

CURRICULUM - 2023

C -23

DIPLOMA IN ELECTRONICS & COMMUNICATION ENGINEERING (INDUSTRY INTEGRATED)



**STATE BOARD OF TECHNICAL EDUCATION & TRAINING
ANDHRA PRADESH**

PREAMBLE

Technical Education is a key driver of economic development and plays a crucial role in providing individuals with the skills and knowledge necessary to thrive in the workplace. As technological advancements continue to reshape industries and create new opportunities, it is critical that technical education curricula remain relevant and up-to-date.

The 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. The revamping of the technical education curriculum is made with collaborative effort from educators, industry experts, policymakers, and students.

At the heart of the curriculum, is the belief that the technical 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 their fullest 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: industries, students, academia, parents and the society at large. **The Curriculum should be flexible, adaptable, and responsive to the changing needs of the industry and society.** 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.

The design of Curriculum C-23 was started in the month of January - 2023. Feedback was collected from all stake holders: Students, Lecturers, Senior Lecturers, Head of Sections and Principals for all programmes for this purpose. Accordingly, a workshop was convened on 15th February 2023 by Smt. C. Naga Rani, I.A.S, Director of Technical Education & Chairperson, SBTET, AP 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 Fourteen Academicians from Higher Level Institutions and officials of ITI, Skill Development, CTE & SBTET attended the workshop.

Smt. C Naga Rani, I.A.S., Commissioner of Technical Education while addressing in the workshop, emphasized the necessity of industrial training and on-hand experience, that the students need to undergo to support the industries and 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 consisting of experts from Industries, Higher Level Institutions and Faculty of Polytechnics are informed to study the possibility of incorporating the following aspects while preparation of the curriculum so as to improve employability.

- **To bring out industry oriented Diploma Engineers.**
- **Internet of Things (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.**

In continuation, series of workshops with subject experts followed in the subsequent weeks for thorough perusal for preparation of draft curriculum. Also, the suggestions received from representatives from various industries, academic experts from higher level institutions, subject experts from Polytechnics, have been recorded, validated for incorporation into the **Curriculum C-23**. Finally, the draft curriculum was sent to academicians of higher-level institutions, industrial experts for Vetting.

The design of new Curricula C-23 for 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 design of this curriculum and designed to meet the requirements of NBA Accreditation, too.

The Revised Curriculum i.e., Curriculum–2023 (C-23) is approved by 45th Academic Committee of SBTET, A.P for its implementation with effect from Academic Year 2023-24. Also, the SBTET, A.P under the aegis of the Department of Technical Education, Andhra Pradesh in it's 62nd Board Meeting held on 13-07-2023 (vide item no: 17) Approved to update the Polytechnic Curriculum C-23 with effect from the academic year 2023-2024 onwards after revamping the present C-20 curriculum, to meet the latest industrial technological developments including Industry 4.0 concepts.

2. HIGHLIGHTS OF CURRICULUM C-23

The following Courses/ Topics are incorporated in this curriculum C-23 as per the suggestions received from Industrial Experts, Faculty of Higher Level Institutions and Polytechnics to improve the Employability Skills of the Polytechnic Students.

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. 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.
8. 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.
9. 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.
10. The theory and practical subjects are restructured to find room for new theory and practical subjects to meet the present the industrial needs.
11. 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, for continuous guidance and valuable inputs during process of revising, modifying and updating the Curriculum C-20 to Curriculum C-23.

We are grateful to Sri. S. Suresh Kumar, I.A.S, Principal Secretary, Skills Development & Training for his valuable suggestions to bring the revamped curriculum C-23 in to a final form to meet latest Industry 4.0 concepts.

We are grateful to Sri. Saurab Gaur, I.A.S, former Principal Secretary, Skills Development & Training who actively participated in the Industry-Academia workshop conducted on 15th February, 2023 and offered valuable suggestions and insights into the learning needs and preferences so that the curriculum is engaging, inclusive, and effective.

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, Guntur involving faculty from Polytechnics, Premier Engineering Colleges & representatives from various Industries and Dr. C. R. Nagendra Rao, Professor & Head, NITTTR-ECV to analyse the Previous C-20 Curriculum and in designing of C-23 Curriculum, is highly appreciated and gratefully acknowledged.

We also extend our sincere thanks to Sri K.V. Ramana Babu, Secretary, SBTE&T, Andhra Pradesh, Sri K.Vijaya Bhaskar, Former 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 curricula.

4. RULES AND REGULATIONS OF C-23 CURRICULUM

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.**

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, Vijayawada. Only the candidates satisfying the following requirements will be eligible to appear for the Common Entrance Test for admissions into Polytechnics (POLYCET).
 - a. 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.
 - b. 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.
 - c. 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

Medium of Instruction

The medium of instruction and examination shall be English.

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.

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.

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 / 1st 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 / 1st year when offered in the next subsequent academic semester/year.

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.

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.

Scheme of Evaluation

a) First Year

Theory Courses: Each Course carries Maximum marks of 80 with an end 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 40/20 Marks for internal assessment i.e. sessional marks for each practical Course with an end examination of 3 hours duration carrying 60/30 marks. However, there are no minimum marks prescribed for sessional.

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.

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. The details are presented below.**

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	5
(iii)	<i>Dynamic Learning activities : Project Work/ Seminar/Tech-fest/Group Discussion, Quizzes etc./Extra-curricular activities/NSS/NCC/ IPSGM/Cleaning & Greening of Campus etc.</i>	5
	T O T A L	50

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

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

The 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.
- Nearby Industry
 - Govt / Semi Govt organization like R & B, PWD, PR, Railways, BSNL, APSRTC, APSEB etc.
 - Govt / University Engg College.
 - HoD/Senior Lecture (Selection Grade-II) from the Govt. Polytechnic
- Internal examiner shall be the person concerned with internal assessment as in (a) 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.

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 short hand 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.
- III. **In-Plant Industrial Training for 3-Year Diploma (C-23) Courses is scheduled as per the Academic Calendar of the SBTET every year.**

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 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.

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%) 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.

A candidate is eligible to appear for the 3rd semester examination if he/she puts the required percentage of attendance in the 3rd semester and pays the examination fee.

- 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 puts the required percentage of attendance in the 4th semester and pays the examination fee.

- 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 puts the required percentage of attendance in the 5th semester and pays the examination fee.

- v) A candidate shall be sent to Industrial training / VI semester provided he/she puts in the required percentage of attendance in the 5th 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) puts the required percentage of attendance, i.e., 90% in 6th semester Industrial Training.

For IVC & ITI Lateral Entry students:

- i.) A candidate shall be permitted to appear for Third Semester examination provided he / she puts in 75% attendance (which can be condoned on Medical grounds up to 10%) and pay the examination fee for Third semester.
- ii) 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 puts the required percentage of attendance in the 4th semester and pays the examination fee.

- ii) 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 puts the required percentage of attendance in the 5th semester and pays the examination fee.

- iii) A candidate shall be sent to Industrial training / VI semester provided he/she puts in the required percentage of attendance in the 5th 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) puts the required percentage of attendance, i.e., 90% in 6th semester Industrial Training and pays the examination fee.

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 puts the required percentage of attendance in the 4th semester

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 i.e., 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

For IVC & ITI Lateral Entry students:

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

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 5th semester.

For IVC & ITI Lateral Entry students:

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

IVC & ITI Lateral Entry students:

- a) Puts in the required percentage of attendance in 6th semester.
- 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, i.e., 90% in 7th semester Industrial Training.

For IVC & ITI Lateral Entry students:

- a) Puts in the required percentage of attendance, i.e., 90% in 7th semester Industrial Training.

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%.
 - 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.

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.

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 ie., Either/Or type , and each question carries 8 marks.

The sum of marks of 3 tests for I year and 2 tests for semesters including assignments and Dynamic learning activities (50 marks) 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. The sum of marks obtained in 2-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.

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 carry 3 marks, i.e., $10 \times 3 = 30$.

Section 'B' with Max marks of 50 contains 8 essay type questions. Only 5 questions are to be answered and each carry 10 marks, i.e., Max. Marks: $5 \times 10 = 50$.

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. $4 \times 5 = 20$.

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., $4 \times 10 = 40$.

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.

ISSUE OF MEMORANDUM 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.

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.

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 have 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.

For IVC & ITI Lateral Entry students:

- 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.

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) FOR RE-COUNTING (RC) and RE-VERIFICATION(RV) OF THE VALUED ANSWER SCRIPT

- 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.

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.

Discrepancies/ Pleas:

Any Discrepancy /Pleas 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.

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.

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.

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 is final.

FIRST YEAR

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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								
ECII-101	English	3	-	90	3	20	80	100
ECII-102	Engineering Mathematics - I	5	-	150	3	20	80	100
ECII-103	Engineering Physics	3	-	90	3	20	80	100
ECII-104	Engineering Chemistry & Environmental Studies	3	-	90	3	20	80	100
ECII-105	Electronic components and power supplies	5	-	150	3	20	80	100
ECII-106	Elements of Electrical Engineering	5	-	150	3	20	80	100
PRACTICAL								
ECII-107	Engineering Drawing	-	3	90	3	40	60	100
ECII-108	Electronic components and Devices Lab	-	3	90	3	40	60	100
ECII-109	Physics Lab	-	1.5	45	3 (1.5+1.5)	20	30	100 (50+50)
ECII-110	Chemistry Lab		1.5	45		20	30	
ECII-111	Computer Fundamentals Lab	-	3	90	3	40	60	100
ECII-112	Electrical Engineering Lab		3	90	3	40	60	100
	Activities		3	90	-	-	-	-
	TOTAL	24	18	1260		320	780	1100



ECII-101, English

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

S. No.	Unit Title	No of	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

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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

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

2. Living in Harmony

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

3. Connect with Care

- Use social media with discretion
- Speak about abilities and possibilities
- Make requests and express obligations
- Use modal verbs and main verbs in appropriate form
- Write short dialogues for everyday situations

4. Humour for Happiness

- Realize the importance of humour for a healthy living
- Improve vocabulary related to the theme
- Acquire reading and speaking skills
- Frame sentences with proper Subject – Verb agreement
- 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!

- Learn to deal with failures in life

Use the present tense form for various every day communicative functions such as speaking and writing about routines, professions, scientific descriptions and sports commentary

Write paragraphs with coherence and other necessary skills

6. Preserve or Perish

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

Narrate / Report past events

Develop vocabulary related to environment

Write e-mails

7. The Rainbow of Diversity

Appraise and value other cultures for a happy living in multi-cultural workspace

Understand the usage of different types of sentences

Ask for or give directions, information, instructions

Use language to express emotions in various situations

Write letters in various real life situations

8. New Challenges – Newer Ideas

Understand the functional difference between Active Voice and Passive Voice

Use Passive Voice to speak and write in various contexts

Understand the major parts and salient features of an essay

Learn about latest innovations and get motivated

9. The End Point First!

Understand the importance of setting a goal in life

Report about what others have said both in speaking and writing

Write an essay following the structure in a cohesive and comprehensive manner

Apply the words related to Goal Setting in conversations and in life

10. The Equal Halves

Value the other genders and develop a gender-balanced view towards life

Identify the use of different conjunctions in synthesising sentences

Write various types of sentences to compare and contrast the ideas

Apply the knowledge of sentence synthesis in revising and rewriting short essays

Develop discourses in speech and writing

11. Dealing with Disasters

Speak and write about different kinds of disasters and the concept of disaster management

Generate vocabulary relevant to disaster management and use it in sentences

Analyze an error in a sentence and correct it

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 : ECII-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	A p	A n	
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 -	8		1			3		CO1,CO2,

	Newer Ideas		10+3						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 *					
Total			110						

*(Integration of the cognitive skills of Understanding, Applying & Analysing)

ECII-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 (6 Questions X ½ Mark)	Helping Verbs	a) Primary helping verbs (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- ECII- 101
SBTET – I Year End Examinations
ECII-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.

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ECII-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 (40 Marks)	Total Marks 40 (Part A=16 Part B =24)	Short Answer questions (Part-A) Q. 1 = 4 marks Q. 2 to 5 = 3 Marks each Total=16 Marks	Long Answer Questions: (Part-B) Q. 6,7,8 @ 8 marks each ; Each question with Internal choice Total: 8X3 = 24 Marks

S.No. of the Question	Weightage of Marks	Language Skill / grammatical Concept of the question	Sub aspects & Description
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	Adjectives	a) Using appropriate forms of adjectives

	mark each)		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
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)
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
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
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- ECII-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".

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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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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:

- What are the two animal habitations mentioned in the passage?
- Give the main advantage of animals living in zoo.
- What kind of food is the zoo animals fed with?
- What is the most disadvantage aspect faced by the zoo animals?
- How do you think that the visitors can harm the zoo animals?
- Do you support keeping the animals in a zoo for our entertainment? Justify your answer in a sentence.
- Pick the word from the passage that would mean: A violent or bigger animal that kills and eats the other tiny animal.
- 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:

- Who is the speaker of the above speech and what is his nationality?
- What is the occasion of the above speech: ()
 - a birthday party
 - an election campaign
 - a movement for a right cause
 - a government function
- What sort of discrimination did the speaker fight against?
- What good does he expect regarding the children of slaves and masters?
- What is the contextual meaning of the frequently used word “dream” ?
- How should a nation be judged?
- What are the two places mentioned by the speaker in his speech?
- Pick the word from the passage that would mean: “that lives for ever without death”

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ECII-102,ENGINEERING MATHEMATICS-I

Course	Course Title	No. of	Total No. of	Marks for FA	Marks for SA
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Code		Periods/week	periods		
ECII-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.
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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.

Explain Relations and functions – examples

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

Define rational, proper and improper fractions of polynomials.

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

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

Define a matrix and order of a matrix.

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

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.

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

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

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.

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.

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.

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

Define compound angles and state the formulae of $\sin(A \pm B)$, $\cos(A \pm B)$, $\tan(A \pm B)$ and $\cot(A \pm B)$.

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

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

Solve simple problems on compound angles.

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

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

Solve simple problems using the above formulae

Syllabus for Unit test-I completed

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

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

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

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

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.

State various properties of inverse trigonometric functions and identities like



$$\sin^{-1} x + \cos^{-1} x = \frac{\pi}{2}, \text{ etc.}$$

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.

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.

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

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

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

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

Define the operations on complex numbers with examples.

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).

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.

Define locus of a point and circle.

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

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).

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

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

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

Syllabus for Unit test-II completed

conics.

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

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

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

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

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

State the concept of derivative of a function $y = f(x)$ – definition, first principle

as $\lim_{h \rightarrow 0} \frac{f(x+h) - f(x)}{h}$ and also provide standard notations to denote the derivative of a function.

Explain the significance of derivative in scientific and engineering applications.

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

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

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

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

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

Explain the method of differentiation of parametric functions with examples.

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

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

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

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

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.
Find the equations of tangent and normal to the curve $y=f(x)$ at any point on it – examples.
Explain the derivative as a rate of change in distance-time relations to find the velocity and acceleration of a moving particle with examples.
Explain the derivative as a rate measurer in the problems where the quantities like volumes, areas vary with respect to time- illustrative examples.
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.
Explain the procedure to find the extreme values (maxima or minima) of a function of single variable- simple problems for quadratic and cubic polynomials.
Apply the concept of derivatives to find the errors and approximations in simple problems.

Syllabus for Unit test-III completed

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.

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	

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) into their partial fractions covering the types mentioned below.

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

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

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 $\sin(A \pm B)$, $\cos(A \pm B)$, $\tan(A \pm B)$, $\cot(A \pm B)$, and related identities with problems.

6. Multiple and sub multiple angles:

Formulae for trigonometric ratios of multiple angles $2A$, $3A$ and sub multiple angles $A/2$ with problems.

7. Transformations: Transformations of 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:

$\sin x = k$, $\cos x = k$, $\tan x = k$, where k is a constant. Solutions of simple quadratic equations and equations of type $a \cos x + b \sin x = c$.

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 at any 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.

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	6	5	0	0	0	0	1/2	0	CO2

	Functions									
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

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



Subject name: Engineering Mathematics-I
Sub Code: ECII-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 $f : X \rightarrow Y$ 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)

$\sin 45^\circ + \cos 45^\circ$ The value of 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 $\frac{\sin 75^\circ}{\sin 2A}$.

(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 $(P+Q)^T = P^T + Q^T$.
(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
State Board of Technical Education and Training, A. P.
First Year
Subject name: Engineering Mathematics-I
Sub Code: ECII- 102

C -23, ECII -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

$$\sin^{-1} \left(\frac{3}{5} \right) = \tan^{-1}(x), \text{ then } x = \underline{\hspace{2cm}}$$

(CO2)

c.

If $z = 2 + 3i$, then

$$|z| = \underline{\hspace{2cm}}$$

(CO2)

d. The eccentricity of the rectangular hyperbola is $\underline{\hspace{2cm}}$.

(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 $\frac{\sin 5\theta + \sin \theta}{\cos 5\theta + \cos \theta} = \tan 3\theta$. (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 $\triangle ABC$. (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 $\frac{1}{2}$. (CO3)

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Unit Test III
State Board of Technical Education and Training, A. P
First Year
Subject name: Engineering Mathematics-I
Sub Code: ECII-102

C –23, EC II-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. $\lim_{x \rightarrow 1} \frac{x^2 + 1}{x + 5} = \frac{1}{3}$: State TRUE/FALSE. (CO4)

b. $\frac{d}{dx} (x^n) = \underline{\hspace{2cm}}$ (CO4)

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

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

2. Evaluate $\lim_{\theta \rightarrow 0} \frac{\sin 2\theta}{\theta}$ (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, ECII- 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 $f : A \rightarrow B$ 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 $\frac{\cos 16^\circ + \sin 16^\circ}{\cos 16^\circ - \sin 16^\circ} = \tan 61^\circ$. (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 $\lim_{x \rightarrow 0} \frac{2x^2 - 3x + 1}{x^2 - 2x + 4}$. (CO4)
10. Find $\lim_{x \rightarrow 0} \frac{\sin 7x}{\sin 11x}$. (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 $\frac{\sin 7\theta + \sin 5\theta}{\cos 7\theta + \cos 5\theta} = \tan 6\theta$. (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) Find the 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. (CO3)
15. A) Find the derivative of $3\tan x - 4\log x - 7x^2 + \sqrt{x}$ w.r.t x . (CO4)
- B) Find the derivative of $x^2 e^{3x}$ 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 $u(x, y) = x^2 y + y^2 x$, 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 is the 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, ECII- 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 $f: A \rightarrow B$ 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 $\frac{\cos 36^\circ + \sin 36^\circ}{\cos 36^\circ - \sin 36^\circ} = \tan 81^\circ$. (CO2)
6. Prove that $\frac{1 + \cos 2\theta}{\sin 2\theta} = \cot \theta$. (CO2)
7. Find the modulus of the complex number $3+2i$. (CO2)
8. Find the equation of the circle with centre (1,2) and radius 4. (CO3)
9. Find $\lim_{x \rightarrow 0} \frac{2x^2 - 3x + 1}{x^2 - 2x + 4}$. (CO4)
10. Find $\lim_{x \rightarrow 0} \frac{\sin 5x}{\tan 3x}$. (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 $\cos 40^\circ + \cos 80^\circ + \cos 160^\circ = 0$. (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 $a = 5$, $b = 7$, $C = 30^\circ$, 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 $3\cos x + \log x + 21x + 8e^{-x}$ 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 $(1+x^2) \frac{d^2 y}{dx^2} + 2x \frac{dy}{dx} = 0$. (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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ECII-103, ENGINEERING PHYSICS

Course Code	Course title	No of periods/week	Total no of periods	Marks for FA	Marks for SA
ECII-103	ENGINEERING PHYSICS	03	90	20	80

S.No	MajorTopics	No.of Periods	Cos
1.	Units and measurements	09	CO1
2.	Statics	11	
3.	Gravitation	12	
4.	Concepts of energy	10	CO2
5.	Thermal physics	10	CO3
6.	Sound	12	
7.	Electricity & magnetism	13	CO4
8.	Modern physics	13	
	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.
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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 cell, optical fibers, semiconductors, superconductors and nanotechnology.

MATRIX SHOWING MAPPING OF COURSE OUTCOMES WITH PROGRAMME OUTCOMES

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

LEARNING OUTCOMES

Understand the concept of units and measurements

Explain the concept of Units

Define the terms

a) Physical quantity, b) Fundamental physical quantities and

c) Derived physical quantities

Define unit

Define fundamental units and derived units

State SI units with symbols

State multiples and submultiples in SI system

State rules of writing S.I. units

State advantages of SI units

What are direct and indirect measurements.

Define accuracy and least count

Define error in measurement

Define absolute, relative and percentage errors with their formulae

Solve simple problems on absolute, relative and percentage errors

Understand the concepts of statics

Explain the concept of Vectors

Define scalar and vector quantities with examples

Represent vectors geometrically

Define the types of vectors (equal, negative, unit, co-initial, co-planar vectors, Position vector)

Resolve the vector into rectangular components

State and explain triangle law of addition of vectors

Define concurrent and co-planar forces

State and explain Lami's theorem

State parallelogram law of addition of forces with diagram

Write the expressions for magnitude and direction of resultant (no derivation)

Illustrate parallelogram law with examples (i) flying of bird and (ii) working of sling.

Define moment of force and couple.

Write the formulae and S.I. units of moment of force and couple.

Solve simple problems on (i) Resolution of force and (i

i) Parallelogram law of forces (finding R , α and θ).

Understand the concepts of Gravitation

State and explain Newton's universal law of gravitation.

Define G and mention its value.

Explain the acceleration due to gravity (g)

Explain the factors affecting the value of g

Derive the relationship between g and G .

3.6. State and explain the Kepler's law of planetary motion

Define a satellite.

What are natural and artificial satellites? Give examples.

Define orbital velocity and write its formula.

Define escape velocity and write its formula.

Write a brief note on PSLV

Write a brief note on GSLV

Mention the applications of artificial satellites

Solve simple problems on (i) Newton's law of gravitation and (ii) calculation of orbital and escape velocities.

Understand the concepts of Energy.

Define work done and energy. Mention their SI units.

List various types of energy.

Define P.E with examples. Write its equation.

Define K.E with examples. Write its equation.

Derive relationship between K.E and momentum.

State the law of conservation of energy. Give various examples.

Write a brief note on solar energy.

Explain the principle of solar thermal conversion.

Explain the principle of photo voltaic effect

Solve simple problems on (i) work done (ii) P.E & K.E and (iii) Relation between K.E & momentum.

Understand the concepts of thermal physics

Define the concepts of heat and temperature

State the modes of transmission of heat

Define conduction, convection and radiation with two examples each.

State and explain Boyle's law

Define absolute zero temperature

Explain absolute scale of temperature

State the relationship between Degree Celcius, Kelvin and Fahrenheit temperatures

State Charles laws and write its equation

State Gay-Lussac's law and write its equation

Define ideal gas

Derive ideal gas equation

Explain why universal gas constant (R) is same for all gases

Calculate the value of R for 1 gram mole of gas.

Solve simple problems on (i) Interconversion of temperatures between °C, K and F (ii) Gas laws and (iii) Ideal gas equation.

Understand the concepts of Sound

Define the term sound

Define longitudinal and transverse waves with one example each

Explain the factors which affect the velocity of sound in air

Distinguish between musical sound and noise

Explain noise pollution and state SI unit for intensity of sound

Explain sources of noise pollution

Explain effects of noise pollution

Explain methods of minimizing noise pollution

Define Doppler effect

List the Applications of Doppler effect

Define reverberation and reverberation time

Write Sabine's formula and name the parameters contained

Define echoes and explain the condition to hear an echo.
 Mention the methods of reducing an echo
 Mention the applications of an echo
 What are ultrasonics
 Mention the applications of ultrasonics, SONAR,
 Solve simple problems on echo

Understand the concepts of Electricity and Magnetism

Explain the concept of P.D and EMF
 State Ohm's law and write the formula
 7.3 Explain Ohm's law
 Define resistance and specific resistance. Write their S.I units.
 State and explain Kichoff's first law.
 State and explain Kirchoff's second law.
 Describe Wheatstone's bridge with legible sketch.
 Derive an expression for balancing condition of Wheatstone's bridge
 Describe Meter Bridge experiment with necessary circuit diagram.
 Write the formulae to find resistance and specific resistance in meter bridge

7 .11 Explain the concept of magnetism

What are natural and artificial magnets (mention some types)
 Define magnetic field and magnetic lines of force and write the properties of magnetic lines of force
 State and explain the Coulomb's inverse square law of magnetism
 Define magnetic permeability
 Define para, dia, ferro magnetic materials with examples
 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

Understand the concepts of Modern physics

State and Explain Photo-electric effect
 State laws of photoelectric effect
 Explain the Working of photoelectric cell
 List the Applications of photoelectric effect
 Recapitulate refraction of light and its laws
 8.6 Define critical angle
 Explain the Total Internal Reflection
 Explain the principle and working of Optical Fiber
 List the applications of Optical Fiber
 Explain the energy gap based on band structure
 Distinguish between conductors, semiconductors and insulators based on energy gap
 Define doping
 Explain the concept of hole
 Explain the types of semiconductors : Intrinsic and extrinsic
 What are n-type and P-type semiconductors
 Mention the applications of semiconductors
 Define superconductor and superconductivity
 List the applications of superconductors
 Nanotechnology definition, non materials 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

ScalarsandVectors– Representation of a vector - Typesofvectors - 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 – Conceptofaccelerationduetogravity (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 - ExpansionofGases -Boyle'slaw -Absolutescale 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'slawandexplanation-Specificresistance- Kirchoff'slaws - Wheatstone'sbridge - Meter bridge.
Natural and artificial magnets – magnetic field and magnetic lines of force - Coulomb'sinversesquarelaw – Permeability – Magnetic materials – Para, dia, ferro – Examples – Problems.

8. Modern Physics

Photoelectric effect – laws of photoelectric effect– photoelectric cell - Applicationsofphotoelectric 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



(Model Paper) **C –23, ECII -103**
State Board of Technical Education and Training, A. P
Diploma in Electronics and Communication Engineering (Industry Integrated)
First Year
Subject Name: ENGINEERING PHYSICS
Sub Code: ECII - 103
Time : 90 minutes **Unit Test-I** **Max.Marks:40**

Part-A

16Marks

Instructions: (1) Answer all questions.

(2) First question carries four marks, each question of remaining carries three marks

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

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) 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)

(Model Paper)

C-23, EC -103

State Board of Technical Education and Training, A. P
Diploma in Electronics and Communication Engineering (Industry Integrated)
First Year

Subject Name: ENGINEERING PHYSICS

Sub Code: ECII - 103

Time : 90 minutes

Unit Test-II

Max.Marks:40

Part-A

16Marks

Instructions: (1) Answer all questions.

(2) First question carries four marks, each question of remaining carries three marks

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

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) 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)

(Model Paper)

C -23, EC -103

State Board of Technical Education and Training, A. P

Diploma in Electronics and Communication Engineering (Industry Integrated)

First Year

Subject Name: ENGINEERING PHYSICS

Sub Code: ECII - 103

Time : 90 minutes

Unit Test-III

Max.Marks:40

Part-A

16Marks

Instructions: (1) Answer all questions.

(2) First question carries four marks, each question of remaining carries three marks

1. (i) The unit of specific resistance is
(a) Ω (b) Ω /m (c) $\Omega -m$ (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) Photoelectric cell converts _____energy into electric energy (Fill in the blank) (CO4)
2. Find the current passing through a conductor of resistance $2\ \Omega$ 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

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

OR

(b) Draw circuit diagram of Meter bridge. Two resistors of $10\ \Omega$ and $30\ \Omega$ 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)



MODEL PAPER
BOARD DIPLOMA EXAMINATIONS
C-23, ECII-103, ENGINEERING PHYSICS
FIRST YEAR
YEAR END EXAMINATION

TIME:3 HOURS

MAX MARKS:80

Part-A

10×3=30

Instructions: (1) Answer all questions.

(2) Each question carries three marks

(3) Answer 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

5×10=50

Instructions:(1) Answer any 5 questions.

(2) Each question carries 10 marks

(3) Answer 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. (CO2) (6 Marks)
(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. (CO2) (4 Marks)
12. State and explain Kepler's law of planetary motion. (CO1) (10 Marks)
13. (a) Derive the relationship between g and G. (CO2) (5 Marks)
(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 $G = 6.67 \times 10^{-11}$ Nm²/kg². (CO2) (5 Marks)
14. Explain the principle of solar thermal conversion and photo voltaic effect.(CO2) (5+5)
15. (a) Derive the ideal gas equation. (CO3) (7 Marks)

(b) Volume of a gas at 27 °C is 100 CC. Keeping the pressure constant, find its volume at a temperature of 50 °C. (CO3) (3 Marks)

16. (a) Write any five methods of reducing noise pollution. (CO3) (5 Marks)

(b) Define echo. Write three applications of it. (CO3) (2+3)

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 resistance S. (CO4) (3 Marks)

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

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ECII-104, ENGINEERING CHEMISTRY AND ENVIRONMENTAL STUDIES

Course code	Course Title	No. of	Total No. of	Marks for FA	Marks for SA

		Periods per week	Periods		
ECII-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.

ECII-104	Engineering. Chemistry and Environmental studies No of Course Objectives:5	No Of periods 90
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POs	Mapped with CO No	CO periods addressing PO in Col 1		Level 1,2,3	remarks
		NO	%		
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	1		1				1	1	
CO2	3	1	1					1	1	
CO3	3		1							
CO4	3				1		1			
CO5	3				1			1		
Average	3	1	1	1	1		1	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	Weight age of marks	Marks wise distribution of Weightage				Question wise distribution of Weightage				Mapped with CO
				R	U	A p	An	R	U	A p	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

LEARNING OUTCOMES

Atomic structure

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

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

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

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

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

Write the electronic configuration of elements up to atomic number 30

Explain the significance of chemical bonding

Explain the Postulates of Electronic theory of valency

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

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

Solutions, Acids and Bases

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

Classify solutions based on solubility.

Define mole and problems on mole concept.

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, $\text{Ca}(\text{OH})_2$, $\text{Al}(\text{OH})_3$) and Salts (NaCl, Na_2CO_3 , CaCO_3)

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

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

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

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

Electrochemistry

Define the terms 1. Conductor 2. Semiconductor 3. Insulator, 4. Electrolyte 5. Non-electrolyte. Give two examples each.

Distinguish between metallic conduction and Electrolytic conduction

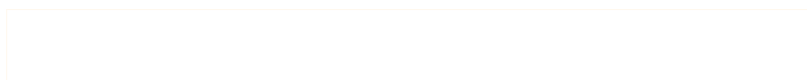
Explain electrolysis by taking example fused NaCl and list out the applications of electrolysis.

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

Distinguish between electrolytic cell and galvanic cell.

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.

Corrosion

Define the term corrosion.

state the Factors influencing the rate of corrosion

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

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

Explain the methods of prevention of corrosion

a) Protective coatings (anodic and cathodic coatings)

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

5.0 Water Treatment

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

Define and classify the hardness of water.

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

State the disadvantages of using hard water in industries.

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

Numerical problems on hardness.

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

Polymers & Engineering materials.

A) Polymers

Explain the concept of polymerisation

Describe the methods of polymerization a) addition polymerization of ethylene

b) condensation polymerization of Bakelite (Only flow chart)

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

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

B) Engineering materials

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

1. Nichrome 2. Duraluminium 3. Stainless Steel.

Define elastomers: Write the composition and applications of the following

1. Buna-S 2. Neoprene

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

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

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

1. Nematic 2. Smectic crystals

Define Nano materials. Write the composition and applications of the following:

1. nanotubes 2. Nano crystals.

Fuels

Define the term fuel

Classify the fuels based on occurrence.

Write the composition and uses of the following:

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

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

ENVIRONMENTAL STUDIES

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

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

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.

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

State the uses of forest resources.

Explain the causes and effects of deforestation

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

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

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

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

COURSE CONTENT

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) Duraluminium iii) Stainless Steel.

Composite materials- Composition and applications of i) GFR ii) CFR

Liquid Crystals-types- applications of i) Nematic Crystals ii) Smectic crystals

Nano materials- 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 alcohol

8. ENVIRONMENTAL STUDIES

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

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

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

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 .
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:
 $\text{CaSO}_4 = 13.6 \text{ mg/lit,}$ $\text{Mg(HCO}_3)_2 = 7.3 \text{ mg/lit,}$
 $\text{Ca(HCO}_3)_2 = 16.2 \text{ mg/lit,}$ $\text{MgCl}_2 = 9.5 \text{ mg/lit}$ (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-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) 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 Galvanic 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)



ELECTRONIC COMPONENTS & POWER SUPPLIES

Course Code	Course title	No of periods/week	Total no of periods	Marks for FA	Marks for SA
ECII-105	ELECTRONIC COMPONENTS & POWER SUPPLIES	05	150	20	80

S No	Unit Title	No. of Periods	COs Mapped
1	Passive Components	20	CO1
2	Switches, Connectors, Relays and PCBs	20	CO2
3	Semiconductor Physics	15	CO3
4	Semiconductor Diodes	15	CO4
5	Bipolar Junction Transistor	20	CO5
6	Field Effect Transistor	20	CO6
7	Opto Electronic Devices	20	CO7
8	DC Power Supplies	20	CO8
	Total	150	

Course Objectives	1. To learn the principles of passive components, switches, relays and PCBs
	2. To Understand the formation of semiconductor materials and the working of semiconductor diode and to analyse the working of BJT and FET
	3. To analyse the working of Special semiconductor devices and to understand the working of DC Power Supplies

CO No		COURSE OUTCOMES
CO1	ECII-105.1	Familiarize different passive components,
CO2	ECII-105.2	Familiarize different switches, relays and their use. Describe PCB manufacturing Techniques and soldering methods
CO3	ECII-105.3	Describe the formation of Extrinsic semiconductors
CO4	ECII-105.4	Analyze the working of semiconductor diode
CO5	ECII-105.5	Analyse the working of BJT & configurations



CO6	ECII-105.6	Analyse the working of FETS
CO7	ECII-105.7	Analyse the working of Special Semiconductor Devices.
CO8	ECII-105.8	Explain rectifier circuits and regulated power supplies

CO-PO/PSO MATRIX

CO No	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
ECII-105.1	3	3	2	2			1	3	1	1
ECII-105.2	3	2	3		2		2	3	1	1
ECII-105.3	3	3	2				2	3	1	
ECII-105.4	3	3	2	2	2		2	3	1	
ECII-105.5	3	3	3	2	2	1	2	3	1	2
ECII-105.6	3	3	3	2	2	1	2	3	1	
ECII-105.7	3	3	2	2	2	1	2	3	2	1
ECII-105.8	3	3	2	1				3	2	
Average	3	2.87	2.37	1.83	2	1	1.85	3	1.25	1.25

3=strongly mapped

2=moderately mapped

1=slightly mapped

LEARNING OUTCOMES

Passive Components

- i) Define the term resistance
- ii) Define the term resistor & classify resistors
- iii) Draw the circuit symbols of fixed and variable resistors
- iv) List the specifications of a resistor

State the physical factors that affect the value of a resistor and calculate resistance value by using colour Code.

Compare the features of carbon and wire wound potentiometers

Describe the working of rheostat and mention its applications.

Define temperature co-efficient of resistance and explain the effects of temperature on resistance

Describe the working of thermistor and sensistor and mention their applications.

- i) Define the term inductance



- ii) Define the term inductor & classify inductors
- iii) Draw the circuit symbols of different types of inductors
- iv) List the specifications of an inductor
- v) Explain the term Stray inductance

List various core materials used in the construction of inductors

Explain the use of Ferrites in the construction of high frequency inductors

List the applications of A.F. and R.F chokes.

- i) Define the term capacitance.
- ii) Define the term capacitor & classify capacitors.
- iii) Draw the circuit symbols of fixed and variable capacitors.
- iv) List the specifications of a capacitor
- v) Explain the term Stray capacitance

State the factors affecting the capacitance of a capacitor.

Define Di-electric constant and Di-electric strength of a material.

State different types of variable capacitors and mention their applications.

Switches, Connectors, Relays and PCBs

Classify switches according to poles and throws (SPST, SPDT, DPST, DPDT, Multi-pole multi-throw)

Sketch the I.S.I symbols of various switches.

State the need of fuse in electronic equipment.

Mention different types of fuses.

Explain the necessity of connectors in electronic circuits.

List different types of connectors.

Mention the use of MCB.

Define a relay.

Classify different relays based on principle of operation, polarization and application.

List the specifications and applications of relays.

Explain the working of general purpose electromagnetic relay.

Explain the need of PCB in electronic equipment.

Classify PCBs and list the types of laminates used in PCBs.

List the methods of transferring layout on to the copper clad sheet.

List the materials used in screen-printing.

List the steps involved in screen-printing for making PCBs.

Describe the methods of etching, cleaning and drilling of PCB.

Describe the steps involved in making double-sided PCB.

Explain Surface Mount Technology and its uses.

List the materials used in soldering.

List the soldering methods of PCBs.

Semiconductor Physics

Explain the terms conductivity and resistivity and give their equations

Describe Energy Level and Energy Band diagrams

Compare conductors, semiconductors and Insulators

Explain Valance band, Conduction band and Forbidden energy gap

Explain Semiconductor materials using Energy Band diagrams

Explain Hole conduction, bi polar nature of Semiconductor materials

Describe Intrinsic Semiconductors and Fermi level

State the need for doping.

Distinguish between intrinsic and extrinsic semiconductor

Explain the formation of P type and N type semiconductor
Compare P-type and N-type semiconductors
Explain Drift and Diffusion currents

Semiconductor Diodes

Explain the formation of PN junction diode.
Describe the working of PN junction Diode with forward & reverse biasing.
Draw the VI characteristics of a diode.
Explain diode equation
Explain the manufacturer specifications of a given diode from data sheet.
Mention the applications of diode
Explain reverse breakdown phenomenon
Distinguish between Avalanche & Zener breakdowns
Explain the construction and working of Zener diode.
Draw the forward & reverse bias characteristics of Zener diode
Mention the applications of Zener diode
Explain the working principle of Varactor diode
List the applications of varactor diode.

Bipolar Junction Transistor

Explain the formation of transistor
Draw the circuit symbol of transistor
Explain the working of PNP and NPN Transistors.
Draw the different transistor configurations
Sketch the input/output characteristics of CB ,CE and CC configurations.
Identify the cut off, saturation and active regions in output characteristics of CB , CE and CC
Configurations
Define alpha, beta and gamma factors
Relate alpha, beta and gamma factors.
Write collector current expression in CB and CE modes of transistors in terms of α , β , I_E , I_B , I_C and I_{CBO} , I_{CEO}
Compare the performance characteristics of CB, CE and CC configurations

Field Effect Transistor

Classify Field Effect Transistors
Describe the construction and principle of operation of n channel JFET
Draw and explain the drain characteristics of JFET
Draw and explain the mutual characteristics of JFET
Define the parameters of JFET and obtain the relation among them.
List the advantages of JFET over BJT
Explain the construction & working of N channel Enhancement type MOSFET
Explain the construction & working of N channel Depletion type MOSFET

Draw the Drain Characteristics of N channel depletion MOSFET
Compare JFET and MOSFET

Opto Electronic Devices

Explain the construction, operation and characteristics of photo diode.
Explain the construction, operation and characteristics of photo transistor.
List the applications of photo diode and photo transistor.
Explain the principle of LDR and list the applications of LDR
Explain the construction, working principle and characteristics of LED
List the applications of LED
Explain the working of opto-coupler
List the applications of opto-couplers
Explain the working principle of LCD
List the applications of LCD

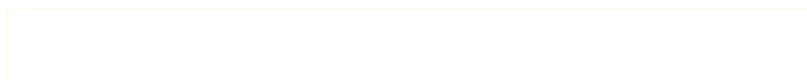
DC Power Supplies

Explain the necessity of D.C. power supply for Electronic circuits
Describe the working of Half wave rectifier, Full Wave centre tapped rectifier and Bridge rectifier circuits with wave forms
Give the equations for RMS value and average value(DC value) voltages and currents for above rectifiers(no need to derive the expressions)
i) Define ripple factor and efficiency for the above circuits
ii) Give the formulae for ripple factor and efficiency
Compare HW, FW Centre tapped and Bridge Rectifiers
List the different types of filters used in rectifier circuits
Explain the working of a RC, CRC and CLC filter for a full wave rectifier output
State the need for a regulated power supply
Draw the block diagram of Regulated DC power supply and explain the function of Each block
Define Voltage Regulation
Explain the working of a simple Zener regulator
List the types of IC regulators and give the advantages of IC regulators
Explain the operation of fixed positive and negative voltage Regulators(using 78xx and 79xx series)
Explain the operation of adjustable voltage regulator(LM317).

COURSE CONTENTS

1. Passive components

Resistors: Resistance, resistor-Classification- Circuit symbols-Specifications-Physical factors- -Colour code-Carbon and wire wound potentiometers – Rheostat – Applications – Temperature coefficient of resistance - Effect of temperature on resistance – Thermistors, sensistors– Applications



Inductors: Inductance, Inductor-Classification - Circuit symbols – Specifications- Stray inductance - Core materials – Ferrites - AF and RF Chokes

Capacitors: Capacitance, Capacitor-Classification - Circuit symbols – Specifications – Stray Capacitance–Factors affecting capacitance- Dielectric constant - Dielectric strength – Variable capacitors - Applications

2. **Switches, Connectors, Relays and PCBs:** Switch- Classification – ISI symbols – Fuse – Types-Necessity of connectors – Types – MCB – Relay – Classification – Specifications – Applications – General purpose electromagnetic relay

PCBs: PCB – Classification – Methods of layout preparation - Methods of transferring layout-Screen printing materials- Steps – Etching, cleaning and drilling - Double sided PCB,Steps-Materials used in soldering – Soldering methods

3. **Semiconductor Physics:** Energy level, Energy Band Diagrams compare conductors , semiconductors and insulators - Valance band, Conduction band and Forbidden energy gap – Semiconductor Materials – Hole conduction, Bi polar nature of semiconductor materials – Intrinsic Semiconductors - Extrinsic Semiconductors - P type & N type semiconductors- Drift and diffusion currents-

4. **Semiconductor Diodes:** PN junction diode – Working - VI characteristics – Energy band diagrams- Potential barrier - Diode equation – Manufacturer specifications – Applications - Breakdown phenomenon – Avalanche and Zener breakdowns - Zener diode construction, working – Reverse bias characteristics –Applications-working principle of varactor diode- applications

5. **BJT:** Transistor formation – PNP & NPN transistors- symbols - Construction – Working - CB, CE and CC configurations - I/p & O/p characteristics - Active, Cut-off and saturation regions– Alpha(α), Beta(β),Gamma (γ)factors- Relation- Collector current expression inCBand CE- Comparison of CB,CE,CC

6. **Field Effect Transistor:** Classification –N channel JFET Construction, Principle of operation – Drain characteristics – Mutual characteristics – Parameters of JFET – Relationship - Advantages of JFET over BJT –N Channel enhancement MOSFET – Construction, working - N Channel depletion MOSFET – Construction, working - Drain and transfer characteristics of N channel Depletion MOSFET – Comparison of JFET and MOSFET

7. **Opto-Electronic Devices:**

Construction, working principle of photo diode, photo transistor, LED and their applications-opto-coupler-working principle of LCD-Applications.

8. **DC Power Supplies:** Necessity of DC power supply- Half wave, Full wave and Bridge rectifiers Working , Wave forms, RMS value, Average value of voltages and currents - Ripple factor and efficiency – Comparison of HW, FW Centre tapped, and bridge rectifiers – Need for filters –



Working of RC,CRC,CLC – Need for regulated power supply – Voltage regulation – Zener regulator –IC regulator

REFERENCE BOOKS

1. G.K.Mithal, Electronic Devices and Circuits, 23rd Edition- Khanna Publication-1988
2. B. Somanathan, Electronic devices and applications, 2nd Edition- PHI.
3. Dr.K.Padmanabham, P.Swaminathan, Electronic components, 2nd Edition,- Laxmi Publications (P) Ltd
4. Walter c bosshard, Printed circuit boards: design and technology -TMH
5. Bernard Grob, Basic Electronics, 4th edition- TMH-1977
6. Millman&Halkias, Electronic devices & Circuits, 4th edition- TMH

BLUE PRINT

Sl No	Unit Title	No of Periods	Weightage Allotted	Weightage of Marks		COs mapped
				No of Essay Questions	No of Short answer Questions	
1	Passive Components	20	16	1	2	CO1
2	Switches, Connectors, Relays and PCBs	20	13	1	1	CO2
3	Semiconductor Physics	15	13	1	1	CO3
4	Semiconductor Diodes	15	13	1	1	CO4
5	Bipolar Junction Transistor	20	13	1	1	CO5
6	Field Effect Transistor	20	13	1	1	CO6
7	Opto-Electronic Devices	20	16	1	2	CO7
8	DC Power Supplies	20	13	1	1	CO8
		150	110	80	30	

Table specifying the scope of 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 3.8 to 6.6
Unit Test-III	From 6.7 to 8.14

Model Paper

C –23, ECII -105

State Board of Technical Education and Training, A. P

Diploma in ELECTRONICS & COMMUNICATION ENGINEERING (INDUSTRY INTEGRATED)

First Year

Subject Name: Electronic Components and Power supplies

Sub Code: ECII – 105, Unit Test-I

Time : 90 minutes

Max.Marks:40



Part-A

16Marks

Instructions: (1) Answer all questions.

(2) First question carries four marks, each question of remaining carries three marks

1. Draw the circuit symbols of following
 - a) Variable Resistor (CO1)
 - b) Single pole double throw (SPDT) switch (CO2)
 - c) Iron core inductor (CO1)
 - d) Double pole single throw (DPST) switch (CO2)
2. Classify the different types of inductors (CO1)
3. Define the term capacitance (CO1)
4. List the materials used in soldering. (CO2)
5. Define the terms resistivity and conductivity and give their equations. (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) Explain the use of Ferrites in the construction of high frequency inductors (CO1)
(or)
(b) Explain the working of thermistor and sensistor. (CO1)
7. (a) Explain the working of general-purpose electromagnetic relay and mention its applications. (CO2)
(or)
(b) Explain the methods of etching, cleaning and drilling of PCB (CO2)
8. (a) Describe the steps involved in making double-sided PCB. (CO3)
(or)
(b) Compare conductors, semiconductors and insulators (CO3)

(Model Paper)

C –23, ECII -105

State Board of Technical Education and Training, A. P



Diploma in ELECTRONICS & COMMUNICATION ENGINEERING (INDUSTRY INTEGRATED)
First Year

Subject name: Electronic Components and Power supplies

Sub Code: ECII - 105

Time : 90 minutes

Unit Test II

Max.Marks:40

Part-A

16Marks

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

(2) First question carries **four** marks, each question of remaining carries **three** marks

1. Draw the circuit symbols of following
 - a) NPN Transistor (CO5)
 - b) PNP Transistor (CO5)
 - c) Varactor diode (CO4)
 - d) Zener Diode (CO4)
2. Draw the VI characteristics of diode (CO4)
3. Write the collector current expression in CB Configuration (CO5)
4. Define alpha, beta and gamma factors of a transistor. (CO5)
5. List the advantages of JFET over BJTs (CO6)

Part-B

3×8=24M

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) Describe the working of PN junction Diode with forward & reverse biasing. (CO4)

(or)

(b) Describe the formation of P- type and N- type semiconductor with energy band diagram (CO4)
7. (a) Explain the operation of NPN transistor (CO5)

(or)

(b) Draw and explain the output characteristics of transistor CE configuration (CO5)
8. (a) Describe the construction and principle of n channel JFET (CO6)

(or)

(b) Draw and explain the mutual characteristics of JFET (CO6)



(Model Paper)
C –23, ECII -105
State Board of Technical Education and Training, A. P
Diploma in ELECTRONICS & COMMUNICATION ENGINEERING (INDUSTRY INTEGRATED)
First Year
Subject Name: Electronic Components and Power supplies
Sub Code: ECII - 105
Time : 90 minutes Unit Test III Max.Marks:40

Part-A

16Marks

Instructions: (1) Answer all questions.

(2) First question carries four marks, each question of remaining carries three marks

1. Draw the circuit symbols of following
 - a) N channel MOSFET (CO6)
 - b) LED (CO7)
 - c) Photo Transistor (CO7)
 - d) Ripple factor of half wave rectifier is ----- (CO8)
2. Compare JFET and MOSFET (CO6)
3. List the applications of photo diode (CO7)
4. Define voltage regulation (CO8)
5. What are the efficiencies of HWR & FWR (CO8)

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) Explain the construction & working of N channel Enhancement type MOSFET (CO6)

(b) Compare JFET and MOSFET (CO6)
7. (a) Explain the construction, working principle and of LDR (CO7)
(or)
(b) Explain the working of Opto-Coupler. (CO7)

8. (a) Explain the working of full wave bridge rectifier with wave forms (CO8)
(or)
(b) Explain the operation of adjustable voltage regulator (CO8)

MODEL PAPAER
BOARD DIPLOMA EXAMINATIONS
C-23, ECII-105, ELECTRONIC COMPONENTS AND POWER SUPPLIES
FIRST YEAR
YEAR END EXAMINATION

TIME:3 HOURS

MAX MARKS:80

Part-A

10×3=30

Instructions: (1) Answer all questions.

(2) Each question carries three marks

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

1. Define the term capacitance (CO1)
2. Compare the features of carbon and wire wound potentiometers (CO1)

3. Sketch the I.S.I symbols of any three switches. (CO2)
4. Distinguish between Drift and Diffusion currents (CO3)
5. Compare Avalanche & Zener breakdown (CO4)
6. Relate alpha, beta and gamma Factors. (CO5)
7. Interpret the advantages of JFET over BJT. (CO6)
8. Write any three applications of photo diode? (CO7)
9. List any three materials used for the construction of LED (CO7)
10. Compare Half wave, Full wave Centre tapped, Bridge rectifiers in any 3 aspects (CO8)

Part-B

5×10=50

Instructions: (1) Answer any 5 questions.

(2) Each question carries ten marks

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

11. Explain the use of Ferrites in the construction of high frequency inductors (CO1)
12. Explain the working of general-purpose electromagnetic relay and mention its applications. (CO2)
13. Explain the formation of P type and N-type semiconductors (CO3)
14. Explain the working of PN junction Diode with forward & reverse biasing. (CO4)
15. Explain the working of NPN and PNP transistors. (CO5)
16. Explain the construction and principle of operation of n channel JFET. (CO6)
17. Explain the construction, operation and characteristics of photo diode. (CO7)
18. Explain the working of centre tapped full wave rectifier with wave forms (CO8)



ELEMENTS OF ELECTRICAL ENGINEERING

Course Code	Course title	No of periods/week	Total no of periods	Marks for FA	Marks for SA
ECII-106	ELEMENTS OF ELECTRICAL ENGINEERING	05	150	20	80

S No	Unit Title	No. of Periods	COs Mapped
1	Basics of Electrical Engineering	25	CO1
2	Basic Electrical circuits	25	CO2

3	AC Fundamentals	30	CO3
4	Transformers	20	CO4
5	Motors	17	CO5
6	Measuring and Test Instruments	18	CO6
7	Batteries	15	CO7
	Total	150	

Course Objectives	1. To understand the concepts of basic electrical circuits
	2. To understand the AC fundamentals
	3. To learn the practical importance and applications of Transformers Motors, Measuring instruments, Testing Instruments and batteries

CO No		COURSE OUTCOMES
CO1	ECII-106.1	Explain the concept of electric field and magnetic field.
CO2	ECII-106.2	Understand the concept of basic electrical circuits
CO3	ECII-106.3	Analyse the AC fundamentals
CO4	ECII-106.4	Explain the transformer principle and applications.
CO5	ECII-106.5	Understand the basic principle of DC and AC motors
CO6	ECII-106.6	Explain the construction and working principle of measuring and test instruments
CO7	ECII-106.7	To understand the construction and working of different batteries

CO-PO/PSO MATRIX

CO No	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
ECII-106.1	3	1						3		
ECII-106.2	3	3						3	1	
ECII-106.3	3	3						3	1	
ECII-106.4	3	1	3		3			3		1
ECII-106.5	3	1	3		3			3		1
ECII-	3	2	3	3	1			3	1	1

106.6										
ECII-106.7	3	2	3		1			3	1	
Average	3	1.85	3	3	2			3	1	1

3=strongly mapped

2=moderately mapped

1=slightly mapped

LEARNING OUTCOMES

Basics of Electrical Engineering

Explain the concept of lines of force & magnetic Field

Define the terms magnetic field intensity, magnetic potential, Flux, magnetic flux density

Define the terms absolute permeability and relative permeability

State Faraday's laws of electro - magnetic induction

Explain dynamically and statically induced E.M.F.

Define the term self-inductance, mutual inductance and co-efficient of coupling.

i) State expression for equivalent inductance of inductors connected in series

ii) State expression for equivalent inductance of inductors connected in parallel

Solve simple problems on the above

Explain the concept of electrostatic field

Define the terms absolute permittivity and relative permittivity

Define the terms electric potential and potential difference, voltage, current and power.

Define the terms electric field intensity, electric flux, electric flux density

i) State expression for equivalent capacitance of capacitors connected in series

ii) State expression for equivalent capacitance of capacitors connected in parallel

Solve simple problems on the above

Explain charging and discharging of capacitor

Basic Electrical circuits

Distinguish between active and passive elements

Explain the terms Ideal voltage source and Ideal current source

State Ohm's Law and its limitations

State Kirchhoff's current law and Kirchhoff's voltage law

Derive an expression for equivalent resistance of resistors connected in series

Derive an expression for equivalent resistance of resistors connected in parallel

Explain current division rule for a two branch parallel resistive network

Solve simple problems on current division rule

AC fundamentals

Explain the effect of AC flowing through Pure Resistance , Inductance and Capacitance with vector diagrams

Explain mathematical representation of vectors in a) symbolic notation ,b) trigonometric c) exponential and polar forms

Define the terms reactance, Impedance, admittance, conductance and power factor
Explain active and reactive components of AC current
Explain active, reactive and apparent power in AC circuit
Define Q factor of a coil
Explain series RL, RC and RLC circuits
Solve problems on series RL and RC circuits
Explain parallel RL, RC and RLC circuits
Explain admittance method for solving parallel RL, RC and RLC circuits

Transformers

Explain the working principle of transformer
Classify transformers based on power rating, construction and applications
Give reasons for using laminations in transformer core
State voltage transformation ratio
Explain the losses in a transformer
Define efficiency and regulation of transformer
Explain the construction and working of an auto transformer
Explain the applications of transformer as
a) potential transformer
b) current transformer
c) impedance matching transformer
d) isolation transformer
List important specifications of a transformer

Motors

Explain the principle of operation of DC Motor
Explain the significance of back EMF
State the equations for speed of
a) DC series motor b) DC shunt motor
Compare DC series motor and DC shunt motor
List specifications of DC motor
Explain the need for starter
Explain the principle of operation of single-phase induction motor
Explain the principle of operation of stepper motor
List the applications of stepper motor

Measuring and Test Instruments

List the characteristics of ideal voltmeter and ideal Ammeter.
Explain the construction and principle of operation of PMMC instrument.
Explain the working of rectifier type voltmeter
List the advantages of digital instruments over analog instruments.
Explain the working of Ramp type digital voltmeter with block diagram.
State the use of analog/digital multimeters.
State the specifications of digital multimeters such as Accuracy, Resolution, Range, Precision, Display Digits



Explain the working of function generator with block diagram.
State the working principle of logic probe.

Batteries

Define the terms „Cell“ and „battery“
State the differences between Cells and Batteries.
Give the Classification of batteries.
Explain the construction and working of sealed Lead Acid battery?
List the advantages, limitations and applications of Lead acid batteries.
Explain the working Principle of Nickel-cadmium (Ni-Cd) batteries?
List the advantages, limitations and applications of Ni-Cd Batteries.
Explain the construction and working of lithium-ion batteries?
List the applications of Lithium-ion batteries.
State the important technical specifications of batteries.

COURSE CONTENT

1.0 Basics of Electrical Engineering

Concept of lines of force & magnetic Field –Magnetic field intensity, Magnetic potential, Flux , Magnetic Flux density - Absolute permeability and relative permeability - Faraday’s laws of electro - magnetic induction - Dynamically and statically induced E.M.F.- Self inductance ,mutual inductance and co-efficient of coupling- Equivalent inductance of inductors connected in series/parallel– Simple problems – Electrostatic field- Absolute permittivity and relative permittivity-Electric potential, potential difference, voltage, current and power- Electric field intensity – Electric flux – Electric flux density - Equivalent capacitance of capacitors connected in series/parallel - Simple problems - Charging and discharging of capacitor

2.0 Basic Electrical circuits

Active and passive elements-Ideal voltage source and Ideal current source- Ohm’s Law – Limitations - Kirchhoff’s current law and Kirchhoff’s voltage law-Equivalent resistance of resistors connected in series/parallel- Current division rule for a two branch parallel resistive network –Simple problems

3.0 AC fundamentals

Effect of AC flowing through Pure Resistance , Inductance and Capacitance with vector diagrams-Mathematical representation of vectors a) symbolic notation ,b) trigonometric c) exponential and polar forms - Reactance, Impedance, admittance, conductance and Power Factor- Active and Reactive components of AC current- Active and Reactive and apparent power - Q factor of a coil –Series RL,RC,RLC circuits with AC supply - AC through RL-RC circuits-problems on RL,RC circuits-Parallel AC circuit containing RLC- Admittance method for solving AC parallel circuits.

4.0 Transformers



Principle of transformer –Classifications-Reasons for using laminations- Voltage transformation ratio-Losses in transformer- Efficiency and regulation of transformer - Auto transformer- Applications of transformer-Specifications of transformer

5.0 Motors

Principle of D.C. motors- Significance of back E.M.F.- Equation for speed of DC motors(Series & Shunt) - Specifications of DC motor–Starter-Single phase induction motor, - Stepper motor

6.0 Measuring and Test Instruments

Characteristics of ideal voltmeter and ideal Ammeter - Construction and principle of operation of PMMC instrument-Rectifier type voltmeter-Advantages of digital instruments over analog instruments- Ramp type digital voltmeter – multimeter- specifications of digital multimeter -Function generator-logic probe.

Batteries

Battery- Classification of batteries-Sealed Lead Acid battery-Nickel-cadmium (Ni-Cd) batteries-lithium-ion batteries-advantages, limitations and applications of different batteries-technical specifications of batteries

REFERENCEBOOKS

1. V K mehata, RohitMehata, Basic electrical engineering-S.Chand Publication
2. D P Kothari, I J Nagrath, Basic electrical engineering, 4th edition- TMH
3. B.L. Thereja, A Text Book of Electrical Technology volume –II -S.Chand
4. Dr.P S Bimbhra, Electrical Machines- Khanna Publication
5. HS Kalsi, Electronic Instrumentation, Tata McGraw Hill
6. T R Crompton, “Battery Reference Book-3 rd. Edition”, Newness- Reed Educational and Professional Publishing Ltd.,

BLUE PRINT

Sl No	Unit Title	No of Periods	Weightage Allotted	Weightage of Marks		COs mapped
				No of Essay Questions	No of Short answer Questions	
1	Basics of Electrical Engineering	25	16	1	2	CO1
2	Basic Electrical circuits	25	16	1	2	CO2
3	AC Fundamentals	30	23	2	1	CO3
4	Transformers	20	16	1	2	CO4
5	Motors	17	13	1	1	CO5
6	Measuring and Test Instruments	18	13	1	1	CO6
7	Batteries	15	13	1	1	CO7
		150	110	80	30	

Table specifying the scope of syllabus to be covered for Unit Tests

Unit Test	Learning outcomes to be covered
Unit Test-I	From 1.1 to 2.8
Unit Test-II	From 3.1 to 4.9
Unit Test-III	From 5.1 to 7.10

(Model Paper)

C –23, ECII-106

State Board of Technical Education and Training, A. P

Diploma in ELECTRONICS & COMMUNICATION ENGINEERING (INDUSTRY INTEGRATED)

First Year

Subject Name: Elements of Electrical Engineering

Sub Code: ECII- 106

Time : 90 minutes

Unit Test- I

Max.Marks:40

Part-A

16Marks

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

(2) First question carries **four** marks, each question of remaining carries **three** marks

1. Fill in the blanks with one word

- a) The work done to move a charge from infinite to the given point is called as _____ (CO1)
- b) The permittivity of space is also called as _____ (CO1)
- c) What are the units for magnetic flux density _____ (CO1)
- d) What is the unit of capacitance _____ (CO1)
2. State Ohm's Law and its limitations (CO2)
3. Define the terms Absolute and relative permittivity of a medium. (CO1)
4. Give the expression for equivalent capacitance of capacitors connected in parallel (CO1)
5. State Kirchhoff's current law and Kirchhoff's voltage law. (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) Explain dynamically and statically induced E.M.F (CO1)
(or)
(b) Explain charging and discharging of capacitor (CO1)
7. (a) Explain current division rule for a two branch parallel resistive network (CO2)
(or)
(b) Explain the terms Ideal voltage source and Ideal current source (CO2)
8. (a) Derive an expression for equivalent capacitance of two capacitors connected in series. (CO1)
(or)
(b) Explain the concept of lines of force & magnetic Field. (CO1)

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(Model Paper)

C –23, ECII-106

State Board of Technical Education and Training, A. P

Diploma in ELECTRONICS & COMMUNICATION ENGINEERING (INDUSTRY INTEGRATED)

First Year



Subject Name: Elements of Electrical Engineering

Sub Code: ECII- 106

Time : 90 minutes

Unit Test - II

Max.Marks:40

Part-A

16Marks

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

(2) First question carries **four** marks, each question of remaining carries **three** marks

1.
 - a) In series RLC circuit at resonance the impedance is maximum. **(T/F)** (CO3)
 - b) In parallel RLC circuit at resonance the impedance is maximum **(T/F)** (CO3)
 - c) The Efficiency of the transformer is defined as the ratio of useful output power to the input power.**(T/F)** (CO4)
 - d)_____of the transformer is the percentage change in the output voltage from no-load to full-load (CO4)
2. Define Q factor of a coil (CO3)
3. Define the terms reactance, Impedance (CO3)
4. State voltage transformation ratio of transformer. (CO4)
5. Classify transformers based on construction (CO4)

Part-B

3×8=24

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

(2) Each question carries **eight** marks

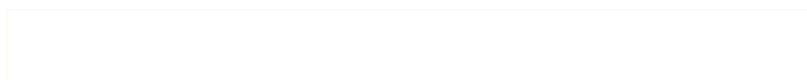
(3) Answer should be comprehensive and the criterion for valuation is the content but not the length of the answer.

6. (a) Explain the effect of AC flowing through Pure Resistance , inductance with vector diagrams (CO3)

(or)
(b) Explain the effect of AC flowing through the series RC circuit with vector diagrams. (CO3)
7. (a) Explain mathematical representation of vectors in i) symbolic notation , ii) trigonometric and iii) polar forms (CO3)

(or)
(b) Explain active, reactive and apparent power in AC circuit (CO3)
8. (a) Explain the losses in a transformer (CO4)

(or)
(b) Explain the construction and working of an auto transformer (CO4)



(Model Paper)
C –23, ECII-106
State Board of Technical Education and Training, A. P
Diploma in ELECTRONICS & COMMUNICATION ENGINEERING (INDUSTRY INTEGRATED)
First Year
Subject Name: Elements of Electrical Engineering
Sub Code: ECII- 106
Time : 90 minutes Unit Test III Max.Marks:40

Part-A

16Marks

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

(2) First question carries **four** marks, each question of remaining carries **three** marks

1. Fill in the blanks with one word
 - a) Write the equation for speed of DC series motor _____ (CO5)
 - b) Write the equation for speed of DC shunt motor _____ (CO5)
 - c) An ideal volt meter has infinite resistance. **TRUE/FALSE** (CO6)
 - d) In Ni-Cd cells the electrolyte is a mixture of deionized water and _____ (CO7)
2. Compare DC series motor and DC shunt motor (CO5)
3. List the advantages of digital instruments over analog instruments. (CO6)
4. State the differences between Cells and Batteries. (CO7)
5. List the limitations of Lead-acid batteries. (CO7)

Part-B

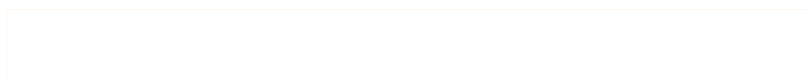
3×8=24

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) Explain the principle of operation of single phase induction motor (CO5)
or
(b) Explain the principle of operation of stepper motor (CO5)
7. (a) Explain the construction and principle of operation of PMMC instrument. (CO6)
(or)
(b) Explain the working of function generator with block diagram. (CO6)
8. (a) Explain the construction and working of sealed Lead Acid battery? (CO7)
(or)
(b) Explain the construction and working of lithium-ion batteries? (CO7)



MODEL PAPER
BOARD DIPLOMA EXAMINATIONS
C-23, ECII-106, ELEMENTS OF ELECTRICAL ENGINEERING
FIRST YEAR
END EXAMINATION

TIME:3 HOURS

MAX

MARKS:80

Part-A

3×10=30

Instructions: (1) Answer **all** questions.
(2) Each question carries **three** marks
(3) Answer should be brief and straight to the point and shall not exceed five simple sentences.

1. Define the terms Absolute and relative permeability of medium (CO1)
2. State Faraday's laws of electro - magnetic induction. (CO1)
3. State Ohm's law and its limitations. (CO2)
4. State Kirchhoff's current law and Kirchhoff's voltage law (CO2)
5. Define Q factor of a coil. (CO3)
6. Define efficiency and regulation of transformer (CO4)
7. State voltage transformation ratio (CO4)
8. Distinguish DC series motor and DC shunt motor (CO5)
9. List any three advantages of digital instruments over analog instruments. (CO6)
10. List the applications of Lead acid batteries. (CO7)

Part-B

5×10=50

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

11. Explain dynamically and statically induced E.M.F (CO1)
12. Explain current division rule for a two branch parallel resistive network (CO2)
13. Explain active, reactive and apparent power in AC circuit (CO3)

14. A series RC circuit with $R=100\ \Omega$, $C=56\ \mu\text{F}$ is connected across 230V, 50Hz AC supply. Find
 (i) Impedance (ii) Current (iii) Power factor (iv) Voltage drop across the resistor (CO3)
15. Explain the construction and working of an auto transformer. (CO4)
16. Explain the principle of operation of stepper motor (CO5)
17. Explain the working of function generator with block diagram. (CO6)
18. Explain the construction and working of lithium-ion batteries? (CO7)

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ENGINEERING DRAWING

Course code	Course Title	No. of periods /week	Total No. of periods	Marks for FA	Marks for SA
ECII-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 able to understand the basic graphic skills and use them in preparation of engineering drawings, their reading and interpretation
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Course Outcomes	CO 1	ECII-107.1	Practice the use of engineering drawing instruments
	CO 2	ECII-107.2	Familiarise with the conventions to be followed in engineering drawing as per BIS
	CO 3	ECII-107.3	Construct the i) basic geometrical constructions ii) engineering curves
	CO 4	ECII-107.4	Visualise and draw the orthographic projections of i) Points ii) Lines iii) Regular Planes iv) Regular Solids V) Sections of Regular Solids
	CO 5	ECII-107.5	Visualise and draw the isometric views of machine components
	CO 6	ECII-107.6	Draw the developments of surfaces of regular solids and use them to make the components used in daily life

PO-CO Mapping

ECII-107	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	3	2	2				1	2	3	1
CO2	3	2	2				1	2	3	1
CO3	3	2	2				1	2	3	1
CO4	3	2	2				1	2	3	1
CO5	3	2	2				1	2	3	1

CO6	3	2	2				1	2	3	1
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3: High, 2: Moderate, 1: Low

LEARNING OUTCOMES

Upon completion of the course the student shall able to

Use of Drawing Instruments, Free Hand Lettering and Dimensioning Practice

State the importance of drawing as an engineering communication medium

Select the correct instruments to draw the different lines / curves.

Use correct grade of pencil and other instruments to draw different types of lines and for different purposes

Identify the steps to be taken to keep the drawing clean and tidy.

Write titles using vertical and slopping (inclined) lettering and numerals of 7mm, 10mm and 14mm height.

Acquaint with the conventions, notations, rules and methods of dimensioning in engineering drawing as per the B.I.S.

Dimension a given drawing using standard notations and desired system of dimensioning.

Principles of Geometric Constructions

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

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

Draw the engineering curves like i) involute ii) cycloid iii) helix

Projections of points, lines, planes and solids (All in first quadrant only)

Explain the basic principles of the orthographic projections

Visualise and draw the projection of a point with respect to reference planes (HP & VP)

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)

Visualise and draw the projections of planes (up to planes perpendicular to one plane and

inclined to other plane)

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)

Sectional Views

Identify the need to draw sectional views.

Draw sectional views of regular solids by applying the principles of hatching.

Orthographic projection

Draw the orthographic views of an object from its pictorial drawing.

Draw the minimum number of views needed to represent a given object fully.

Competencies and Key competencies to be achieved by the student

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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 and helix 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:

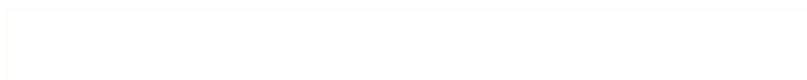
NOTES:

- B.I.S Specification should invariably be followed in all the topics.**
- 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 and Helix, 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

Engineering Graphics by P I Varghese – (McGraw-hill)

Engineering Drawing by Basant Agarwal & C.M Agarwal - (McGraw-hill)
 Engineering Drawing by N.D.Bhatt.
 T.S.M. & S.S.M on “ Technical Drawing” prepared by T.T.T.I., Madras.
 SP-46-1998 – Bureau of Indian Standards.

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, ECII-107
ENGINEERING DRAWING

TIME:90 MINUTES

MAX MARKS: 40

PART-A

(4X5=20)

Instructions :

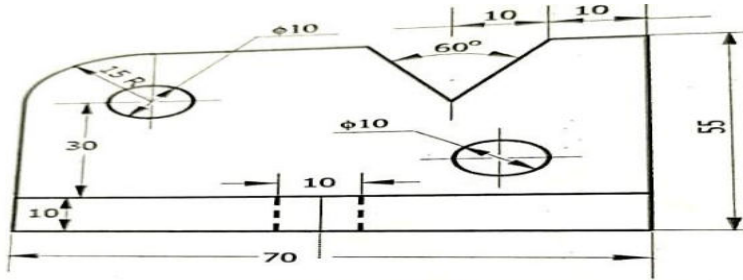
- (1) Answer all questions.
- (2) Each question carries five marks.
- (3) All dimensions are in mm.

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 revolution 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, ECII-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 60° 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, ECII-107,
ENGINEERING DRAWING
TIME:90 MINUTES MAX MARKS: 40**

PART-A

(4X5=20M)

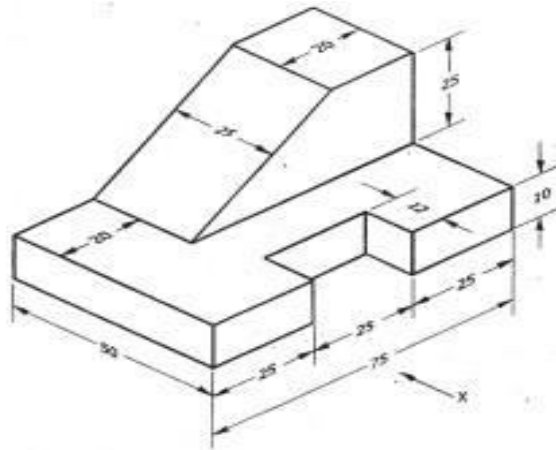
Answer all questions and each question carries four marks.

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

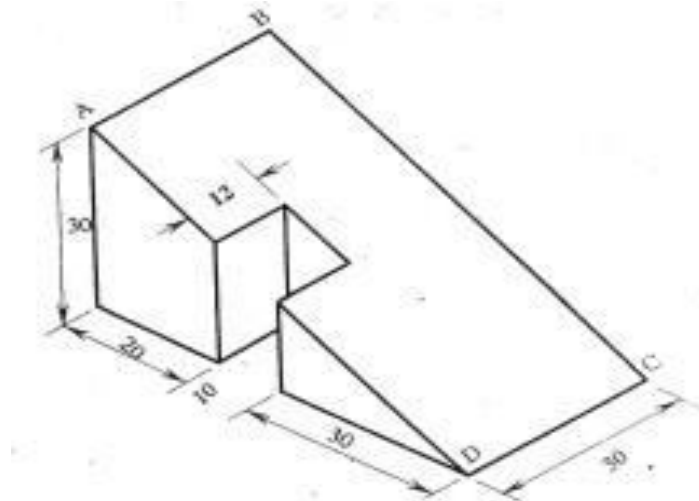


horizontal section plane passing through the axis. Draw front view and sectional top view of the prism. (CO4)

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° 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)

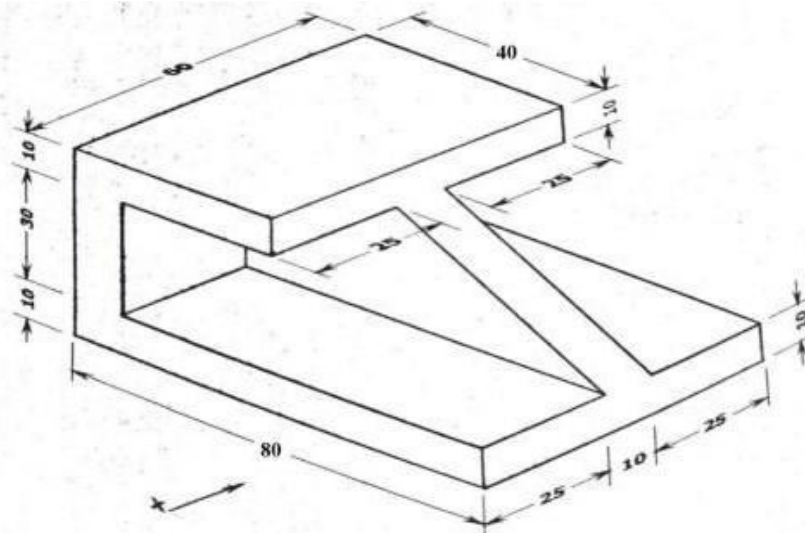
Answer any Two questions, Each question carries ten marks.

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° to HP, perpendicular to VP and is bisecting the axis. Draw its front view, sectional top view and the true shape of section. (CO4)



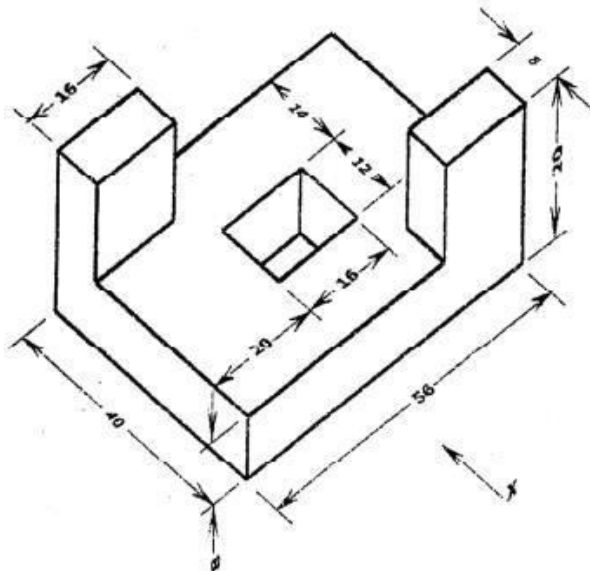
2. A cone of diameter 60 mm and height 70 mm is resting on ground on its base. It is cut by a section plane perpendicular to VP inclined at 45° to HP and cutting the axis at a point 40 mm from the bottom. Draw the front view, sectional top view and true shape. (CO4)

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-ECII-107

**BOARD DIPLOMA EXAMINATIONS
MODEL QUESTION PAPER
DECE(Industry Integrated) – I-YEAR
ECII-107 :: ENGINEERING DRAWING**

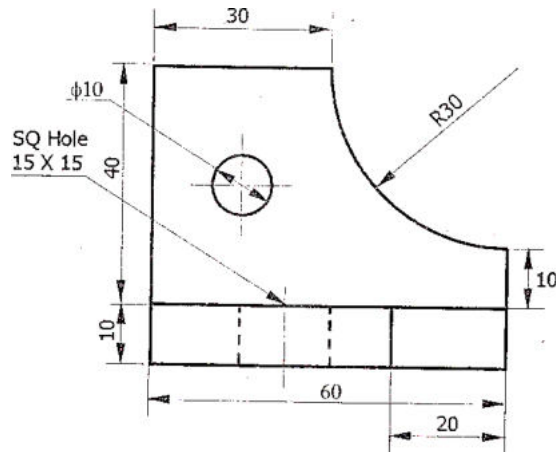
- Instructions:**
- All the dimensions are in mm
 - Use first angle projections only
 - Due weightage will be given for the dimensioning and neatness

PART – A

05 x 04=20

- Answer all the questions
- Each question carries FIVE marks

- Write the following in single stroke capital vertical lettering of size 10mm
ORTHOGRAPHIC PROJECTIONS
- Redraw the given fig. and dimension it according to SP-46:1988. Assume suitable scale



- Draw internal common tangents to two unequal circles of radii 26mm and 20mm. The distance between the circles is 75mm.
- Draw the projections of a point A lying on HP and 25mm in front of V.P.

PART – B

10 X 04 = 40

- Answer any FOUR questions
- Each question carries TEN marks

- 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° 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.

Electronic Components and Devices Lab

Course Code	Course title	No of periods/week	Total no of periods	Marks for FA	Marks for SA
ECII-108	Electronic Components and Devices Lab	03	90	40	60

S No	Unit Title	No. of Periods	COs Mapped
1	Identifying different electronic components	06	CO1
2	Soldering practice and Preparation of PCB	24	CO2
3	Study and use of Electronic equipment	21	CO3
4	Testing ,obtaining characteristic of electronic devices	33	CO4
5	PA system	06	CO5
	Total	90	

Course Objectives	To have hands on practice on Soldering, de-soldering of circuits
	To have practice on preparation of PCB for given circuits
	To get acquainted with the usage of electronic equipment
	To test electronic devices and obtain their characteristics
	To arrange PA system with different loudspeakers and microphones

CO No	COURSE OUTCOMES
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CO1	ECII-108.1	Practice on Soldering, de-soldering of circuits and
CO2	ECII-108.2	Preparation of PCB for given circuits
CO3	ECII-108.3	Operating different electronic equipment
CO4	ECII-108.4	Plot the characteristics of electronic devices
CO4	ECII-108.5	Arrange PA system

CO-PO/PSO MATRIX

CO No	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
ECII-108.1	3		2	2	2		2	3		2
ECII-108.2	3	2	2	2	2		2	3	2	1
ECII-108.3	3	2	2	3				3	2	
ECII-108.4	3	2	2	2				3	2	
ECII-108.5	3		2	2	3			3	2	
Average	3	2	2	2.25	2.5		2	3	2	1.5

3=strongly mapped

2=moderately mapped

1=slightly mapped

LEARNING OUTCOMES:

Identify different Electronic Components and devices

a) Identify the components, its terminals, and test :

i) colour coded resistors, different fixed and variable type resistors, different Inductors-

different types of capacitors: ceramic, disc, paper, mica, gang etc.

ii) different SMD resistors, SMD inductors, SMD capacitors

iii) Diodes, Transistors, JFETs, MOSFETs

iv) Relays, Switches –SPST,SPDT,DPST,DPDT- Toggle-Push button –Rotary-Slider –Thumb Wheel

v) Diode, transistor & IC"s SMD packages (SOT,PLCC),

vi) Different LEDs-Red LED, Blue LED, Green LED, Bi colour LED, LED-different sizes and forms,

their specifications

b) Familiarise with

i) Bread Board



- ii) bridge rectifier as a device,
- iii) DC to DC (Ex: 12V to 5V) converter as a device,
- iv) temperature controlled Soldering station,
- v) programmable Regulated power supply

2.0 Soldering practice and Preparation of PCB

- a) Familiarise with Temperature controlled Soldering Station
- b) Technique of using soldering iron, Soldering different components and ICs
- c) Soldering components on to general PCB as per the given circuit diagram
- d) Technique of de-soldering using de-soldering pump and wick.
- e) Draw PCB for simple circuits and etch them on to a copper clad sheet
- f) Preparing PCB for soldering and soldering components on the PCB

Study and use of Electronic equipment

- a) Study of RPS units, CROs, Function Generators, Digital Multi meters, Analog multimeters and other meters using their manuals and write down the steps in using each equipment.
- b) i) Measure Resistance using multimeter and compare with the calculated value using the colour code.
- ii) Measure L and C using digital LCR meter and compare with the calculated value using the code.

Testing and obtaining characteristics of electronic devices

- a) Identify different terminals of diode, Zener diode, BJT, FET using multimeter
- b) i) Obtain VI characteristics of diode
- ii) Obtain VI characteristics of Zener diode
- c) Obtain i/p and o/p characteristics of a transistor in CE configurations
- d) Obtain VI characteristics of photo diode
- e) Obtain VI characteristics of photo diode
- f) Control a load using relay
 - i) Turn On and Off DC load (LED/Buzzer/DC motor)
 - ii) Turn On and Off AC load (Bulb/Tube light/Fan)
- g) Obtain drain characteristics of JFET

5.0 Testing of Loudspeakers and arranging PA system

- a) Measure the input impedance of Loud Speakers
- b) Arrange PA system with multi speakers and microphones (with cord and cordless)

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ECII-109, ENGINEERING PHYSICS LAB
(C-23 curriculum common to all Branches)

Course code	Course Title	No. of Periods per week	Total No. of Periods	Marks for FA	Marks for SA
ECII-109	ENGINEERING PHYSICS LAB	3	45	20	30

TIMESCHEDULE

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	

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.
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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.

COs-POs mapping strength (as per given table)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	3	2	2	2	2	1	2	3	2	2
CO2	2	3		2	2			1		
CO3	2	3		2	2			1		
CO4	2	3		2	2			1		
Average	2	3		2	2			1		

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

LEARNING OUTCOMES:

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 $I-T^2$ 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.

ECII-110, CHEMISTRY LABORATORY
(C-23 curriculum common to all Branches)

Course code	Course Title	No. of Periods per week	Total No. of Periods	Marks for FA	Marks for SA
ECII-110	CHEMISTRY LABORATORY	3	45	20	30

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 ECII-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		2				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		
Average	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.	a) Recognition of chemical substances and solutions used in the laboratory by senses. b) Familiarization of methods for Volumetric analysis	03	CO1
2.	Preparation 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	Determination of acidity of water sample	03	CO2
6	Determination of alkalinity of water sample	03	CO2
7.	Estimation of Mohr's Salt using Std. KMnO_4	03	CO3
8.	Estimation of Ferrous ion by using Std. $\text{K}_2\text{Cr}_2\text{O}_7$	03	CO3
9.	Determination of total hardness of water using Std. EDTA	03	CO4
10.	Estimation of Chlorides present in water sample	03	CO4
11.	Estimation 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 required level.	03	CO5
14.	Determination of turbidity of water	03	CO5
15.	Estimation of total solids present in water sample	03	CO5
	Total:	45	

LEARNING OUTCOMES:

- 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_3 solution for 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.KMnO₄ solution for estimation of Mohr's Salt
- 8.0 Conduct titrations adopting standard procedures and using Std.K₂Cr₂O₇ 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
Conduct the test on given samples of water / solutions
- To determine conductivity
 - 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	-	--
Preparation of Std Na ₂ CO ₃ and making solutions of	▪ Weighing the salt to the accuracy of .01 mg	▪ Weighing the salt to the accuracy of .01 mg
Estimation of HCl solution using Std. Na ₂ CO ₃ solution	▪ Cleaning the glassware and rinsing with appropriate	▪ Making standard solutions ▪ Measuring accurately the
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 ₂ Cr ₂ O ₇ (03)		
Determination of total hardness of water using		
Estimation of Chlorides present in water sample (03)		
Estimation of Dissolved Oxygen(D.O) in water sample		

	- Familiarize with instrument - Choose appropriate 'Mode' /	Prepare standard solutions / buffers, etc.
Determination of pH using pH meter (03)		
Determination of conductivity of water and adjusting ionic		
Determination of turbidity of water (03)		
Estimation of total solids present in water sample (03)	Measuring the accurate volume and weight of sample	Measuring the accurate volume and weight of

SCHEME OF VALUATION

A) Writing Chemicals, apparatus ,principle and procedure	5M
B) Demonstrated competencies	20M
Making standard solutions	
Measuring accurately the standard solutions and titrants	
Effectively controlling the flow of the titrant	
Identifying the end point	
Making accurate observations	
C) Viva-voce	5M
Total	30M

COMPUTER FUNDAMENTALS LABORATORY (C-23 curriculum common to all Branches)

Course code	Course Title	No. of Periods/Weeks	Total No. of periods	Marks for FA	Marks for SA
ECII-111 (common to all branches)	Computer Fundamentals Lab	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.
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Course Outcomes	At the end of the course students will be able to		
	CO1	ECII-111.1	Identify hardware and software components
	CO2	ECII-111.2	Prepare documents with given specifications using word processing software
	CO3	ECII-111.3	Use Spread sheet software to make calculation and to draw various graphs / charts.
	CO4	ECII-111.4	Use Power point software to develop effective presentation for a given theme or topic.
	CO5	ECII-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
ECII-111.1	3	3	3	3	3	3	3	3	2	3
ECII-111.2	3	3	3	3	3	3	3	3	2	3
ECII-111.3	3	3	3	3	3	3	3	3	2	3
ECII-111.4	3	3	3	3	3	3	3	3	2	3
ECII-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

- 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
- 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
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 with standard 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:

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Expt No	Name of Experiment	Competencies	Key competencies
1 (a).	To familiarize with Computer system and hardware connections	e. 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 f. Identify and connect various peripherals g. Identify and connect the cables used with computer system h. 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	d. Log in using the password e. Start and shut down the computer f. Use Mouse and Key Board	c. Login and logout as per the standard procedure d. Operate mouse & Key Board
1 (c).	To Explore Windows Desktop	d. Familiarize with Start Menu, Taskbar, Icons and Shortcuts e. Access application programs using Start menu, Task manager f. Use Help support	c. Access application programs using Start menu d. Use taskbar and Task manager
2.	To check the software details of the computer	c. Find the details of Operating System being used d. 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	f. Find the CPU name and clock speed g. Find the details of RAM and Hard disk present h. Access Device manager using Control Panel and check the status of devices like mouse and key board i. Use My Computer to check the details of Hard drives	c. Access device manager and find the details d. Type /Navigate the correct path and Select icon related to the details required

		and partitions j. Use the Taskbar	
4.	Working with Files and Folders	h. Create folders and organizing files in different folders i. Use copy / paste move commands to organize files and folders	b. Create files and folders Rename , arrange and search for the required folder/file
	Working with Files and Folders Continued....	j. Arrange icons – name wise, size, type, Modified k. Search a file or folder and find its path l. Create shortcut to files and folders (in other folders) on Desktop m. Familiarize with the use of My Documents n. Familiarize with the use of Recycle Bin	c. Restore deleted files from Recycle bin
5.	To use Windows Accessories: Calculator – Notepad – WordPad – MS Paint	e. Familiarize with the use of Calculator f. Access Calculator using Run command g. Create Text Files using Notepad and WordPad and observe the difference in file size h. Use MS paint and create .jpeg, .bmp files using MS Paint	c. Use windows accessories and select correct text editor based on the situation. d. Use MS paint to create /Edit pictures and save in the required format.
6.	To familiarize with Ribbon layout of MS word. – Home – Insert- page layout- References- Review-View	e. Create/Open a document f. Use Save and Save as features g. Work on two Word documents simultaneously h. Choose correct Paper size and Printing options	c. Create a Document and name appropriately and save d. Set paper size and print options
7.	To practice Word Processing Basics	h. Typing text i. Keyboard usage j. Use mouse (Left click / Right click / Scroll) k. Use Keyboard shortcuts l. Use Find and Replace features in MS- word m. Use Undo and Redo	d. Use key board and mouse to enter/edit text in the document. e. Use shortcuts f. Use spell check/ Grammar features for auto

		Features n. Use spell check to correct Spellings and Grammar	corrections.
8.	To practice Formatting techniques	i. Formatting Text j. Formatting Paragraphs k. Setting Tabs l. Formatting Pages m. The Styles of Word n. Insert bullets and numbers o. Themes and Templates p. Insert page numbers, header and footer	e. Format Text and paragraphs and use various text styles. f. Use bullets and numbers to create lists g. Use Templates /Themes h. Insert page numbers date, headers and footers
9.	To insert a table of required number of rows and columns	g. Edit the table by adding the fields – Deleting rows and columns – inserting sub table – marking borders. Merging and splitting of cells in a Table h. Changing the background colour of the table i. Use table design tools j. Use auto fit – fixed row/ column height/length – Even distribution of rows / columns features k. Convert Text to table and Table to Text l. Use Sort feature of the Table to arrange data in ascending/descending order	c. Insert table in the word document and edit d. Use sort option for arranging data.
10.	To Insert objects, clipart and Hyperlinks	d. Create a 2-page document. & Insert hyperlinks and t Bookmarks. e. Create an organization chart f. Practice examples like preparing an Examination schedule notice with a hyperlink to Exam schedule table.	c. Insert hyperlinks & Bookmarks d. Create organization charts/flow charts
11.	To Use Mail merge	c. Use mail merge to prepare	Use Mail merge

	feature of MS Word	individually addressed letters d. Use mail merge to print envelopes.	feature
12.	To use Equations and symbols features.	d. Explore various symbols available in MS Word e. Insert a symbol in the text f. Insert mathematical equations in the document	Enter Mathematical symbols and Equations in the word document
13.	To Practice with MS-EXCEL	c. Open /create an MS Excel spreadsheet and familiarize with MS Excel 2007 layout like MS office Button- d. Use Quick Access Toolbar- Title Bar- Ribbon- Worksheets- Formula Bar- Status Bar	c. Familiarize with excel layout and use d. Use various features available in toolbar
14.	To access and Enter data in the cells	c. Move Around a Worksheets-Quick access - Select Cells d. Enter Data-Edit a Cell- Wrap Text-Delete a Cell Entry-Save a File-Close Excel	c. Access and select the required cells by various addressing methods d. Enter data and edit
15.	To edit spread sheet Copy, Cut, Paste, and selecting cells	d. Insert and Delete Columns and Rows-Create Borders-Merge and Center e. Add Background Color- Change the Font, Font Size, and Font Color f. 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	c. Perform Mathematical Calculations verify - AutoSum d. Perform Automatic Calculations-Align Cell Entries	Use built in functions in Excel
17.	To enter a Formula for automatic calculations	f. Enter formula g. Use Cell References in Formulae h. Use Automatic updating function of Excel	Enter formula for automatic calculations

		Formulae i. Use Mathematical Operators in Formulae j. Use Excel Error Message and Help	
18.	To Create Excel Functions, Filling Cells	d. Use Reference Operators e. Work with sum, Sum if , Count and Count If Functions f. Fill Cells Automatically	c. Create Excel sheets involving cross references and equations d. 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	d. Produce an Excel Pie Chart e. Produce f. Excel Column Chart	c. Use data in Excel sheet to Create technical charts and graphs Produce Excel Line Graph d. Produce a Pictograph in Excel
21.	To develop lab reports of respective discipline	Create 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	g. Shade alternate rows of data h. Add currency and percentage symbols i. Change height of a row and width of a column j. Change data alignment k. Insert Headers and Footers l. Set Print Options and Print	c. Format Excel sheet d. 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	Access required options in the tool bar

		f. View g. Review	
24.	To create a simple PowerPoint Presentation	h. Insert a New Slide into PowerPoint i. Change the Title of a PowerPoint Slide j. PowerPoint Bullets k. Add an Image to a PowerPoint Slide l. Add a Textbox to a PowerPoint slide	c. Create simple PowerPoint presentation with photographs/Clip Art and text boxes d. Use bullets option
25.	To Set up a Master Slide in PowerPoint and add notes	f. Create a PowerPoint Design Template g. Modify themes h. Switch between Slide master view and Normal view i. Format a Design Template Master Slide j. Add a Title Slide to a Design Template m. The Slide Show Footer in PowerPoint n. Add Notes to a PowerPoint Presentation	c. Setup Master slide and format d. Add notes
26.	To Insert Text and Objects	h. Insert Text and objects i. Set Indents and line spacing j. Insert pictures/ clipart k. Format pictures l. Insert shapes and word art m. Use 3d features n. Arrange objects	Insert Text and Objects Use 3d features
27.	To insert a Flow Chart / Organizational Charts	d. Create a Flow Chart in PowerPoint e. Group and Ungroup Shapes f. Use smart art	Create organizational charts and flow charts using smart art
28.	To insert a Table	i. PowerPoint Tables j. Format the Table Data k. Change Table Background l. Format Series Legend	Insert tables and format
29.	To insert a Charts/Graphs	f. Create 3D Bar Graphs in PowerPoint g. Work with the PowerPoint Datasheet h. Format a PowerPoint Chart Axis	Create charts and Bar graphs, Pie Charts and format.

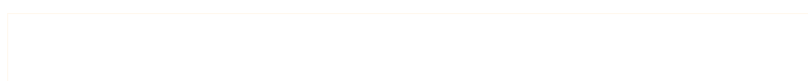
		i. Format the Bars of a Chart m. Create PowerPoint Pie Charts n. Use Pie Chart Segments o. Create 2D Bar Charts in PowerPoint p. Format the 2D Chart j. Format a Chart Background	
30.	To Insert audio & video, Hyperlinks in a slide Add narration to the slide	g. Insert sounds in the slide and hide the audio symbol h. Adjust the volume in the settings i. Insert video file in the format supported by PowerPoint in a slide j. Use automatic and on click options k. Add narration to the slide l. Insert Hyperlinks	d. Insert Sounds and Video in appropriate format. e. Add narration to the slide f. Use hyperlinks to switch to different slides and files
31.	To Practice Animation effects	c. Apply transitions to slides d. To explore and practice special animation effects like Entrance, Emphasis, Motion Paths & Exit	Add animation effects
32.	Reviewing presentation	i. Checking spelling and grammar j. Previewing presentation k. Set up slide show l. Set up resolution m. Exercise with Rehearse Timings feature in PowerPoint n. Use PowerPoint Pen Tool during slide show o. Saving p. Printing presentation (a) Slides (b) Hand-out	e. Use Spell check and Grammar feature f. Setup slide show g. Add timing to the slides h. Setup automatic slide show
33	To familiarize with standard toolbox	e. Open Adobe Photoshop f. Use various tools such as xi. The Layer Tool xii. The Color & Swatches Tool xiii. Custom Fonts & The Text Tool xiv. Brush Tool xv. The Select Tool xvi. The Move Tool	Open a photograph and save it in Photoshop

		vii. The Zoom Tool viii. The Eraser xix. The Crop Tool xx. The Fill Tool	
34	To edit a photograph	e. Use the Crop tool f. Trim edges g. Change the shape and size of a photo h. Remove the part of photograph including graphics and text	a. Able to edit image by using corresponding tools.
35	To insert Borders around photograph	g. Start with a single background layer h. Bring the background forward i. Enlarge the canvas j. Create a border color k. Send the border color to the back l. Experiment with different colors	Able to create a border or frame around an image to add visual interest to a photo
36	To change Background of a Photograph	f. open the foreground and background image g. Use different selection tools to paint over the image h. Copy background image and paste it on the foreground. i. Resize and/or drag the background image to reposition. j. In the Layers panel, drag the background layer below the foreground image layer.	Able to swap background elements using the Select and Mask tool and layers.
37	To change colors of Photograph	f. Change colors using: i) Color Replacement tool ii) Hue/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. g. apply two different colors to work area by dividing it into two parts using Rectangle tool. h. Copy any picture and place it on work area→ resize it using free transform tool.	Able to prepare cover page for the book

		i. Type text and apply color and style j. Apply effects using blended options	
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. g. adjust the brightness and contrast. h. 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



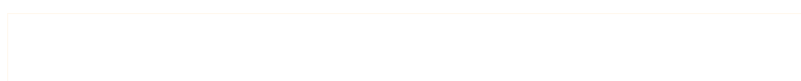
Electrical Engineering Lab

Course Code	Course title	No of periods/week	Total no of periods	Marks for FA	Marks for SA
ECII-112	Electrical Engineering Lab	03	90	40	60

S No	Unit Title	No. of Periods	COs Mapped
1	Safety precautions and cleaning	6	CO1
2	Electrical Wiring	30	CO2
3	Transformers, Series and parallel circuits, Verification of Ohms law, KCL and KVL	24	CO3
4	Measurement of electrical Quantities using CRO	15	CO4
5	Batteries	15	CO5
	Total	90	

Course Objectives	To apply safe working practices
	To get acquainted with the usage of different types of tools, wires, cables and electrical wiring
	To test transformers, verify Ohm's law, KCL and KVL
	To operate CRO and measure electrical quantities and to make battery connections

CO No		Course Outcomes
CO 1	ECII-112.1	Use different electrical safety accessories and practices
CO 2	ECII-112.2	Use different types of electric tools, wires, cables, prepare wire joints and practice electrical wiring.
CO 3	ECII-112.3	Test the working of given transformers, make series and parallel circuits and verify Ohm's law, KCL and KVL
CO 4	ECII-112.4	Operate CRO and measure electrical parameters using CRO
CO 5	ECII-112.5	Test the condition of battery and make series and parallel connection of batteries



CO-PO/PSO MATRIX

CO No	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
ECII-112.1	3			2	2			3		2
ECII-112.2	3	2		3		2		3	2	
ECII-112.3	3	2		3		2		3	2	
ECII-112.4	3		1	1	3	2		3		2
Average	3	2	1	2.25	2.5	2		3	2	2

3=strongly mapped

2=moderately mapped

1=slightly mapped

Safety precautions and cleaning

Identify safety symbols and interpret what they mean with the help of their colour and shape

Practice and follow preventive safety rules to avoid electrical accidents.

Select fire extinguishers according to the type of the fire and operate the fire extinguisher to extinguish the fire.

Practice the disposal procedure of waste materials.

Electrical wiring

Identifying and working with the following tools used in Electrical Wiring

- i. Wire stripper
- ii. Insulation remover
- iii. Pocket knife
- iv. Electrical Tester
- v. Phillips Head Screwdrivers
- vi. Mallet
- vii. Raw plug jumper
- viii. Standard wire Gauge



Identifying and Working with Pliers

- a. Identify and Know the various functions of cutting pliers
 - i. Nose pliers
 - ii. Pipe pliers
 - iii. Flush cutter
 - iv. Top cutting pliers
 - v. Electronics pliers
 - vi. Insulated cutting pliers
- b. perform the following operations
 - i. Holding
 - ii. Wire cutting
 - iii. Component bending
 - iv. Twisting the wire

Identification of different wires and cables

- a. Identify Wires used for electrical wiring
 - i. Hook up wire
 - ii. Teflon wires
 - iii. Service wire
 - iv. TRS wires /PVC Wires (Al and Cu)
 - v. single strand
 - vi. Multi strand
 - vii. twisted Flexible pair wires
 - viii. Enamelled copper wire
 - ix. Power cord
- b. Identify Cables used for communication
 - i. UTP cable,
 - ii. Co axial cables
 - iii. Flat ribbon cable for antennas,
 - iv. Telephone cable
 - v. Ethernet cable
 - vi. Ribbon cables
 - vii. Optical fiber

Practice of wire joints

Make simple twist, married, Tee and western union joints

Make britannia straight, britannia „T“ (Tee) and rat tail joints

Identifying the Electrical accessories

- i. SPST Switch
- ii. SPDT switch

- iii. Two pin and 3pin Sockets and plugs
- iv. Power Socket
- v. Power plugs
- vi. Lamp holders
- vii. Ceiling rose
- viii. Mains Switch
- ix. MCB
- x. Kit-kat Fuse
- xi. Fuse wire ratings

Know the mains supply Phase, Neutral and Ground

Identify Phase and Neutral terminals in mains supply

Study the purpose of earthing

Make 2pin and 3pin Plug connections

Make simple switch connections using low voltage transformer

Make and test a circuit with one 6V lamp controlled by a switch(toggle)

Make and Test 2-way light switch connections

Make Series and parallel connection of lamps

Series and Parallel circuits & Measurement of Electrical Quantities using CRO

Verify Ohm's law.

Connect a series combination of three 1 k Ω resistors across 12V dc supply.

Measure the current in the circuit and calculate equivalent resistance of the series connected resistors.

Connect a parallel combination of two 1 k Ω resistors across 10V dc supply.

Measure the current supplied by the source and calculate equivalent resistance of the parallel connected resistors.

Verify the Kirchhoff's current law (with two branch currents)

Verify the Kirchhoff's voltage Law (with one voltage source)

Identify the voltage rating, primary and secondary terminals of a given step-down transformer and measure its secondary voltage by applying rated primary voltage.

Measurement of electrical parameters using CRO

Study the function of front panel controls of CRO

Measure DC voltage using CRO

Measure amplitude and Time period of a sinusoidal signal using CRO.

Batteries

Study different types of primary batteries, their characteristics and applications

Study different types of secondary batteries, their characteristics and applications

Identify the given batteries/ cells and test whether they are in good condition or not



Connect the given two batteries in series and measure the voltage across the series connection. What do you learn from the measured equivalent voltage and the voltage of each battery?

Connect the given two batteries in parallel and measure the voltage across the parallel connection. What do you learn from the measured equivalent voltage and the voltage of each battery?

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