA, design programs of automated applications in SCADA.

LEARNING OUTCOMES

1. **Basics of PLC**

1. Demonstrate PLC architecture
2. Working with various tools available in PLC software
3. Preparation of ladder diagram, uploading of code to PLC and running the code on PLC
4. Ladder diagram for ON/OFF inputs to produce ON/OFF outputs.

2. **Ladder Diagrams for logic gates, timers and counters**

1. Execute ladder diagram for Logical Gates – AND gate, OR gate, NOT gate, NAND gate, NOR gate, EX-OR gate and EX-NOR gate
2. Execute the following Boolean expressions
   - $\bar{A}$ BC + $\overline{AB}$
   - $A\overline{BC}$ + $\bar{C}$B + $\bar{A}$ CB
3. Execute ladder diagram to run the motor for a specified time using timers.
4. Execute the ladder diagram for blinking the LED until a key is pressed using timer.
5. Execute the ladder diagram for starting the motor after pressing the push button for three times using counters.

3. **Ladder Diagrams for domestic applications**

1 Execute ladder diagram for interfacing of lamp and button for ON / OFF operation
2 Execute ladder diagram for delayed operation of lamp by using PUSH button.
3 Execute ladder diagram by multiple push button operation with delayed lamp for ON/OFF operation.
4 Execute ladder diagram for Stair Case Lighting
5 Execute ladder diagram for sensing of temperature of the given liquid.

4. **Ladder Diagrams for industrial applications**

1 Execute ladder diagram for DOL starter
2 Execute ladder diagram for Star-Delta starter
3 Execute ladder diagram for PMDC Motor Speed Controller
4 Execute ladder diagram for Traffic Light Controller
5 Execute ladder diagram for rotating stepper motor in forward and reverse direction at constant speed.

5. **Supervisory Control and Data Acquisition(SCADA)**

1. Interface SCADA with PLC and perform read/ command transfer operation.
2. Design of ON and OFF switch in SCADA
3. Execute Parameter reading of PLC in SCADA.
4. Operate the PLC inputs through the switch symbol from the computer screen and view the
5. status of the outputs using lamp and motor graphics symbols in the screen.
6. Perform Alarm annunciation using SCADA.
7. Perform Reporting and Trending in SCADA System.
8. Perform temperature sensing using SCADA.

CO-PO/PSO MATRIX

CO NO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
EE-507.1	3		2	2			1	3	1	
EE-507.2	3	2	2	2		1		3	1	
EE-507.3	3		2	2	1			3	1	1
EE-507.4	3	2	2	2	1	1	1	3	1	1
EE-507.5	3		2	2	1		1	3	2	
Average	**3**	**2**	**2**	**2**	**1**	**1**	**1**	**3**	**1**	**1**

3-Strongly Mapped 2- Moderately Mapped 1- Slightly Mapped

Note:

The gaps in CO and PO mapping will be achieved by one or more appropriate activities from the following:

(i) Assignments (ii) Tutorials (iii) Seminars (iv) Guest Lectures (v) Group Discussions (vi) Quizzes (vii) Industrial Visits (viii) Tech Fests (ix) Mini Projects (x) Library Visits

HYPONATED COURSE CONTENTS

1. Basics of PLC

Demonstrate PLC architecture - Working with various tools available in PLC software - Preparation of ladder diagram - uploading of code to PLC and running the code on PLC

2. Ladder Diagrams for logic gates, timers and counters

Execute ladder diagram for different Logical Gates - ladder diagram using timers & counters

3. Ladder Diagrams for domestic applications

Execute ladder diagram for interfacing of lamp and button for ON / OFF operation - ladder diagram for delayed operation of lamp by using Push button - ladder diagram by multiple push button operation with delayed lamp for ON/OFF operation - ladder diagram with combination of counter and timer for lamp ON/OFF operation - ladder diagram for Stair Case Lighting - ladder diagram for Temperature Controller.

4. Ladder Diagrams for industrial applications

Execute ladder diagram for DOL starter - ladder diagram for Star-Delta starter - ladder diagram for PMDC Motor Speed Controller - ladder diagram for Traffic Light Controller - ladder diagram for rotating stepper motor in forward and reverse direction at constant speed.

5. Supervisory Control and Data Acquisition (SCADA)

Interface SCADA with PLC and perform read/ command transfer operation - Design of ON and OFF switch in SCADA - Execute Parameter reading of PLC in SCADA - Operate the PLC inputs through the switch symbol from the computer screen and view the status of the outputs using lamp and motor graphics symbols in the screen - Perform Alarm annunciation using SCADA - Perform Reporting and Trending in SCADA System - Perform temperature sensing using SCADA

Competencies & Key competencies to be achieved by the student

S. NO.	Experiment Title	Competencies	Key competencies
1	(i) Demonstrate PLC architecture and Ladder diagram (ii) Execute Ladder diagrams for different Logical Gates (iii) Execute Ladder diagrams using timers & counters	Identify the PLC trainer kit, the Personal Computer and Load PLC software	i) Test the ladder logic with logic gate examples ii) Test the ladder logic with Timer/Counter instructions in ladder diagrams
		Observe the input and output ports of the PLC	
		Make the interfacing between the PC and the PLC.	
		Prepare the appropriate ladder diagrams for different logic gates(AND, OR, NOT, NOR,NAND)	
		Save the ladder diagram with relevant file names	
		Execute each ladder diagram program and check for errors	
		Rectify errors if any then save and again execute the program	
		Download the Ladder Diagram program into the PLC	

		Run each program and check its output logic with relevant inputs.	
		Prepare simple ladder diagrams using timers and counters instructions	
		Execute ,Run and check the output logic for each program	
2	Execute Ladder diagrams with model applications (i) ladder diagram for interfacing of lamp and button for ON / OFF operation (ii) ladder diagram for delayed operation of lamp by using Push button (iii) ladder diagram by multiple push button operation with delayed lamp for ON/OFF operation (iv) ladder diagram with combination of counter and timer for lamp ON/OFF operation (v) ladder diagram for Stair case Lighting vi) ladder diagram for sensing of temperature of the given liquid	Identify the PLC trainer kit, the Personal Computer and Load PLC software	Execute the Ladder Diagram programs and observe the performance
		Observe the input and output ports of the PLC	
		Make the interfacing between the PC and the PLC.	
		Prepare the appropriate ladder diagrams for lamp ON/OFF operation	
		Save the ladder diagram with relevant file names	
		Execute each ladder diagram program and check for errors	
		Rectify errors if any then save and again execute the program	
		Download the Ladder Diagram program into the PLC	
		Run each program and check its output logic with relevant inputs.	
3	Execute Ladder diagrams with model applications (i) ladder diagram for DOL starter (ii) ladder diagram for Star-Delta starter (iii) ladder diagram for PMDC Motor Speed Controller (iv) ladder diagram for Traffic Light Controller (v) ladder diagram for rotating stepper motor in forward and reverse direction at constant speed.	Identify the different available model application kits in the lab	Execute the ladder diagram programs and observe the performance
		Draw the ladder diagrams for the given program	
		Prepare the ladder diagrams in the Computer, save and execute the program	
		Make proper connections of the model application at the output port of PLC and download its relevant ladder diagram program in PLC	
		Run the ladder diagram program and observe the outputs with the model applications	

4	(i) Execute Parameter reading of PLC in SCADA (ii) the PLC inputs through the switch symbol from the computer screen and view the status of the outputs using lamp and motor graphics symbols in the screen (iii) Alarm annunciation using SCADA (iv) Reporting and Trending in SCADA System (v) temperature sensing using SCADA	Make the Interfacing between SCADA and PLC, perform read/ command transfer operation	Operate the buttons in SCADA and observe the outputs on the computer screen
		Develop switch symbols from the computer screen in SCADA to operate the PLC inputs	
		Observe the output in the computer screen	

LIFE SKILLS

Course code	Course title	No. Of periods/week	Total No. of periods	Marks for FA	Marks for SA
EE-508	LIFE SKILLS	3	45	40	60

Course Title : Life Skills	Course code : C23- Common-508 { Common to all Branches}
Year/ Semester : V/ VI Semester	Total periods : 45
Type of Course : Practical	Max Marks : 100 { Sessional 40 + External 60 }

Course Objectives: The students shall

- understand the relevance of life skills in both personal and professional lives

- practise life skills complementarily in life-management to lead a happy and successful life

Course Outcomes: The students shall

CO1: exhibit right attitude and be adaptable in adverse and diverse situations.

CO2: set appropriate goals and achieve them through proper planning, time management and self-motivation

CO3: solve diverse real-life and professional problems with critical thinking and creativity for a stress-free life.

CO4: be an ideal team player and manifest as a leader.

Course Delivery:

Text book: **"Life Skills" –** by State Board of Technical Education and Training, AP

Sl no	Unit	Teaching Hours
1	**Attitude**	**4**
2	**Adaptability**	**4**

3	**Goal Setting**	**4**
4	**Motivation**	**4**
5	**Time Management**	**4**
6	**Critical thinking**	**4**
7	**Creativity**	**4**
8	**Problem Solving**	**5**
9	**Team work**	**4**
10	**Leadership**	**4**
11	**Stress Management**	**4**
	Total	**45**

Course Content:

UNIT I: Attitude *matters!*
Preparatory activity-Role play; Generating word bank; Types of attitude. Read the passage and answer the related questions, read the story and discuss issues raised; Express opinions on the given topic and fill the grid with relevant words.

UNIT 2: **Adaptability… *makes life easy!***
Pair work-Study the given pictures and understand adaptability -read the anecdote and discuss, read the story and answer the questions, role play

UNIT 3: Goal Setting… *life without a goal is a rudderless boat!*
Short term goals and long term goals-SMART features, observe the pictures and answer questions-matching- read the passage and answer questions-filling the grid.

UNIT 4: Motivation… *triggers success!*
Types of motivation-difference between motivation and inspiration- matching different personalities with traits - dialogue followed by questions - writing a paragraph based on the passage.

UNIT 5: Time Management *… the need of the hour!*

Effective Time Management- Time quadrant - Group task on management of time- Time wasters-fill in the grid, read the story and answer the questions- prioritising tasks.

UNIT 6: Critical Thinking… *Logic is the key!*

Preparatory activity-read the passage and answer the questions- differentiate between facts and assumptions- components of critical thinking- complete the sets of analogies- choose the odd one out- true or false statements- decide which of the conclusions are logical.

UNIT 7: Creativity…. The essential YOU!!

Definition- Pre-activity-read the anecdote and answer the questions- matching celebrities with their fields of specialisation- think of creative uses of objects- think creatively in the given situations.

UNIT 8: Problem Solving… *there is always a way out!*

Preparatory activity-read the story and answer the questions- discuss the given problem and come out with three alternative solutions- group activity to select the best solution among available alternatives- discuss the problem and plan to analyse it.

UNIT 9: Team Work… *Together we are better!*

Advantages of team work- Characteristics of a team player- Activity-Observe the pictures and classify them into two groups- team game - read the story and answer the questions- fill in the grid.

UNIT 10 : Leadership… the *making of a leader!*

Characteristics of effective leadership- styles of leadership- Activity-read the dialogue and answer the questions- identify the people in the picture and describe them- discuss leadership qualities of the given leaders- filling the grid- read the quotes and write the name of the leader.

UNIT 11: Stress Management … *live life to the full !!*

Types of stress- Strategies for Stress Management- Activity-read the passage and answer the questions, read the situation and write a paragraph about how to manage stress.

Mapping Course Outcomes with Program Outcomes

P O	**1**	**2**	**3**	**4**	**5**	**6**	**7**
C O	**POs 1 to 5 are applications of Engineering Principles, can't directly be mapped to Life Skills**					**1,2,3,4**	**1,2,3,4**

Cos- POs Mapping :

CO	**Course Outcome**	**CO Unit Mapped**	**PO mapped**	**Cognitive levels as per Bloom's Taxonomy** **R/U/Ap/An/Ev/Cr**

				(Remembering / Understanding/ Applying/Analysing/ Evaluating/ Creating)
CO 1	To exhibit right attitude and be adaptable to adverse and diverse situations	All Lessons (1 to 11)	6,7	U/Ap/ An
CO2	To set appropriate goals and achieve them through proper planning, time management and self-motivation	3,4,5	6,7	U/Ap/An
CO3	To solve diverse real-life and professional problems with critical thinking and creativity for a stress-free life	6,7,8,11	6,7	U/Ap/An/ Ev/ Cr.
CO4	To be an ideal team player and manifest as a leader	9,10	6,7	U/Ap/An/ Ev

ASSESSMENT

C23-Common-508: Life Skills

- The assessment for C23-Common 508 is on par with all other practical subjects comprising 40 marks for Internal Assessment and 60 marks for External examination attaining the final total of 100 Marks.
- The Internal Assessment can be conducted in the form of Assignments in all the 11 Units together, taking the average for 40 marks as suggested below.
- The Assessment sheet provided after each lesson in the workbook can be evaluated as an assignment (A) for 10 marks. In addition to that, another assignment (B) can be conducted for 10 marks in each Unit, awarding total average of 10 marks for each Lesson. Finally the grand total can be averaged for 40 marks as Internal marks.
- The students can present these assignments (B) to the teacher orally and they should also write down their assignments (B) in a separate note book for practice as they are going to speak/present in the external examination and submit the same to the teacher.
- The questions for Assignment styles vary from Lesson to Lesson as different skills are assessed in each Lesson with specific parameters. We can also consider the questions of assignments given after each lesson in the workbook.

- The assignment questions can also be given based on case studies, personal experiences, observations, making inferences/ analysis/ forming opinions, solving puzzles, questions on logical thinking, reasoning, evaluating and writing reviews..etc.

Calculating Internal marks through Assignments				
Name of the student:		**PIN:**	**Branch:**	**Academic Year:**
S. No.	**Title of the Unit / Lesson**	**Assignment A: 10Marks (assessment sheets after each lesson)**	**Assignment B: 10 Marks**	**Total Marks in each Unit/ Lesson (Average for 10 Marks)**
1	Attitude			
2	Adaptability			
3	Goal setting			
4	Motivation			
5	Time Management			
6	Critical Thinking			
7	Creativity			
8	Problem Solving			
9	Team work			
10	Leadership			
11	Stress Management			
	Marks scored		Example: :	90
	Total Number of Assignments			11
	Internal Assessment: Average for 40 Marks		Example: (90/11) X4=32.7	33

End Exam Model paper: C23-Common-508 : Life Skills Lab

----------Guidelines to prepare the question paper of the Lab End exam for 60 marks:

I. Define any three of the following terms of Life skills: (Oral) – 10 Marks

(From Lessons 1 to 11)

II. Recollect and narrate an incident either from your personal experience or observation where you have exhibited/ learned about any one of the following life skills. (oral) – 15 Marks.

(From Lessons 1 to 4: Attitude/ Adaptability/Motivation/Goal setting/

III. Recollect and narrate an incident either from your personal experience or observation where you have exhibited/ learned about any one of the following life skills. (oral) – 15Marks.

(From Lessons 5, 9,10,11 : Time Management, Team Work, Leadership, Stress Management)

IV. A question on problem solving skill, using creativity and critical thinking.

(A case study/a problematic situation should be provided by the examiner and the students should answer it in writing.)

Ex: Analyse the following problematic situation and write down the possible solutions and choose the best among them using your creativity and critical thinking / How do you solve the following problem?– (written) 20 Marks

(From Lessons 6,7,8: Creativity/ Critical Thinking/ Problem Solving)

Note: The questions I to III can be evaluated through Viva Voce and Q.No. IV should be answered by the students in writing. The examiner can adapt the blended mode of evaluation (oral& written) in view of the more number of students and time constraint.

DIGITAL ELECTRONICS AND MICROCONTROLLERS LABORATORY

Course Code	Course Title	No. of periods / Week	Total No. of Periods	Marks for FA	Marks for SA
EE-509	DIGITAL ELECTRONICS AND MICROCONTROLLERS	3	45	40	60

S.No	Major Topics	No. of periods	CO's Mapped
1.	Logic Gates	6	CO1
2.	Combinational Logic Circuits	6	CO2
3.	Sequential Logic Circuits	9	CO3
4	Basics of Microcontrollers	6	CO4
5	Programming on Microcontrollers	9	CO5

COURSE OUTCOMES MAPPING

COURSE OBJECTIVES	i. To understand number representation and conversion between different representation in digital electronic circuits.
	ii. To analyze logic processes and implement logical operations using combinational logic circuits.
	iii. To know the importance of different peripheral devices and their interfacing to microcontrollers.
	iv.To know the design aspects of microcontrollers and to write assembly language programs of microcontrollers for various applications.

COURSE OUTCOMES	**CO1**	EE-509.1	Understand theory of Boolean Algebra & the underlying features of various number systems.
	CO2	EE-509.2	Apply the concepts of Boolean Algebra for the analysis & design of various combinational & sequential logic circuits.
	CO3	EE-509.3	Analyze the sequential logic circuits design both in synchronous and asynchronous modes for various complex logic and switching devices.
	CO4	EE-509.4	Interpret various peripheral devices to the microcontrollers.
	CO5	EE-509.5	Write assembly language program for microcontrollers and Design microcontroller based system for various applications.

LEARNING OUTCOMES

1. Logic Gates

1.1 Verify the truth tables of basic gates and universal gates.
1.2 Show NAND gate and NOR gate as Universal gates.

2. Combinational Logic Circuits

2.1 Realize a given boolean function and obtain its truth table.
2.2 Construct half adder and full adder and verify the truth tables.
2.3 Verify the function of 74138 decoder IC.
2.4 Verify the working of Multiplexer (Using IC 74153)
2.5 Verify the functional table of 4-bit magnitude comparator 7485 IC.

3. Sequential Logic Circuits

3.1 Construct and verify the truth tables of NAND & NOR latches
3.2 Construct clocked RS FF using NAND gates and Verify its truth table.
3.3 Verify the truth table of JK FF using 7476 IC.
3.4 Construct D and T flip flops using 7476 and verify the truth tables.

4. Basics of Microcontrollers

4.1 Familiarization of 8051 Microcontroller Kit
4.2 Familiarization of 8051 simulator EDSIM 51 (or similar)

5. Programming on Microcontrollers

5.1 Write a program to demonstrate different register addressing techniques on 8051
5.2 Write a program to demonstrate Addition, subtraction, division and multiplication of 8 bit numbers using immediate data access on 8051.
5.3 Write a program to Add and Subtract 16 bit numbers on 8051.
5.4 Control a RGB led with Arduino.
5.5 Interface an LCD display with Arduino.
5.6 Control a small pump using moisture sensor and Arduino

CO'S AND PO'S MAPPING STRENGTH

CO No	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
EE-510.1	3				1			3	1	
EE-510.2	3	1				1	1	3		
EE-510.3	3	1		1		1		3		1
EE-510.4	3	1	1	1	1		1	3	1	
EE-510.5	3	1	1	1	1	1		3	1	1
Average	**3**	**1**	**1**	**1**	**1**	**1**	**1**	**3**	**1**	**1**

HYPONATED COURSE CONTENTS

1. Logic Gates

Verify the truth tables of basic gates and universal gates - Show NAND gate and NOR gate as Universal gates.

2. Combinational Logic Circuits

Realize a given boolean function and obtain its truth table - Construct half adder and full adder and verify the truth tables - Verify the function of 74138 decoder IC - Verify the working of Multiplexer (Using IC 74153) - Verify the functional table of 4-bit magnitude comparator 7485 IC.

3. Sequential Logic Circuits

Construct and verify the truth tables of NAND & NOR latches - Construct clocked RS FF using NAND gates and Verify its truth table - Verify the truth table of JK FF using 7476 IC - Construct D and T flip flops using 7476 and verify the truth tables.

4. Basics of Microcontrollers

Familiarization of 8051 Microcontroller Kit - Familiarization of 8051 simulator EDSIM 51 (or) similar

5. Programming on Microcontrollers

Write small ALP to demonstrate different register addressing techniques - Write an ALP to demonstrate Addition, subtraction, division and multiplication of 8 bit numbers using immediate data access - Write an ALP to Add and Subtract 16 bit numbers – Arduino Programming

Competencies & Key competencies to be achieved by the student

Sl.No.	Experiment Title	Competencies	Key Competencies
1	Logic Gates	• Understand the connection patterns in bread board • Identifying and constructing circuits using the basic logic gates (NOT, OR, AND, NOR, NAND) and their truth tables. • Identifying and constructing circuits using the compound logic gates (EXOR, EXNOR) and their truth tables.	• Connection of devices with exact ratings as per circuit diagram in bread board • Ability to verify truth table
2	Combinational Logic Circuits	• Applying fundamental theorems, associative laws, distributive laws, commutative laws, and De Morgan's theorems to solve problems. • . Applying Boolean principles to perform logic circuit evaluation by using truth tables, simplification by fundamental theorems, and simplification by the Karnaugh map technique. • Minimizing logic circuits into sum of products (SOP) and product of sums (POS) form. • . Identifying types of encoding, decoding, multiplexer and de-multiplexer devices and describing their functions and uses.	• Ability to verify truth table • Ability to build half adder and full adder and verify the truth tables
3	Sequential Logic Circuits	• Ability to detect and respond to clock signals • Connection of circuit diagram on kit with proper input sources	• Ability to detect and respond to changes in input signals

		• Using CRO to observe frequency response waveform patterns	• Ability to generate output signals based on input signals • Ability to detect and respond to enable signals
4	Basics of Microcontrollers	• Knowledge of microcontroller architecture and its components • Ability to write and debug assembly language programs • Knowledge of communication protocols	• Ability to write and debug assembly language programs
5	Programming on Microcontrollers	• Understanding of the microcontroller's instruction set • Knowledge of embedded system design principles • Ability to interface with external devices	• Ability to write and debug C and assembly language programs • Ability to interface with external devices

PROJECT WORK

Course Code	Course Title	No. of periods / Week	Total No. of Periods	Marks for FA	Marks for SA
EE-510	PROJECT WORK	3	45	40	60

Course Objectives	• Enhance the knowledge by field visits • Provide with the opportunity to synthesize knowledge from various areas of learning • Critically and creatively apply it to real life situations

COURSE OUT COMES	CO1	Organising teamwork.
	CO2	Innovative learning.
	CO3	Apply theoretical knowledge to practical work situations.
	CO4	Practice technical project reports preparation and presentation.

PO-CO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1						2				
CO2							2			
CO3			3							
CO4						2				

3: High, 2: Moderate, 1: Low

Note:

The gaps in CO and PO mapping will be met by one or more appropriate activities from the following:

(i) Assignments (ii) Tutorials (iii) Seminars (iv) Guest Lectures (v) Group Discussions (vi) Quiz (vii) Industry Visits (viii) Tech Fest (ix) Mini Projects (x) Library Visits.

Learning Outcomes

Upon completion of the course the student shall be able to

1. Problem solving and Critical Thinking

1.1. Generate Ideas from electrical courses and develop the ideas.
1.2. Gather relevant Information.
1.3. Evaluate Ideas.
1.4. Apply these ideas to a specific task.
1.5. Execute appropriate Laboratory skills
1.6. Draw Appropriate Conclusions

2. Communication

2.1 Communicate effectively.

2.2 Present Ideas Clearly.

2.3 Present Ideas Coherently.

2.4 Report writing.

3. Collaboration

3.1 Discuss the ideas.
3.2 Coordinate with team members
3.3 Team work in accomplishing the task.

4. Independent Learning

4.1 Involves in the group task.
4.2 Analyze the appropriate actions.
4.3 Compares merits and demerits
4.4 Analyze the activities for sustaina
4.5 Analyze the activities to ensure ethics

5. Ethics

5.1 Give respect and value to all classmates, educators, colleagues, and others
5.2 Understand the health, safety, and environmental impacts of their work
5.3 Recognize the constraints of limited resources
5.4 Develop sustainable products and processes that protect the health, safety, and prosperity of future generations
5.5 Maintain integrity in all conduct and publications and give due credit to the contributions of others

COURSE CONTENT

1.0 Design/Assembling/Analysis/Case Study Projects in the areas of Electrical & Electronics Engineering

Weightage of marks for Assessment of Learning Outcomes of Project work

S.No	Item	Marks
1	**Internal Marks** Completion of Assigned task in the group/individual to complete the project	**40**
	End Exam Marks: i) Demonstration of skill relevant to the project (30) ii) Project Report (20) iii) Viva Voce (10)	**60**
Total marks		**100**

- End Examination assessment shall be done by HEEES, external examiners and faculty members who guided the students during project work.
- The external examiner shall be from an industry/organisation/Head of EEE of other polytechnic/Senior faculty of other polytechnic.

VI SEMESTER

DIPLOMA IN ELECTRIAL AND ELECTRONICS ENGINEERING
SCHEME OF INSTRUCTIONS AND EXAMINATIONS
VI SEMESTER
INDUSTRIAL TRAINING

Sl. No.	Course Title	Duration	Scheme of evaluation			Remarks
			Item	**Nature**	**Max. Marks**	
1	Industrial Training	6 months	1.First Assessment at training place/ Industry (After 12 Weeks)	Assessment of Learning outcomes by both the faculty and training Mentor of the industry	120	Pass marks is 50% in assessment at training place/industry (first and second assessment put together)
			2.Second Assessment at training place/Industry (After 20 weeks)	Assessment of Learning outcomes by both the faculty and training Mentor of the industry	120	
			Final Summative assessment at institution level after completion of training.	Training Report	20	Pass marks is 50% in final summative assessment
				Demonstration of any one of the skills listed in learning outcomes	30	
				Viva Voce	10	
TOTAL MARKS					**300**	

INDUSTRIAL TRAINING

Subject Title	Subject Code	Duration
Industrial Training	EE-601	6 months

Time schedule

S.NO	Code	TOPICS	Duration
1	EE-601	• Practical training in Industry • Training Report Preparation Report Preparation: Title Page, Certificate, Acknowledgements, Abstract, Contents(introduction of Industry, Organization Chart, List of Major Equipments, List of Processes: Skills Acquired; Conclusions; Bibliography	Six Months

Course Objectives and Course Outcomes

Upon completion of the course the student shall be able to		
Course Objectives		1.Expose to real time working environment 2. Enhance knowledge and skill already learnt in the institution. 3. Acquire the required skills of assembling, dismantling, testing, trouble shooting, observing and supervising in electrical engineering fields.
COURSE OUT COMES	**CO1**	Apply theory to practical work situations
	CO2	Cultivate sense of responsibility and good work habits
	CO3	Exhibit the strength, teamwork spirit and self-confidence
	CO4	Gaining knowledge in installations, manufacturing, operations and maintaining various electrical goods and appliances.
	CO5	Writing reports and auditing in electrical projects.

PO-CO Mapping

CO NO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	3	1	1		2		1	3		2
CO2	3			1		3		3	1	2
CO3	3				2	3	1	3		2
CO4	3	1	1	1		3		3	1	2
CO5	3	1					1	3		2
Average	**3**	**1**	**1**	**1**	**2**	**3**	**1**	**3**	**1**	**2**

3: High, 2: Moderate, 1: Low

Learning Outcomes

The student shall be able to display the following skill sets

1) Demonstration Skills
2) Reading drawings and analysing Specifications
3) Handling Tools/Instruments/Materials/Machines
4) Assembling, dismantling, testing, trouble shooting and maintenance skills.
5) Assess and Control of quality parameters
6) Planning, Organizing, recording and report submission Skills

Scheme of evaluation

Sl. No.	Course Title	Duration	Scheme of evaluation		
			Item	**Nature**	**Max. Marks**
1	Industrial Training	6 months	1.First Assessment at Industry (After 12 Weeks)	Assessment of Learning outcomes by both the faculty and training Mentor of the industry	120
			2.Second Assessment at the Industry (After 20 weeks))	Assessment of Learning outcomes by both the faculty and training Mentor of the industry	120
			Final Summative assessment at institution level	Training Report	20
				Demonstration of any one of the skills listed in learning outcomes	30
				Viva Voce	10
TOTAL MARKS					**300**

Weightage of marks for Assessment of Learning Outcomes during first and second assessment

Sl.No	Learning Outcome	Max Marks Allotted For each parameter	Marks secured for each parameter
1	Demonstration Skills	20	
2	Reading drawings and analysing Specifications	20	
3	Handling Tools/Instruments/Materials/machines	20	
4	Assembling, dismantling, testing, trouble shooting and maintenance skills.	20	
5	Assess and Control of quality parameters	15	
6	Planning, Organizing, recording and report submission Skills	25	
	Total	**120**	

During assessment the performance of the students shall be assessed in those skills in which the student has been trained and be awarded the marks as per the weightage assigned as above. In case the student has undergone training in a few skill sets then the total marks obtained shall be raised to 120 marks for the given assessment i.e. either assessment 1 or 2. However the performance of the student shall be assessed at the most skill sets listed above but not less than three skill sets.

Illustration

If the student has undergone training in only 4 skill sets (namely serial number 1, 3, 4, 5 of above skill sets) and marks awarded during assessment is 50 out of 80 marks, then the marks of 50 shall be enhanced to 120 proportionately as (50/80)*120 =75.

GUIDELINES FOR INDUSTRIAL TRAINING OF DIPLOMA IN ELECTRICAL AND ELECTRONICS ENGINEERING PROGRAMME:

11. Duration of the training: 6 months.

12. Eligibility: As per SBTET norms
13. Training Area: Students can be trained in APGENCO/APTRANSCO/APDISCOM/Captive Power plants/Wind power plants,/Solar power plants/Milk factories/Railways/Roadways/Communication sectors/Television sectors/Public and private Organizations or industries or companies etc., related to electrical & electronics fields.
14. The Industrial Training shall carry 300 marks and pass marks is 50% in assessment at industry (first and second assessment put together) and also 50% in final summative assessment at institution level.
15. Formative assessment at industry level shall be carried out by the representative of the industry, where the student is undergoing training and the faculty from the concerned section in the institution.
16. If the student fails to secure 50% marks in industrial assessments put together, the student should reappear for 6 months industrial training at his/her own expenses.
17. If the student fails to secure 50% marks in final summative assessment at institution level, the student should reappear for final summative assessment in the subsequent board examination.
18. Final Summative assessment at institution level is done by a committee including **1. Head of the section (of concerned discipline ONLY), 2. External examiner from an industry and 3. Faculty member who assessed he student during industrial training as member.**
19. During Industrial Training the candidate shall put a minimum of 90% attendance.
20. If the student fails to secure 90% attendance during industrial training, the student should reappear for 6 months industrial training at his/her own expenses.

Guidelines and responsibilities of the faculty members who are assessing the students performance during industrial training:

- Shall guide the students in all aspects regarding training.
- Shall create awareness regarding safety measures to be followed in the industry during the training period, and shall check it scrupulously.
- Shall check the logbook of the students during the time of their visit for the assessment.
- Shall monitor progress at regular intervals and make appropriate suggestions for improvement.
- Shall visit the industry and make first and second assessments as per stipulated schedules.
- Shall assess the skill sets acquired by the students during their assessment.
- Shall award the marks for each skill set as per the marks allotted for that skill set during 1st and 2nd assessments
- Shall voluntarily supplement students learning through appropriate materials like photographs, articles, videos etc.
- Shall act as co-examiner along with other examiners in the final assessment at institution.
- Shall act as liaison between the student and mentor.
- Shall maintain a diary indicating his observation with respect to the progress of students learning in all three domains (Cognitive, Psychomotor and Affective).

Guidelines to the Training Mentor in the industry:

- Shall train the students in all the skill sets as far as possible.
- Shall assess and award the marks in both the assessments along with the faculty member.
- Shall check and approve the log books of the students.
- Shall approve the attendance of each student at the end of the training period.
- Shall report to the guide about student's progress, personality development or any misbehavior as the case may be.

- ✓ **Every Teacher (including HoD if not holding any FAC) shall be assigned a batch of students of 10 to 15 for industrial training irrespective of student's placements for training.**

Rubrics for assessment

Department of Technical Education

Industrial training assessment

PROFORMA

1. Name of the institution :
2. PIN :
3. Name of the student :
4. Assessment Period (I / II) : FROM: TO:

Skill Set Sl. No	*SKILL SET*	Max Marks Allotted For each parameter	Precisely completes the task	Completes the task, mistakes are absent, but not Precise	Completes the task, Mistakes are a few	Makes attempt, Mistakes are many
1	**Technical Skills (Manufacturing/Service/Name plate details /Identification of Tools components etc.,) (20)** *(i) Identification of components and tools.* *(ii) Identification of name plate details of machine/equipment. (iii) Explaining manufacturing procedure.* *(iv) Identification of service requirement.*	*5* *5* *5* *5*	*5* *5* *5* *5*	*3* *3* *3* *3*	*2* *2* *2* *2*	*1* *1* *1* *1*
2	**Reading, Observing, drawing and analysing Specifications. (15)** *(i) Analysing specifications of machine/ equipment.* *(ii) Drawing circuit diagram/schematic diagram of the*	*5* *5*	*5* *5*	*3* *3*	*2* *2*	*1* *1*

	manufacturing process. *(iii) Observing readings of various parameters.*	*5*	*5*	*3*	*2*	*1*
3	**Using of Tools/Instruments /Materials/Machines (20)** *(i) Use of proper Tools/Instruments* *(ii) Materials/Machinery required for the process*	*10* *10*	*10* *10*	*7* *7*	*6* *6*	*3* *3*
4	**Assembling, dismantling, testing, repair and maintenance skills (20)** *(i) Assembling and Dismantling* *(ii) Testing* *(iii) Repair and maintenance*	*10* *5* *5*	*10* *5* *5*	*7* *3* *3*	*6* *2* *3*	*3* *1* *2*
5	**Assess and Control of quality parameters, Practice of Safety measures and Precautions while handling the Electrical equipment (20)** *(i) Assess and control of quality parameters.* *(ii) Safety and precautions for handling the equipment.*	*10* *10*	*10* *10*	*7* *7*	*6* *6*	*3* *3*
6	**Planning, Organizing, Recording, Communicating, Supervising and report submission Skills *(25)*** *(i) Planning and organizing.* *(ii) Maintenance of records in the work place.* *(iii) Communication and*	*10* *5*	*10* *5*	*7* *3*	*6* *3*	*4* *2*

	Supervising skill. *(iv) Reporting technical issues.*	*5* *5*	*5* *5*	*4* *3*	*3* *3*	*2* *2*
TOTAL MARKS OBTAINED FOR 120						

NOTE: Mistakes are with reference to Technique, Procedure & precautions, while precision refers to technique, procedure, precautions, time & result.

(Marks awarded in words: **)**

Signature of the Training In-charge (Mentor)

Name

Designation

Signature of the faculty incharge (Guide)

Name

Designation