GOVERNMENT OF ANDHRA PRADESH

STATE BOARD OF TECHNICAL EDUCATION AND TRAINING
Andhra Pradesh :: AMARAVATI

Globally Competitive

CURRICULUM (C-20)

For Polytechnic Diploma Courses in Andhra Pradesh

3 YEAR (REGULAR) DIPLOMA IN

ELECTRONICS AND COMMUNICATIONS ENGINEERING

CURRICULUM -2020

(C-20)

3 YEAR (REGULAR)

DIPLOMA IN ELECTRONICS AND COMMUNICATION ENGINEERING

STATE BOARD OF TECHNICAL EDUCATION AND TRAINING
Andhra Pradesh :: AMARAVATI

CURRICULUM -2020
(C-20)
FOR DIPLOMA COURSES IN ANDHRA PRADESH

PREAMBLE

The proposed programme intends to develop a skilled technician to support the industries both nationally or globally. It also helps to kindle the spirit of entrepreneurship with necessary skills and theoretical inputs aligning with the National policy of 'Make in India'. The programme also provides for accomplishing higher education goals for those who wish to enrich their theoretical concepts further.

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. As such, it has been the practice of SBTET, A.P., to keep the curriculum abreast with the advances in technology through systematic and scientific analysis of current curriculum and bring out an updated revised version at regular intervals. Accordingly the SBTET, AP under the aegis of the Department of Technical Education, Andhra Pradesh in it's 57th Board Meeting held on 05-02-2019 (vide item no: 18) resolved to update the Polytechnic Curriculum C-16 with the guidance of National Institute of Technical Teachers Training & Research (NITTTR), Extension Centre, Vijayawada (ECV), to be implemented with effect from the academic year '20-21.

Analysis of Curriculum C-16 (SWOT analysis) started in the month of June-2019. Feedback was collected from all stake holders: Students, Lecturers, Senior Lecturers, Head of Sections and Principals for all programmes for this purpose. A series of workshops with subject experts followed in the subsequent weeks and the draft curricula were prepared for every programme. Finally, an interactive session with representatives from industries, academia and subject experts was held on 04.01.2020 for thorough perusal and critique of draft curricula; and the suggestions received thus received from Industrialists and academia have been recorded , validated by another set of experienced subject teachers from the Department of Technical education for incorporation into the Curriculum C-20.

The design of new Curricula for the different diploma programmes has thus been finalised with the active participation of the members of the faculty teaching in the Polytechnics of Andhra Pradesh, and duly reviewed by Expert Committee constituted of academicians and representatives from industries. Thus, the primary objective of the curriculum change is to produce employable technicians 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 is designed to meet the requirements of NBA Accreditation, too.

The revised New Curriculum i.e., Curriculum–2020 (C-20) is approved by BoG of SBTET for its implementation with effect from 2020-21.

Highlights of Curriculum C-20:

1. Duration of course for regular Diploma and for sandwich Diploma is 3 years and 3½ years respectively.

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 and 1 year Industrial Training is introduced for 3 ½ years Sandwich Diploma courses.
4. Updated subjects relevant to the industry are introduced in all the Diploma courses.
5. CISCO course content has been incorporated into the ECE and CME programmes for certification from CISCO in lieu of industrial training when students are unable to get Industrial Training placement in any industry.
6. 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.
7. 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.
8. CAD specific to the branch has been given emphasis in the curriculum. Preparing drawings using CAD software has been given more importance.
9. Upon reviewing the existing C-16 curriculum, it is found that the theory content is found to have more weightage than the Practical content. In C-20 curriculum, more emphasis is given to the practical content in Laboratories and Workshops, thus strengthening the practical skills.
10. 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.
11. Curricula 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.
12. An exclusive section for assessing Higher order Thinking skills (HOTS) has been introduced in summative evaluation.

Acknowledgements:

It is pertinent to acknowledge the support of the following in the making of Curriculum C-20.

A series of workshops in three phases were conducted by NITTTR, AP Extension Centre, Vijayawada involving faculty from Polytechnics, Premier Engineering Colleges & Industries to analyze the Previous C-16 Curriculum and to design C-20 Curriculum under the guidance of Dr C. R. NagendraRao, Professor & Head, NITTTR-ECV. The efforts & support extended by NITTTR to bring out final Curriculum C-20 by incorporating needs, aspiration & expectations of all stake holders is highly appreciated and gratefully acknowledged.

The Members of the working group are grateful to Dr.Pola Bhaskar I.A.S., Commissioner of Technical Education & Chairman of SBTET, AP.,Sri M.M. Nayak, I.A.S., former Special Commissioner of Technical Education & Chairman of SBTET, AP. and Smt.G.Jayalakshmi I.A.S., Principal Secretary, Department of Skill Development and TrainingSri. G. AnanthaRamu, I.A.S., former Principal Secretary, Department of Skill Development and Training for their guidance and valuable inputs during process of revising, modifying and updating the Curriculum C-20.

The Members acknowledge with thanks the guidance & inspiration provided by Sri.K.Vijay Bhaskar, Secretary, SBTET, Andhra Pradesh,Sri. V.S. Dutt, former Secretary, SBTET, Andhra Pradesh and other officials of Directorate of Technical Education and the State Board of Technical Education, Andhra Pradesh, experts from industry, academia from the universities

and higher learning institutions and all teaching fraternity from the Polytechnics who are directly or indirectly involved in preparation of the curricula.

RULES AND REGULATIONS OF C-20 CURRICULUM

1 DURATION AND PATTERN OF THE COURSES

All the Diploma programs run at various institutions are of AICTE approved 3 years or 3½ years duration of academic instruction.

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

2 PROCEDURE FOR ADMISSION INTO THE DIPLOMA COURSES:

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

a) Candidates who wish to seek admission in any of the Diploma courses will have to appear for the POLYtechnic Common Entrance Test (POLYCET) for admissions into Polytechnics 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 POLYtechnic Common Entrance Test(POLYCET) for admissions into Polytechnics.

b) The candidates seeking admission should have appeared for S.S.C examination, conducted by the Board of Secondary Education, Andhra Pradesh or equivalent examination thereto, at the time of applying for the POLYtechnic Common Entrance Test(POLYCET) for admissions into Polytechnics. In case of candidates whose results of their Qualifying Examinations is pending, their selection shall be subject to production of proof of their passing the qualifying examination in one attempt or compartmentally at the time of admission.

c) Admissions are made based on the merit obtained in the POLYtechnic Common Entrance Test (POLYCET) and the reservation rules stipulated by the Government of Andhra Pradesh from time to time.

d) For admission into the following Diploma Courses for which entry qualification is 10+2, candidates need not appear for POLYCET. A separate notification will be issued for admission into these courses.

i). D.HMCT ii).D. Pharmacy

3 MEDIUM OF INSTRUCTION

The medium of instruction and examination shall be English.

4 PERMANENT IDENTIFICATION NUMBER (PIN)

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

5 NUMBER OF WORKING DAYS PER SEMESTER / YEAR:

a) The Academic year for all the Courses shall be in accordance with the Academic Calendar.
b) The Working days in a week shall be from Monday to Saturday
c) There shall be 7 periods of 50 minutes duration each on all working days.
d) The minimum number of working days for each semester / year shall be 90 / 180 days excluding examination days. If this prescribed minimum is not achieved due to any reason, special arrangements shall be made to conduct classes to complete the syllabus.

6 ELIGIBILITY (ATTENDANCE TO APPEAR FOR THE END EXAMINATION)

a) A candidate shall be permitted to appear for the end examination in all subjects, if he or she has attended a minimum of 75% of working days during the year/Semester.
b) Condonation of shortage of attendance in aggregate up to 10% (65% and above and below 75%) in each semester or 1st year may be granted on medical grounds.
c) A stipulated fee shall be payable towards condonation for shortage of attendance.
d) Candidates having less than 65% attendance shall be detained.
e) Students whose shortage of attendance is not condoned in any semester / 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.
f) For INDUSTRIAL TRAINING:
   i) During Industrial Training the candidate shall put in a minimum of 90% attendance.
   ii) If the student fails to secure 90% attendance during industrial training, the student shall reappear for 6 months industrial training at his own expenses.

7 READMISSION

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

a) (i) Within 15 days after commencement of class work in any semester (Except Industrial Training).
   (ii) For Industrial Training: before commencement of the Industrial training.
b) Within 30 days after commencement of class work in any year (including D. Pharmacy course or first year course in Engineering and Non Engineering Diploma streams).
   Otherwise such cases shall not be considered for readmission for that semester / year and are advised to seek readmission in the next subsequent eligible academic year.
   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.

8 SCHEME OF Evaluation

a) First Year

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

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

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

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

Laboratory Courses: Each Course carry 60/30 marks of 3hours duration 40/2 sessional marks.

9 INTERNAL ASSESSMENT SCHEME

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

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

The average of marks of all the test, reduced to 20 shall be taken as final sessional in any case.

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:

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

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 be prepared as per SBTET rules in vogue.

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

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

i) Nearby Industry

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

iii) Govt / University Engg College.

iv) HoDs/SLs/Lecturers from Govt.Polytechnic

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

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

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

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

Assessment no	**Upon completion of**	**By**	**Based on**	**Max Marks**
1	12 weeks	1.The faculty concerned and 2. Training 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	23 week	1.The faculty member concerned, 2.HoD concerned and	1.Demonstration of any one of the skills listed in learning outcomes	30
			2.Training Report	20

		3.An external examiner	3.Viva Voce	10
TOTAL				**300**

h) Every teacher shall be assigned a batch of students of 10 to 15 for industrial training irrespective of student's placements for training.

10 MINIMUM PASS MARKS

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.

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.

INDUSTRIAL ASSESSMENT:

Pass marks is 50% in assessment at Industry (I and II assessments put together) and also 50% in final summative assessment at institution level

11. PROVISION FOR IMPROVEMENT

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

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

12. RULES OF PROMOTION FROM 1ST YEAR TO 3,rd, 4,th 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 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, AP from time to time before commencement of 3rd semester.

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

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

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

For IVC & ITI Lateral Entry Students:

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

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

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

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

The first backlog exam in 5th semester will be conducted only in instant/supplementary diploma examination.

For IVC& ITI Lateral Entry students:

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

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

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

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

For IVC & ITI Lateral Entry students:

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

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

i. A candidate shall be permitted to appear for 1st year examination provided he / she puts in 75% attendance (which can be condoned on Medical grounds upto 10%) i.e. attendance after condonation on Medical grounds should not be less than 65% and pay the examination fee.

ii. A candidate shall be promoted to 3rd semester if he/she puts the required percentage of attendance in the 1st year and pays the examination fee. A candidate who could not pay the 1st year examination fee has to pay the promotion fee as prescribed by State Board of Technical Education and Training from time to time before commencement of 3rd semester.

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

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

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

For IVC & ITI Lateral Entry students:

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

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

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

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

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

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

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

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

For IVC & ITI Lateral Entry students:

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

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

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

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

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

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

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

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

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

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

For IVC & ITI Lateral Entry Students:

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

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

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

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

b) Should get eligibility to appear for 4th Semester examination.

For IVC & ITI Lateral Entry students:

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

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

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

A candidate is eligible to appear for 6th semester examination

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

For IVC & ITI Lateral Entry students:

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

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

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

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

For IVC & ITI Lateral Entry students:

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

Important Note:

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

OTHER DETAILS

a) In case a candidate does not successfully complete the Industrial training, he / she will have to repeat the training at his / her own cost.
b) The First spell of Industrial training shall commence 10 days after the completion of the last theory examination of 4th Semester.
c) The Second spell of Industrial training shall commence within 10 days after the completion of first spell of Industrial training.

13. STUDENTS PERFORMANCE EVALUATION

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

a) First Class with Distinction shall be awarded to the candidates who secure an overall aggregate of 75% marks and above.
b) First Class shall be awarded to candidates who secure overall aggregate of 60% marks and above and below 75% marks.
c) Second Class shall be awarded to candidates who secure a pass with an overall aggregate of below 60%.
    i. The Weightage of marks for various year/Semesters which are taken for computing overall aggregate shall be 25% of I year marks + 100% of 3rd and subsequent Semesters.
    ii. In respect IVC & ITI Lateral Entry candidates who are admitted directly into diploma course at the 3rd semester (i.e., second year) level the aggregate of (100%) marks secured at the 3rd and subsequent semesters of study shall be taken into consideration for determining the overall percentage of marks secured by the candidates for award of class/division.
d) Second Class shall be awarded to all students, who fail to complete the Diploma in the regular 3 years/ 3 ½ years and four subsequent examinations, from the year of first admission.

14. EXAMINATION FEE SCHEDULE:

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

15. STRUCTURE OF EXAMINATION QUESTION PAPER:

I. Formative assessment (Internal examination)

a) For theory Courses:

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

Part Acontains 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 Bcarries 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 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 marks 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', 'B' and 'C'**.

Section 'A' with Max marks of 30,contains 10 short answer questions. All questions are to be answered and each carries 3 marks, i.e., 10 x 3 = 30.

Section 'B' with Max marks of 40contains 5 essay type questions including Numerical questions (without any divisions in the question), with internal choice(Either/or type), each carrying 8 marks, i.e., Max. Marks: 5 x 8 = 40.

Section 'C' with Max marks of 10contains single essay type, Higher order Thinking skills question (HoTs)including Numerical questions, without choice (without any divisions in the question),

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

b) **For Engineering Drawing Course (107) consist of section 'A' and section 'B'**.

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

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

c) **Practical Examinations**

For Workshop practice and Laboratory Examinations with 100 marks (60 marks for End exam), 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 (30 marks for End exam), the marks shall be distributed as

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

Total Max. Marks : 30

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

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

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

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

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

16. ISSUE OF MEMORONDUM OF MARKS

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

17. MAXIMUM PERIOD FOR COMPLETION OF DIPLOMA Programmes:

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

18. ELIGIBILITY FOR AWARD OF DIPLOMA

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

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

ii. He / she 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.

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

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

ii. He / she has completed all the Courses.

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

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

A) FOR ISSUE OF PHOTO COPIES OF VALUED ANSWER SCRIPTS

I. A candidate desirous of applying for Photo copy of valued answer script/s should apply within prescribed date from the date of the declaration of the result.

II. Photo copies of valued answer scripts will be issued to all theory Courses and Drawing Course(s).

III. The Photo copy of valued answer script will be dispatched to the concerned candidate's address as mentioned in the application form by post.

IV. No application can be entertained from third parties.

B) 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.

20. MAL PRACTICE CASES:

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

21. 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.

22. ISSUE OF DUPLICATE DIPLOMA

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

23. ISSUE OF MIGRATION CERTIFICATE AND TRANSCRIPTS:

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

24. The following specific changes are discussed and incorporated:

i) In the course Electronic Measurements & consumer gadgets (EC-306) in C-20, the topics on Digital Television are included as suggested by the industrialists.

ii) In the course Advanced Communications Lab (EC-410) in C-20, the exercises on Microwave communications and Antennas are included.

iii) In the course Industrial Management & Smart Technologies (EC-501) in C-20 is reviewed thoroughly and topics related to electronic industry such as Electronic Product Design, Testing, Documentation etc. are included.

iv) In the courses Computer Hardware & Networking (EC-505) and Computer Hardware & Networking Laboratory (EC-509) in C-20, the latest technologies like Wi-fi analyser, Bluetooth technology etc., in both theory and practical topics are included.

v) Modifications in the Industrial training (EC-601) in C-20 are made in view of non-availability of sufficient number of Electronic Industries. The students are given 3 options to undergo industrial training of 6 months duration,

(1) Student can attend at an Industry (OR)

(2) Student can attend at an IN-HOUSE simulated industry (OR)

(3) Student can attend training for CCNA at CISCO training through Net Academy and shall obtain CCNA certificates issued by net-academy.

In-House industrial Training:

It is a new concept incorporated in ECE program, with an idea of providing Electronic Industrial environment in the institute itself, where the student shall participate in Electronic Product design, development, manufacturing and marketing stages. In-house simulated industry can also be called as **Technology Incubation lab.**

The In-House simulated industry at Institute provides training to the ECE students in all of the following fields:

- PCB Design & Manufacturing
- Soldering technologies
- Embedded systems
- Product development and Testing
- Product installation and servicing
- Computer Network Administration

25. GENERAL

i. The Board may change or amend the academic rules and regulations or syllabi at any time and the changes or amendments made shall be applicable to all the students, for whom it is intended, with effect from the dates notified by the competent authority.

ii. All legal matters pertaining to the State Board of Technical Education and Training, AP are within the jurisdiction of Vijayawada.

iii. In case of any ambiguity in the interpretation of the above rules, the decision of the Secretary, SBTET, A.P is final.

C-20 Curriculum for DECE
With Industrial training in Semester VI

VISION
Develop Electronics and Communication Engineering professionals competent to face the global challenges in a progressive environment conducive to learn technical knowledge, skills blended with ethics and values, to serve the society and to better it for a happy and comfortable living.

MISSION

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

Programme Educational Objectives (PEOs)

Diploma in Electronics and Communication Engineering programme is steadfast to transform students in to competent professionals with qualities of good human values and responsible citizens. On completion of the Diploma programme, the students should have acquired the following characteristics

PEO1	To apply technical knowledge and management principles in analyzing and planning problems in the field of electronics and Communication Engineering while ensuring maximization of economic benefits to society and minimization of damage to ecology and environment
PEO2	To be life-long learners with sprit of enquiry and zeal to acquire new knowledge and skills so as to remain contemporary and posses required professional skills.
PEO3	To enhance entrepreneurial, communication and other soft skills, which will enable them to work globally as leaders, team members and contribute to nation building for the betterment of the society.
PEO4	To make them strongly committed to the highest levels of professional ethics and focus on ensuring quality, adherence to public policy and law, safety, reliability and environmental sustainability in all their professional activities

PROGRAMME OUTCOMES(POs)

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

PROGRAMME SPECIFIC OUTCOMES(PSOs)

1. An ability to understand the concepts of basic Electronics & Communication Engineering and to apply them to various areas like Signal processing, VLSI, Embedded systems, Communication Systems, Digital &Analog Devices, etc.

2. An ability to solve complex Electronics and Communication Engineering problems, using latest hardware and software tools, along with analytical skills to arrive cost effective and appropriate solutions.

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

DIPLOMA IN ELECTRONICS & COMMUNICATION ENGINEERING
SCHEME OF INSTRUCTIONS AND EXAMINATIONS
FIRST YEAR

Subject Code	Name of the Subject	Instruction period / week		Total Period /year	Scheme of Examination			
		Theory	Practical/ Tutorial		Duration (hours)	Sessional Marks	End Exam Marks	Total Marks
THEORY								
EC-101	English	3	-	90	3	20	80	100
EC-102	Engineering Mathematics - I	5	-	150	3	20	80	100
EC-103	Engineering Physics	4	-	120	3	20	80	100
EC-104	Engineering Chemistry & EnvironmentalStudies	4	-	120	3	20	80	100
EC-105	Electronic components and Power Supplies	5	-	150	3	20	80	100
EC-106	Elements of Electrical Engineering	3	-	90	3	20	80	100
PRACTICAL								
EC-107	Engineering Drawing	-	6	180	3	40	60	100
EC-108	Electrical Wiring and Electronic components Lab	-	6	180	3	40	60	100

EC-109	109-A Physics Lab	-	1.5	45	3 (1.5+1.5)	20	30	100 (50+50)
	109-B Chemistry Lab		1.5	45		20	30	
EC-110	Computer Fundamentals Lab	-	3	90	3	40	60	100
	TOTAL	**24**	**18**	**1260**		**280**	**720**	**1000**

DIPLOMA IN ELECTRONICS & COMMUNICATION ENGINEERING
SCHEME OF INSTRUCTIONS AND EXAMINATIONS
III SEMESTER

Subject Code	Name of the Subject	Instruction period / week		Total Period / Sem	Scheme of Examination			
		Theory	Practical /Tutorial		Duration (hours)	Sessional Marks	End Exam Marks	Total Marks
THEORY								
EC- 301	Engineering Mathematics - II	4	-	60	3	20	80	100
EC -302	Electronic Circuits -I	4	-	60	3	20	80	100
EC -303	Digital Electronics	4	-	60	3	20	80	100
EC-304	Analog and Digital Communication Systems	4	-	60	3	20	80	100
EC-305	Network Analysis	5	-	75	3	20	80	100
EC - 306	Electronic Measurements & consumer gadgets	4	-	60	3	20	80	100
PRACTICAL								
EC-307	Electronic Circuits-I lab	-	6	90	3	40	60	100
EC-308	Digital Electronics lab	-	3	45	3	40	60	100
EC-309	Analog and Digital Communication systems Lab	-	4	60	3	40	60	100
EC-310	Measurements & Network Analysis Lab	-	4	60	3	40	60	100
TOTAL		**25**	**17**	**630**	**-**	**280**	**720**	**1000**

DIPLOMA IN ELECTRONICS & COMMUNICATION ENGINEERING
SCHEME OF INSTRUCTIONS AND EXAMINATIONS
IV SEMESTER

Subject Code	Name of the Subject	Instruction period / week		Total Period / Sem	Scheme of Examination			
		Theory	Practical /Tutorial		Duration (hours)	Sessional Marks	End Exam Marks	Total Marks
THEORY								
EC-401	Engineering Mathematics-III	3		45	3	20	80	100
EC- 402	Electronic Circuits-II	6	-	90	3	20	80	100
EC - 403	Microprocessors	6	-	90	3	20	80	100
EC-404	Microwave & Satellite Communication systems	5	-	75	3	20	80	100
EC-405	Programming in C & MATLAB	5	-	75	3	20	80	100
PRACTICAL								

EC - 406	Electronic Circuits-II Lab	-	4	60	3	40	60	100
EC - 407	Microprocessors lab	-	3	45	3	40	60	100
EC - 408	Communication skills	-	3	45	3	40	60	100
EC – 409	C & MATLAB practice laboratory	-	3	45	3	40	60	100
EC-410	Advanced Communications Lab	-	4	60	3	40	60	100
	TOTAL	**30**	**12**	**630**	**-**	**300**	**700**	**1000**

DIPLOMA IN ELECTRONICS & COMMUNICATION ENGINEERING
SCHEME OF INSTRUCTIONS AND EXAMINATIONS
V SEMESTER

Subject Code	Name of the Subject	Instruction period / week		Total Periods / Sem	Scheme of Examination			
		Theory	Practical /Tutorial		Duration (hours)	Sessional Marks	End Exam Marks	Total Marks
THEORY								
EC -501	Industrial Management & Smart Technologies	5		75	3	20	80	100
EC-502	Microcontrollers And Applications	5	-	75	3	20	80	100
EC-503	Optical & Mobile Communications	5	-	75	3	20	80	100

EC-504	Industrial Electronics	5	-	75	3	20	80	100
EC-505	Computer Hardware &Networking	5	-	75	3	20	80	100
PRACTICAL								
EC-506	Microcontrollers lab	-	4	60	3	40	60	100
EC-507	Industrial Electronics Lab	-	4	60	3	40	60	100
EC-508	Life Skills	-	3	45	3	40	60	100
EC-509	Computer Hardware &Networking lab	-	3	45	3	40	60	100
EC-510	Project Work	-	3	45	3	40	60	100
	TOTAL	**25**	**16**	**630**	**-**	**300**	**700**	**1000**

DIPLOMA IN ELECTRONICS & COMMUNICATION ENGINEERING
SCHEME OF INSTRUCTIONS AND EXAMINATIONS
C-20-VI Semester

EC-601 INDUSTRIAL TRAINING

Sl.No.	**Subject**	**Duration**	**Scheme of evaluation**		
			Item	**Nature**	**Max. Marks**
1	**Industrial Training**	**6 months**	**1.First Assessment at Industry (After 12 Weeks)**	**Assessment of learning outcomes by both the faculty and training mentor of the industry**	**120**
			2.Second Assessment at the Industry (After 20 weeks))	**Assessment of learning outcomes by both the faculty and training mentor of the industry**	**120**
			Final Summative	**Training Report**	**20**

			assessment at institution level	**Demonstration of any one of the skills listed in learning outcomes**	**30**
				Viva Voce	**10**
TOTAL MARKS					**300**

The Industrial Training shall carry maximum 300 marks. Students can be trained in either in In-house/Industry/Cisco CCNA Training. Pass mark is 50% in first and second assessment put together and also 50% in final summative assessment at the institution level.

FIRST YEAR

FIRST YEAR

Subject Code	Name of the Subject	Instruction period / week		Total Period /year	Scheme of Examination			
		Theory	Practical/ Tutorial		Duration (hours)	Sessional Marks	End Exam Marks	Total Marks
THEORY								
EC-101	English	3	-	90	3	20	80	100
EC-102	Engineering Mathematics - I	5	-	150	3	20	80	100
EC-103	Engineering Physics	4	-	120	3	20	80	100
EC-104	Engineering Chemistry & Environmental Studies	4	-	120	3	20	80	100
EC-105	Electronic components	5	-	150	3	20	80	100

	and Power Supplies							
EC-106	Elements of Electrical Engineering	3	-	90	3	20	80	100
PRACTICAL								
EC-107	Engineering Drawing	-	6	180	3	40	60	100
EC-108	Electrical Wiring and Electronic components Lab	-	6	180	3	40	60	100
EC-109	109-A Physics Lab	-	1.5	45	3 (1.5+1.5)	20	30	100 (50+50)
	109-B Chemistry Lab		1.5	45		20	30	
EC-110	Computer Fundamentals Lab	-	3	90	3	40	60	100
	TOTAL	**24**	**18**	**1260**		**280**	**720**	**1000**

English

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

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

Course Objectives	To improve the skills of English Language use by enriching vocabulary and learning accurate structures for effective communication.
	To comprehend themes for value based living in professional and personal settings.

CO No.	Course Outcomes
CO1	Applies perceptions of themes related to societal responsibility of adolescents towards their surroundings.
CO2	Demonstrates knowledge of form and function of 'grammar items' and use them in both academic and everyday situations
CO3	Demonstrates effective English communication skills with competence in listening, speaking, reading and writing in academic, professional and everyday contexts.
CO4	Displays positivity and values of harmonious living in personal and professional spheres as reflected through communication.

CO-PO Matrix

Course Code C-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	CO1, CO2, CO3, CO4	20	22		>50%: Level 3
PO6	CO1, CO2, CO3, CO4	52	58		21-50%: Level 2
PO7	CO1, CO2, CO3, CO4	18	20		Up to 20%: Level 1

Level 3 – Strongly Mapped

Level 2- Moderately Mapped

Level 1- Slightly Mapped

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7
CO 1					✓	✓	✓
CO 2					✓	✓	✓
CO3					✓	✓	✓
CO 4					✓	✓	✓

NOTE: CO-PO groups shall be fulfilled through 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.

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.

Blue Print of Question Paper:

<table>
<tr><th rowspan="2">S. No.</th><th rowspan="2">Name of the Unit</th><th rowspan="2">Periods Allocated</th><th rowspan="2">Weightage Allocated</th><th colspan="4">Marks Wise Distribution of Weightage</th><th colspan="4">Question Wise Distribution of Weightage</th><th rowspan="2">CO's Mapped</th></tr>
<tr><th>R</th><th>U</th><th>Ap</th><th>An</th><th>R</th><th>U</th><th>Ap</th><th>An</th></tr>
<tr><td>1</td><td>English for Employability</td><td>8</td><td rowspan="3">17</td><td>3</td><td rowspan="3">8*</td><td></td><td></td><td>1</td><td rowspan="3">1*</td><td rowspan="5"></td><td></td><td>CO1, CO2, CO3, CO4</td></tr>
<tr><td>2</td><td>Living in Harmony</td><td>8</td><td>3</td><td></td><td></td><td>1</td><td></td><td>CO1, CO2, CO3, CO4</td></tr>
<tr><td>3</td><td>Connect with Care</td><td>8</td><td></td><td>3</td><td></td><td></td><td></td><td>CO1, CO2, CO3, CO4</td></tr>
<tr><td>4</td><td>Humour for Happiness</td><td>8</td><td rowspan="3">14</td><td></td><td>3</td><td rowspan="2">8*</td><td></td><td></td><td>1</td><td rowspan="3">1*</td><td></td><td>CO1, CO2, CO3, CO4</td></tr>
<tr><td>5</td><td>Never Ever Give Up!</td><td>8</td><td></td><td>3</td><td></td><td></td><td>1</td><td></td><td>CO1, CO2, CO3, CO4</td></tr>
<tr><td>6</td><td>Preserve or Perish</td><td>9</td><td></td><td>3</td><td></td><td></td><td rowspan="2">1*</td><td>1</td><td></td><td>CO1, CO2, CO3, CO4</td></tr>
<tr><td>7</td><td>The Rainbow of Diversity</td><td>8</td><td rowspan="2">14</td><td></td><td>8*</td><td>3</td><td>10*</td><td></td><td>1</td><td></td><td>CO1, CO2, CO3, CO4</td></tr>
<tr><td>8</td><td>New Challenges - Newer Ideas</td><td>8</td><td rowspan="4">35</td><td></td><td rowspan="4">8*</td><td rowspan="4">8*+3+3+3</td><td rowspan="4"></td><td></td><td rowspan="4">1*</td><td rowspan="4">4</td><td rowspan="4">1*</td><td>CO1, CO2, CO3, CO4</td></tr>
<tr><td>9</td><td>The End Point First!</td><td>8</td><td></td><td></td><td>CO1, CO2, CO3, CO4</td></tr>
<tr><td>10</td><td>The Equal Halves</td><td>8</td><td></td><td></td><td>CO1, CO2, CO3, CO4</td></tr>
<tr><td>11</td><td>Dealing with Disasters</td><td>9</td><td></td><td></td><td></td><td></td><td>CO1, CO2, CO3, CO4</td></tr>
<tr><td colspan="2">TOTAL</td><td>90</td><td>80</td><td>6</td><td>30</td><td>34</td><td>10</td><td>2</td><td>5</td><td>8</td><td>1</td><td></td></tr>
</table>

PART-A: 10 Questions 3 marks each =30 Marks	All Questions are compulsory	: 60 minutes
PART-B: 5 Questions 8 marks each =40 Marks	Internal choice	: 90 minutes
Part-C: 1 Question 10 marks =10 Marks		
(Higher Order Question)	No choice, one compulsory question	: 30 minutes

NOTE: * indicates questions can be given from any of the corresponding lessons in the blue print.

Question Paper Pattern for Unit Tests

Part A: 16 marks: 4 questions with 1 mark each (FIB, True/false, one word/phrase, etc.)
4 questions with 3 marks each (short answer/ descriptive/ applicative questions)
Part B: 24 marks: 3 questions 8 marks each with internal choice

Learning Outcomes :

1. English for Employability

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

2. Living in Harmony

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

3. Connect with Care

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

4. Humour for Happiness

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

5. Never Ever Give Up!

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

6. Preserve or Perish

6.1. Describe the ecological challenges that we face today and act to save the environment.
6.2. Narrate / Report past events.
6.3. Develop vocabulary related to environment.
6.4. Write e-mails.

7. The Rainbow of Diversity

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

8. New Challenges – Newer Ideas

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

9. The End Point First!

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

10. The Equal Halves

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

11. Dealing with Disasters

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

Textbook: INTERACT (A Textbook for I Year English) - Published 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 (RevisedByN.D.V. Prasad Rao)
: English Grammar and Composition, Blackie ELT Books, S. Chand and Co.
Sarah Freeman : Strengthen Your Writing, Macmillan

STATE BOARD OF TECHNICAL EDUCATION –A.P

C20- EC-101-ENGLISH

UNIT TEST-1

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

PART-A **4X4= 16 marks**

Instructions: Answer all the questions. Each question carries FOUR Marks.

1. Rewrite / Fill in the blank as directed. Each question carries ½ Mark.

a) Write the antonym of 'cruel' **(CO2)**

b) Write the synonym of 'love'

c) Give prefix to 'adventure'.

d) Give suffix to ' liberate'

e) It is _____ universal truth. (Fill in with suitable article)

f) The boy is fond ____ ice-cream. (Fill in the blank with proper preposition)

g) He ____not like sweets. (Fill in the blank with correct primary auxiliary verb.)

h) We _____ respect our national flag. (Fill in with a proper modal verb)

2. Rewrite the sentences as directed. Each question carries One mark. 4X1=4 Marks

a) No other metal is so useful as iron. (Change into superlative degree) **(CO2)**

b) Very few students are so clever as Ramesh. (Change into comparative degree)

c) Guess the contextual meaning of the italicized word in the following sentence.

"The CBI officer has *interrogated* the bank employees in connection with the scam."

d) Only sings plays Prasanth not also well but cricket. (Rearrange the jumbled words)

3. Fill in the blanks with proper form of the verb given in brackets. 4X1 = 4 marks **(CO2)**

The IPSGM _____(hold) in our college last month. Nearly all the colleges in our zone _____(participate) in the event. The prizes _____ (distribute) by the district collector. Next year, Government Polytechnic, Vijayawada _____ (conduct) the games meet.

4. Rewrite the following sentences after making necessary corrections: 4X 1= 4 Marks

a) The police has arrested the culprit. **(CO3)**

b) Three hundred miles are a long distance.

c) The Principal along with the Heads of Sections have visited the laboratories.

d) Either he or I is to blame.

PART-B **3X8=24 Marks**

Instructions: Answer all the questions and each question carries EIGHT marks.

5. Write a dialogue of at least five turns between a shopkeeper and customer about buying a mobile phone. **(CO3)**

6. Make an analysis and write a paragraph in around 100 words about your strengths and weaknesses in learning and using English and also the measures to improve it. **(CO3)**

7. Write a paragraph in about 100 words on how to overcome low esteem and negativity. **(CO3, CO4)**

***

STATE BOARD OF TECHNICAL EDUCATION –A.P

C20-EC-101-ENGLISH

UNIT TEST-II

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

PART-A 4X4= 16 Marks

Instructions: Answer all the questions. Each question carries FOUR marks.

1) Match the words in column A with their corresponding meanings in column B **(CO2)**

Column A	**Column B**
a) Deserve	i) continuous
b) Hidden	ii) protect
c) Preserve	iii) worthy
d) Incessant	iv) praise
	v) unseen
	vi) affection

2) Rewrite as directed: **(CO3)**

a) You ask your Mom to give you another chocolate. (Change into a request)

b) The baby fell down and got injured. (Change into an exclamatory sentence)

c) The match was very interesting. (Frame a question using 'how')

d) Hemanth submitted his project report last week. (Frame Yes-No question)

3) Fill in the blanks with appropriate forms of verbs given in brackets: **(CO2)**

a) The Sun _____ (set) in the west.

b) Balu _____ (sing) for over fifty years in the films.

c) We _____ (see) a camel on the road yesterday.

d) They _____(enter) the stadium before the gates were closed.

4. Change the voice of the following: **(CO2)**

a) Marconi invented the radio.

b) Sravanthi has been offered a job.

c) Pragathi can type the letter.

d) The Chief Guest will be received by the Final year students.

PART-B **3X8=24 Marks**

Answer all the questions. Each question carries EIGHT marks.

5. Write a letter to your younger brother motivating him to deal with failures and hurdles in life. **(CO3)**

6. Write an essay in around120 words on the role of robots in the modern world. **(CO3)**

7. Read the following passage and answer the questions that follow: **(CO3)**

The greatest enemy of mankind, as people have discovered, is not science, but war. Science merely reflects the social forces by which it is surrounded. It was found that when there is peace, science is constructive when there is war, science is perverted to destructive end. The weapons which science gives us do not necessarily create war. These make war increasingly more terrible. Until now, it has brought us on the doorstep of doom. Our main problem, therefore, is not to curb science, but to substitute law for force, and international government for anarchy in the relations of one nation with another. That is a job in which everybody must participate, including the scientists. Now we are face to face with these urgent questions: Can education and tolerance, understanding and creative intelligence run fast enough to keep us side by side without our mounting capacity to destroy? That is the question which we shall have to answer, one way or the other, in this generation. Science must help us in the answer, but the main decision lies within ourselves. The hour is late and our work has scarcely begun.

a) What is the chief enemy of man?
b) What does science reflect?
c) When is science perverted?
d) What makes war more terrible?
e) Why do we need international government?
f) What are the four aspects that may stop destruction?
g) Have we really started our work to fight the problem discussed?
h) Pick the word from the passage that would mean: 'replace with other one'

***

STATE BOARD OF TECHNICAL EDUCATION –A.P

C20-EC-101-ENGLISH

UNIT TEST-III

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

PART-A **4X4 = 16 Marks**

Instructions: Answer all the questions. Each question caries Four marks.

1. Give the meaning of the word in italics: **(CO3)**
   a) When the girls laughed in the class, the teacher was *furious.*
   b) He was *rusticated* from the school for his misbehavior.
   c) Vikramaditya was a *benevolent* Indian King.
   d) We should not show any *discrimination* between boys and girls.

2. Change the speech of the following: **(CO2)**
   a) He said, "I am sorry."
   b) The teacher said to the boys, "Why are you late?"
   c) Sushma said that she had submitted her report recently.
   d) Pratap requested Priya to give him her pen.

3. Rewrite as directed: **(CO2)**
   a) Though he was weak, he took the test. (change into a simple sentence)
   b)You must work hard to achieve success. (change into a complex sentence)
   c)If you run fast, you will catch the bus. (change into a compound sentence)
   d) The fog disappeared when the Sun rose. (Split into two simple sentences)

4. Locate eight errors from the following passage and correct them. **(CO2)**

   Once upon a time there live a king who was very kind to his people. In his council of ministers, there is a wise man. He had a son called Sumanth who was a educated and highly learned. Once the wise minister fall sick. All the physicists in the country could not heal him. Then Sumanth will go in search of medicine in Himalayas. He bring the special medicinal roots to cure his father's sickness. Sumanth looked before his father carefully and healed him. The king rewarded Sumanth with rich gifts.

PART- B **3X8 = 24 Marks**

Instructions: Answer all the questions and each one carries eight marks.

5) Read the following paragraph and make notes first and then its summary. **(CO3)**

Astronauts are people who travel on space ships. They need to have a very clean home. They travel far from Earth. We need clean kitchens everywhere on earth and in space. Astronauts have to solve two problems: how to get food and how to keep their spaceship clean. Here is how they solved the food problem. At first, the astronauts took tubes of food with them into space. They would squeeze a tube and eat semi-liquid food. It did not taste great, but since they

did not need to take dishes or silverware with them, they had no dishes to wash. Today's spaceships have a bigger menu. Astronautscan eat from bowls. In fact, they take cereal and other standard foods with them. The foods are packaged in special containers to keep them fresh. They useknives, forks, and spoons. One unusual item on their table is a pair of scissors. They use the scissors to open the food packages. They can eat right from the package. They have a kitchen on the spaceship. Its oven can heat food to 170 degrees. The kitchen has water and sets of meals that come on trays. The astronauts choose their menu before they go into space. They take a lot of food with them. The astronauts keep bread and fresh fruits and vegetables in a special food locker. How do they keep the kitchen clean? They do not have to worry about mice or other rodents. They make sure that there are no rodents before the ship leaves. But sometimes mice travel on the ship. Those mice are part of experiments. They live in cages. How do astronauts keep their trays clean? That is another health problem the astronauts solve. They need to stay healthy in space. To carry a lot of water to wash trays would be a lot of extra weight. They pack wet wipes in plastic bags. They use them to clean trays. So, their kitchen is clean and they stay healthy.

6) Write an essay in about 120 words on the importance of goal setting and your short and long term goals. **(CO3,CO4)**

7) Write a report about the bush fire that raged in Australia recently by using the following clues: forest, natural disaster, wild fire, dried leaves, no rain fall, wild animals, burnt alive, loss of flora and fauna, fire fighters, uncontrollable, moderate rains, environmental pollution, measures to protect...etc. **(CO3)**

***

STATE BOARD OF TECHNICAL EDUCATION- A.P

Model Question Paper

C20-EC-101- ENGLISH

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

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

Instructions: Answer all the questions. Each question carries Three marks.

1. a) Fill in the blanks with suitable articles: **(CO2)**
   I have seen _____ European at _____local market.
   b) Fill in with proper form of adjective given in the bracket: **(CO2)**
   China is the _____country in the world. (populous, more populous, most populous)
   a) i) Choose the synonym from the following for the word : 'filthy' **(CO3)**
   dirty / clean / hygienic / tidy
   ii) Choose the antonym from the following for the word: 'exterior' **(CO3)**
external / internal / open / interior

2. a) i) Give prefix for the word: 'popular' **(CO2)**
   ii)Write suffix for the word : 'king' **(CO2)**
   b) He was married __ her __ January 2015. (Fill in with appropriate preposition) **(CO3)**
   c) Match the words in column A with their corresponding meanings in column B:**(CO2)**

Column-A	**Column-B**
i)Dynamic	a) tasty
Ii) Gloomy	b) active
	c) sad
	d) proud

3. a) The old man *hunted* for his spectacles. (Give the contextual meaning of the word in italics) **(CO3)**
   b) The committee / have submitted / its report / to the President. (identify the part which contains an error) **(CO3)**
   c) Recently has a scooter purchased Shanthi.(Rearrange the jumbled words to make a meaningful sentence.) **(CO3)**

4. a) Use the following primary auxiliary verb in sentence of your own: **(CO2)**
   ' does'
   b) Fill in the blank with proper modal auxiliary verb based on the clue in the bracket: **(CO2)**
   Harish _____ speak four languages. (ability)
   c) Rakesh wants two hundred rupees from his father. (Write the sentence how he requests hisFather) **(CO2)**

5. Fill in the blanks with suitable form of the verb given in brackets: **(CO2)**
   a) He _____ (go) for a walk daily.
   b) The bus _____ (arrive) just now.
   c) We _____ (live) in Chennai since 2005.

6. Change the voice of the following sentences: **(CO2)**
   a) English is spoken all over the world.
   b) They watched a movie yesterday.
   c) The Chief Minister will inaugurate the exhibition.

7. a) It is a beautiful rainbow. (Change into an exclamatory sentence) **(CO3)**
   b) C.V. Raman won the Nobel Prize in 1930. (Frame a question using 'When') **(CO3)**
   c) He can swim across the river. (change into 'Yes / No' question) **(CO3)**

8. Change the speech of the following: **(CO2)**
   a) He said, "I will go to Delhi tomorrow."
   b) Ravi said to Ashok, " Where are you going?"
   c) She told him to mind his own business.

9. Rewrite as directed: (**CO2)**
   a) In spite of being busy he attended the meeting. (Rewrite the sentence using 'though')
   b) She is poor. She is honest. (combine the two sentences using 'but')
   c) On seeing the tiger, he climbed a tree. (split into two simple sentences)

10. Rewrite the following sentences after making necessary corrections: **(CO2)**
    a) We have gone to picnic yesterday.
    b) Suresh watched T.V when I went to his house.
    c) They left Gujarat before the earthquake occurred.

PART-B **5X8=40**

Instructions: Answer the following questions. Each question carries EIGHT marks.

11. Write a paragraph in about 100 words on what you do daily. **(CO3,CO4)**

OR

Write a paragraph in about 100 words on the uses and misuses of social media.

12. Construct a dialogue of at least five turns between an American and you about places worth visiting in your city. **(CO3,CO4)**

OR

Compose a dialogue of at least five turns between two friends, one favouring homemade food and the other, fast foods.

13. Write a letter to your parents about your preparation for year-end examinations. **(CO3,CO4)**

OR

Write a letter to the editor of a newspaper about the inconvenience caused due to loud speakers in your area.

14. Write an essay in about 120 words on measures to prevent water pollution.

OR

Write an essay in about 120 words on importance of gender equality.

15. Read the following passage and answer the questions that follow:

(CO3)

A farmer in ancient China had a neighbour who was a hunter, and who owned ferocious and poorly trained hunting dogs. They jumped over the fence frequently and chased the farmer's lambs. The farmer asked his neighbour to keep his dogs in check, but this fell on deaf ears. One day the dogs again jumped the fence, attacked and severely injured several of the lambs.

The farmer had had enough, and went to town to consult a judge who listened carefully to the story and said: "I could punish the hunter and instruct him to keep his dogs chained or lock them up. But you would lose a friend and gain an enemy. Which would you rather have, friend or foe for a neighbour?" The farmer replied that he preferred a friend. “Alright, I will offer you a solution that keeps your lambs safe, and which will keep your a neighbour a friend." Having heard the judge's solution, the farmer agreed.

Once at home, the farmer immediately put the judge's suggestions to the test. He took three of his best lambs and presented them to his neighbour's three small sons, who were beside themselves with joy and began to play with them. To protect his son's newly acquired playthings, the hunter built a strong kennel for his dogs. Since then, the dogs never again bothered the farmer's lambs. Out of gratitude for the farmer's generosity toward his sons, the hunter often shared the game he had hunted with the farmer. The farmer reciprocated by sending the hunter the cheese he had made. Within a short time the neighbours became good friends.

a) What kind of dogs does the neighbor have?
b) When did the farmer consult the judge?
c) What would be the consequence if the judge punished the neighbor?
d) What was the solution suggested by the judge?
e) What did the neighbour’s sons do with the gifts they received?
f) How did the dogs stop bothering the farmer’s lambs?
g) What items are exchanged happily between the two neighbours?
h) Pick the word from the passage that would mean: ‘a closed shelter for dogs’.

OR

Read the following short poem and answer the questions that follow:

Crisp in the winter’s morning,
Softly all through the night,
What is this without warning,
Falling and white?

I have never seen snow,
But I can imagine it quite –
Not how it tastes, but I know,
It falls and is white.

One morning I’ll open the door,
To bring in the morning’s milk,
And all around there’ll be snow –
Fallen and still.

How I'll roll in the stuff!
How I'll tumble and spin!
Until the neighbours cry,
Enough!And send me back in.

Q.1. What is the poem about?

2. How does snow fall?

3. Did you ever touch snow? How did you feel?

4. a) Pick the word from the poem that means 'slip and fall'

b) Write the antonym for the word 'soft'

SECTION – C **1X10=10 Marks**

16. Write a report on the blood donation camp organized by International Red Cross Society in your college. Use the following clues: date, time, place, arrangements, donors, equipment, doctors, response, sponsors, snacks, volunteers, help others, save lives…etc.

***

ENGINEERING MATHEMATICS – I

Course Code	Course Title	No. of Periods/week	Total No. of periods	Marks for FA	Marks for SA
EC-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	33	CO4
5	Applications of Differentiation	19	CO4, CO5
	Total Periods	**150**	

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

Course Outcomes	CO1	Identify various functions, resolve partial fractions and solve problems on matrices.
	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	Evaluate solutions for engineering problems using differentiation.

ENGINEERING MATHEMATICS – I

COMMON TO ALL BRANCHES

Learning Outcomes

UNIT - I

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

L.O. 1.1 Define Set, ordered pairs and Cartesian product - examples.

1.2 Explain Relations and functions – examples

1.3 Find Domain & Range of functions – simple examples.

1.4 Classify types of functions (into, many-to-one, one-one, onto and bijective).

1.5 Define inverse functions - examples.

1.6 Define rational, proper and improper fractions of polynomials.

1.7 Explain the procedure of resolving rational fractions of the type mentioned below into partial fractions

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

iii) $\frac{f(x)}{(x^2+a^2)(bx+c)}$ *iv*) $\frac{f(x)}{(x^2+a^2)(x^2+b^2)}$

1.8 Define a matrix and order of a matrix.

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

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

1.11 Define the transpose of a matrix and write its properties;

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

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

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

1.15 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.

2.2 List the values of trigonometric ratios at specified values.

2.3 Draw graphs of trigonometric functions.

2.4 Explain periodicity of trigonometric functions.

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

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

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

2.8 Solve simple problems on compound angles.

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

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

2.11 Solve simple problems using the above formulae

Syllabus for Unit test-I completed

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

2.13 Solve problems by applying these formulae to sum or difference or product of three or more terms.

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

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

2.16 Derive relations between inverse trigonometric functions so that given A= $\sin^{-1}x$, express angle A in terms of other inverse trigonometric functions with examples.

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

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

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

2.20 Solve models of the type a $\sin^2 x$ + b sin x +c=0, a cos x + b sin x=c etc., and problems using simple transformations.

2.21 State sine rule, cosine rule, tangent rule and projection rule.

2.22 Explain the formulae for sin A/2, cos A/2, tan A/2 and cot A/2 in terms of semi-perimeter s and sides a,b,c and solve problems.

2.23 List various formulae for the area of a triangle.

2.24 Solve problems using the above formulae.

2.25 Define Sinh x, cosh x and tanh x and list the hyperbolic identities.

2.26 Represent inverse hyperbolic functions in terms of logarithms.

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

2.28 Define the operations on complex numbers with examples.

2.29 Define amplitude of a complex number.

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

2.31 Write DeMoivre's theorem (without proof) and illustrate with simple examples.

UNIT - III

Coordinate Geometry

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

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

3.2 Solve simple problems on the above forms.

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

3.4 Define locus of a point and define a circle.

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

3.6 Find the equation of a circle given (i) centre and radius, (ii) two ends of a diameter (iii) Centre and a point on the circumference (iv) three non collinear points.

3.7. Define a conic section.

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

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

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

Syllabus for Unit test-II completed

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

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

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

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

4.4 Explain the concept of continuity of a function at a point and on an interval with some examples whether a given function is continuous or not.

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

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

4.7 Find the derivatives of elementary functions like x^n , a^x, e^x, log x, sin x, cos x, tanx, Secx, Cosecx and Cot x using the first principles.

4.8 Find the derivatives of simple functions from the first principle .

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

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

4.11 Find the derivatives of Inverse Trigonometric functions and examples using the Trigonometric transformations.

4.12 Explain the method of differentiation of a function with respect to another function and also differentiation of parametric functions with examples.

4.13 Find the derivatives of hyperbolic functions.

4.14 Explain the procedures for finding the derivatives of implicit function withexamples.

4.15 Explain the need of taking logarithms for differentiating some functions with examples like $[f(x)]^{g(x)}$.

4.16 Explain the concept of finding the higher order derivatives of second and third order with examples.

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

4.18 Explain the definition of Homogenous function of degree n.

4.19 Explain Euler's theorem for homogeneous functions with applications to simple problems.

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

L.O.5.1 State the geometrical meaning of the derivative as the slope of the tangent to the curve y=f(x) at any point on the curve.

5.2 Explain the concept of derivative to find the slope of tangent and to find the equation of tangent and normal to the curve y=f(x) at any point on it.

5.3 Find the lengths of tangent, normal, sub-tangent and sub normal at any point on the curve y=f(x) .

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

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

5.6 Define the concept of increasing and decreasing functions.

5.7 Explain the conditions to find points where the given function is increasing or decreasing with illustrative examples.

5.8 Explain the procedure to find the extreme values (maxima or minima) of a function of single variable- simple problems yielding maxima and minima.

5.9 Solve problems on maxima and minima in applications like finding areas, volumes etc.

5.10 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**	**2.5**	**2**				**3**	**2.4**	**2**

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

Note:

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

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

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

PSO1: An ability to understand the concepts of basic mathematical concepts and to apply them in various areas like computer programming, civil constructions, fluid dynamics, electrical and electronic systems and all concerned engineering disciplines.
PSO2: An ability to solve the Engineering problems using latest software tool, along with analytical skills to arrive at faster and appropriate solutions.
PSO3: Wisdom of social and environmental awareness along with ethical responsibility to have a successful career as an engineer and to sustain passion and zeal for real world technological applications.

PO- CO – Mapping strength

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

COMMON TO ALL BRANCHES
COURSE CONTENT

Unit-I

Algebra

1. **Relations and Functions**:
   Define Set, Ordered pairs, Cartesian product, Relations, functions, domain & range of functions. Describe types of functions (in-to, many-to-one, one-one, onto and bijective) and inverse functions – examples.

2. **Partial Fractions:**
   Define rational, proper and improper fractions of polynomials. Resolve rational fractions in to their partial fractions covering the types mentioned below.

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

$$iii)\quad \frac{f(x)}{(x^2+a^2)(bx+c)} \qquad iv)\quad \frac{f(x)}{(x^2+a^2)(x^2+b^2)}$$

3. **Matrices:**
   Definition of a matrix, types of matrices-examples, algebra of matrices-equality of two matrices, sum, 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 Cramers's rule and Matrix inversion method-examples.

Unit-II

Trigonometry

4. **Trigonometric ratios:**
   Definition of trigonometric ratios of any angle, values of trigonometric ratios at specified values, draw graphs of trigonometric functions, periodicity of trigonometric functions.
5. **Compound angles:**
   Formulas of sin(A±B), cos(A±B), tan(A±B),cot(A±B),and related identities with problems.
6. **Multiple and sub multiple angles:**
   Formulae for trigonometric ratios of multiple angles 2A, 3A and sub multipleangles A/2 with problems.
7. Transformations 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:

sinx =k , cosx= k, tanx =k, where k is a constant. Solutions of simple quadratic equations, equations involving usage of transformations- problems.

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. **Hyperbolic functions:**
    Definitions of hyperbolic functions, identities of hyperbolic functions, inverse hyperbolic functions and expression of inverse hyperbolic functions in terms of logarithms.
12. **Complex Numbers:**
    Definition of a complex number, Modulus and conjugate of a complex number, Arithmetic operations on complex numbers, Modulus- Amplitue (polar) form , Exponential form (Euler form) of a complex number- Problems. DeMoivre's theorem.

UNIT-III

Coordinate geometry

13. **Straight lines:** various forms of straight lines, angle between lines, perpendicular distance from a point, distance between parallel lines-examples.
14. **Circle:** locus of a point, Circle, definition-Circle equation given (i) centre and radius, (ii)two ends of a diameter (iii) centre and a point on the circumference (iv) three non collinear points - general equation of a circle – finding centre, radius.
15. 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:

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

17. **Concept of derivative-** Definition (first principle)- different notations-derivatives of elementary functions- problems. Derivatives of sum, product, quotient, scalar multiplication of functions - problems. Chain rule, derivatives of inverse trigonometric functions, derivative of a function with respect to another function, derivative of parametric functions, derivative of hyperbolic, implicit functions, logarithmic differentiation – problems in each case. Higher order derivatives - examples – functions of several variables - partial differentiation, Euler's theorem-simple problems.

UNIT-V

Applications of Derivatives:

18. Geometrical meaning of the derivative, equations of Tangent and normal to a curve at any point. Lengths of tangent, normal, sub tangent and subnormal to the curve at any point - problems.
19. Physical applications of the derivative – velocity, acceleration, derivative as a rate measure – Problems.

20. Applications of the derivative to find the extreme values – Increasing and decreasing functions, finding the maxima and minima of simple functions - problems leading to applications of maxima and minima.

21. 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

Engineering Mathematics – I

Blue print

S. No	Chapter/ Unit title	No of Periods		Weightage Allotted	Marks wise distribution of weightage				Question wise distribution of weightage				COs mapped
	Unit - I : Algebra	**Theory**	**Practice**		**R**	**U**	**Ap**	**An**	**R**	**U**	**Ap**	**An**	
1	Relations and Functions	4	2	3	0	3	0	0	0	1	0	0	**CO 1**
2	Partial Fractions	3	2	3	0	3	0	0	0	1	0	0	**CO 1**
3	Matrices and Determinants	10	10	11	3	0	8	0	1	0	1	0	**CO 1**
	Unit - II : Trigonometry												
4	Trigonometric Ratios	1	1	0	0	0	0	0	0	0	0	0	**CO2**
5	Compound Angles	3	2	3	3	0	0	0	1	0	0	0	**CO2**
6	Multiple and Submultiple angles	4	4	3	0	3	0	0	0	1	0	0	**CO2**
7	Transformations	3	3	8	0	8	0	0	0	1	0	0	**CO2**
8	Inverse Trigonometric Functions	3	2										
9	Trigonometric Equations	3	2	8	0	0	8	0	0	0	1	0	**CO2**

10	Properties of triangles	3	2										
11	Hyperbolic Functions	1	1	0	0	0	0	0	0	0	0	0	**CO2**
12	Complex Numbers	4	2	3	3	0	0	0	1	0	0	0	**CO2**
	Unit III : Co-ordinate Geometry												
13	Straight Lines	4	2	3	3	0	0	0	1	0	0	0	**CO3**
14	Circle	3	2	8	0	8	0	0	0	1	0	0	**CO3**
15	Conic Sections	8	4										
	Unit – IV : Differential Calculus												
16	Limits and Continuity	4	2	3	0	3	0	0	0	1	0	0	**CO4**
17	Differentiation	17	10	14	3	11	0	0	1	2	0	0	**CO4**
	Unit - V : Applications of Differentiation												
18	Geometrical Applications	3	2	10	0	0	0	10	0	0	0	1	**CO5**
19	Physical Applications	2	2										
20	Maxima and Minima	3	4										
21	Errors and Approximations	2	1										
Total		**89**	**61**	**80**	**15**	**39**	**16**	**10**	**5**	**8**	**2**	**1**	

R: Remembering Type : 15 Marks
U: understanding Type : 39 Marks
Ap: Application Type : 16 Marks
An: Analysing Type : 10 Marks

Engineering Mathematics – I

Unit Test Syllabus

Unit Test	Syllabus
Unit Test-I	From L.O. 1.1 to L.O. 2.11
Unit Test-II	From L.O. 2.12 to L.O. 3.10
Unit Test-III	From L.O.4.1 to L.O. 5.10

Unit Test I **C-20**

State Board of Technical Education and Training, A. P

First Year

Subject name: Engineering Mathematics-I

Sub Code: EC-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 $f(x)=x^2$ and domain $=\{-1,0,1\}$, then find range. **(CO1)**

   b. If $A=\begin{bmatrix}1 & 2\\ 3 & 4\end{bmatrix}$, then find 3A. **(CO1)**

   c. Write the value of $Sin120^0$ **(CO2)**

   d. Write the formula for $\tan 2A$ in terms of $\tan A$ **(CO2)**

2. If $f:R\to R$ is defined by $f(x)=3x-5$, then prove that $f(x)$ is onto. **(CO1)**

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

4. Prove that $Sin^2 45^0 - Sin^2 15^0 = \frac{\sqrt{3}}{4}$ **(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 $\frac{x+4}{x^2-3x+2}$ into partial fractions. **(CO1)**

7. A) Using Cramer's rule to solve

$x-y+z=2, 2x+3y-4z=-4, 3x+y+z=8$ **(CO1)**

or

B) Prove that $\begin{vmatrix} bc & b+c & 1 \\ ca & c+a & 1 \\ ab & a+b & 1 \end{vmatrix} = (a-b)(b-c)(c-a)$ **(CO1)**

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

or

B) If $A=\begin{bmatrix} 2 & 3 & 4 \\ 5 & 7 & 9 \\ -2 & 1 & 3 \end{bmatrix}$; $B=\begin{bmatrix} 3 & 1 & -5 \\ 2 & 1 & 4 \\ 0 & 3 & 1 \end{bmatrix}$, find AB and BA and verify if $AB=BA$.

(CO1)

-o0o-

Unit Test II **C –20**

State Board of Technical Education and Training, A. P

First Year

Subject name: Engineering Mathematics-I

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

   b. If $z = 2+3i$, then find $|z|$ **(CO2)**

   c. $\sinh x = \frac{e^{x} - e^{-x}}{2}$: State TRUE/FALSE **(CO2)**

   d. Write the eccentricity of rectangular hyperbola. (CO3)

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

3. Find the perpendicular distance from $(1,1)$ to the line $2x+3y-1=0$ (CO3)

4. Find the angle between lines $2x-y+3=0$ and $x+y-2=0$ **(CO3)**

5. Find the centre and radius of the circle $x^2+y^2-2x+4y-4=0$ **(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 $\frac{\sin 2\theta + \sin 4\theta + \sin 6\theta}{\cos 2\theta + \cos 4\theta + \cos 6\theta} = \tan 4\theta$. **(CO2)**

or

B) Prove that $\tan^{-1}\frac{1}{2} + \tan^{-1}\frac{1}{5} + \tan^{-1}\frac{1}{8} = \frac{\pi}{4}$ **(CO2)**

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

or

B) In any ΔABC, If $\angle B = 60^0$ then $\frac{c}{a+b} + \frac{a}{b+c} = 1$ **(CO2)**

8. A) Find the equation of circle with $(2,3)$ and $(6,9)$ as the end points of diameter and also find centre and radius of circle. **(CO3)**

(or)

B) Find the equation of ellipse whose focus is $(1,-1)$, directrix is $x - y + 3 = 0$ and eccentricity is1/2. **(CO3)**

-o0o-

Unit Test III **C –20**

State Board of Technical Education and Training, A. P

First Year

Subject name: Engineering Mathematics-I

Sub Code: EC-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. Find $\lim_{x\to 1}\frac{x^2+1}{x+5}$ **(CO4)**
   b. $\lim_{\theta\to 0}\frac{\sin 2\theta}{\theta}=2$: State TRUE/FALSE **(CO4)**
   c. $\frac{d}{dx}\left(3\tan^{-1}x\right)=?$ **(CO4)**
   d. Formula for percentage error in x is _____ **(CO5)**

2. Evaluate $\lim_{x\to 2}\frac{x^5-32}{x^2-4}$ **(CO4)**
3. Find the derivative of $3\tan x-4\log x+7^x$ w.r.t. x **(CO4)**
4. Differentiate $x^2\sin x$ w.r.t. x **(CO4)**
5. Find the derivative of $\frac{2x+3}{3x+4}$ **(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) Find the derivative of $\sin^{-1}\left(\frac{2x}{1+x^2}\right)$ w.r.t. $\tan^{-1}\left(\frac{2x}{1-x^2}\right)$. **(CO4)**

or

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

7. A) Verify Euler's theorem when $u(x, y) = \frac{x^4 + y^4}{x - y}$ **(CO4)**

or

B) Find the equation of tangent and normal to the curve $3y = x^2 - 6x + 17$ at $(4, 3)$ **(CO5)**

8. A) Circular patch of oil spreads on water and the area is growing at the rate of $8\,sqcm/\min$. How fast is the radius increasing when radius is $5\,cm$. **(CO5)**

or

B) Find the maxima and minima values of $f(x) = x^3 - 6x^2 + 9x + 15.$ **(CO5)**

-o0o-

END-EXAM MODEL PAPERS

STATE BOARD OF TECHNICAL EDUCATION, A.P

ENGINEERING MATHEMATICS EC- 102

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

PART-A

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

1. If $A=\left\{0,\frac{\pi}{6},\frac{\pi}{4},\frac{\pi}{3},\frac{\pi}{2}\right\}$ and $f:A\to B$ is a function such that $f(x)=\cos x$, then find the range of f.

CO1

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

CO1

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

4. Show that $\frac{\cos 16^0+\sin 16^0}{\cos 16^0-\sin 16^0}=\tan 61^0.$

CO2

5. Prove that $\frac{\sin 2\theta}{1-\cos 2\theta}=\cot\theta.$

CO2

6. Find the modulus of the complex number $\left(\frac{1-i}{2+i}\right)$.

CO2

7. Find the distance between parallel lines $x+2y+3=0$ and $x+2y+8=0.$

CO3

8. Find $\lim_{x\to 0}\frac{\sin 77x}{\sin 11x}.$

CO4

9. Differentiate $3\tan x-4\log x-7x^2$ w.r.t. x.

CO4

10. If $x=at^2, y=2at$, then find $\frac{dy}{dx}$.

CO4

PART-B

Answer All questions. Each question carries EIGHT marks. **5x8=40M**

11 A) Find the inverse of the matrix $\begin{bmatrix} 3 & -3 & 4 \\ 2 & -3 & 4 \\ 0 & -1 & 1 \end{bmatrix}$. **CO1**

(Or)

B) Solve the system of equations $x+y+z=6, x-y+z=2$ and $2x-y+3z=9$ by Cramer's rule. **CO1**

12 A) If $\cos x+\cos y=\frac{3}{5}$ and $\cos x-\cos y=\frac{2}{7}$, then show that

$$21\tan\left(\frac{x-y}{2}\right)+10\cot\left(\frac{x+y}{2}\right)=0.$$ **CO2**

(Or)

B) If $\tan^{-1}x+\tan^{-1}y+\tan^{-1}z=\pi$ then show that $x+y+z=xyz.$ **CO2**

13 A) Solve $\sqrt{3}\cos\theta-\sin\theta=1.$ **CO2**

Or

B) In any $\Delta ABC,$ Show that $\cot\frac{A}{2}+\cot\frac{B}{2}+\cot\frac{C}{2}=\frac{s^2}{\Delta}.$ **CO2**

14 A) Find the equation of the circle with $(4,2)$ and $(1,5)$ as the two ends of its diameter and also find its centre and radius. **CO3**

(Or)

B) Find the centre, vertices, equation of axes, lengths of axes, eccentricity, foci, equations of directrices and length of latus rectum of the ellipse $4x^2+16y^2=1.$ **CO3**

15 A) Find the derivative of $\sin^{-1}\left(\frac{2x}{1+x^2}\right)$ w.r.t. $\tan^{-1}\left(\frac{2x}{1-x^2}\right)$ **CO4**

Or

B) If $u=\tan^{-1}\left(\frac{x^3-y^3}{x+y}\right)$, then prove that $x\frac{\partial u}{\partial x}+y\frac{\partial u}{\partial y}=\sin 2u.$ **CO4**

PART-C

Answer the following question. Question carries TEN marks. **1x10=10M**

16. The sum of two numbers is 24. Find them so that the sum of their squares is minimum. **CO5**

***

STATE BOARD OF TECHNICAL EDUCATION, A.P

ENGINEERING MATHEMATICS EC- 102

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

PART-A

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

1. If $f : R \to R$ is a bijective function such that $f(x) = ax + b$, then find $f^{-1}(x)$. **CO1**

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

3. If $A = \begin{bmatrix} 0 & -1 & 3 \\ 1 & 0 & 7 \\ -3 & x & 0 \end{bmatrix}$ is a skew-symmetric matrix, find the value of x. **CO1**

4. Find the value of $\sin^2 82\frac{1}{2}^0 - \sin^2 22\frac{1}{2}^0$. **CO1**

5. Prove that $\frac{\cos 3A}{2\cos 2A - 1} = \cos A$. **CO2**

6. Find the conjugate of the complex number $(3-2i).(4+7i)$ **CO2**

7. Find the equation of the line passing through the points $(1,2)$ and $(3,-4)$. **CO3**

8. Find $\lim_{x \to 2} \frac{x^5 - 32}{x - 2}$. **CO4**

9. Differentiate $\sqrt{x} - \sec x + \log x$ w.r.t. x. **CO4**

10. If $u(x, y) = x^3 - 3axy + y^3$, then find $\frac{\partial u}{\partial x}$ and $\frac{\partial u}{\partial y}$. **CO4**

PART-B

Answer All questions. Each question carries EIGHT marks. **5x8=40M**

11 A) Show that $\begin{vmatrix} 1 & 1 & 1 \\ a & b & c \\ a^2 & b^2 & c^2 \end{vmatrix} = (a-b)(b-c)(c-a)$. **CO1**

Or

B) Solve the system of equations $x + 2y + 3z = 6, 3x - 2y + 4z = 5$ and $x - y - z = -1$ using matrix inversion method. **CO1**

12 A) Prove that $\frac{\sin 2\theta + \sin 4\theta + \sin 6\theta}{\cos 2\theta + \cos 4\theta + \cos 6\theta} = \tan 4\theta$. **CO2**

Or

B) Prove that $\tan^{-1}\frac{1}{3}+\tan^{-1}\frac{1}{5}+\tan^{-1}\frac{1}{7}+\tan^{-1}\frac{1}{8}=\frac{\pi}{4}.$ **CO2**

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

Or

B)In any $\Delta ABC,$ Show that $\sum a^3\cos(B-C)=3abc.$ **CO2**

14 A) Find the equation of the circle passing through the points $(0,0),(6,0)$ and $(0,8).$ **CO3**

Or

B) Find the equation of the rectangular hyperbola whose focus is $(1,2)$ and directrix is $3x+4y-5=0.$ **CO3**

15 A) If $\sin y=x\sin(a+y),$ then prove that $\frac{dy}{dx}=\frac{\sin^2(a+y)}{\sin a}.$ **CO4**

Or

B) If $y=\tan^{-1}x,$ then prove that $(1+x^2)y_2+2xy_1=0.$ **CO4**

PART-C

Answer the following question. Question carries TEN marks. **1x10=10M**

16 Show that the semi-vertical angle of the cone of maximum volume and of given slant height is $\tan^{-1}\sqrt{2}.$ **CO4**

***

Engineering Physics

Course code	Course Title	No. of Periods per week	Total No. of Periods	Marks for FA	Marks for SA
EC-103	Engineering Physics	4	120	20	80

S. No	Unit Title/Chapter	No of Periods	COs Mapped
1	Units and Dimensions	08	CO1
2	Elements of Vectors	12	CO1
3	Dynamics	12	CO2
4	Friction	10	CO2
5	Work, Power and Energy	12	CO3
6	Simple harmonic motion	12	CO3
7	Heat and Thermodynamics	12	CO4
8	Sound	10	CO4
9	Properties of matter	10	CO5
10	Electricity and Magnetism	12	CO5
11	Modern physics	10	CO5
Total		**120**	

Course Title: Engineering Physics	
Course Objectives	1. To familiarize with the concepts of Physics involved in the process of various Engineering, Industrial and Daily life Applications. 2. To understand and apply the basic principles of physics in the field of engineering and technology to familiarize certain natural phenomenon occurring in the day to day life 3. To reinforce theoretical concepts by conducting relevant experiments/exercises

Course Outcomes	CO1	Explain S.I units and dimensions of different physical quantities, basic operations among vector quantities.
	CO2	Explain the motion of objects moving in one dimension and two dimensions, the causes of motion and hindrance to the motion of the objects especially with respect to friction.
	CO3	Explain the mechanical energy of bodies like PE, KE and conservation law of energy, the properties of simple harmonic motion.
	CO4	Explain gas laws, ideal gas equation, Isothermal and adiabatic processes, Specific heats, to study the laws of thermodynamics. Causes, consequences and methods to minimise noise pollution, explain beats, Doppler effect, Reverberation, echoes.
	CO5	Explain certain properties of solids, liquids like elastic properties, viscosity and surface tension. Explain Ohm's law, to study Kirchoff's laws, to study the principle of Wheatstone's bridge and its application to meter bridge. To study the magnetic force and understand magnetic field. To compute magnetic field strength on axial and equatorial lines of a bar magnet. To familiarise with modern topics like photoelectric effect, optical fibres, superconductivity and nanotechnology.

COS, POS, PSOS MAPPING

- **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		2					1	1	
CO3	3		2					1		
CO4	3	2			2				2	2
CO5	3			2			2	1	1	

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

Note:

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

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

Learning Outcomes

1.0 Concept of Units and dimensions

1.1 Explain theconcept of Units, Physical quantity, Fundamental physical quantities and Derived physical quantities

1.2 Define unit, fundamental units and derived units, State SI units with symbols

1.3 State Multiples and submultiples in SI system, State Rules of writing S.I. units, State advantages of SI units

1.4 Define Dimensions, Write Dimensional formulae of physical quantities

1.5 List dimensional constants and dimensionless quantities
1.6 State the principle of homogeneity of dimensions
1.7 State the applications and limitations of dimensional analysis
1.8 Errors in measurement, Absolute error, relative error, percentage error, significant figures
1.9 Solve problems

2.0 Concept of Elements of Vectors

2.1 Explain the concept of scalars, Vectors and give examples
2.2 Represent vectors graphically, Classify the Vectors, Resolve the vectors
2.3 Determine the resultant of a vector by component method, represent a vector in Space using unit vectors (i, j, k)
2.4 State and explain triangle law, parallelogram law, and polygon law of addition of Vectors
2.5 Define Dot product of two vectors with examples (Work done, Power), mention the Properties of dot product
2.6 Define cross product of two vectors with examples (Torque, Linear velocity) Mention the properties of Cross product.
2.7 Solve the related numerical problems

3.0 Concept of Dynamics

3.1 Write the equations of motion in a straight line. Explain the acceleration due to Gravity.
3.2 Explain vertical motion of a body and derive expressions for a) Maximum Height, b) Time of ascent, c) time of descent, and d) time of flight
3.3 Derive height of a tower when a body projected vertically upwards from the top of a tower.
3.4 Explain projectile motion with examples
3.5 Explain horizontal projection and derive an expression for the path of a projectile in horizontal projection
3.6 Explain oblique projection and derive an expression for it. Derive formulae for a) Maximum Height b) time of ascent c) time of descent and d) time of flight e) Horizontal Range, f) Maximum range
3.7 Define force, momentum, angular displacement, angular velocity, angular acceleration, angular momentum, moment of inertia, torque
3.8 Solve the related numerical problems

4.0 Concept of Friction

4.1 Define friction and classify the types of friction.
4.2 Explain the concept of normal reaction.
4.3 State the laws of friction.
4.4 Define coefficients of friction, Angle of friction and angle of repose.
4.5 Derive expressions for acceleration of a body on a rough inclined plane. (Upwards and downwards)
4.6 List the advantages and disadvantages of friction.
4.7 Mention the methods of minimizing friction.

4.8 Explain why it is easy to pull a lawn roller than to push it.

4.9 Solve the related numerical problems.

5.0 Concepts of Work, Power, and Energy

5.1 Define the terms Work, Power and Energy. State SI units and dimensional Formulae.

5.2 Define potential energy and give examples, derive an expression for potential energy.

5.3 Define Kinetic energy and give examples, derive an expression for kinetic energy.

5.4 State and derive Work-Energy theorem.

5.5 Derive the relation between Kinetic energy and momentum.

5.6 State the law of conservation of energy and verify it in the case of a freely falling body.

5.7 Solve the related numerical problems.

6.0 Concepts of Simple harmonic motion

6.1 Define Simple harmonic motion, Give examples, state the conditions.

6.2 Explanation of uniform circular motion of a particle is a combination of two Perpendicular S.H.M.s.

6.3 Derive expressions for displacement, velocity, acceleration, Frequency, Time period of a particle executing SHM.

6.4 Define phase of SHM.

6.5 Define Ideal simple pendulum and derive expression for time period of simple pendulum.

6.6 State the laws of motion of simple pendulum.

6.7 Solve the related numerical problems.

7.0 Concept of heat and thermodynamics

7.1 Explain the concept of expansion of gases

7.2 State and explain Boyle's and Charles laws.

7.3 Define absolute zero temperature, absolute scale of temperature

7.4 Define ideal gas and distinguish from real gas

7.5 Derive Ideal gas equation. Define specific gas constant and universal gas constant, write S.I unit and dimensional formula. Calculate the value of R.

7.6 Explain why universal gas constant is same for all gases

7.7 State and explain isothermal process and adiabatic process

7.8 State first and second laws of thermodynamics and state applications

7.9 Define specific heats and molar specific heats of a gas, Derive C_P-C_V =R

7.10 Solve the relevant numerical problems

8.0 Concept of Sound

8.1 Concept of the sound, Wave motion. (Longitudinal and transverse wave)

8.2 Distinguish between musical sound and noise.

8.3 Explain noise pollution and state SI unit for intensity level of sound.

8.4 Explain causes, effects and methods of minimizing of noise pollution.
8.5 Explain the phenomenon of beats state the applications.
8.6 Define Doppler Effect, list the applications.
8.7 Define reverberation and reverberation time and write Sabine's formula.
8.8 Define and explain echoes state its applications.
8.9 State conditions of good auditorium.
8.10 Solve the related numerical problems.

9.0 Concepts of properties of matter

9.1 Explain the terms elasticity, stress, strain and types of stress and strain.
9.2 State and explain Hooke's law.
9.3 Definitions of Modulus of elasticity, Young's modulus(Y), Bulk modulus (K), Rigidity modulus (n),Poisson's ratio (σ),
9.4 Define surface tension and give examples.
9.5 Explain Surface tension with reference to molecular theory.
9.6 Define angle of contact and capillarity and write formula for Surface Tension.
9.7 Explain the concept of viscosity, give examples, write Newton's formula.
9.8 Define co-efficient of viscosity and write its units and dimensional formulaand State Poiseulle's equation for Co-efficient of viscosity.
9.9 Explain the effect of temperature on viscosity of liquids and gases.
9.10 Solve the related numerical problems.

10. Concepts of Electricity and Magnetism

10.1 Explain Ohm's law in electricity and write the formula.
10.2 Define specific resistance, conductance and state their units.
10.3 Explain Kichoff's laws.
10.4 Describe Wheatstone's bridge with legible sketch.
10.5 Describe Meter Bridge for the determination of resistivity with a circuit diagram.
10.6 Explain the concept of magnetism. State the Coulomb's inverse square law of Magnetism.
10.7 Define magnetic field and magnetic lines of force and write the properties of magnetic lines of force.
10.8 Derive an expression for the moment of couple on a bar magnet placed in a uniform magnetic field.
10.9 Derive equations for Magnetic induction field strength at a point on the axial line and on the equatorial line of a bar magnet.
10.10 Solvethe related numerical problems

11.0 Concepts of modern physics

11.1 State and explain Photo-electric effect and Write Einstein's photo electric Equation.
11.2 State laws of photo electric effect.
11.3 Explain the Working of photo electric cell, write its applications.
11.4 Recapitulation of refraction of light and its laws, critical angle, total Internal Reflection.

11.5 Explain the principle and working of Optical fiber, mention different types of Optical fiber, state the applications.

11.6 Define super conductor and super conductivity and mention examples.

11.7 State the properties of super conducting materials and list the applications.

11.8 Nanotechnology definition, nano materials, applications.

COURSECONTENT

1. Units and Dimensions:

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. Dimensions and Dimensional formulae, Dimensional constants and Dimensionless quantities, Principle of homogeneity, Advantages and limitations of dimensional analysis, Errors in measurement, Absolute error, relative error, percentage error, significant figures, Problems.

2. Elements of Vectors:

Scalars and Vectors, Types of vectors (Proper Vector, Null Vector, Unit Vector, Equal, Negative Vector, Like Vectors, Co-Initial Vectors, Co-planar Vectors and Position Vector).Addition of vectors, Representation of vectors, Resolution of vectors, Parallelogram, Triangle and Polygon laws of vectors, Subtraction of vectors, Dot and Cross products of vectors-Problems.

3. Dynamics

Introduction-Concept of acceleration due to gravity-Equations of motion for a freely falling body and for a body thrown up vertically- Projectiles- Horizontal and Oblique projections-Expressions for maximum height, time of flight, range-Define force, momentum, angular displacement, angular velocity, angular acceleration, angular momentum, moment of inertia, torque–problems.

4. Friction:

Introduction to friction- Causes- Types of friction- Laws of friction- Angle of repose-Angle of friction- rough inclined plane- Advantages and disadvantages of friction-Methods of reducing friction–Problems.

5. Work, Power and Energy:

Work, Power and Energy- Definitions and explanation- potential energy- kinetic energy-Derivations of Potential and Kinetic energies-K.E and Momentum relation - Work-Energy theorem- Law of Conservation of energy- Problems.

6. Simple Harmonic Motion:

Introduction- Conditions of SHM- Definition- Examples- Expressions for displacement, velocity, acceleration, Time period, frequency and phase in SHM- Time period of a simple pendulum- Laws of simple pendulum-seconds pendulum-Problems.

7. Heat and Thermodynamics:

Expansion of Gases, Boyle's law, absolute scale of temperature- Charles laws- Ideal gas equation- Universal gas constant- Differences between gas constant(r) and universal gas constant(R),Isothermal and adiabatic processes, Laws of thermodynamics, Specific heats - molar specific heats of a gas -Different modes of transmission of heat ,laws of thermal conductivity, Coefficient of thermal conductivity-Problems.

8. Sound:

Sound- Nature of sound- Types of wave motion -musical sound and noise- Noise pollution – Causes &effects- Methods of reducing noise pollution- Beats- Doppler effect- Echo-Reverberation-Reverberation time-Sabine 's formula-Conditions of good auditorium-Problems.

9. Properties of matter

Definition of Elasticity –Definition of stress and strain -the units and dimensional formulae for stress and strain-The Hooke's law-Definitions of Modulus of elasticity, Young's modulus(Y), Bulk modulus(K), Rigidity modulus (n),Poisson's ratio (σ), relation between Y, K, n and σ(equations only no derivation)

Definition of surface tension-Explanation of Surface tension with reference to molecular theory - Definition of angle of contact -Definition of capillarity -The formula for surface tension based on capillarity - Explanation of concept of Viscosity - Examples for surface tension and Viscosity - Newton's formula for viscous force- Definition of co-efficient of viscosity- The effect of temperature on viscosity of liquids and gases - Poiseuille's equation for Co-efficient of viscosity- The related numerical problems.

10. Electricity & Magnetism:

Ohm's law and explanation, Specific resistance, Kirchoff'slaws, Wheatstone's bridge, Meter bridge, Coulomb's inverse square law, magnetic field, magnetic lines of force, magnetic induction field strength- magnetic induction field strength at a point on the axial line - magnetic induction field strength at a point on the equatorial line–problems.

11. Modern Physics;

Photoelectric effect –Einstein's photoelectric equation-laws of photoelectric effect-photoelectric cell–Applications of photo electric effect- Total internal reflection- fiber optics--principle and working of an optical fiber-types of optical fibers - Applications of optical fibers- superconductivity–applications-Nanotechnology definition, nano materials, applications

REFERENCEBOOKS

1. Telugu Academy (English version)	Intermediate physics Volume-I & 2
2. Dr. S. L. Guptha and SanjeevGuptha	Unified physics Volume 1,2,3 and 4
3. Resnick& Holiday	Text book of physics Volume I
4. Dhanpath Roy	Text book of applied physics
5. D.A Hill	Fiber optics
6. XI & XII Standard	NCERT Text Books

➢ **Model Blue Print with Weightage for Blooms category and questions for chapter and Cos mapped**

S. No	Unit Title/Chapter	No of Periods	Weightage of marks	Marks wise distribution of Weightage				Question wise distribution of Weightage				Mapped with CO
				R	U	Ap	An	R	U	Ap	An	
1	Units and Dimensions	08	03	3	0	0	0	1	0	0	0	CO1
2	Elements of Vectors	12	11	3	8	0	0	1	1	0	0	CO1
3	Dynamics	12	11	3	8	0	0	1	1	0	*	CO2
4	Friction	10	11	3	0	8	0	1	0	1	0	CO2
5	Work, Power and Energy	12	11	3	8	0	0	1	1	0	0	CO3
6	Simple harmonic motion	12	11	3	8	0	0	1	1	0	*	CO3
7	Heat and Thermodynamics	12	11	0	8	3	0	0	1	1	*	CO4
8	Sound	10	11	0	8	3	0	0	1	1	0	CO4
9	Properties of matter	10	08	0	8	0	0	0	1	0	0	CO5
10	Electricity and Magnetism	12	14	6	0	8	0	2	0	1	0	CO5
11	Modern physics	10	08	0	8	0	0	0	1	0	0	CO5
Total		**120**	**110**	**24**	**64**	**22**	**0**	**8**	**8**	**4**	***10**	

***One question of HOTs for 10 marks from any of the unit title 3 or 6 or 7**

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

Unit Test	Learning outcomes to be covered
Unit Test – 1	From 1.1 to 4.9
Unit Test – 2	From 5.1 to 7.10
Unit Test – 3	From 8.1 to 11.8

➢ **Model question paper for Unit Tests I,II,III with COs mapped**

UNIT TEST –I

Model Question Paper (C-20)

ENGINEERING PHYSICS (EC-103)

TIME: 90 minutes Total Marks: 40

PART-A 16 Marks

Instructions: (1) Answer all questions.

(2) First question carries 4 marks and others carry 3 marks each.

(3) Answers for the Question numbers 2 to 5 should be brief and straight to the point and shall not exceed five simple sentences.

1. i) The dimensional formula of force is _____ **(CO1)**

   ii) Which of the following is a scalar **(CO1)**

   a) force b) workc) displacement d) velocity

   iii) We can add a scalar to a vector (Yes / No) (**CO1)**

   iv) Friction is a self-adjusting force. [True / False] **(CO2)**

2. Define dot product. Give one example. **(CO1)**
3. A force of 150 N acts on a particle at an angle of 30° to the horizontal. Find the horizontal and vertical components of force. (**CO1)**
4. Define projectile. Give two examples**.** **(CO2)**
5. It is easier to pull a lawn roller than to push it. Explain **(CO2)**

PART—B 3x8=24

Instructions: (1) Answer all questions. Each question carries 8marks.

(2) Answer should be comprehensive and the criteria for evaluation is content but not the length of the answer.

6) (A) Derive an expression for magnitude and direction of resultant of two Vectors using parallelogram law of vectors **(CO1)**

OR

(B) Write any four properties of dot product and any four properties of Cross product **(CO1)**

7) (A) Show that path of a projectile is a parabola in case of obliqueProjection. **(CO2)**

OR

(B) Derive the expression for range and time of flight of a projectile **(CO2)**

8) (A) State and explain polygon law of vector addition with a neat diagram **(CO1)**

OR

(B) Derive the equation for acceleration of a body on a rough inclined plane **(CO2)**

***

UNIT TEST –II

Model Question Paper (C-20)

ENGINEERING PHYSICS (EC–103)

TIME: 90 minutes Total Marks: 40

PART –A 16 Marks

Instructions: (1) Answer all questions.

(2) First question carries 4 marks and others carry 3 marks each.

(3) Answers for the Question numbers 2 to 5 should be brief and Straight to the point and shall not exceed five simple sentences.

1) i) The value of 100^0 C is equal to _____ in Kelvin scale of temperature **(CO4)**

ii) Write the S.I unit of power **(CO3)**

iii) A simple pendulum be used in artificial satellite (Yes / No) **(CO3)**

iv) Specific heat of a gas is constant for all gases in nature [True / False] **(CO4)**

2) Derive the relation between momentum and kinetic energy **(CO3)**

3) A girl is swinging by sitting in a swing, how the frequency changes if she stands in the swing. **(CO3)**

4) Write the physical significance of universal gas constant. **(CO4)**

5) A body is projected in to the air in the vertically upward direction, find the height at which its potential and kinetic energies are equal. **(CO3)**

PART—B 3x8=24 Marks

Instructions: (1) Answer all questions. Each question carries 8marks.

(2) Answer should be comprehensive and the criteria for evaluation is content but not the length of the answer.

6) (A) State the law of conservation of energy and verify it in case of a freely falling body. **(CO3)**

(OR)

(B) State and prove work energy theorem. **(CO3)**

7) (A) Define ideal simple pendulum and derive the equation for time period of a simple pendulum **(CO3)**

(OR)

(B) State the conditions for S.H.M, derive the equation for velocity for a Particle in S.H.M. **(CO3)**

8) (A) Define idealgas, show that for an ideal gas the difference in specific heats is equal to universal gas constant **(CO4)**

(OR)

(B) State gas laws and derive the ideal gas equation **(CO4)**

***

UNIT TEST –III

Model Question Paper (C-20)

ENGINEERING PHYSICS (EC–103)

TIME: 90 minutes Total Marks: 40

PART –A 16 Marks

Instructions: (1) Answer all questions.

(2) First question carries 4 marks and others carry 3 marks each.

(3) Answers for the Question numbers 2 to 5 should be brief and straight to the point and shall not exceed five simple sentences.

1) i) Photo electric cell converts light energy in to _____ energy **(CO5)**
   ii) What is elastic limit ? **(CO5)**
   iii) SI unit of Specific resistance is ---------- **(CO5)**
   iv) Inside a bar magnet magnetic line of force will travel from North pole to South pole [True / False] **(CO5)**
2) Distinguish between Musical sound and Noise **(CO4)**
3) What is the effect of temperature on Viscosity of liquids and gases **(CO5)**
4) The values of resistances P, Q, R are 50 Ω, 10Ω, 15 Ω respectively in the balanced condition of Wheatstone bridge, find the unknownresistance **(CO5)**
5) What is nanotechnology and write any two uses. **(CO5)**

PART—B 3x8=24 Marks

Instructions: (1) Answer all questions. Each question carries 8marks.

(2) Answer should be comprehensive and the criteria for evaluation is content but not the length of the answer.

6) (A) Explain Surface Tension based on the molecular theory **(CO5)**

(OR)

(B)Define Reverberation and Reverberation Time. Derive Sabine formula for reverberation time. **(CO4)**

7) (A) Derive the balancing condition of Wheatstone bridge with neat circuit Diagram. **(CO5)**

(OR)

(B) Derive an expression for the magnetic induction field strength at a point on the equatorial line of a bar magnet. **(CO5)**

8) (A) Describe an experiment to determine the specific resistance of a wire using meter bridge. **(CO5)**

(OR)

(B) Explain the principle and working of an optical fiber. **(CO5)**

***

BOARD DIPLOMA EXAMINATION, (C–20)

FIRST YEAR EXAMINATION

EC–103, ENGINEERING PHYSICS

Time : 3 hours] [Total Marks : 80M

PART—A **3×10=30**

Instructions: (1) Answer all questions.

(2) Each question carries three marks.

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

1. Write the dimensional formula of the following physical quantities **(CO1)**

   (a) Velocity (b) Force (c) Angular momentum

2. Write any three properties of scalar product. **(CO1)**

3. Define projectile. Give two examples. **(CO2)**

4. It is easier to pull a lawn roller than to push it. Explain. **(CO2)**

5. Define potential energy and kinetic energy. **(CO3)**

6. For a body in simple harmonic motion velocity at mean position is 4m/s, if the time period is 3.14 s, find its amplitude. **(CO3)**

7. State first and second laws of thermodynamics. **(CO4)**

8. Write any three conditions of good auditorium **(CO4)**

9. Define ohmic and non-ohmic conductors. **(CO5)**

10. State Coulomb's inverse square law of magnetism. **(CO5)**

PART—B **8 ×5= 40**

Instructions: (1) Each question carries eight marks.

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

11. A) Derive an expression for magnitude and direction of the resultant of two vectors using Parallelogram law of vectors. **(CO1)**

    (OR)

    B) Show that path of a projectile is parabola in case of oblique projection and derive expression for maximum height. **(CO2)**

12. A) Derive expression for acceleration of a body sliding downwards on a rough inclined plane**.** **(CO2)**

    (OR)

    B) Verify the law of conservation of energy in case of a freely falling body**.** **(CO3)**

13. A) Derive an expression for velocity and acceleration of a particle performing simple harmonic Motion. **(CO3)**

(OR)

B) Define ideal gas and derive ideal gas equation**.** **(CO4)**

14. A) Two tuning forks A and B produce 4 beats per second. On loading B with wax 6 beats are produced. If the quantity of wax is reduced the number of beats drops to 4. If the frequency of A is 326 Hz, find the frequency of B**.** **(CO4)**

(OR)

B) Explain surface tension based on molecular theory. Write three examples of surface tension. **(CO5)**

15. A) Derive an expression for balancing condition of Wheat stone's bridge with a neat circuit diagram. **(CO5)**

(OR)

B) Explain principle and working of optical fibers. Write any three applications . **(CO5)**

PART C **1 x 10 = 10**

16) Derive relationship between molar specific heat of a gas at constant pressure C_p and molar specific heat of a gas at constant volume C_v and hence show that $C_p$is greater than C_v. **(CO4)**

***

Engineering Chemistry and Environmental Studies

Course code	Course Title	No. of Periods per week	Total No. of Periods	Marks for FA	Marks for SA
EC-104	Engineering Chemistry and Environmental Studies	4	120	20	80

S.No	Unit Title/Chapter	No of Periods	COs Mapped
1	Fundamentals of Chemistry	18	CO1
2	Solutions	10	CO1
3	Acids and bases	10	CO1
4	Principles of Metallurgy	8	CO1
5	Electrochemistry	16	CO2
6	Corrosion	8	CO2
7	Water Treatment	10	CO3
8	Polymers	12	CO4
9	Fuels	6	CO4
10	Chemistry in daily life	6	CO4
11	Environmental Studies	16	CO5
	Total	**120**	

- **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 metallurgical process and alloys
	CO2	Explain electrolysis, Galvanic cell, emf and corrosion
	CO3	Explain the chemistry involved in the treatment of water by advanced method
	CO4	Synthesise of Plastics, rubber and applications of fuel chemical compounds used in our daily life.
	CO5	Explain the causes, effects and control methods of air and water pollution and measures to protect the environment

Course code M-104	**Engg. Chemistry and Environmental studies No of Cos;5**				**No Of periods 120**
POs	**Mapped with CO No**	**CO periods addressing PO in Col 1 NO**	**%**	**Level 1,2,3**	**remarks**
PO1	CO1,CO2,CO3, CO4,CO5	60	50%	3	>40% level 3 (highly addressed) 25% to 40% level2(moderately addressed 5% to 25% level1 (Low addressed < 5%(not addressed)
PO2	CO1,CO2	13	10.8%	1	
PO3	CO2,CO3	10	8.3%	1	
PO4	CO1	10	8.3%	1	
PO5	CO4,CO5	15	12.5	1	
PO6					
PO7	CO4	12	10%	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	2					1	1	
CO3	3		2							
CO4	3				1		2			
CO5	3				3			1		

3 = strongly mapped

2= moderately mapped

1= slightly mapped

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

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

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

S.No	Unit Title/Chapter	No of Periods	Weightage of marks	Marks wise distribution of Weightage				Question wise distribution of Weightage				Mapped with CO
				R	U	Ap	An	R	U	Ap	An	
1	Fundamentals of Chemistry	18	19	8	8	3		1	1	1		CO1
2	Solutions	10	11	0	0	8	3			1	1	CO1
3	Acids and bases	10	11	0	8	0	3		1		1	CO1
4	Principles of Metallurgy	8	8	8	0	0		1				CO1
5	Electrochemistry	16	11	8	3	0		1	1		*	CO2
6	Corrosion	8	8	0	8	0			1			CO2
7	Water Treatment	10	11	8	3	0		1	1			CO3
8	Polymers	12	11	3	8	0		1	1		*	CO4
9	Fuels	6	3	3	0	0		1				CO4
10	Chemistry in daily life	6	3	0	0	3				1		CO4
11	Environmental Studies	16	14	3	11	0		1	2			CO5
Total		**120**	**110**	**12**	**6**	**6**	**6**	**20**	**35**	**5**	***10**	

***One question of HOTs for 10 marks from any of the unit title 5 or 8**

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

ENGINEERINGCHEMISTRY AND ENVIRONMENTAL STUDIES

1.0 Atomic structure

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

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

1.3 Explain the significance of four Quantum numbers.

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

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

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

1.7 Explain the significance of chemical bonding

1.8 Explain the Postulates of Electronic theory of valency

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

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

1.11 Structures of ionic solids-define a) Unit cell b) co-ordination number and the structures of NaCl and CsCl unit cells.

2.0 Solutions

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

2.2 Classify solutions based on physical state and solubility

2.3 Define mole and problems on mole concept.

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

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

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

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

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

3.0 Acids and bases

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

3.2 Explain Bronsted–Lowry theory of acids and bases and give the limitations of Bronsted–Lowry theory of acids and bases.

3.3 Explain Lewis theory of acids and bases and give the limitations of Lewis theory of acids and bases.

3.4 Explain the Ionic product of water

3.5 Define pH and explain P^H scale and solve the Numerical problems on pH(Strong Acids and Bases)

3.6 Define and explain buffer solution and give the examples of buffer solutions.

3.7 State the application of buffer solutions

4.0 Principles of Metallurgy

4.1 List out the Characteristics of Metals and non-metals

4.2 Distinguish between Metals and Non-metals

4.3 Define the terms 1.Mineral, 2.Ore, 3. Gangue, 4.Flux5.Slag

4.4 Describe the methods of concentration of Ore; 1.Handpicking, 2.Levigation and 3. Froth Floatation

4.5 Describe the methods involved in extraction of crude metal- Roasting, Calcination and Smelting.

4.6 Explain the purification of Copper by Electrolytic Refining

4.7 Define an Alloy and Write the composition and uses of the following alloys. 1. Brass 2. Germen silver 3. Nichrome.

5.0 Electrochemistry

5.1 Define the terms1. Conductor 2. Semiconductor 3.Insulator, 4.Electrolyte5.Non–

electrolyte.Give two examples each.

5.2 Distinguish between metallic conduction and Electrolytic conduction

5.3 Explain electrolysis by taking example fused NaCl

5.4 Explain Faraday's laws of electrolysis

5.5 Define 1. Chemical equivalent (E) 2. Electrochemicalequivalent (e) and their relation.

5.6 Solve the Numerical problems on Faraday's laws of electrolysis and applications of electrolysis (Electro plating)

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

5.8 Distinguish between electrolytic cell and galvanic cell

5.9 Explain the electrode potentials and standard electrode potentials

5.10 Explain the electrochemical series and its significance

5.11 Explain the emf of a cell and solve the numerical problems on emf of the cell based on standard electrode potentials.

6.0 Corrosion

6.1 Define the term corrosion.

6.2 state the Factors influencing the rate of corrosion

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

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

6.5 Explain the methods of prevention of corrosion

a)Protective coatings (anodic and cathodic coatings)

b) Cathodicprotection (Sacrificial anode process and Impressed–voltage process)

7. 0 Water Treatment

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

7.2 Define and classify the hardness of water.

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

7.4 State the disadvantages of using hard water in industries.

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

7.6 Explain the methods of softening of hard water: a) Ion-exchange process, b)Permutit process or zeolite process

7.7 State the essential qualities of drinking water.

7.8 Chemistry involved in treatment of water (Coagulation, Chlorination, deflouridation)

7.9 Explain Osmosis and Reverse Osmosis with examples.

7.10 State the applications of Reverse Osmosis.

8.0 Polymers

8.1 Explain the concept of polymerisation

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

8.3 Define thermoplastics and thermosetting plastics with examples.

8.4 Distinguish between thermo plastics and thermosetting plastics

8.5 List the Characteristics of plastics and state the disadvantages of using plastics.

8.6 State the advantages of plastics over traditional materials.

8.7 Explain the methods of preparation and uses of the following plastics:
1. PVC, 2.Teflon, 3. Polystyrene 4. Nylon 6,6

8.8 Explain processing of Natural rubber and write the structural formula of Natural rubber.

8.9 List the Characteristics of raw rubber

8.10 Define and explain Vulcanization and List out the Characteristics of Vulcanized rubber.

8.11 Define the term Elastomer and describe the preparation and uses of the following synthetic rubbers a) Buna-s and b)Neoprene rubber.

9.0 Fuels

9.1 Define the term fuel

9.2 Classify the fuels based on physical state and based on occurrence.

9.3 List the characteristics of good fuel.

9.4 State the composition and uses of gaseous fuels.
a)water gas b) producer gas, c) natural gas, d) Coal gas, e)Biogas.

10.0 Chemistry in daily life

10.1 Give the basic chemical composition, applications, health aspects and pollution impacts of a) soaps, and detergents b) vinegar c) Insect repellents d) activated charcoal e) Soft drinks

11.0 ENVIRONMENTALSTUDIES

11.1 Define the term environment and explain the scope and importance of environmentalstudies

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

11.3 Define the following terms 1)Pollutant, 2).Pollution, 3).Contaminant, 4)receptor, 5)sink, 6) particulates, 7)dissolved oxygen (DO), 8)Threshold limit value (TLV), 9)BOD,10).COD 11) eco system12) Producers13) Consumers 14) Decomposers with examples

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

11.5 Explain biodiversity and threats to biodiversity

11.6 Define air pollution and classify the air pollutants-based on origin and physical state of matter.

11.7 Explain the causes, effects of air pollution on human beings, plants and animals and control methods of air pollution.

11.8 State the uses of forest resources.

11.9 Explain causes and effects of deforestation

11.10 Explain the causes and effects of the following
1) Greenhouse effect, 2) Ozone layer depletion and 3) Acid rain

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

COURSE CONTENT

ENGINEERING CHEMISTRY AND ENVIRONMENTAL STUDIES

1. Fundamentals of Chemistry

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

Chemical Bonding: Introduction – types of chemical bonds – Ionic and covalent bond with examples–Properties of Ionic and Covalent compounds- structures of ionic crystals (NaCl and CsCl).

2. Solutions

Introduction of concentration methods – mole concept, molarity and normality – Numerical problems on mole, molarity and normality.

3. Acids and Bases

Introduction – Theories of acids and bases and limitations – Arrhenius theory- Bronsted – Lowry theory – Lewis acid base theory – Ionic product of water- pHrelated numerical problems–Buffer solutions, action of buffer and its applications.

4. Principles of Metallurgy

Characteristics of Metals and non-metals –Distinguish between Metals and Non-metals, Define the terms i) Metallurgy ii) ore iii) Gangue iv) flux v) Slag - Concentration of Ore –Hand picking, Levigation, Froth floatation – Methods of Extraction of crude Metal – Roasting, Calcination, Smelting – Alloys – Composition and uses of brass, German silver and nichrome.

5. Electrochemistry

Conductors, semiconductors, insulators, electrolytes and non-electrolytes – electrolysis – Faraday's laws of electrolysis-application of electrolysis(electroplating) -numerical problems on Faraday's laws – Galvanic cell – standard electrode potential – electrochemical series–emf and numerical problems on emf of a cell .

6. Corrosion

Introduction - factors influencing corrosion - composition, stress and concentration cells– rusting of iron and its mechanism – prevention of corrosion by coating methods, cathodicprotection methods.

7. Water technology

Introduction–soft and hard water–causes of hardness–types of hardness –disadvantages of hard water – degree of hardness (ppm and mg/lit) – softening methods – permutit process – ion exchange process– qualities of drinking water –Chemistry involved in treatment of water (Coagulation, Chlorination, defluoridation) - Osmosis, Reverse Osmosis –Applications of Reverse osmosis.

8. Polymers

Introduction – polymerization – types of polymerization – addition, condensation with examples – plastics – types of plastics – advantages of plastics over traditional materials- Disadvantages of using plastics – Preparation and uses of the following plastics i).PVC ii) Teflon iii) Polystyrene iv) .Nylonn 6,6 –Processing of natural rubber - Vulcanization – Elastomers- Preparation and applications of Buna-s, Neoprene rubbers.

9. Fuels

Definition and classification of fuels–characteristics of good fuel-composition and uses of gaseous fuels.

10. Chemistry in daily life

Basic composition, applications, health aspects and pollution impacts of soaps and

detergents, vinegar, insect repellents, soft drinks, activated charcoal.

11. **ENVIRONMENTALSTUDIES**

Introduction– environment –scope and importance of environmental studies – important terms related to environment– renewable and non-renewable energy sources–Concept of ecosystem – Biotic components –Forest resources – Deforestation -Biodiversity and its threats-Air pollution – causes-effects–Global environmental issues – control measures – Water pollution – causes – effects – control measures.

REFERENCEBOOKS

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 3.7
Unit Test - 2	From 4.1 to 7.10
Unit Test - 3	From 8.1 to 11.11

Model question paper for Unit Test with Cos mapped

UNIT TEST –I

Model Question Paper (C-20)

ENGINEERING CHEMISTRY & ENVIRONMENTAL STUDIES (104)

TIME: 90 minutes **Total Marks: 40**

PART-A **16 Marks**

Instructions: (1) Answer all questions.

(2) First question carries 4 marks and each of rest carries 3 marks.

(3) Answers for Q.No. 2 to 5 should be brief and straight to the point and shall not exceed five simple sentences.

1. a) Number of neutrons in $_{11}Na^{23}$ is ---------- **(CO1)**
   b) The molarity and normality of HCl is the same (True or False) **(CO1)**
   c) What is the p^H range of base? **(CO1)**
   d) Graphite is a good conductor of electricity (Yes or No) **(CO1)**
2. Distinguish between orbit and orbital. **(CO1)**
3. Define Covalent bond. Explain the formation of covalent bond in Oxygen and Nitrogen molecules**.** **(CO1)**
4. Define mole. Calculate the number of moles present in 50 gm of $CaCO_3$ and 9.8 gm of H_2SO_4. **(CO1)**
5. Define P^H. Calculate the P^H of 0.001M HCl and 0.01M NaOH solution. **(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) Express molarity normality with mathematical equation. Calculate the molarity and normality of 10gm of NaOH present in 500 ml solution. **(CO1)**

(OR)

B) Classify solutions based the physical state of solute and solvent and give an example each. **(CO1)**

8. A) What is buffer solution? Classify with examples and give it`s applications. **(CO1)**

(OR)

B) Explain Bronsted-Lowry theory of acids and bases. Give its limitations. **(CO1)**

***

UNIT TEST –II

Model Question Paper (C-20)

ENGINEERING CHEMISTRY & ENVIRONMENTAL STUDIES (M-104)

TIME: 90 minutes Total Marks:40Marks

PART-A **16 Marks**

Instructions: (1) Answer all questions.

(2) First question carries 4 marks and each of rest carries 3 marks.

(3) Answers forQ.No. 2 to 5 should be brief and straight to the point and shall not exceed five simple sentences.

1. a) Bauxite is the ore of ..... metal **(CO2)**

   b) What is the unit of electrochemical equivalent? **(CO2)**

   c) $CaSO_4$ is the permanent hardness causing salt. (True or False) **(CO3)**

   d) Write the Chemical formula of rust **(CO2)**

2. Write any three differences between metallic conduction and electrolytic conduction.**(CO2)**

3. Write the composition and applications of German silver and Nichrome. **(CO1)**

4. Mention any three disadvantages of using hard water in industries. **(CO3)**

5. Define electro chemical equivalent and chemical equivalent. Give the relation between them. **(CO2)**

PART – B **3x8M = 24M**

Answer either (A) or (B) from each questions from Part-B.Each question carries 8 marks.

6. A) What is galvanic cell? Explain construction and working of galvanic cell with neat diagram **(CO2)**

   (OR)

   B) State and explain Faraday`s laws of electrolysis. **(CO2)**

7. A) Explain different types of galvanic cells formed during the corrosion of metals. **(CO2)**

   (OR)

   B) What is hard water? Explain zeolite process of softening of hard water. **(CO3)**

8. A) Explain Froth floatation process. **(CO1)**

   (OR)

   B) Explain Electrolytic refining processing of copper. **(CO1)**

***

UNIT TEST –III

Model Question Paper (C-20)

ENGINEERING CHEMISTRY & ENVIRONMENTAL STUDIES (104)

TIME: 90 minutes Total Marks:40

PART-A 16 Marks

Instructions: (1) Answer all questions.

(2) First question carries 4 marks and each of rest carries 3 marks.

(3) Answers for Q. No. 2 to 5 should be brief and straight to the point and shall not exceed five simple sentences.

1. a) The monomer of PVC..... **(CO4)**

   b) Sulphur is the vulcanising agent. (True/False) **(CO4)**

   c) Give an example for secondary pollutant. **(CO5)**

   d) Presence of ozone in stratosphere is a pollutant.(Yes/No) **(CO5)**
2. List any three characteristic properties of vulcanised rubber. **(CO4)**
3. Define primary fuel and secondary fuels give an example each. **(CO4)**
4. Mention the basic chemical composition and applications of vinegar. **(CO4)**
5. Write any three threats to the biodiversity. **(CO5)**

PART – B 3x8M = 24M

Answer either (A) or (B) from each questions from Part-B. Each question carries 8 marks.

6. A) Explain addition and condensation polymerization with an example each. **(CO4)**

   (OR)

   B) Give a method of preparation and applications of the followingi) Buna-S ii) Neoprene **(CO4)**
7. A) What is air pollution? Explain any three causes of air pollution. **(CO5)**

   (OR)

   B) Briefly explain ozone layer depletion and green house effect. **(CO5)**
8. A) What is water pollution? Explain any three controlling methods of water pollution.**(CO5)**

   (OR)

   B) What are thermoplastics and thermo setting plastic? Write any four differences between these two plastics. **(CO4)**

***

Model Question Paper (C-20)

ENGINEERING CHEMISTRY & ENVIRONMENTAL STUDIES (M-104)

TIME: 3hrs Total Marks:80

PART-A

Instructions: (1) Answer all questions. 3x10=30M
(2) Each question carries 3 marks.

1. Draw the shapes of s and p orbitals. **(CO1)**
2. Define mole. Find the mole number of 10 g of $CaCO_3$ **(CO1)**
3. Define Buffer solution. Give any two examples. **(CO1)**
4. Define chemical equivalent and electrochemical equivalent. Give their relation. **(CO2)**
5. State name of the salts and their formulae that cause hardness. **(CO3)**
6. Write any three disadvantages of using plastics. **(CO4)**
7. Classify the fuels based on their occurrence. **(CO4)**
8. Mention the basic chemical composition and applications of vinegar. **(CO4)**
9. List out any three threats to biodiversity. **(CO5)**
10. Define pollutant and contaminant. Give an example each. **(CO5)**

PART – B

Each question carries eight marks. 8x5=40M

11. A) Explain Bhor's atomic theory and give its limitations. **(CO1)**

(OR)

B) Explain ionic bond formation and covalent bond formation with one example each **(CO1)**

12. A) Calculate the molarity and normality of 250 ml of sodium carbonate solution that contains 10.6 gm of sodium carbonate. **(CO1)**

(OR)

B) Explain Bronstead and Lowry theory of acids and bases. Give its limitations. **(CO1)**

13. A) Explain froth floatation and electrolytic refining of copper with neat diagrams. **(CO1)**

(OR)

B) Explain the construction and working of galvanic cell. **(CO2)**

14. A) Explain Cathode protection methods. **(CO2)**

(OR)

B) Explain ion-exchange of softening of hard water with a neat diagram. **(CO3)**

15. A) Explain addition and condensation polymerisation with an example each. **(CO4)**

(OR)

B) Explain the causes and effects of air pollution. **(CO5)**

PART –C

Question carries ten marks 10x1 =10M

16. Analyse the products formed at cathode and anode with electrode reactions during the Electrolysis of aqueous NaCl in compare with fused NaCl. **(CO2)**

***

ELECTRONIC COMPONENTS & POWER SUPPLIES

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

S No	Unit Title	No. of Periods	COs Mapped
1	Passive Components	24	CO1
2	Switches ,Connectors and Relays	10	CO1
3	PCBs	10	CO2
4	Semiconductor Physics	20	CO3
5	Semiconductor Diode	22	CO3
6	BJT	25	CO4
7	Field Effect Transistor	20	CO4
8	DC Power Supplies	19	CO5
	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
	3. To analyse the working of BJT and FET circuits
	4 To understand different rectifier circuits and regulated power supplies

CO No		COURSE OUTCOMES
CO1	**EC-105.1**	Familiarize different passive components, switches ,relays and their uses
CO2	**EC-105.2**	Describe PCB manufacturing Techniques and soldering methods
CO3	**EC-105.3**	Describe the formation of Extrinsic semiconductors and the working of semiconductor diode
CO4	**EC-105.4**	Analyse the working of BJT & FET and their configurations
CO5	**EC-105.5**	Explain rectifier circuits and regulated power supplies

CO-PO/PSO MATRIX

CO No	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
EC-105.1	3	3	2					3		
EC-105.2	3	2	3		3			3		1
EC-105.3	3	3	1					3		
EC-105.4	3	3	2					3		
EC-105.5	3	3	3		3			3	1	2
Average	3	2.8	2.2		3			3	1	1.5

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

LEARNING OUTCOMES

1.0 Passive Components

1.1 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

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

1.3 Compare the features of carbon and wire wound potentiometers

1.4 Describe the working of rheostat and mention its applications.

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

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

1.7 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

1.8 Explain the term Stray inductance

1.9 List various core materials used in the construction of inductors

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

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

1.12 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

1.13 State the factors affecting the capacitance of a capacitor.

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

1.15 State different types of variable capacitors and mention their applications.

2.0 Switches, Connectors and Relays

2.1 Explain the working of a switch.

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

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

2.4 State the need of fuse in electronic equipment.

2.5 Mention different types of fuses.
2.6 Explain the necessity of connectors in electronic circuits.
2.7 List different types of connectors.
2.8 Mention the use of MCB.
2.9 Define a relay.
2.10 Classify different relays based on principle of operation, polarization and application.
2.11 List the specifications and applications of relays.
2.12 Explain the working of general purpose electromagnetic relay.

3.0 PCBs

3.1 Explain the need of PCB in electronic equipment
3.2 Classify PCBs and list types of laminates used in PCBs.
3.3 Mention the methods of layout preparation of PCB.
3.4 List the methods of transferring layout on to the copper clad sheet.
3.5 List the materials used in screen-printing.
3.6 List the steps involved in screen-printing for making PCBs.
3.7 Describe the methods of etching, cleaning and drilling of PCB.
3.8 Describe the steps involved in making double-sided PCB.
3.9 State the need for multilayer PCBs
3.10 Explain Surface mount Technology (SMT) and its uses
3.11 List the materials used in soldering.
3.12 List the soldering methods of PCBs.

4.0 Semiconductor Physics

4.1 Explain the terms conductivity and resistivity, and give their equations
4.2 Describe Energy Level and Energy Band diagrams
4.3 Compare conductors, semiconductors and Insulators
4.4 Explain Valance band, Conduction band and Forbidden energy gap
4.5 Explain Semiconductor materials using Energy Band diagrams
4.6 Explain Hole conduction, bi polar nature of Semiconductor materials
4.7 Describe Intrinsic Semiconductors and Fermi level
4.8 Describe extrinsic Semiconductors , and their EBDs by using Fermi level
4.9 Distinguish between intrinsic and extrinsic semiconductors
4.10 Explain the formation of P type and N type semiconductors
4.11 Compare P-type and N-type semiconductors
4.12 Explain Drift and Diffusion currents
4.13 Explain the exact and approximate conductivity equations of P & N typesemiconductors.

5.0 Semiconductor Diodes

5.1 Explain the formation of PN junction diode.
5.2 Describe the working of PN junction Diode with forward & reverse biasing.
5.3 Sketch the forward and Reverse Bias VI characteristics of a diode.
5.4 Explain the Energy Band Diagram of PN diode
5.5 Explain potential barrier by using Energy band diagram
5.6 Explain diode equation
5.7 Explain the manufacturer specifications of a given diode from data sheet.
5.8 Mention the applications of diode
5.9 Explain reverse breakdown phenomenon
5.10 Distinguish between Avalanche &Zener breakdowns
5.11 Describe the construction and working of Zener diode.
5.12 Draw the forward &reverse bias characteristics of Zener diode
5.13 Mention the applications of zener diode

6.0 BJT

6.1 Explain the formation of transistor
6.2 Draw the circuit symbol of transistor.
6.3 Explain the construction of PNP and NPN transistors
6.4 Explain the working of PNP and NPN Transistors.
6.5 Draw the different transistor configurations.
6.6 Sketch the input/output characteristics of CB, CE and CC configurations.
6.7 Identify the cut off, saturation and active regions in output characteristics of CB,CE and CC configurations
6.8 Define alpha, beta and gamma Factors.
6.9 Relate alpha, beta and gamma Factors.
6.10 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}
6.11 Compare the performance characteristics of CB, CE and CC configurations
6.12 Explain transistor as a switch

7.0 Field Effect Transistor

7.1. Classify Field Effect Transistors
7.2. Describe the construction and principle of operation of n channel JFET
7.3. Draw and explain the drain characteristics of JFET
7.4. Draw and explain the mutual characteristics of JFET
7.5. Define the parameters of JFET and obtain the relation among them.
7.6. List the advantages of JFET over BJT
7.7. Explain the construction & working of N channel Enhancement type MOSFET
7.8. Explain the construction & working of N channel Depletion type MOSFET
7.9. Draw the Drain & Transfer Characteristics of N channel depletion MOSFET
7.10. Compare JFET and MOSFET

8.0 DC Power Supplies

8.1 Explain the necessity of D.C. power supply for Electronic circuits
8.2 Describe the working of Half wave rectifier, Full Wave centre tapped rectifier and Bridge rectifier circuits with wave forms
8.3 Give the equations for RMS value and average value(DC value) voltages and currents for above rectifiers
8.4 i) Define ripple factor and efficiency for the above circuits
ii) Give the formulae for ripple factor and efficiency
8.5 Compare HW, FW Centre tapped and Bridge Rectifiers
8.6 Explain the need for a filter circuit in power supplies
8.7 Explain the working of a RC, CRC, CLC filters for a full wave rectifier output
8.8 Explain the need of swinging choke
8.9 State the need for a regulated power supply
8.10 Define Voltage Regulation
8.11 Explain the working of a simple Zener regulator
8.12 Explain the operation of transistor series voltage regulator
8.13 List the disadvantages of transistor series voltage Regulator
8.14 Explain the operation of transistor shunt voltage regulator
8.15 Explain the significance of bleeder resistor

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 and Relays**: Switch- Classification – ISI symbols – Fuse – Types – Necessity of connectors – Types – MCB – Relay – Classification – Specifications – Applications – General purpose electromagnetic relay

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

4. **Semiconductor Physics:** Conductivity,resistivity – equations- Energy level, Energy Band Diagramscompare 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 - Exact & approximate conductivity equations

5. **Semiconductor Diodes:** PN junction diode – Working - VI characteristics – Energy band diagrams- Potential barrier - Diode equation – Manufacturer specifications – Applications - Breakdown phenomenon - Avalancheand Zener breakdowns - Zener diode construction, working – Reverse bias characteristics –Applications

6. **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 in CB and CE-Comparison of CB,CE,CC -Transistor as switch.

7. **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

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, and CLC –Swinging choke – Need for regulated power supply – Voltage regulation – Zener regulator - Transistor series voltage regulator- Disadvantages - Transistor shunt voltage 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	Marks Wise distribution of weightage				Question Wise distribution of weightage				COs mapped
				R	U	Ap	An	R	U	Ap	An	
1	Passive Components	24	14	3	3	8	-	1	1	1	-	CO1
2	Switches ,Connectors and Relays	10	7	3	-	8/2*	-	1	-	1/2	-	CO1
3	PCBs	10	7	3	-	8/2*	-	1	-	1/2	-	CO2
4	Semiconductor Physics	20	10	3	3	8/2*		1	1	1/2	-	CO3
5	Semiconductor Diode	22	7		3	8/2*	-		1	1/2	-	CO3
6	BJT	25	13		3	-	10	-	1	-	1	CO4
7	Field Effect Transistor	20	11		3	8		-	1	1	-	CO4
8	DC Power Supplies	19	11		3	8		-	1	1	-	CO5
	Total	150	80	12	18	40	10	4	6	5	1	

* Part-B essay question is divided into two four marks questions

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 3.12
Unit Test-II	From 4.1 to 6.6
Unit Test-III	From 6.7 to 8.15

(Model Paper) **C –20, EC -105**

State Board of Technical Education and Training, A. P

Diploma in Electronics and Communication Engineering (DECE)

First Year

Subject Name: Electronic Components and Power Supplies

Sub Code: EC - 105

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. Draw the circuit symbols of following
   a) Ferrite core inductor (CO1)
   b) Single pole double throw (SPDT) switch (CO2)
   c) Iron core inductor (CO1)
   d) Double pole single throw (DPST) switch (CO2)
2. Define the term capacitance (CO1)
3. Compare the features of carbon and wire wound potentiometers (CO1)
4. List the materials used in soldering. (CO2)
5. State the need of fuse in electronic equipment. (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 the use of Ferrites in the construction of high frequency inductors (CO2)

   (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 (CO3)
8. (a) Explain the working of rheostat and mention its application. (CO1)

   (or)

   (b) Explain Surface mount Technology (SMT) and its uses (CO3)

-o0o-

(Model Paper) **C –20, EC -105**

State Board of Technical Education and Training, A. P

Diploma in Electronics and Communication Engineering (DECE)

First Year

Subjectname:Electronic Components and Power Supplies

Sub Code: EC - 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 (CO6)
   b) PNP Transistor (CO6)
   c) PN Diode (CO5)
   d) Zener Diode (CO5)
2. Compare P-type and N-type semiconductors (CO4)
3. Write any three applications of diode (CO5)
4. Distinguish between Avalanche &Zener breakdowns (CO5)
5. Draw the input and output characteristics of a transistor connected in common emitter configuration (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) Explain Semiconductor materials using Energy Band diagrams (CO4)

   (or)

   (b) Explain the formation of P and N type semiconductors (CO4)

7. (a) Describe the working of PN junction Diode with forward & reverse biasing. (CO5)

   (or)

   (b) Describe the construction and working of Zener diode. (CO5)

8. (a) Explain the formation of transistor (CO6)

   (or)

   (b) Explain the construction of PNP and NPN transistors (CO6)

-o0o-

(Model Paper) **C –20, EC -105**

State Board of Technical Education and Training, A. P

Diploma in Electronics and Communication Engineering (DECE)

First Year

Subject Name:Electronic Components and Power Supplies

Sub Code: EC - 105

Time : 90 minutes **Unit Test III** Max.Marks:40

Part-A **16Marks**

Instructions: (1) Answer all questions.
(2) First question carries fourmarks, each question of remaining carries three marks

1. Draw the circuit symbols of following
   a) N channel JFET (CO7)
   b) N channel MOSFET (CO7)
   c) Bridge rectifier is a Half wave rectifier (TRUE/FALSE) (CO8)
   d) 2 Diodes are used in Full wave center tapped rectifier (CO8)
2. Define alpha, beta and gamma Factors. (CO6)
3. List the advantages of JFET over BJT (CO7)
4. State the need for a regulated power supply (CO8)
5. List the disadvantages of transistor series voltage Regulator (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) Write collector current expression in CB and CE modes of transistors in terms of α, β, IE, IB, IC and ICBO, ICEO (CO6)

   (or)

   (b) Explain transistor as a switch (CO6)
7. (a) Describe the construction and principle of operation of n channel JFET (CO7)

   (or)

   (b) Explain the construction & working of N channel Enhancement type MOSFET(CO7)
8. (a) Describe the working of Bridge rectifier circuits with wave forms (CO8)

   (or)

   (b) Explain the operation of transistor series voltage regulator and list its disadvantages (CO8)

-o0o-

MODEL PAPAER
BOARD DIPLOMA EXAMINATIONS
C-20, EC-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. (CO1)
4. List the materials used in soldering. (CO2)
5. Define Energy Level and Energy Band diagrams (CO3)
6. Distinguish between Drift and Diffusion currents (CO3)
7. Compare Avalanche &Zener breakdown (CO3)
8. Relate alpha, beta and gamma Factors. (CO3)
9. Interpret the advantages of JFET over BJT. (CO4)
10. Compare Half wave, Full wave Centre tapped, Bridge rectifiers in any 3 aspects(CO5)

Part-B **5**×8=40

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.

11. (a) Explain the use of Ferrites in the construction of high frequency inductors (CO1)

(or)

(b) Explain the working of thermistor and sensistor. (CO1)

12. (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)

13. (a) Explain the formation of P type and N-type semiconductors (CO3)

(or)

(b) Explain the working of PN junction Diode with forward & reverse biasing. (CO3)

14. (a) Explain the construction and principle of operation of n channel JFET. (CO4)

(or)

(b) Explain the construction & working of Depletion type MOSFET (CO4)

15. (a) Explain the working of full wave bridge rectifier with wave forms (CO5)

or

(b) Explain the operation of transistor series voltage regulator and mention its disadvantages? (CO5)

Part-C **1**×10=10

Instructions: **(1) Answer the question given below. It carries 10 marks**

(2) Answer should be comprehensive and the criterion for valuationis the content but not the length of the answer.

16. Analyse variation of collector current in CB and CE transistors with respect to transistor parameters and input variations (CO4)

-o0o-

ELEMENTS OF ELECTRICAL ENGINEERING

Course Code	Course title	No of periods/week	Total no of periods	Marks for FA	Marks for SA
EC-106	ELEMENTS OF ELECTRICAL ENGINEERING	03	90	20	80

S No	Unit Title	No. of Periods	COs Mapped
1	Basics of Electrical Engineering	23	CO1
2	Basic Electrical circuits	12	CO2
3	AC Fundamentals	25	CO3
4	Transformers	15	CO4
5	Motors	15	CO5
	Total	**90**	

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 and motors

CO No		COURSE OUTCOMES
CO1	**EC-106.1**	Explain the concept of electric field and magnetic field.
CO2	**EC-106.2**	Understand the concept of basic electrical circuits
CO3	**EC-106.3**	Analyse the AC fundamentals
CO4	**EC-106.4**	Explain the transformer principle and applications.
CO5	**EC-106.5**	Understand the basic principle of DC and AC motors

CO-PO/PSO MATRIX

CO No	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
EC-106.1	3	1						3		
EC-106.2	3	3						3	1	
EC-106.3	3	3						3	1	
EC-106.4	3	1	3		3			3		1
EC-106.5	3	1	3		3			3		1
Average	3	1.8	3		3			3	1	1

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

LEARNING OUTCOMES

1.0Basics of Electrical Engineering

1.1 Explain the concept of lines of force & magnetic Field
1.2 Define the terms magnetic field intensity, magnetic potential, Flux ,magnetic flux density
1.3 Define the terms absolute permeability and relative permeability
1.4 State Faraday's laws of electro - magnetic induction
1.5 Explain dynamically and statically induced E.M.F.
1.6 Define the term self inductance ,mutual inductance and co-efficient of coupling.
1.7 i) State expression for equivalent inductance of inductors connected in series
ii) State expression for equivalent inductance of inductors connected in parallel
1.8 Solve simple problems on the above
1.9 Explain the concept of electrostatic field
1.10 Define the terms absolutepermittivity and relative permittivity
1.11 Define the terms electric potential and potential difference, voltage,current and power.
1.12 Define the terms electric field intensity, electric flux, electric flux density
1.13 i) State expression for equivalent capacitance of capacitors connected in series
ii) State expression for equivalent capacitance of capacitors connected in parallel
1.14 Solve simple problems on the above
1.15 Explain charging and discharging of capacitor

2.0 Basic Electrical circuits

2.1 Distinguish between active and passive elements
2.2 Explain the terms Ideal voltage source and Ideal current source
2.3 State Ohm's Law and it's limitations
2.4 State Kirchhoff's current law and Kirchhoff's voltage law
2.5 State expression for equivalent resistance of resistors connected in series
2.6 State expression for equivalent resistance of resistors connected in parallel
2.7 Explain current division rule for a two branch parallel resistive network
2.8 Solve simple problems on current division rule

3.0 AC fundamentals

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

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

3.3 Define the terms reactance, Impedance, admittance, conductance and power factor

3.4 Explain active and reactive components of AC current

3.5 Explain active, reactive and apparent power in AC circuit

3.6 Define *Q* factor of a coil

3.7 Explain series RL, RC and RLC circuits

3.8 Solve problems on series RL and RC circuits

3.9 Explain parallel RL, RC and RLC circuits

3.10 Explain admittance method for solving parallel RL, RC and RLC circuits

4.0 Transformers

4.1 Explain the working principle of transformer

4.2 Classify transformers based on power rating, construction and applications

4.3 Give reasons for using laminations in transformer core

4.4 State voltage transformation ratio

4.5 State the losses in a transformer

4.6 Define efficiency and regulation of transformer

4.7 Understand the working of an auto transformer

4.8 Explain the applications of transformer as

a)potential transformer

b) current transformer

c) impedance matching transformer

d) isolation transformer

4.9 List important specifications of a transformer

5.0 Motors

5.1 Explain the principle of operation of DC Motor

5.2 Explain the significance of back EMF

5.3 Statethe equations for speed of

a) DC series motor b) DC shunt motor

5.4 Compare DC series motor and DC shunt motor

5.5 List specifications of DC motor

5.6 Explain the need for starter

5.7 Explain the principle of operation of single phase induction motor

5.8 Explain the principle of operation of stepper motor

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 connectedin 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

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

BLUE PRINT:

Sl No	Unit Title	No of Periods	Weightage Allotted	Marks Wise distribution of weightage				Question Wise distribution of weightage				COs mapped
				R	U	Ap	An	R	U	Ap	An	
1	Basics of Electrical Engineering	23	17	6	3	8	-	2	1	1	-	CO1
2	Basic Electrical circuits	12	11	3	-	8	-	1	-	1	-	CO2
3	AC Fundamentals	25	24	3	3	8	10	1	1	1	1	C03
4	Transformers	15	14	3	3	8	-	1	1	1	-	C04
5	Motors	15	14	3	3	8	-	1	1	1	-	C05
Total		**90**	**80**	**18**	**12**	**40**	**10**	**6**	**4**	**5**	**1**	

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 2.4
Unit Test-II	From 2.5 to 3.10
Unit Test-III	From 4.1 to 5.8

(Model Paper) **C –20, EC -106**

State Board of Technical Education and Training, A. P

Diploma in Electronics and Communication Engineering (DECE)

First Year

Subject Name: Elements of Electrical Engineering

Sub Code: EC - 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 it's 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) Explain the concept of lines of force & magnetic Field. (CO1)

   (or)

   (b) Explain Surface Explain the concept of electro static field (CO1)

-o0o-

(Model Paper) **C –20, EC -106**

State Board of Technical Education and Training, A. P

Diploma in Electronics and Communication Engineering (DECE)

First Year

Subject Name:Elements of Electrical Engineering

Sub Code: EC - 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. Fill in the blanks with one word

   a) _____of an inductor at the operating frequency ω is defined as the ratio of reactance of the coil to its resistance. (CO3)

   b) Power factor is defined as the ratio of the actual electrical power dissipated by an AC circuit to the product of the r.m.s. values of current and voltage. **(State True/False)** (CO3)

   c) In series RLC circuit at resonance the impedance is maximum**(State True/False)** (CO3)

   d) In parallel RLC circuit at resonance the impedance is maximum**(State True/False)** (CO3)

2. State expression for equivalent resistance of resistors connected in series (CO2)
3. Define Q factor of a coil (CO3)
4. Define the terms reactance, Impedance (CO3)
5. Define the terms admittance, conductance (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 current division rule for a two branch parallel resistive network (CO2)

   (or)

   (b) Explain the effect of AC flowing through Pure Resistance , Inductance and Capacitance with vector diagrams (CO3)

7. (a)Explain mathematical representation of vectors in a) symbolic notation , b) trigonometric c) exponential and polar forms (CO3)

   (or)

   (b) Explain active and reactive components of AC current (CO3)

8. (a) Explain active, reactive and apparent power in AC circuit (CO3)

   (or)

   (b) Explain series RL, RC and RLC circuits (CO3)

-o0o-

(Model Paper) C –20, EC -106

State Board of Technical Education and Training, A. P

Diploma in Electronics and Communication Engineering (DECE)

First Year

Subject Name:Elements of Electrical Engineering

Sub Code: EC - 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) The Efficiency of the transformer is defined as the ratio of useful output power to the input power.**(TRUE/FALSE)** (CO4)
   d) _____ of the transformer is the percentage change in the output voltage from no-load to full-load (CO4)
2. Give reasons for using laminations in transformer core (CO4)
3. State voltage transformation ratio (CO4)
4. Compare DC series motor and DC shunt motor (CO5)
5. List specifications of DC motor (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) Explain the working principle of transformer (CO4)
   (or)
   (b) Explain the applications of transformer as
   i)potential transformer ii)current transformer (CO4)
7. (a) Explain the applications of transformer as
   i)impedance matching transformer ii)isolation transformer (CO4)
   (or)
   (b) Explain the principle of operation of DC Motor (CO5)
8. (a) Explain the principle of operation of single phase induction motor (CO5)
   (or)
   (b) Explain the principle of operation of stepper motor (CO5)

-o0o-

MODEL PAPER
BOARD DIPLOMA EXAMINATIONS
C-20, EC-106, ELEMENTS OF ELECTRICAL ENGINEERING
FIRST YEAR
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. Give the expression for equivalent capacitance of capacitors connected in parallel (CO1)
4. State Kirchhoff's current law and Kirchhoff's voltage law (CO2)
5. Define *Q* factor of a coil. (CO3)
6. Describe Active and Reactive components of AC current (CO3)
7. Define efficiency and regulation of transformer (CO4)
8. State voltage transformation ratio (CO4)
9. List any three specifications of motor (CO5)
10. Distinguish DC series motor and DC shunt motor (CO5)

Part-B **5**×8=40

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.

11. (a) Explain dynamically and statically induced E.M.F (CO1)

(or)

(b) Explain charging and discharging of capacitor (CO1)

12. (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)

13. (a) Explain AC through Resistance and Capacitance connected in series. (CO3)

(or)

(b) Explain the Admittance method for solving AC parallel circuits (CO3)

14. (a) Explain the applications of a transformer as (CO4)

1) Potential transformer 2) Current transformer

3) Impedance matching transformer 4) Isolation transformer

(or)

(b) Explain the working of an auto transformer (CO4)

15. (a) Explain the principle of operation of single phase induction motor (CO5)

(or)

(b)Explain the principle of operation of stepper motor (CO5)

Part-C **1**×10=10

Instructions: (1) Answer the question given below. It carries 10 marks

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

16. Analyze a series RC circuit when it is connect to AC supply(230V,50HZ) and find out (i) Impedance.(ii) Current (iii) Power factor (iv) Voltage drop across the resistor when R=100 Ohms, C=56 micro Farads (CO3)

-o0o-

ENGINEERING DRAWING

Subject Title	Subject Code	Periods/Week	Periods Per Year
Engineering Drawing	**EC–107**	**06**	**180**

TIME SCHEDULE

S.No	Major Topics	No. of Drawing plates	No. Of Periods	Marks to be awarded	Short Answer Questions	Essay type Questions
1	Importance of Engineering Drawing	--	01	-	-	-
2	Engineering Drawing Instruments	01	05	-	-	-
3	Free hand lettering & Numbering	01	06	05	1	-
4	Dimensioning Practice	01	09	05	1	-
5	Geometrical constructions	03	24	15	1	1
6	Projections of Points, Lines, Planes & Auxiliary Planes	03	21	05	1	
7	Projections of Solids	01	12	10		1
8	Sections of Solids	01	21	10	-	1
9	Orthographic Projections	01	30	10	-	1
10	Isometric Views	01	30	10	-	1
11	Development of surfaces	01	21	10	-	1
Total		**14**	**180**	**80**	**04**	**06**

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
Course Outcomes	**CO1**	EC-107.1	Practice the use of engineering drawing instruments
	CO2	EC-107.2	Familiarise with the conventions to be followed in engineering drawing as per BIS
	CO3	EC -107.3	Construct the i) basic geometrical constructions ii) engineering curves
	CO4	EC -107.4	Visualise and draw the orthographic projections of i) Points ii) Lines iii) Regular Planes iv) Regular Solids V) Sections of Regular Solids
	CO5	EC -107.5	Visualise and draw the isometric views of machine components
	CO6	EC -107.6	Draw the developments of surfaces of regular solids and use them to make the components used in daily life

EC–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

3: High, 2: Moderate,1: Low

LEARNING OUTCOMES

Upon completion of the course the student shall able to

1.0 Understand the basic concepts of Engineering Drawing

1.1 State the importance of drawing as an engineering communication medium

1.2 State the necessity of B.I.S. Code of practice for Engineering Drawing.

1.3 Explain the linkages between Engineering drawing and other subjects of Mechanical Engineering

2.0 Use of Engineering Drawing Instruments

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

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

2.3 Select and use appropriate scales for a given application.

2.4 Identify different drawing sheet sizes as per I.S. and Standard Lay- outs.

2.5 Prepare Title block as per B.I.S. Specifications.

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

Drawing Plate 1: (Having two exercises)

3.0 Write Free Hand Lettering and Numbers

3.1 Write titles using vertical lettering and numerals of 7mm, 10mm and 14mm height

3.2 Write titles using sloping lettering and numerals of 7mm, 10mm and 14mm height

3.3 Select suitable sizes of lettering for different layouts and applications

Drawing plate 2: (Having 5 to 6 exercises)

4.0 Understand Dimensioning Practice

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

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

Drawing Plate 3: (Having 08 to10 exercises)

5.0 Apply Principles of Geometric Constructions

5.1 Practice the basic geometric constructions like i) dividing a line into equal parts ii) exterior and interior tangents to the given two circles iii) tangent arcs to two given lines and arcs

5.2 Draw any regular polygon using general method when i) side length is given ii) inscribing circle radius is given iii) describing circle radius is given

5.2 Draw the conics using general and special methods,

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

5.4 Identify the applications of the above constructions in engineering practice.

Drawing Plate -4: Having problems up to construction of polygon

Drawing Plate -5: Having problems of construction of conics

Drawing Plate -6: Having problems of construction of involute, cycloid and helix

6.0 Projections of points, lines, planes & auxiliary planes

6.1 Explain the basic principles of the orthographic projections

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

6.3 Visualise and draw the projections of straight lines with respect to two reference Planes (up to lines parallel to one plane and inclined to other plane)

6.4 Visualise and draw the projections of planes (up to planes perpendicular to one plane and inclined to other plane)

6.5 Identify the need of Auxiliary views for a given engineering drawing.

6.5 Draw the auxiliary views of a given engineering component

Drawing Plate -7: Having problems up to projection of points and Lines (15 exercises)

Drawing Plate -8: Having problems of projection of planes (6 exercises)

Drawing Plate -9: Having problems on auxiliary planes (Having 4 exercises)

7.0 Draw the Projections of Solids

7.1 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)

Drawing plate No.10: Having problems of projection of solids (10 exercises)

8.0 Appreciate the need of Sectional Views

8.1 Identify the need to draw sectional views.

8.4 Differentiate between true shape and apparent shape of section

8.5 Draw sectional views and true sections of regular solids by applying the principles of hatching.

Drawing Plate–11: Having problems of section of solids (6 exercises)

9.0 Apply principles of orthographic projection

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

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

Drawing Plate 12 : (Having 10 to 12 exercises)

10.0 Prepare pictorial drawings

10.1 identify the need of pictorial drawings.

10.2 Differentiate between isometric scale and true scale.

10.3 Prepare Isometric views from the given orthographic drawings.

Drawing plate 13: (Having 10 to 12 exercises)

11.0 Interpret Development of surfaces of different solids

11.1 State the need for preparing development drawing.

11.2 Draw the development of simple engineering objects and their truncations (cubes, prisms, cylinders, cones, pyramid)

11.3 Prepare development of surface of engineering components like i) funnel ii) 90^0 elbow iii) Tray

Drawing plate No. 14: (Having 05 exercises)

Competencies and Key competencies to be achieved by the student

S.No	Major topic	Key Competency

1.	Importance of Engineering Drawing	• Explain the linkages between Engineering drawing and other subjects of study in Diploma course.
2.	Engineering Drawing Instruments	• Select the correct instruments to draw various entities in different orientation
3.	Free hand lettering & Numbering	• Write titles using sloping and vertical lettering and numerals as per B.I.S (Bureau of Indian standards)
4.	Dimensioning Practice	• Dimension a given drawing using standard notations and desired system of dimensioning
5.	Geometrical construction	• Construct ellipse, parabola, rectangular hyperbola, involute, cycloid and helix from the given data.
6.	Projection of points, Lines, Planes & Solids	• Draw the projections of points, straight lines, planes & solids with respect to reference planes (HP& VP)
7.	Auxiliary views	• Draw the auxiliary views of a given Engineering component • Differentiate between Auxiliary view and apparent view
8.	Sections of Solids	• Differentiate between true shape and apparent shape of section • Apply principles of hatching. • Draw simple sections of regular solids
9.	Orthographic Projection	• Draw the minimum number of views needed to represent a given object fully.
10.	Isometric Views	• Differentiate between isometric scale and true scale. • Draw the isometric views of given objects,.
11.	Development of surfaces	• Prepare development of Surface of regular solids and other components like i) funnel ii) 90^0 elbow iii) Tray

COURSE CONTENTS:

NOTES:

1. **B.I.S Specification should invariably be followed in all the topics.**
2. **A-3 Size Drawing Sheets are to be used for all Drawing Practice Exercises.**

1.0 The importance of Engineering Drawing

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 – Link between Engineering drawing and other subjects of study.

2.0 Engineering drawing Instruments

Classifications: Basic Tools, tools for drawing straight lines, tools for curved lines, tools for measuring distances and special tools like mini drafter & drafting machine – 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,

3.0 Free hand lettering & numbering

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

4.0 Dimensioning practice

Purpose of engineering Drawing, Need of B.I.S code in dimensioning -Shapedescription 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.

5.0 Geometric Construction

Division of a line: to divide a straight line into given number of equal parts

Construction of tangent lines: to draw interior and exterior tangents to two circles of given radii and centre distance

Construction of tangent arcs:

i) To draw tangent arc of given radius to touch two lines inclined at given angle (acute, right and obtuse angles).

ii)Tangent arc of given radius touching a circle or an arc and a given line.

iii)Tangent arcs of radius R, touching two given circles internally and externally.

Construction of polygon: construction of any regular polygon by general method for given side length, inscribing circle radius and describing/superscribing circle radius

Conics: Explanation of Ellipse, Parabola, Hyperbola, as sections of a double cone and a loci of a moving point, Eccentricity of above curves – Their Engg. Applications viz., Projectiles, reflectors, Cooling Towers, P-V Diagram of a Hyperbolic process - Construction of any conic section of given eccentricity by general method - Construction of ellipse by concentric circles method, Oblong Method and Arcs of circles method - Construction of parabola by rectangle method and Tangent method - Construction of rectangular hyperbola

General Curves: Involute, Cycloid and Helix, explanations as locus of a moving point, their engineering application, viz., Gear tooth profile, screw threads, springs etc. – their construction

6.0 Projection of points, lines and planes & auxiliary views

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 in different quadrants
Projections of straight line -
(a) Parallel to both the planes.
(b) Perpendicular to one of the planes.
(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.
Auxiliary views
Need for drawing auxiliary views -Explanation of the basic principles of drawing an auxiliary views explanation of reference plane and auxiliary plane - Partial auxiliary view.

7.0 Projections of regular solids
(a) Axis perpendicular to one of the planes
(b) Axis parallel to VP and inclined to HP and vice versa.

8.0 Sections of Solids
Need for drawing sectional views – what is a sectional view - Hatching – Section of regular solids inclined to one plane and parallel to other plane

9.0 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 engg 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 miter 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.

10.0 Pictorial Drawings

Brief description of different types of pictorial drawing viz., Isometric, oblique, and perspective and their use - Isometric drawings: Isometric axes, angle between them, meaning of visual distortion in dimensions - Need for an isometric scale, difference between Isometric scale, and true scale - difference between Isometric view and Isometric projection - Isometric and non-Isometric lines -Isometric drawing of common features like rectangles, circular - shapes, non-isometric lines – Drawing the isometric views for the given orthographic projections -Use of box / offset method

11.0 Development of Surfaces

Need for preparing development of surface with reference to sheet metal work-Concept of true length of a line with reference to its orthographic projection when the line is (i) parallel to the plane of projection (ii) inclined to one principal and parallel to the other - Development of simple solids like cubes, prisms, cylinders, cones, pyramid and truncation of these solids-Types of development: Parallel line and radial line development -Procedure of drawing development of funnels, 90^0 elbow pipes, Tray.

REFERENCE BOOKS

1. P I Varghese, Engineering Graphics-McGraw-hill
2. BasantAgarwal& C.M Agarwal, Engineering Drawing - (McGraw-hill)
3. N.D.Bhatt, Engineering Drawing- charotar publishing house

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 6.5
Unit Test-II	From 7.1 to 9.2
Unit Test-III	From 10.1 to 11.3

BOARD DIPLOMA EXAMINATIONS
MODEL QUESTION PAPER – UNIT TEST - 1
D.ECE. – I YEAR EXAMINATION
ENGINEERING DRAWING

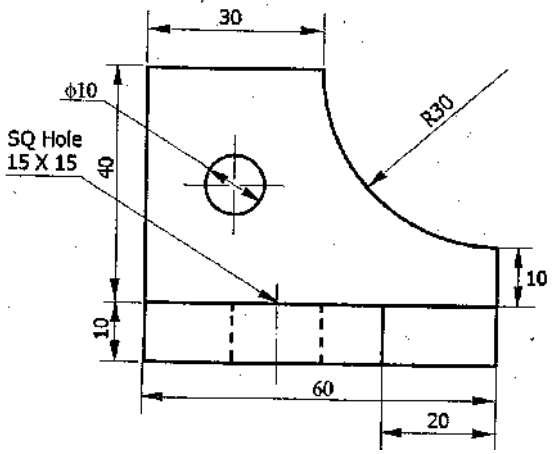
Total Marks : 40 M **Time : 2 hours**

Instructions: 01. All the dimensions are in mm
02. Use first angle projections only
03. Due Weightage will be given for the dimensioning and neatness

PART – A **04 x 05=20**

01. Answer all the questions
02. Each question carries FIVE marks

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



03. Draw internal common tangents to two unequal circles of radii 26mm and 20mm.The distance between the circles is 75mm.
04. Inscribe a regular hexagon in a circle of diameter 50 mm.

PART – B **02 X 10 = 20**

01. Answer all questions
02. Each question carries TEN marks

05. Draw the involute of a circle of diameter 40 mm and also draw a tangent to the curve at a distance of 50 mm from the centre of the circle.

06. Draw the projections of a regular pentagon of side length 40 mm inclined to the H.P. by 30^0 and perpendicular to V.P. using auxiliary plane method.

***

MODEL QUESTION PAPER
DECE – I-YEAR
ENGINEERING DRAWING

Instructions: **01.** **All the dimensions are in mm**
02. **Use first angle projections only**

03. **Due weightage will be given for the dimensioning and neatness**

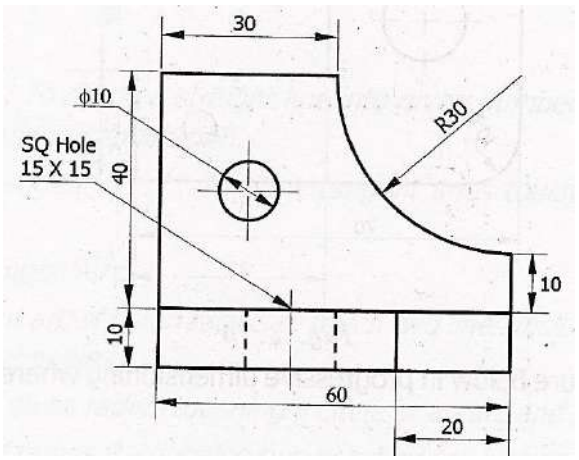
PART – A **05 x 04=20**

01. **Answer all the questions**
02. **Each question carries FIVE marks**

01. Write the following in single stroke capital vertical lettering of size 10mm

ORTHOGRAPHIC PROJECTIONS

02. Redraw the given fig. and dimension it according to SP-46:1988.Assume suitable scale



03. Draw internal common tangents to two unequal circles of radii 26mm and 20mm.The distance between the circles is 75mm.

04. Draw the projections of a regular pentagon of side length 40 mm inclined to the H.P. by 30^0 and perpendicular to V.P. using auxiliary plane method

PART – B **10 X 04 = 40**

01. **Answer any FOUR of the following questions**
02. **Each question carries TEN marks**

05. 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.

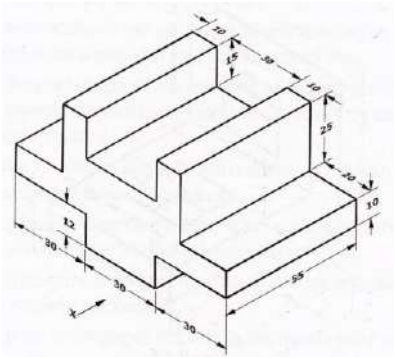
06. A right circular cone of height 80 mm and base radius 60 mm is resting in the H.P. on one of its generators and its axis is parallel to V.P. Draw the projections of the solid.

07. A regular hexagonal prism of height 80 mm and base side 40 mm is resting in the H.P. on its base. It is cut by an auxiliary inclined plane of 60^0 inclination passing through the axis at a

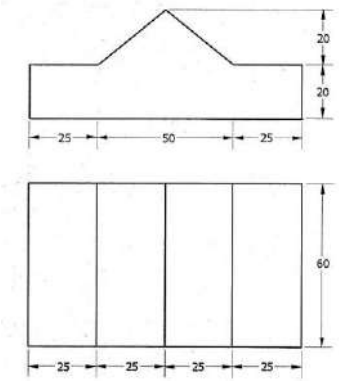
distance of 30 mm from the top base. Draw the sectional views of the solid and the true section.

08. A pentagonal pyramid of height 80 mm and base side 40 mm is resting in the H.P. on its base such that one of the sides of the base is perpendicular to the V.P. It is cut by a section plane perpendicular to the V.P. and inclined to the H.P. by 60^0 and passing through the axis at a distance of 25 mm from the base. Draw the development of the lateral surface of the truncated pyramid.

09. Draw the front view, top view and left side view of the object shown in the fig.



10. Draw the isometric view of the component whose orthographic projections are given below



***

Electrical Wiring and Electronic Components Lab

Course Code	Course title	No of periods/week	Total no of periods	Marks for FA	Marks for SA
EC-108	**Electrical Wiring and Electronic components Lab**	06	180	40	60

S No	Unit Title	No. of Periods	COs Mapped
1	Soldering practice and Preparation of PCB	**60**	CO1
2	Study and use of Electronic equipment	**25**	CO2
3	Testing, obtaining characteristic of electronic devices	**45**	CO3
4	Electrical wiring	**50**	CO4
	Total	180	

Course Objectives	To have hands on practice on Soldering, de-soldering of circuits and preparation of PCB for given circuits
	To get acquainted with the usage of electronic equipment
	To test electronic devices and obtain their characteristics
	To have hands on practice on Electrical wiring

CO No		COURSE OUTCOMES
CO1	**EC-108.1**	Practice on Soldering, de-soldering of circuits and preparation of PCB for given circuits
CO2	**EC-108.2**	Operating different electronic equipment
CO3	**EC-108.3**	Plot the characteristics ofelectronic devices
CO4	**EC-108.4**	Practice on Electrical wiring

CO-PO/PSO MATRIX

CO No	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
EC-108.1	3			2	2			3		2
EC-108.2	3	2		3		2		3	2	
EC-108.3	3	2		3		2		3	2	
EC-108.4	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

LEARNING OUTCOMES:

1.0 Soldering practice and Preparation of PCB

1. Identifying different components R, L, C, Diodes, Transistors, JFETs,MOSFETs,Relays, Switches etc.
2. Technique of using soldering iron, Soldering different components and ICs
3. Soldering components on to general PCB as per the given circuit diagram
4. Technique of de-soldering using de-soldering pump and wick.
5. Draw PCB for simple circuits and etch them on to a copper clad sheet
6. Preparing PCB for soldering and soldering components on the PCB

2.0 Study and use of Electronic equipment

1. Study of RPS units, CROs, Function Generators, Digital Multi meters, Analogmultimeters and other meters using their manuals and write down the steps in using each equipment.
2. i)Measure Resistance using multimeterand 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 thecode.

3.0 Testing and obtaining characteristics of electronic devices

1. Identify different terminals of diode, zener diode, BJT, FET using multimeter
2. i)Obtain VI characteristics of diode
   ii)Obtain VI characteristics of zener diode
3. Obtain i/p and o/p characteristics of a transistor in CB and CE configurations
4. 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)
5. Arrange PA system with multi speakers and microphones (with cord and cordless)
6. Obtain drain & transfer characteristics of JFET
7. Measure the primary and secondary voltages of step down transformer
8. Wind manually single air core inductor using available wire and measure inductance using LCR meter

4.0 Electrical wiring

1. 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. Rawl plug jumper
    viii. Standard wire Gauge

2. 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

3. Identification of different wires and cables
    i. Hookup wires
    ii. PVC wire
    iii. Teflon wires
    iv. single strand
    v. multi strand

    Wires used for electrical wiring
    i. Service wire
    ii. TRS wires /PVC Wires (Al and Cu)
    iii. single strand
    iv. Multi strand
    v. twisted Flexible pair wires
    vi. Enameled copper wire
    vii. Power cord

    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

4. Practice of wire joints

Perform the following wire joints operations

i. Twisting
ii. Splicing
iii. Insulating
iv. Western union joint
v. Married joint
vi. Britania (straight Joint)
vii. Tee joint
viii. Joining running cables
ix. Pigtail or rat tail joint
x. Removing the insulation
xi. Taping the joint
xii. Make the joint professionally and tape

5. 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. Kitkat Fuse
xi. Fuse wire ratings

6. Know the mains supply Phase ,Neutral and Ground

i. identification Phase and Neutral terminals in mains supply,
ii. Know the purpose of earthing
iii. 2pin and 3pin Plug connections

7. Make simple switch connections using low voltage transformer

i. Connecting a 6V lamp to a switch (toggle)
ii. 2 way switch connections
iii. Series and parallel connection of lamps
iv. know the use of two way switch for stair case wiring

8. Tube light connections (To be done in the presence of Instructor)

i. Make the tube light connections as per the circuit and Test

PHYSICS LAB PRACTICE
(C-20 CURRIUCULUM COMMON TO ALL BRANCHES)

SubjectCode	SubjectTitle	Periodsperweek	Totalperiodsperyear
EC-109 A	Physics Laboratory	03	45

TIMESCHEDULE

S.No	Name of the Experiment	No.of Periods
1.	Hands on practice on VernierCalipers	03
2.	Hands on practice on Screw gauge	03
3.	Verification of Parallelogram law of forces and Triangle law of forces	03
4.	Simple pendulum	03
5.	Velocity of sound in air – (Resonance method)	03
6.	Focal length and Focal power of convex lens (Separate & Combination) (**Single lens only**)	03
7.	Refractive index of solid using traveling microscope	03
8.	Boyle's law verification	03
9.	Meter bridge	03
10.	Mapping of magnet lines of force and locate null points	03
	DEMONSTRATION EXPERIMENTS	
11.	Surface tension of liquid using traveling microscope	03
12.	Coefficient of viscosity by capillary method	03
	Revision	06
	Test	03
	Total	**45**

OBJECTIVES:

Upon completion of the course the student shall be able to

1.0 Practice with Verniercalipers to determine the volumes and areas of a cylinder and sphere and their comparison etc .

2.0 Practice with Screw gauge to determine thickness of a glass plate, cross sectional area of a wire and volumes of sphere and also their comparison etc

3.0 Verify the parallelogram law and Triangle law

4.0 Determine the value of acceleration due to gravity using Simple Pendulum

5.0 Determine the velocity of sound in air at room temperature and its value at zero degree centigrade.

6.0 Calculate the Focal length and focal power of convex lenses using distant object method , U-V method , U-V graph and 1 / U – 1 / V graph methods and their comparison.

7.0 Determine the refractive index of a solid using travelling microscope.

8.0 Verify the Boyle's law employing a Quill tube.

9.0 Determine the specific resistance of material of a wirel using Meter Bridge.

10.0 Drawing magnetic lines of force under N-S and N-N methods and locate null points.

11.0 Determine the surface tension of a liquid using travelling Microscope (**Demo)**

12.0 Determine the viscosity of a liquid using capillary method (**Demo)**

Competencies and Key competencies to be achieved by the student

Name of the Experiment (No of Periods)	**Competencies**	**Key competencies**
1. Hands on practice on VernierCalipers(03)	• Find the Least count • Fix the specimen in posit • Read the scales • Calculate the physical quantities of given object	• Read the scales • Calculate the requisite physical quantities of given objects
2. Hands on practice on Screw gauge(03)	• Find the Least count • Fix the specimen in posit • Read the scales • Calculate thickness of glass place and cross section of wire and other quantities	• Read the scales • Calculate thickness of given glass plate • Calculate cross section of wire and other quantities
3. Verification of Parallelogram law of forces and Triangle law of forces(03)	• Fix suitable weights • Note the positions of threads on drawing sheet • Find the angle at equilibrium point • Construct parallelogram • Compare the measured diagonal • Construct triangle • Find the length of sides • Compare the ratios	• Find the angle at equilibrium point • Constructing parallelogram • Construct triangle • Compare the ratios of force and length
4. Simple pendulum(03)	• Fix the simple pendulum to the stand • Adjust the length of pendulum • Find the time for number of oscillations • Find the time period • Calculate the acceleration due to gravity • Draw l-T and $l\text{-}T^2$ graph	• Find the time for number of oscillations • Find the time period • Calculate the acceleration due to gravity • Draw l-T and $l\text{-}T^2$ graph

5. Velocity of sound in air –Resonance method (03)	• Arrange the resonance apparatus • Adjust the reservoir level for booming sound • Find the first and second resonanting lengths • Calculate velocity of sound	• Adjust the reservoir level • Find the first and second resonanting lengths • Calculate velocity of sound at room temperature • Calculate velocity of sound at 0^0 C
6. Focal length and Focal power of convex lens (Separate & Combination) (03)	• Fix the object distance • Find the Image distance • Calculate the focal length and power of convex lens and combination of convex lenses • Draw u-v and 1/u – 1/v graphs	• Calculate the focal length and power of convex lens • Draw u-v and 1/u – 1/v graphs
7. Refractive index of solid using traveling microscope(03)	• Find the least count of vernier on microscope • Place the graph paper below microscope • Read the scale • Calculate the refractive index of glass slab	• Read the scale • Calculate the refractive index of glass slab

8. Boyle's law verification (03)	• Note the atmospheric pressure • Fix the quill tube to retort stand • Find the length of air column • Find the pressure of enclosed air • Find and compare the calculated value P x l	• Find the length of air column • Find the pressure of enclosed air • Find the value P x l
9. Meter bridge(03)	• Make the circuit connections • Find the balancing length • Calculate unknown resistance • Find the radius of wire • Calculate the specific resistance	• Find the balancing length • Calculate unknown resistance • Calculate the specific resistance
10. Mapping of magnet lines of force(03)	• Draw magnetic meridian • Placed the bar magnet in NN and NS directions • Draw magnetic lines of force • Locate the neutral points along equatorial and axial lines	• Draw magnetic lines of force • Locate the neutral points along equatorial and axial lines
11. Surface tension of liquid using traveling microscope(03)	• Find the least count of vernier on microscope • Focus the microscope to the lower meniscus & bent pin • Read the scale • Calculate height of liquid rise • Calculate the surface tension of water	• Read the scale • Calculate height of liquid rise • Calculate the surface tension of water

12.. Coefficient of viscosity by capillary method(03)	• Find the least count of vernier • Fix the capillary tube to aspiratory bottle • Find the mass of collected water • Find the pressure head • Calculate rate of volume of liquid collected • Find the radius of capillary tube • Calculate the viscosity of water using capillary method	• Find the pressure head • Calculate rate of volume of liquid collected • Find the radius of capillary tube • Calculate the viscosity of water

Scheme of Valuation for end Lab Practical Examination :

A.	Writing Aim, Apparatus, Formula, Graph, Precautions carries	10 (Ten) Marks
B.	For Drawing the table, taking Readings, Calculation work, Drawing the graph, finding result carries	15 (Fifteen) Marks
C.	Viva Voice	05 (Five) Marks
	Total	**30 (Thirty) Marks**

- **Course outcomes**

Course Outcomes	CO1	Experiments with Verniercalipers, Screw gauge, Parallelogram law and Triangle law
	CO2	Experiments with Simple pendulum, Resonance apparatus (Velocity of sound in air)
	CO3	Experiments with Convex lens, Refractive index of solid by travelling microscope
	CO4	Experiments with quill tube (Boyles law verification), Meter bridge, Mapping of magnetic lines of force
	CO5	Experiments with Surface tension and Viscosity

- **COs-PO mapping strength (as per given table)**

	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3			1	1	1	1
CO2	3	2	2		1		
CO3	3		2			1	2
CO4	3	2			2		
CO5	3		1	2		1	2

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

CHEMISTRY LABORATORY
(C-20 curriculum common to all Branches)

SubjectCode	SubjectTitle	Periodsperweek	Totalperiodsperyear
EC -109B	Chemistry Laboratory	03	45

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 EC-109B	**Chemistry Laboratory No of Cos;5**				**No Of periods 45**
POs	**Mapped with CO No**	**CO periods addressing PO in Col 1 NO**	**%**	**Level 1,2,3**	**remarks**
PO1	CO1,CO2,CO3, CO4,CO5	12	26.66	2	>40% level 3 (highly addressed) 25% to 40% level2(moderately addressed 5% to 25% level1 (Low addressed < 5%(not addressed)
PO2	CO1,CO2,CO3, CO4,CO5	9	20	1	
PO3					
PO4	CO1,CO2,CO3, CO4,CO5	12	26.66	2	
PO5	CO2,CO3, CO4,CO5	12	26.66	2	
PO6					
PO7					

COs-POs mapping strength (as per given table)

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

3=strongly mapped

2= moderately mapped

1= slightly mapped

Note:
The gaps in CO and PO mapping will be achieved by one or more appropriate activities from the following:
i) Seminars ii) Tutorials iii) Guest Lectures iv) Assignments v) Quiz competitions vi) Industrial visit vii) Tech Fest viii) Mini project ix) Group discussions x) Virtual classes xi) Library visit for e-books

TIMESCHEDULE

S.No	Name of the Experiment	No.ofPeriods	Mapped with COs
1.	a) Recognition of chemical substances and solutions used in the laboratory by senses. b) Familiarization of methods for Volumetricanalysis	03	CO1
2.	Preparation of StdNa_2CO_3 and making solutions of different dilution	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.	Estimation of H_2SO_4usingStd.NaOH solution	03	CO2
6.	Estimation of Mohr's Salt using Std.$KMnO_4$	03	CO3
7.	Determination of acidity of water sample	03	CO2
8.	Determination of alkalinity of water sample	03	CO2
9.	Determination of total hardness of water using Std.EDTA solution	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	03	CO5
14.	Determination of turbidity of water	03	CO5
15.	Estimation of total solids present in water sample	03	CO5
	Total:	**45**	

Objectives:

Upon completion of the course the student shall be able to

1.0 Practice volumetric measurements (using pipettes, measuring jars, volumetric flask, burettes) and gravimetric measurements (using different types of balances), making dilutions, etc.To identify the chemical compounds and solutions by senses.
2.0 Practice making standard solutions with pre weighed salts and to make solutions of desired dilutions using appropriate techniques.
3.0 Conduct titrations adopting standard procedures and using Std. Na_2CO_3solutionfor estimation of HCl
4.0 Conduct titrations adopting standard procedures and using Std. HClsolution for estimation of NaOH
5.0 Conduct titrations adopting standard procedures and using Std. NaOH solution for estimation of H_2SO_4
6.0 Conduct titrations adopting standard procedures and using Std.$KMnO_4$solution for estimation of Mohr'sSalt

7.0 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)

8.0 Conduct titrations adopting standard procedures to determine the alkalinity of given samples of water (One ground water and one surface / tap water)

9.0 Conduct titrations adopting standard procedures to determine the total hardness of given samples of water (One ground water and one surface / tap water) using Std. EDTA solution

10.0 Conduct titrations adopting standard procedures to determine the chlorides present in the given samples of water and wastewater (One ground water and one surface / tap water)

11.0 Conduct the test using titrometric / electrometric method to determine Dissolved Oxygen (D.O) in given water samples (One sample from closed container and one from open container / tap water)

12.0 Conduct the test on given samples of water / solutions (like soft drinks, sewage, etc.) to determine their pH using standard pH meter

13.0 Conduct the test on given samples of water / solutions
a) To determine conductivity
b) To adjust the ionic strength of the sample to the desired value

14.0 Conduct the test on given samples of solutions (coloured and non coloured) to determine their turbidity in NTU

15.0 To determine the total solids present in given samples of water (One ground water and one surface / tap water)

Competencies and Key competencies to be achieved by the student

Name of the Experiment (No of Periods)	**Competencies**	**Key competencies**
Familiarization of methods for Volumetric analysis. Recognition of chemical substances And solutions (03)	-	--
Preparation of StdNa_2CO_3 and making solutions of different dilution(03)	▪ Weighing the salt to the accuracy of .01 mg ▪ Measuring the water with volumetric flask, measuring jar, volumetric pipetteand graduated pipette ▪ Making appropriate dilutions	▪ Weighing the salt to the accuracy of .01 mg ▪ Measuring the water with volumetric flask, measuring jar, volumetric pipette and graduated pipette ▪ Making appropriate dilutions
Estimation of HCl solution using Std. Na_2CO_3solution (03)	▪ Cleaning the glassware and rinsing with appropriate solutions ▪ Making standard solutions ▪ Measuring accurately the standard solutions and titrants ▪ Filling the burette with titrant ▪ Fixing the burette to the stand	▪ Making standard solutions ▪ Measuring accurately the standard solutions and titrants ▪ Effectively Controlling the flow of the titrant ▪ Identifying the end point ▪ Making accurate observations
Estimation of NaOH using Std.HCl solution (03)		
Estimation of H_2SO_4 using Std.NaOH solution (03)		
Estimation of Mohr's Salt using Std.$KMnO_4$ (03)		

Determination of acidity of water sample (03)	▪ Effectively Controlling the flow of the titrant ▪ Identifying the end point ▪ Making accurate observations ▪ Calculating the results	
Determination of alkalinity of water sample (03)		
Determination of total hardness of water using Std. EDTA solution (03)		
Estimation of Chlorides present in water sample (03)		
Estimation of Dissolved Oxygen(D.O) in water sample (By titration method) (03)		
Determination of pH using pH meter (03)	▪ Familiarize with instrument ▪ Choose appropriate 'Mode' / 'Unit' ▪ Prepare standard solutions / buffers, etc. ▪ Standardize the instrument with appropriate standard solutions ▪ Plot the standard curve ▪ Make measurements accurately ▪ Follow Safety precautions	▪ Prepare standard solutions / buffers, etc. ▪ Standardize the instrument with appropriate standard solutions ▪ Plot the standard curve ▪ Make measurements accurately
Determination of conductivity of water and adjusting ionic strength to required level (03)		
Determination of turbidity of water (03)		
Estimation of total solids present in water sample (03)	▪ Measuring the accurate volume and weight of sample ▪ Filtering and air drying without losing any filtrate ▪ Accurately weighing the filter paper, crucible and filtrate ▪ Drying the crucible in an oven	▪ Measuring the accurate volume and weight of sample ▪ Filtering and air drying without losing any filtrate ▪ Accurately weighing the filter paper, crucible and filtrate

SCHEME OF VALUATION

A) Writing Chemicals, apparatus ,principle and procedure 5M

B) Demonstrated competencies 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 FUNDAMENTALSLABORATORY
(C-20 curriculum common to all Branches)

ourse code	Course Title	No. of Periods/Weeks	Total No. of periods	Marks for FA	Marks for SA
EC-110 (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.

Course Outcomes	At the end of the course students will be able to		
	CO1	C-110.1	Identify hardware and software components
	CO2	C-110.2	Prepare documents with given specifications using word processing software
	CO3	C-110.3	Use Spread sheet software to make calculation and to draw various graphs / charts.
	CO4	C-110.4	Use Power point software to develop effective presentation for a given theme or topic.
	CO5	C-110.5	Edit digital or scanned images using Photoshop

CO-PO/PSO MATRIX

CO NO.	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
C-110.1	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**2**	**3**
C-110.2	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**2**	**3**
C-110.3	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**2**	**3**
C-110.4	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**2**	**3**
C-110.5	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**2**	**3**
Average	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**2**	**3**

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

Learning Outcomes:

I. Computer Hardware Basics

1. a)To Familiarize with Computer system and hardware connections
   b)To Start and Shut down Computer correctly
   c)To check the software details of the computer
2. To check the hardware present in your computer

II. Windows's operating system

3. To Explore Windows Desktop
4. Working with Files and Folders
5. Windows Accessories: Calculator – Notepad – WordPad – MS Paint

III. Practice with MS-WORD

6. To familiarize with Ribbon layout of MS Word

Home – Insert- Page layout – References – Review- View.

7. To practice Word Processing Basics
8. To practice Formatting techniques
9. To insert a table of required number of rows and columns
10. To insert Objects, Clipart and Hyperlinks
11. To use Mail Merge feature of MS Word
12. To use Equations and symbols features

IV. Practice with MS-EXCEL

13. To familiarize with MS-EXCEL layout
14. To access and enter data in the cells
15. To edit a spread sheet- Copy, Cut, Paste, and selecting Cells
16. To use built in functions and Formatting Data
17. To create Excel Functions, Filling Cells
18. To enter a Formula for automatic calculations
19. To sort and filter data in table.
20. To present data using Excel Graphs and Charts.
21. To develop lab reports of respective discipline.
22. To format a Worksheet in Excel, Page Setup and Print

V. Practice with MS-POWERPOINT

23. To familiarize with Ribbon layout features of PowerPoint 2007.
24. To create a simple PowerPoint Presentation
25. To set up a Master Slide in PowerPoint
26. To insert Text and Objects
27. To insert a Flow Charts

28. To insert a Table
29. To insert a Charts/Graphs
30. To insert video and audio
31. To practice Animating text and objects
32. To Review presentation

VI. Practice with Adobe Photoshop

33. To familiarize 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:

Expt No	Name of Experiment	Competencies	Key competencies
1 (a).	To familiarize with Computer system and hardware connections	a. Identify the parts of a Computer system: i). CPU ii). Mother Board iii) Monitor iv) CD/DVD Drive v) Power Switch vi) Start Button vii) Reset Button b. Identify and connect various peripherals c. Identify and connect the cables used with computer system d. Identify various ports on CPU and connect Keyboard & Mouse	Connect cables to external hardware and operate the computer
1 (b).	To Start and Shut down Computer correctly	a. Log in using the password b. Start and shut down the computer c. Use Mouse and Key Board	a. Login and logout as per the standard procedure b. Operate mouse &Key Board
1 (c).	To Explore Windows Desktop	a. Familiarize with Start Menu, Taskbar, Icons and Shortcuts b. Access application programs using Start menu, Task manager c. Use Help support	a. Access application programs using Start menu b. Use taskbar and Task manager
2.	To check the software details of the computer	a. Find the details of Operating System being used b. Find the details of Service Pack installed	Access the properties of computer and find the details
3.	To check the hardware	a. Find the CPU name and clock	a. Access device

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

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

		c. Insert mathematical equations in the document	word document
13.	To Practice with MS-EXCEL	a. Open /create an MS Excel spreadsheet and familiarize with MS Excel 2007 layout like MS office Button- b. Use Quick Access Toolbar- Title Bar- Ribbon-Worksheets- Formula Bar-Status Bar	a. Familiarize with excel layout and use b. Use various features available in toolbar
14.	To access and Enter data in the cells	a. Move Around a Worksheets-Quick access -Select Cells b. Enter Data-Edit a Cell-Wrap Text-Delete a Cell Entry-Save a File-Close Excel	a. Access and select the required cells by various addressing methods b. Enter data and edit
15.	To edit spread sheet Copy, Cut, Paste, and selecting cells	a. Insert and Delete Columns and Rows-Create Borders-Merge and Center b. Add Background Color-Change the Font, Font Size, and Font Color c. Format text with Bold, Italicize, and Underline-Work with Long Text-Change a Column's Width	Format the excel sheet
16.	To use built in functions and Formatting Data	a. Perform Mathematical Calculations verify -AutoSum b. Perform Automatic Calculations-Align Cell Entries	Use built in functions in Excel
17.	To enter a Formula for automatic calculations	a. Enter formula b. Use Cell References in Formulae c. Use Automatic updating function of Excel Formulae d. Use Mathematical Operators in Formulae e. Use Excel Error Message and Help	Enter formula for automatic calculations
18.	To Create Excel Functions, Filling Cells	a. Use Reference Operators b. Work with sum, Sum if , Count and Count If Functions c. Fill Cells Automatically	a. Create Excel sheets involving cross references and equations b. Use the advanced functions for conditional calculations
19.	To sort and filter data in table	a. Sort data in multiple columns b. Sort data in a row c. Sort data using Custom order d. Filter data in work sheet	a. Refine the data in a worksheet and keep it organized b. Narrow a worksheet by selecting specific

			choice
20.	To Practice Excel Graphs and Charts	a. Produce an Excel Pie Chart b. Produce c. Excel Column Chart	a. Use data in Excel sheet to Create technical charts and graphs Produce Excel Line Graph b. Produce a Pictograph in Excel
21.	To develop lab reports of respective discipline	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	a. Shade alternate rows of data b. Add currency and percentage symbols c. Change height of a row and width of a column d. Change data alignment e. Insert Headers and Footers f. Set Print Options and Print	a. Format Excel sheet b. Insert headers &footers and print
23.	To familiarize with Ribbon layout &features of PowerPoint 2007.	Use various options in PowerPoint a. Home b. Insert c. Design d. Animation e. Slideshow f. View g. Review	Access required options in the tool bar
24.	To create a simple PowerPoint Presentation	a. Insert a New Slide into PowerPoint b. Change the Title of a PowerPoint Slide c. PowerPoint Bullets d. Add an Image to a PowerPoint Slide e. Add a Textbox to a PowerPoint slide	a. Create simple PowerPoint presentation with photographs/Clip Art and text boxes b. Use bullets option
25.	To Set up a Master Slide in PowerPoint and add notes	a. Create a PowerPoint Design Template b. Modify themes c. Switch between Slide master view and Normal view d. Format a Design Template Master Slide e. Add a Title Slide to a Design Template f. The Slide Show Footer in PowerPoint g. Add Notes to a PowerPoint	a. Setup Master slide and format b. Add notes

		Presentation	
26.	To Insert Text and Objects	a. Insert Text and objects b. Set Indents and line spacing c. Insert pictures/ clipart d. Format pictures e. Insert shapes and word art f. Use 3d features g. Arrange objects	Insert Text and Objects Use 3d features
27.	To insert a Flow Chart / Organizational Charts	a. Create a Flow Chart in PowerPoint b. Group and Ungroup Shapes c. Use smart art	Create organizational charts and flow charts using smart art
28.	To insert a Table	a. PowerPoint Tables b. Format the Table Data c. Change Table Background d. Format Series Legend	Insert tables and format
29.	To insert a Charts/Graphs	a. Create 3D Bar Graphs in PowerPoint b. Work with the PowerPoint Datasheet c. Format a PowerPoint Chart Axis d. Format the Bars of a Chart e. Create PowerPoint Pie Charts f. Use Pie Chart Segments g. Create 2D Bar Charts in PowerPoint h. Format the 2D Chart e. Format a Chart Background	Create charts and Bar graphs, Pie Charts and format.
30.	To Insert audio & video, Hyperlinks in a slide Add narration to the slide	a. Insert sounds in the slide and hide the audio symbol b. Adjust the volume in the settings c. Insert video file in the format supported by PowerPoint in a slide d. Use automatic and on click options e. Add narration to the slide f. Insert Hyperlinks	a. Insert Sounds and Video in appropriate format. b. Add narration to the slide c. Use hyperlinks to switch to different slides and files
31.	To Practice Animation effects	a. Apply transitions to slides b. To explore and practice special animation effects like Entrance, Emphasis, Motion Paths &Exit	Add animation effects

32.	Reviewing presentation	a. Checking spelling and grammar b. Previewing presentation c. Set up slide show d. Set up resolution e. Exercise with Rehearse Timings feature in PowerPoint f. Use PowerPoint Pen Tool during slide show g. Saving h. Printing presentation (a) Slides (b) Hand-out	a. Use Spell check and Grammar feature b. Setup slide show c. Add timing to the slides d. Setup automatic slide show
33	To familiarize with standard toolbox	a. Open Adobe Photoshop b. Use various tools such as i. The Layer Tool ii. The Color& Swatches Tool iii. Custom Fonts & The Text Tool iv. Brush Tool v. The Select Tool vi. The Move Tool vii. The Zoom Tool viii. The Eraser ix. The Crop Tool x. The Fill Tool	Open a photograph and save it in Photoshop
34	To edit a photograph	a. Use the Crop tool b. Trim edges c. Change the shape and size of a photo d. Remove the part of photograph including graphics and text	a. Able to edit image by using corresponding tools.
35	To insert Borders around photograph	a. Start with a single background layer b. Bring the background forward c. Enlarge the canvas d. Create a border color e. Send the border color to the back f. Experiment with different colors	Able to create a border or frame around an image to add visual interest to a photo
36	To change Background of a Photograph	a. open the foreground and background image b. Use different selection tools to paint over the image c. Copy background image and paste it on the foreground. d. Resize and/or drag the background image to reposition. e. 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	a. 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. b. apply two different colors to work area by dividing it into two parts using Rectangle tool. c. Copy any picture and place it on work area→ resize it using free transform tool. d. Type text and apply color and style e. Apply effects using blended options	Able to prepare cover page for the book
39	To adjust the brightness and contrast of picture to give an elegant look	a. open a file. b. Go to image→ adjustments→ Brightness/Contrast. c. adjust the brightness and contrast. d. 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

III SEMESTER

Subject Code	Name of the Subject	Instruction period / week		Total Period / Sem	Scheme of Examination			
		Theory	Practical/Tutorial		Duration (hours)	Sessional Marks	End Exam Marks	Total Marks
THEORY								
EC- 301	Engineering Mathematics - II	4	-	60	3	20	80	100
EC -302	Electronic Circuits -I	4	-	60	3	20	80	100
EC -303	Digital Electronics	4	-	60	3	20	80	100
EC-304	Analog and Digital Communication Systems	4	-	60	3	20	80	100
EC-305	Network Analysis	5	-	75	3	20	80	100
EC - 306	Electronic Measurements & consumer gadgets	4	-	60	3	20	80	100
PRACTICAL								
EC-307	Electronic Circuits-I lab	-	6	90	3	40	60	100
EC-308	Digital Electronics lab	-	3	45	3	40	60	100
EC-309	Analog and Digital Communication systems Lab	-	4	60	3	40	60	100
EC-310	Measurements & Network Analysis Lab	-	4	60	3	40	60	100
TOTAL		**25**	**17**	**630**	**-**	**280**	**720**	**1000**

ENGINEERING MATHEMATICS-II

Course Code	Course Title	No. of Periods/week	Total No. of periods	Marks for FA	Marks for SA
EC-301	Engineering Mathematics-II	4	60	20	80

S.No.	Unit Title	No. of periods	COs mapped
1	Indefinite Integration	22	CO1
2	Definite Integration and its applications	24	CO2
3	Differential Equations of first order	14	CO3
	Total Periods	**60**	

Course Objectives	(i) To understand the concepts of indefinite integrals and definite integrals with applications to engineering problems. (ii) To understand the formation of differential equations and learn various methods of solving them.

Course Outcomes	CO1	Integrate various functions using different methods.
	CO2	Evaluate definite integrals with applications.
	CO3	Obtain differential equations and solve differential equations of first order and first degree.

Learning Outcomes

Unit-I

C.O. 1 Integrate various functions using different methods.

L.O. 1.1. Explain the concept of Indefinite integral as an anti-derivative.

1.2. State the indefinite integral of standard functions and properties of Integrals $\int (u + v)\,dx$ and $\int ku\,dx$ where k is constant and u, v are functions of x.

1.3. Solve integration problems involving standard functions using the above rules.

1.4. Evaluate integrals involving simple functions of the following type by the method of substitution.

i) $\int f(ax + b)\,dx$ where $f(x)dx$ is in standard form.

ii) $\int [f(x)]^n f'(x)\,dx$

iii) $\int f'(x)/[f(x)]\,dx$

iv) $\int f\{g(x)\}\,g'(x)\,dx$

1.5. Find the integrals of $\tan x$, $\cot x$, $\sec x$ and $\operatorname{cosec} x$ using the above.

1.6. Evaluate the integrals of the form $\int \sin^m x \cos^n x\,dx$ where m and n are suitablepositive integers.

1.7. Evaluateintegrals of suitable powers of $\tan x$ and $\sec x$.

1.8. Evaluate the Standard integrals of the functions of the type

$$i)\ \frac{1}{a^2+x^2}, \frac{1}{a^2-x^2}, \frac{1}{x^2-a^2}$$

$$ii)\ \frac{1}{\sqrt{a^2+x^2}}, \frac{1}{\sqrt{a^2-x^2}}, \frac{1}{\sqrt{x^2-a^2}}$$

$$iii)\ \sqrt{x^2-a^2}, \sqrt{x^2+a^2}, \sqrt{a^2-x^2}$$

1.9. Evaluate the integrals of the type

$$\int \frac{1}{a+bSin\theta} d\theta, \int \frac{1}{a+b\cos\theta} d\theta \text{ and } \int \frac{1}{a\cos\theta + b\sin\theta + c} d\theta .$$

1.10. Evaluate integrals using decomposition method.

1.11. Solve problems using integration by parts.

1.12 Use Bernoulli's rule for evaluating the integrals of the form $\int u.v\,dx$.

1.13. Evaluate the integrals of the form $\int e^x [f(x) + f'(x)]\,dx$.

Unit-II

C.O.2Evaluate definite integrals with applications.

L.O. 2.1. State the fundamental theorem of integral calculus

2.2. Explain the concept of definite integral.

2.3. Solve problems on definite integrals over an interval using the above concept.

2.4. State various properties of definite integrals.

2.5. Evaluate simple problems on definite integrals using the above properties.

Syllabus for Unit test-I completed

2.6. Explain definite integral as a limit of sum by considering an area.

2.7. Find the areas under plane curves and area enclosed between two curves using integration.
2.8. Obtain the mean value and root mean square value of the functions in any given interval.
2.9. Obtain the volumes of solids of revolution.
2.10. Solve some problems using Trapezoidal rule, Simpson's 1/3 rule for approximation of integrals.

Unit -III

C.O. 3 Form differential equations and solve differential equations of first order and first degree.

L.O. 3.1. Define a Differential equation, its order and degree
3.2. Find order and degree of a given differential equation.
3.3. Form a differential equation by eliminating arbitrary constants.
3.4. Solve the first order and first degree differential equations by variables separable method.
3.5. Solve Homogeneous differential equation of first order and first degree.
3.6. Solve exact differential equation of first order and first degree.
3.7. Solve linear differential equation of the form dy/dx + Py = Q, where P and Q are functions of x or constants.
3.8. Solve Bernoulli's differential equation reducible to linear form.
3.9. Solve simple problems arising in engineering applications.

Syllabus for Unit test-II completed

C-20
Engineering Mathematics – II
CO/PO – Mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PSO1**	**PSO2**	**PSO3**
CO1	3	2	2	2				3	1	2
CO2	3	3	3	3				3	3	3
CO3	3	3	3	3				3	3	3
Avg	3	2.6	2.6	2.6				3	2.3	2.6

3 =Strongly mapped (High), **2 =** Moderately mapped (Medium), **1 =** Slightly mapped (Low)

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

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

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

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

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

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

Engineering Mathematics – II
PO- CO – Mapping strength

PO no	Mapped with CO no	CO periods addressing PO in column I		Level (1,2 or 3)	Remarks
		Number	%		
1	CO1, CO2, CO3	60	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	60	100%	3	
3	CO1, CO2, CO3	60	100%	3	
4	CO2, CO3	38	63.3%	3	
5					
6					
7					
PSO 1	CO1, CO2, CO3	60	100%	3	
PSO 2	CO1, CO2, CO3	40	66.6%	3	
PSO 3	CO1, CO2, CO3	48	75%	3	

ENGINEERING MATHEMATICS – II
COURSE CONTENTS

Unit-I
Indefinite Integration.

1. Integration regarded as anti-derivative – Indefinite integrals of standard functions. Properties of indefinite integrals.Integration by substitution or change of variable.Integrals of tan x, cot x, sec x, cosec x. Integrals of the form $\int \sin^m x.\cos^n x\,dx,$ where at least one of m and n is odd positive integers.Integrals of suitable powers of tanx.secx and cosecx.cotx by substitution.
Evaluation of integrals which are reducible to the following forms:

$$i)\ \frac{1}{a^2+x^2}, \frac{1}{a^2-x^2}, \frac{1}{x^2-a^2}$$

$$ii)\ \frac{1}{\sqrt{a^2+x^2}}, \frac{1}{\sqrt{a^2-x^2}}, \frac{1}{\sqrt{x^2-a^2}}$$

$$iii)\ \sqrt{x^2-a^2}, \sqrt{x^2+a^2}, \sqrt{a^2-x^2}$$

Integration by decomposition of the integrand into simple rational, algebraic functions. Integration by parts, Bernoulli's rule and integrals of the form $\int e^x [f(x) + f'(x)]\, dx$.

Unit-II

Definite Integral and its applications:

2. Definite integral-fundamental theorem of integral calculus, properties of definite integrals, evaluation of simple definite integrals. Definite integral as the limit of a sum. Area under plane curves – Area enclosed between two curves. Mean and RMS values of a function on a given interval Volumes of solids of revolution. Trapezoidal rule, Simpson's 1/3 rule to evaluate an approximate value of a define integral.

Unit -III

Differential Equations:

3. Definition of a differential equation-order and degree of a differential equation- formation of differential equations-solutions of differential equations of first order and first degree using methods, variables separable, homogeneous, exact, linear differential equation, Bernoulli's equation.

Textbook:

Engineering Mathematics-II, a textbook for third semester diploma courses, prepared & prescribed by SBTET, AP.

Reference Books:

1. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers.
2. Schaum's Outlines Differential Equations, Richard Bronson & Gabriel B. Costa
3. M.Vygodsky, Mathematical Handbook: Higher Mathematics, Mir Publishers, Moscow.

BLUE PRINT

S. No	Chapter/Unit title	No of Periods	Weightageallotted	Marks wise distribution of weightage				Questionwise distributionof weightage				COs mapped
				R	U	Ap	An	R	U	Ap	An	
1	Unit – I: Indefinite Integration	22	28	11	11	06	0	2	2	2	0	CO1
2	Unit – II: Definite Integration and its applications	24	33	11	03	11	08	2	1	2	1	CO2
3	Unit – III: Differential Equations of first order	14	19	03	03	03	10	1	1	1	1	CO3
	Total	**60**	**80**	**25**	**17**	**20**	**18**	**5**	**4**	**5**	**2**	

R: Remembering Type : 25 Marks

U: understanding Type : 17 Marks

Ap: Application Type : 20 Marks

An: Analysing Type : 18 Marks

Engineering Mathematics – II

Unit Test Syllabus

Unit Test	Syllabus
Unit Test-I	From L.O 1.1 to L.O 2.5
Unit Test-II	FromL.O 2.6 to L.O 3.9

UNIT TEST MODEL PAPERS

Unit Test I **C –20, EC-301**

State Board of Technical Education and Training, A. P

First Year

Subject Name: Engineering Mathematics-II

Sub Code: EC-301

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.

   Evaluate $\int x^8 dx$ (CO1)

   Evaluate $\int \frac{1}{\sqrt{4-x^2}} dx.$ (CO1)

   $\int e^x \left(f(x) + f'(x) \right) dx = e^x f(x) + c$ is true/false (CO1)

   a. Evaluate $\int_0^{\frac{\pi}{2}} \cos x dx$ (CO2)

2. Evaluate $\int \left(3\cos ec^2 x - 2\tan x \sec x + \frac{1}{x} \right) dx.$ (CO1)

3. Evaluate $\int \frac{\sin(\log x)}{x} dx.$ (CO1)

4. Evaluate $\int e^x \sin 2x dx.$ (CO1)

5. Evaluate $\int_0^{\frac{\pi}{2}} \sin^2 x dx$ (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) Evaluate $\int \frac{1}{5+4\cos x} dx.$ (CO1)

   (or)

   B) Evaluate $\int \sin^4 x \cos^3 x dx.$ (CO1)

7. A) Evaluate $\int \cos^{-1}\left(\frac{1-x^2}{1+x^2}\right)dx.$ (CO1)

(or)

B) Evaluate $\int x^4 e^{2x} dx.$ (CO1)

8. A) Evaluate $\int_0^{\frac{\pi}{2}} \cos 4x \cos x dx$ (CO2)

(or)

B) Evaluate $\int_0^{\frac{\pi}{2}} \frac{\sin^{10} x}{\sin^{10} x + \cos^{10} x} dx$ (CO2)

-o0o-

Unit Test II **C –20, EC-301**

State Board of Technical Education and Training, A. P

First Year

Subject Name: Engineering Mathematics-II

Sub Code: EC-301

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. Volume of the curve $y = f(x)$ over the interval $[a,b]$ when rotated about X-axis is _____ (CO2)

   b. Mean value of $f(x)$ over the interval $[a,b]$ is_____ (CO2)

   c. Order of differential equation $\frac{d^2y}{dx^2} + p^2y = 0$ is_____ (CO3)

   d. Integrating factor of $\frac{dy}{dx} + Py = Q$ is_____ (CO3)

2. Find the mean value of $x^2 + 2x + 1$ over the interval $[1,2]$ (CO2)

3. Find the area enclosed by curve $x^2 = 4y$ between the lines $x = 2$ and $x = 4$ (CO2)

4. Form the differential equation by eliminating the arbitrary constants from $y = A\cos 2x + B\sin 2x.$ (CO3)

5. Solve $\frac{dy}{dx} = \sqrt{\frac{1-y^2}{1-x^2}}$. (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) Find the area bounded between the curve $y = x^2 - 5x$ and the line $y = 4 - 2x$ (CO2)

(or)

B) Find the R.M.S value of $\sqrt{\log x}$ between the lines $x = e$ to $x = e^2$ (CO2)

7. A) Find the volume of the solid obtained by revolving the ellipse $\frac{x^2}{16}+\frac{y^2}{25}=1$ about x axis (CO2)

(or)

B) Calculate the approximate value of $\int_0^6 \frac{1}{1+x}dx$ by taking $n=6$ using Trapezoidal rule (CO3)

8. A) Solve $\left(y^2-2xy\right)dx+\left(2xy+x^2\right)dy=0.$ (CO3)

(or)

B) Solve $x\frac{dy}{dx}+\frac{y}{x}=x^3y^6.$ (CO3)

-o0o-

END EXAM MODEL PAPERS

STATE BOARD OF TECHNICAL EDUCATION, A.P

ENGINEERING MATHEMATICS

Sub Code: **EC-301**

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

PART-A

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

1. Evaluate $\int\left(2\sin x-3e^{x}+\frac{4}{1+x^{2}}\right)dx.$ **CO1**
2. Evaluate $\int e^{x}\sin e^{x}dx.$ **CO1**
3. Evaluate $\int \sin 3x\cos 2xdx.$ **CO1**
4. Evaluate $\int xe^{x}dx.$ **CO1**
5. Evaluate $\int_{0}^{1}\frac{1}{1+x^{2}}dx.$ **CO2**
6. Find the mean value of $y=x^{2}$ from $x=0$ to $x=1$ **CO2**
7. Find the area of the region bounded by the curve $y=\sin x$ from $x=0$ to $x=\pi$ **CO2**
8. Find the order and degree of the differential equation $\left(\frac{d^{3}y}{dx^{3}}\right)^{2}-3\left(\frac{dy}{dx}\right)^{2}-x^{2}=1$ **CO3**
9. Solve $\frac{dy}{dx}=\frac{1+y^{2}}{1+x^{2}}$ **CO3**
10. Solve $\left(x^{2}+y\right)dx+\left(y^{2}+x\right)dy=0.$ **CO3**

PART-B

Answer All questions. Each question carries EIGHT marks. **5x8=40M**

11. A) Evaluate $\int \frac{3x+1}{(x-1)(x+3)}dx.$ **CO1**

(Or)

B) Evaluate $\int \frac{1}{5+4\cos x}dx.$ **CO1**

12. A) Evaluate $\int x\sin 3x\cos x dx.$ **CO1**

(Or)

B) Evaluate $\int x^3\cos x dx.$ **CO1**

13. A) Evaluate $\int_0^1 \frac{x^3}{1+x^8}dx.$ **CO2**

(Or)

B) Evaluate $\int_0^{\frac{\pi}{2}} \frac{1}{1+\tan^3 x}dx.$ **CO2**

14. A) Find the area of the region bounded by the curves $y^2=4x$ **and** $x^2=4y$. **CO2**

(Or)

B) Find the R.M.S values of $\sqrt{27-4x^2}$ from $x=0$ to $x=3$ **CO2**

15. A) Find the volume of the solid generated by revolution of the ellipse $\frac{x^2}{16}+\frac{y^2}{25}=1$ about X-axis **CO2**

(Or)

B) Calculate the approximate value of $\int_1^{11} x^3 dx$ by using Simpson's 1/3rd rule by dividing the range into 10 equal parts. **CO2**

PART-C

Answer the following question. Question carries TEN marks. **1x10=10M**

16. Solve $2\sin x\frac{dy}{dx}-y\cos x=xy^3e^x.$ **CO3**

***

STATE BOARD OF TECHNICAL EDUCATION, A.P

ENGINEERING MATHEMATICS

Sub Code: **EC- 301**

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

PART-A

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

1. Evaluate $\int\left(3e^{x}-2\cos x+\frac{3}{x}\right)dx.$ **CO1**

2. Evaluate $\int\cos^{2}2xdx.$ **CO1**

3. Evaluate $\int\frac{\tan^{-1}x}{1+x^{2}}dx.$ **CO1**

4. Evaluate $\int x\cos xdx.$ **CO1**

5. Evaluate $\int_{0}^{2}\frac{1}{\sqrt{4-x^{2}}}dx.$ **CO2**

6. Find the mean value of $i=a\sin t$ over the complete wave. **CO2**

7. Find the volume generated by revolving the circle $x^{2}+y^{2}=9$ from $x=0$ to $x=2$ about x-axis **CO2**

8. Obtain the differential equation by eliminating the arbitrary constants A and B from the curve $y=Ae^{x}+Be^{-x}$ **CO3**

9. Solve $\frac{dy}{dx}=e^{2x+y}$ **CO3**

10. Solve $\frac{dy}{dx}+\frac{y}{x}=x$ **CO3**

PART-B

Answer All questions. Each question carries EIGHT Marks. **5x8=40M**

11. A) Evaluate $\int\frac{1}{2x^{2}+3x+5}dx.$ **CO1**

(Or)

B) Evaluate $\int\sin^{3}x\cos^{5}xdx.$ **CO1**

12. A) Evaluate $\int e^x \left(\frac{2+\sin 2x}{1+\cos 2x} \right) dx.$ **CO1**

(Or)

B) Evaluate $\int e^{2x} x^4 dx.$ **CO1**

13.A) Evaluate $\int_0^1 \frac{\sec^2 x}{(1+\tan x)^2} dx.$ **CO2**

(Or)

B) Evaluate $\int_0^{\frac{\pi}{2}} \log(1+\tan\theta) d\theta.$ **CO2**

14. A) Find the area bounded between the curves $y = x^2$ and the line $y = 3x + 4$. **CO3**

(Or)

B) Find the R.M.S value of $\sqrt{\log x}$ between the lines $x = e$ to $x = e^2$ **CO2**

15. A) Find the volume of right circular cone using integration. **CO2**

(Or)

B) Find the approximate value of π from $\int_0^1 \frac{1}{1+x^2} dx$ using Trapezoidal rule by dividing $[0,1]$ into 5 equal sub-intervals. **CO2**

PART-C

Answer the following question. Question carries TEN marks. 1x10=10M

16. Solve $xy^2 dy - (x^3 + y^3) dx = 0$ **CO3**

***

BLUE PRINT

S. No	Chapter/ Unit title	No of Periods	Weightage allotted	Marks wise distribution of weightage				Question wise distribution of weightage				COs mapped
				R	U	Ap	An	R	U	Ap	An	
1	Unit – I: Indefinite Integration	22	28	11	11	06	0	2	2	2	0	CO1
2	Unit – II: Definite Integration and its applications	24	33	11	03	11	08	2	1	2	1	CO2
3	Unit – III: Differential Equations of first order	14	19	03	03	03	10	1	1	1	1	CO3
Total		**60**	**80**	**25**	**17**	**20**	**18**	**5**	**4**	**5**	**2**	

R: Remembering Type : 25 Marks

U: understanding Type : 17 Marks

Ap: Application Type : 20 Marks

An: Analysing Type : 18 Marks

C-20

Engineering Mathematics – II

Unit Test Syllabus

Unit Test	Syllabus
Unit Test-I	From L.O 1.1 to L.O 2.5
Unit Test-II	FromL.O 2.6 to L.O 3.9

UNIT TEST MODEL PAPERS

Unit Test I **C –20, EC-301**

State Board of Technical Education and Training, A. P

First Year

Subject Name: Engineering Mathematics-II

Sub Code: EC-301

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. Evaluate $\int x^8 dx$ (CO1)

   b. Evaluate $\int \frac{1}{\sqrt{4-x^2}} dx.$ (CO1)

   c. $\int e^x \left(f(x) + f'(x) \right) dx = e^x f(x) + c$ is true/false (CO1)

   d. Evaluate $\int_0^{\frac{\pi}{2}} \cos x dx$ (CO2)

2. Evaluate $\int \left(3\cos ec^2 x - 2\tan x \sec x + \frac{1}{x} \right) dx.$ (CO1)

3. Evaluate $\int \frac{\sin(\log x)}{x} dx.$ (CO1)

4. Evaluate $\int e^x \sin 2x dx.$ (CO1)

5. Evaluate $\int_0^{\frac{\pi}{2}} \sin^2 x dx$ (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) Evaluate $\int \frac{1}{5+4\cos x}\,dx.$ (CO1)

(or)

B) Evaluate $\int \sin^4 x \cos^3 x dx.$ (CO1)

7. A) Evaluate $\int \cos^{-1}\left(\frac{1-x^2}{1+x^2}\right)dx.$ (CO1)

(or)

B) Evaluate $\int x^4 e^{2x} dx.$ (CO1)

8. A) Evaluate $\int_0^{\frac{\pi}{2}} \cos 4x \cos x dx$ (CO2)

(or)

B) Evaluate $\int_0^{\frac{\pi}{2}} \frac{\sin^{10} x}{\sin^{10} x + \cos^{10} x}\,dx$ (CO2)

-o0o-

Unit Test II **C –20, EC -301**

State Board of Technical Education and Training, A. P

First Year

Subject Name: Engineering Mathematics-II

Sub Code: EC-301

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. Volume of the curve $y = f(x)$ over the interval $[a,b]$ when rotated about X-axis is _____ (CO2)

   b. Mean value of $f(x)$ over the interval $[a,b]$ is_____ (CO2)

   c. Order of differential equation $\frac{d^2y}{dx^2} + p^2y = 0$ is_____ (CO3)

   d. Integrating factor of $\frac{dy}{dx} + Py = Q$ is_____ (CO3)

2. Find the mean value of $x^2 + 2x + 1$ over the interval $[1,2]$ (CO2)

3. Find the area enclosed by curve $x^2 = 4y$ between the lines $x = 2$ and $x = 4$ (CO2)

4. Form the differential equation by eliminating the arbitrary constants from

   $y = A\cos 2x + B\sin 2x.$ (CO3)

5. Solve $\frac{dy}{dx} = \sqrt{\frac{1-y^2}{1-x^2}}.$ (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) Find the area bounded between the curve $y = x^2 - 5x$ and the line $y = 4 - 2x$ (CO2)

(Or)

B) Find the R.M.S value of $\sqrt{\log x}$ between the lines $x = e$ to $x = e^2$ (CO2)

7. A) Find the volume of the solid obtained by revolving the ellipse $\frac{x^2}{16} + \frac{y^2}{25} = 1$ about x axis (CO2)

(or)

B) Calculate the approximate value of $\int_0^6 \frac{1}{1+x}\,dx$ by taking $n = 6$ using Trapezoidal rule (CO3)

8. A) Solve $\left(y^2 - 2xy\right)dx + \left(2xy + x^2\right)dy = 0.$ (CO3)

(or)

B) Solve $x\frac{dy}{dx} + \frac{y}{x} = x^3y^6.$ (CO3)

-o0o-

END EXAM MODEL PAPERS

STATE BOARD OF TECHNICAL EDUCATION, A.P

ENGINEERING MATHEMATICS

Sub Code : **EC-301**

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

PART-A

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

1. Evaluate $\int\left(2\sin x-3e^{x}+\frac{4}{1+x^{2}}\right)dx.$ **CO1**

2. Evaluate $\int e^{x}\sin e^{x}dx.$ **CO1**

3. Evaluate $\int \sin 3x\cos 2xdx.$ **CO1**

4. Evaluate $\int xe^{x}dx.$ **CO1**

5. Evaluate $\int_{0}^{1}\frac{1}{1+x^{2}}dx.$ **CO2**

6. Find the mean value of $y=x^{2}$ from $x=0$ to $x=1$ **CO2**

7. Find the area of the region bounded by the curve $y=\sin x$ from $x=0$ to $x=\pi$ **CO2**

8. Find the order and degree of the differential equation $\left(\frac{d^{3}y}{dx^{3}}\right)^{2}-3\left(\frac{dy}{dx}\right)^{2}-x^{2}=1$ **CO3**

9. Solve $\frac{dy}{dx}=\frac{1+y^{2}}{1+x^{2}}$ **CO3**

10. Solve $\left(x^{2}+y\right)dx+\left(y^{2}+x\right)dy=0.$ **CO3**

PART-B

Answer All questions. Each question carries EIGHT marks. 5x8=40M

11. A) Evaluate $\int \frac{3x+1}{(x-1)(x+3)}dx.$ **CO1**

(Or)

B) Evaluate $\int \frac{1}{5+4\cos x}dx.$ **CO1**

12. A) Evaluate $\int x\sin 3x cos x dx.$ **CO1**

(Or)

B) Evaluate $\int x^3 \cos x dx.$ **CO1**

13. A) Evaluate $\int_0^1 \frac{x^3}{1+x^8}dx.$ **CO2**

(Or)

B) Evaluate $\int_0^{\frac{\pi}{2}} \frac{1}{1+\tan^3 x}dx.$ **CO2**

14. A) Find the area of the region bounded by the curves $y^2 = 4x$ **and** $x^2 = 4y$. **CO2**

(Or)

B) Find the R.M.S values of $\sqrt{27-4x^2}$ from $x=0$ to $x=3$ **CO2**

15. A) Find the volume of the solid generated by revolution of the ellipse $\frac{x^2}{16}+\frac{y^2}{25}=1$ about X-axis **CO2**

(Or)

B) Calculate the approximate value of $\int_1^{11} x^3 dx$ by using Simpson's 1/3rd rule by dividing the range into 10 equal parts. **CO2**

PART-C

Answer the following question. Question carries TEN marks. 1x10=10M

16. Solve $2\sin x\frac{dy}{dx} - y\cos x = xy^3e^x.$ **CO3**

***

STATE BOARD OF TECHNICAL EDUCATION, A.P

ENGINEERING MATHEMATICS

Sub Code :**EC-301**

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

PART-A

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

1. Evaluate $\int\left(3e^{x}-2\cos x+\frac{3}{x}\right)dx.$ **CO1**

2. Evaluate $\int\cos^{2}2x dx.$ **CO1**

3. Evaluate $\int\frac{\tan^{-1}x}{1+x^{2}}dx.$ **CO1**

4. Evaluate $\int x\cos x dx.$ **CO1**

5. Evaluate $\int_{0}^{2}\frac{1}{\sqrt{4-x^{2}}}dx.$ **CO2**

6. Find the mean value of $i=a\sin t$ over the complete wave. **CO2**

7. Find the volume generated by revolving the circle $x^{2}+y^{2}=9$ from $x=0$ to $x=2$ about x-axis **CO2**

8. Obtain the differential equation by eliminating the arbitrary constants A and B from the curve $y=Ae^{x}+Be^{-x}$ **CO3**

9. Solve $\frac{dy}{dx}=e^{2x+y}$ **CO3**

10. Solve $\frac{dy}{dx}+\frac{y}{x}=x$ **CO3**

PART-B

Answer All questions. Each question carries EIGHT marks. 5x8=40M

11. A) Evaluate $\int \frac{1}{2x^2+3x+5}dx.$ **CO1**

(or)

B) Evaluate $\int \sin^3 x \cos^5 x dx.$ **CO1**

12. A) Evaluate $\int e^x \left(\frac{2+\sin 2x}{1+\cos 2x}\right)dx.$ **CO1**

(or)

B) Evaluate $\int e^{2x} x^4 dx.$ **CO1**

13. A) Evaluate $\int_0^1 \frac{\sec^2 x}{(1+\tan x)^2}dx.$ **CO2**

(or)

B) Evaluate $\int_0^{\frac{\pi}{2}} \log(1+\tan\theta)d\theta.$ **CO2**

14. A) Find the area bounded between the curves $y = x^2$ and the line $y = 3x+4$. **CO3**

(or)

B) Find the R.M.S value of $\sqrt{\log x}$ between the lines $x = e$ to $x = e^2$ **CO2**

15. A) Find the volume of right circular cone using integration. **CO2**

(or)

B) Find the approximate value of π from $\int_0^1 \frac{1}{1+x^2}dx$ using Trapezoidal rule by dividing $[0,1]$ into 5 equal sub-intervals. **CO2**

PART-C

Answer the following question. Question carries TEN marks. 1x10=10M

16. Solve $xy^2dy - (x^3+y^3)dx = 0$ **CO3**

***

ELECTRONIC CIRCUITS - I

Course Code	Course title	No of periods/week	Total no of periods	Marks for FA	Marks for SA
EC-302	ELECTRONIC CIRCUITS-I	04	60	20	80

S No	Unit Title	No. of Periods	COs Mapped
1	Transistor Biasing and stabilization	15	CO1
2	Small Signal Amplifiers	15	CO2
3	Feedback amplifiers	8	CO3
4	Large Signal Amplifiers	10	CO4
5	Oscillators	12	CO5
	TOTAL	60	

Course Objectives	To familiarize with various transistor biasing and stabilization circuits
	To understand different small signal, large signal amplifiers
	To explain different feedback amplifiers and oscillators

CO No		COURSE OUTCOMES
CO1	**EC-302.1**	Analyze the need of biasing and Stabilization techniques
CO2	**EC-302.2**	Explain the working of small signal amplifiers
CO3	**EC-302.3**	Analyze the concept of feedback and feedback amplifiers
CO4	**EC-302.4**	Describe various large signal amplifier circuits
CO5	**EC-302.5**	Describe various oscillator circuits

CO-PO/PSO MATRIX

CO No	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
EC-302.1	3	3	2	1				3	2	
EC-302.2	3	3	2	1	2			3		
EC-302.3	3	3	2	1	2			3		
EC-302.4	3	3	2	1	2			3	1	
EC-302.5	3	3	2	1	2			3		
Average	3	3	2	1	2			3	1.5	

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

LEARNING OUTCOMES:

1.0 Transistor biasing and stabilization

1.1 i) Explain the concept of DC and AC load lines
ii) Define operating point of transistor amplifier
iii) List the factors affecting the operating point
iv) Analyze the selection of proper operating point
1.2 Explain the importance of transistor biasing
1.3 Explain the need for stabilization
1.4 Define stability factors and give their equations
1.5 List the types of biasing circuits
1.6 Explain fixed bias circuit
1.7 Analyze the stability of fixed bias circuit
1.8 Explain the concept of thermal runaway
1.9 List the drawbacks of using fixed bias circuit
1.10 Explain collector to base bias circuit
1.11 Analyze the stability of collector to base bias circuit
1.12 List the advantages and disadvantages of collector to base bias circuit
1.13 i) Explain self bias circuit
ii) State the importance of emitter by-pass capacitor, $C_e$in self bias circuit
iii) Analyze the stability of self bias circuit
iv) List the advantages of self bias circuit
1.14 State the importance of heat sink

2.0 Small Signal Amplifiers

2.1 Define h-parameters of BJT
2.2 Draw h-model of CB, CE and CC transistor configurations
2.3 Mention conversion formulas for CE to CB h parameters, CE to CC h parameters
2.4 Draw and explain the small signal model of a FET

2.5 Draw the practical single stage transistor CE amplifier
2.6 Classify the amplifiers based on frequency of operation, period of conduction, and type of coupling.
2.7 State the need for Multistage amplifier (Cascading of amplifiers)
2.8 Define the terms gain, gain in db, frequency response and bandwidth of an amplifier
2.9 Explain the working of two-stage RC coupled amplifier with circuit diagram
2.10 Draw & explain the frequency response of RC coupled amplifier
2.11 Explain the working of two-stage transformer coupled amplifier with circuit diagram
2.12 Draw & explain the frequency responseof transformer-coupled amplifier
2.13 Explain the working of direct coupled amplifier with circuit diagram
2.14 Explain the operation of Darlington pair with the help of circuit diagram
2.15 List three applications of Darlington pair

3.0 Feedback Amplifiers

3.1 State the concept of feedback in amplifiers
3.2 Explain negative feedback amplifier with block diagram
3.3 Derive the expression for the gain of negative feedback amplifier
3.4 List the four types of negative feedback amplifiers
3.5 Explain the effect of negative feedback on gain, bandwidth, input and output impedances of an amplifier
3.6 List the merits of negative feedback amplifiers
3.7 Draw the block diagrams of voltage series, current series, current shunt and voltage Shunt feedback amplifiers
3.8 Compare characteristics of the above feedback amplifiers

4.0 Large signal Amplifiers

4.1 State the need for power amplifier
4.2 List any three performance metrics of power amplifier
4.3 Classify power amplifiers based on period of conduction
4.4 Explain the working of Class A, Class B, Class AB & Class C amplifiers with waveforms
4.5 Explain the working of Class-B Push-pull amplifier with circuit diagram
4.6 Explain the working of complementary symmetry Push-pull power amplifier with circuit diagram
4.7 List different distortions in power amplifiers
4.8 Explain the working of Class-AB Push-pull amplifier circuit
4.9 Mention the applications of Class C Amplifiers
4.10 Compare efficiency of different types of power amplifiers
4.11 Draw the circuit diagrams of single and double tuned amplifiers and give their frequency response curves.

5.0 Oscillators

5.1 State the conditions (Barkhausen criteria) for an amplifier to work as an oscillator
5.2 Classify oscillator circuits
5.3 Explain the working of an RC phase shift oscillator with a circuit diagram
5.4 Explain the generalized LC oscillator and state the conditions for sustained oscillations
5.5 Explain the working of tuned collector oscillator with a circuit diagram

5.6 Explain the working of Hartley oscillator with a circuit diagram

5.7 Explain the working of Colpitts oscillator with a circuit diagram

5.8 Write the expressions for frequency of oscillations and conditions for sustained oscillations of the above circuits

5.9 Draw the equivalent circuit of piezoelectric crystal

5.10 Explain the working of transistor crystal oscillator with a circuit diagram

5.11 List the advantages of crystal oscillators over other types of oscillators

COURSE CONTENT:

1.0 Transistor biasing and Stabilization

DC and AC load lines, transistor biasing, operating point, types of biasing circuits, fixed bias network, thermal runaway, bias stabilization, collector to base bias network, self bias network, heat sink

2.0 Small signal Amplifiers

Practical transistor CE amplifier - h parameters of a transistor Amplifier-Classification of amplifiers based on frequency, period of conduction and coupling- Multistage amplifier - gain, frequency response and bandwidth of an amplifier- RC coupled amplifier - frequency response of RC coupled amplifier- transformer coupled amplifier - Frequency response of transformer coupled amplifier- direct coupled amplifier - Darlington pair - applications of Darlington pair

3.0 Feedback Amplifiers

Concept of feedback - Block diagram of negative feedback amplifier - four types of negative feedback amplifiers- Block diagrams of voltage series current series, current shunt and voltage Shunt feedback amplifiers- gain of negative feedback amplifiers- Effect of negative feedback on gain, bandwidth, input and output impedances- comparison of characteristics of feedback amplifiers.

4.0 Large signal Amplifiers

Need for Power Amplifier- Performance measures of power amplifier-Classification of power amplifiers based on conduction (Class A, B, AB, C)- operation of Class A, Class B, Class AB & Class C with waveforms- Working of Class B Push-pull amplifier circuit- Distortions in power amplifiers- Applications of Class C Amplifiers as - Efficiencies of different power amplifiers

5.0 Oscillators

Condition for an amplifier to work as an oscillator (Barkhausen criteria) - RC phase shift oscillator- tuned collector oscillator- Generalized LC oscillator - Hartley oscillator- Colpitts oscillator - Equivalent circuit of crystal - crystal oscillator - Advantages of crystal oscillator-

REFERENCE BOOKS:

1. G.K.Mithal, Electronic Devices and Circuits, 23rd Edition, 2014, Khanna Publishers
2. David A.Bell, Electronic Devices and Circuits, 4th edition PHI, India Publishers
3. T.F. Bogart Jr, J.S.Beasley and G.Rico, Electronic Devices and Circuits, 6th edition, 2004 Pearson Education
4. Albert Malvino and J Bates, Electronic Principles, 7th edition Tata McGraw-Hill Education (TMH) Publishers.
5. V.K. Mehta, Principles of Electronics, 2008, S Chand & Company
6. S.Salivahanan,N.Suresh kumar,Electronic devices & circuits , 4th edition,McGraw-Hill Education
7. Allen Mottershead, Electronic devices & circuits,An introduction, PHI Publication

BLUE PRINT:

Sl No	Unit Title	No of Periods	Weightage Allotted	Marks Wise distribution of weightage				Question Wise distribution of weightage				COs mapped
				R	U	Ap	An	R	U	Ap	An	
1	Transistor Biasing and stabilization	15	24	6	8		10	2	1		1	CO1
2	Small Signal Amplifiers	15	14	3	11			1	2			CO2
3	Feedback amplifiers	8	11	3	8			1	1			CO3
4	Large Signal Amplifiers	10	17	6	11			2	2			CO4
5	Oscillators	12	14	6	8			2	1			CO5
Total		60	80	24	46		10	8	7		1	

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 2.15
Unit Test-II	From 3.1 to 5.11

(Model Paper) **C –20, EC -302**

State Board of Technical Education and Training, A. P

Diploma in Electronics and Communication Engineering (DECE)

III Semester

Subject Name: Electronic Circuits-I

Sub Code: EC - 302

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 the following blanks with one word
   a) What is the slope of DC load line_____ (CO1)
   b) In self bias the emitter resistor is used for the purpose of_____ (CO1)
   c) In Darlington pair each transistor is connected in _____ configuration (CO2)
   d) In a 2 stage RC coupled amplifier gain of first stage is 10, gain of second stage is 20 then what is the total gain _____ (CO2)
2. List the factors affecting the operating point (CO1)
3. Define the concept of thermal run away. (CO1)
4. Define the terms gain and bandwidth of an amplifier (CO2)
5. State the need of multistage amplifiers (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 fixed bias circuit (CO1)

   (or)

   (b) Explain collector to base bias circuit (CO1)
7. (a) Explain the working of two-stage transformer coupled amplifier with circuit diagram and explain its frequency response characteristics (CO2)

   (or)

   (b) Explain the working of two-stage RC coupled amplifier with circuit diagram and explain itsfrequency response characteristics (CO2)
8. (a) Explain the Analyze the stability of self bias circuit (CO1)

   (or)

   (b) Explain the operation of Darlington pair with the help of circuit diagram (CO2)

***

(Model Paper) **C –20, EC -302**

State Board of Technical Education and Training, A. P

Diploma in Electronics and Communication Engineering (DECE)

III Semester

Subject Name: Electronic Circuits-I

Sub Code: EC-302

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. Fill the following blanks with one word
   a) Negative feedback is used in oscillators **(State True/False)** (CO5)
   b) How many degrees pahse shift is produced by feed back network of RC phase shift oscillator (CO5)
   c) With the introduction of negative feedback the gain of an amplifier is decreases **(State True/False)** (CO3)
   d) What is the efficiency of Class B amplifier (CO4)
2. State the concept of feedback in amplifiers (CO3)
3. State the need for Power Amplifier (CO4)
4. List any three applications of Class C Amplifiers (CO4)
5. State the conditions (Barkhausen's criteria) for an amplifier to work as an oscillator(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) Explain negative feedback amplifier with block diagram and Derive the expression for the gain of negative feedback amplifier (CO3)

   (or)

   (b) Explain the effect of negative feedback on gain, bandwidth, input and output impedances of an amplifier (CO3)

7. (a) Explain the working of Class-B Push-pull amplifier with circuit diagram and waveforms (CO4)

   (or)

   (b) Explain the working of complementary symmetry Push-pull power amplifier with circuit diagram (CO4)

8. (a) Explain the working of an RC phase shift oscillator with a circuit diagram and Write the expressions for frequency of oscillations and mention the conditions required for sustained oscillations (CO5)

   (or)

   (b)Explain the working of Colpitts oscillator with a circuit diagram and Write the expressions for frequency of oscillations and mention the conditions required for sustained oscillations (CO5)

-o0o-

MODEL PAPER

BOARD DIPLOMA EXAMINATIONS

C-20, EC-302, ELECTRONIC CIRCUITS –I

III SEMESTER

SEMESTER 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. List the factors affecting the operating point (CO1)
2. Briefly explain the concept of thermal run away (CO1)
3. Define h-parameters of BJT (CO2)
4. State the need for Multistage amplifier (CO3)
5. List the merits of negative feedback amplifiers (CO3)
6. State the need for Power Amplifier (CO4)
7. List any three applications of Class C Amplifiers (CO4)
8. Classify power amplifiers based on period of conduction (CO4)
9. State the conditions (Barkhausen's criteria) for an amplifier to work as an oscillator (CO5)
10. List the merits and demerits of RC oscillators (CO5)

Part-B **5×8=40**

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.

11. (a) Explain fixed bias circuit (CO1)

    (or)

    (b) Explain collector to base bias circuit (CO1)

12. (a) Explain the working of two-stage RC coupled amplifier with circuit diagram and explain its frequency response characteristics (CO2)

    (or)

    (b) Explain the working of two-stage transformer coupled amplifier with circuit diagram and explain its frequency response characteristics (CO2)

13. (a) Explain negative feedback amplifier with block diagram and Derive the expression for the gain of negative feedback amplifier (CO3)

(or)

(b)Explain the effect of negative feedback on gain, bandwidth, input and output impedances of an amplifier (CO3)

14. (a)Explain the working of Class-B Push-pull amplifier with circuit diagram and waveforms (CO4)

(or)

(b)Explain the working of complementary symmetry Push-pull power amplifier with circuit diagram (CO4)

15. (a)Explain the working of an RC phase shift oscillator with a circuit diagram and Write the expressions for frequency of oscillations and mention the conditions required for sustained oscillations (CO5)

(or)

(b) Explain the working of Colpitts oscillator with a circuit diagram and Write the expressions for frequency of oscillations and mention the conditions required for sustained oscillations (CO5)

Part-C **1×10=10**

Instructions: (1) Answer the question given below. It carries 10 marks
(2) Answer should be comprehensive and the criterion for valuation is the content but not the length of the answer.

16. Analyse the stability of self bias circuit to show that self bias circuit is more stable than other biasing circuits (CO1)

-o0o-

DIGITAL ELECTRONICS

Course Code	Course title	No of periods/week	Total no of periods	Marks for FA	Marks for SA
EC-303	DIGITAL ELECTRONICS	4	60	20	80

S No	Unit Title	No. of Periods	COs Mapped
1	Basics of Digital Electronics.	15	CO1
2	Logic Families	7	CO2
3	Combinational Logic circuits.	15	CO3
4	Sequential Logic Circuits.	15	CO4
5	Semiconductor memories.	8	CO5
	TOTAL	60	

Course Objectives	1. To familiarize with various number systems, postulates of boolean algebra, logic gates and logic circuits
	2. To analyze the working of logic gates, combinational and sequential circuits and memories
	3. To learn the practical importance and applications of digital electronic circuits

CO No		COURSE OUTCOMES
CO1	**EC-303.1**	Convert a number from one system to another system, implement logic circuits and analyse logic expressions.
CO2	**EC-303.2**	Describe different logic families
CO3	**EC-303.3**	Design combinational logic circuits
CO4	**EC-303.4**	Construct different sequential logic circuits
CO5	**EC-303.5**	Describe different semiconductor memories

CO-PO/PSO MATRIX

CO No	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
EC-303.1	3	3	1	1	1			3	1	
EC-303.2	3	3			1		1	3		
EC-303.3	3	3	3	1	1			3	1	1
EC-303.4	3	3	3	1	1			3	1	1
EC-303.5	3	3			1		1	3	1	1
Average	3	3	2.3	1	1		1	3	1	1

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

LEARNING OUTCOMES:

1.0 Basics of Digital Electronics

1.1 i)Explain Binary, Octal, Hexadecimal number systems.
ii)Convert a given decimal number into Binary, Octal, and Hexadecimal number and viceversa
iii)Convert a given binary number into octal and hexadecimal number and vice versa

1.2 Perform binary addition, subtraction, multiplication and division.

1.3 i) Write 1's complement and 2's complement numbers for a given binary number.
ii) Perform subtraction of binary numbers in 2's complement method.

1.4 Compare weighted and Un-weighted codes.

1.5 Write Binary equivalent number for a number in 8421, Excess-3 and Gray Code and vice-versa.

1.6 State the use of digital codes in digital electronics.

1.7 Mention the use of alphanumeric codes (ASCII & EBCDIC)

1.8 State the importance of parity Bit

1.9 State different postulates in Boolean algebra

1.10 Explain the basic logic gates AND, OR, NOT gates with their truth tables

1.11 Explain the working of universal logic gates (NAND, NOR gates) with truth tables

1.12 Explain the working of an Exclusive–OR gate with truth table

1.13 i)State De-Morgan's theorems
ii)Apply De-Morgan's theorems and other postulates to simplify Boolean expressions (up to three variables only)

1.14 Realize AND, OR, NOT operations using NAND, NOR gates

1.15 Explain standard representations for logical functions (SOP and POS form)

1.16 Write Boolean expressions from the given truth table

1.17 Write Boolean expressions for real life examples

1.18 Simplify Boolean Expression using Karnaugh map (up to 3 variables only)

2.0 Logic families

2.1 Classify logic families

2.2 List the important characteristics of Digital ICs of different logic families.

2.3 Define the terms: propagation delay, Noise margin, Fan-in, Fan-out and Power dissipation of digital ICs.

2.4 Give logic levels and voltage requirements of TTL and CMOS ICs.

2.5 Explain the working of open collector TTL NAND gate with circuit diagram.

2.6 Explain the working of Totem-pole output TTL NAND gate with circuit diagram.

2.7 Explain the working of CMOS NAND gate with circuit diagram

2.8 Compare the TTL, CMOS and ECL logic families.

2.9 List IC numbers of two input TTL Logic gates.

3.0 Combinational logic circuits

3.1 State the concept of combinational logic circuit.

3.2 i) Explain Half adder circuit using Ex-OR gate and an AND gate.
ii) Realize Half-adder using i) NAND gates only and ii) NOR gates only.

3.3 i) Explain the operation of Full adder circuit with truth table using Ex-OR gate and basic gates.

ii)Realize full-adder using two Half-adders and an OR gate

3.4 Explain the working of 4 Bit parallel adder using full adders.

3.5 Explain 4-bit parallel adder cum 2's compliment subtractor circuit.

3.6 Explain the working of a serial adder with block diagram.

3.7 Compare the performance of serial and parallel adders

3.8 Explain 4x1 Multiplexer with logic circuit diagram

3.9 Mention any 3 applications of multiplexers

3.10 Explain 1x4 De-multiplexer with logic circuit diagram

3.11 Mention any 3 applications of De-multiplexers.

3.12 Explain the working of 3x8 decoder circuit.

3.13 Mention any 3 applications of decoders.

3.14 Explain the working of BCD to decimal decoder

3.15 State the need for a tri-state buffer.

3.16 List four types of tri-state buffers.

3.17 Draw and explain a simple tri-state buffer circuit.

3.18 Realize one bit digital comparator circuit using gates

4.0 Sequential logic circuits

4.1 State the concept of Sequential logic circuits.

4.2 Explain NAND and NOR latches with truth tables.

4.3 i)State the necessity of clock in digital circuits
ii) Differentiate between level triggering and edge triggering

4.4 Explain clocked SR flip flop using NAND gates.

4.5 State the need for preset and clear inputs.

4.6 i) Explain level clocked JK flip flop (using S-R flip-flops) with truth table.
ii) State race around condition in JK flipflops

4.7 Explain the master slave JK flip flop with necessary diagrams.

4.8 Explain the level clocked D and T flip flops with the help of truth table and circuit diagram

4.9 i) Give the concept of edge triggering using RC differentiator
ii) Draw the symbols of edge triggered D and T flip flops.

4.10 List the applications of flip flops.

4.11 Define the term modulus of a counter.

4.12 i) Explain the working of 4-bit asynchronous counter with circuit diagram and timing diagram.
ii) Explain the working of asynchronous decade counter with circuit diagram and Timing diagram.
iii) Explain the working of asynchronous 3 bit up-down counter with circuit diagram.

4.13 Explain the working of 4-bit synchronous counter with circuit diagram.

4.14 Distinguish between synchronous and asynchronous counters.

4.15 Explain the working of 4-bit ring counter with circuit diagram.

4.16 i) State the necessity of Registers and classify registers based on data i/o operations
ii) Explain the working of 4-bit shift left register with Circuit diagram
iii) Explain the working of 4-bit shift right register with Circuit diagram.
iv) List any four common applications of shift registers.

5.0 Semiconductor memories

5.1 Classify different types of semiconductor memories

5.2 Define the terms: i) memory read operation; ii) memory write operation; iii) access time; iv) memory capacity; v) address lines; vi)word length related to memories

5.3 Differentiate:
i) Read Only Memory & Read write memory ;

ii) Sequential access memory & Random Access Memory

5.4 Explain working of diode ROM with suitable circuit diagram

5.5 Distinguish between EEPROM and UVEPROM

5.6 Explain the working of basic dynamic MOS RAM cell with suitable circuit diagram

5.7 Compare static RAM and dynamic RAM

5.8 State the difference between Flash ROM and NV RAM

5.9 State the use of pen drive, SD Card, solid state hard disk.

COURSE CONTENT

1.0 Basics of Digital Electronics

Number systems- Conversion from one number system to another number system-Binary Arithmetic-Weighted and un-weighted codes - parity Bit- Boolean algebra – Basic gates-Universal gates - De-Morgan's theorems-Realize AND, OR, NOT operations using NAND, NOR gates-SOP and POS forms-Write Boolean expressions from the given truth table-Karnaugh map (up to 3 variables only)

2.0 Logic families.

Classify different logic families- characteristics of logic families-open collector TTL NAND gate with circuit diagram-Totem pole output TTL NAND gate - CMOS NAND gate-Compare TTL, CMOS and ECL

3.0 Combinational logic circuits

Concept of combinational logic circuits- Half adder circuit - Half-adder using NAND gates only &NOR gates only- Full adder circuit - Full-adder using two Half-adders and an OR gate - a 4 Bit parallel adder using full adders- 2's compliment parallel adder/ subtractor circuit- Serial adder -Performance of serial and parallel adder- Operation of 4x1 Multiplexers- Operation of 1 to 4 de-multiplexer- applications- 3x8 decoder- Applications - Tri-state buffer- working of simple tri state buffer -Types of tri-state buffers- one bit digital comparator.

4.0 Sequential logic circuits

Concept of Sequential logic circuits- NAND and NOR latches - Necessity of clock - Concept of level and edge triggering - Clocked SR flip flop circuit using NAND gates- Need for preset and clear inputs - Circuit of level Clocked JK flip flop (using S-R flip-flops) -Race around condition-Master slave JK flip flop circuit - Level clocked D and T flip flops - Truth table, Circuit diagram - Symbols of above Flip Flops- Truth tables of edge triggered D and T flip flops - Applications of flip flops-Modulus of a counter- 4-bit asynchronous counter - Asynchronous decade counter with a circuit - 4-bit synchronous counter –differences between synchronous and asynchronous counters- asynchronous 3 bit up-down counter – Ring counter - Need for a Register - Types of registers- 4 bit shift left and shift right registers - Applications of shift registers.

5.0 Semiconductor memories

Types of memories -Memory read operation, write operation, access time, memory capacity, address lines and word length- ROM and RAM- Diode ROM- EEPROM and UVEPROM- Dynamic MOS RAM cell- static RAM and dynamic RAM- Differences between Flash ROM and NV RAM – use of pen drive, SD card, solid state disk

REFERENCE BOOKS:

1. 1. Malvino and Leach, Digital Computer Electronics, 3rd edition Tata McGraw-HillEdition
2. RP JAIN , Modern Digital Electronics, 3th editionTMH
3. Roger L. Tokheim , Digital Electronics: Principles & Application, McGraw-Hill Edition,2008
4. GK Kharate , Digital Electronics, Oxford UniversityPress.
5. V.K.Puri, Digital Electronics, TataMcGraw-Hill.
6. M.MorrisMano,Digital logic &Computer Design,PEARSONEdition 2017
7. M.MorrisMano,MichaelD.Ciletti,Digital Design ,PEARSON 4th Edition

.

BLUE PRINT:

Sl No	Unit Title	No of Periods	Weightage Allotted	Marks Wise distribution of weightage				Question Wise distribution of weightage				COs mapped
				R	U	Ap	An	R	U	Ap	An	
1	Basics of Digital Electronics.	15	19	3	6	-	10	1	2	-	1	**CO1**
2	Logic Families	7	11	3	8	-	-	1	1	-	-	**CO2**
3	Combinational Logic circuits.	15	17	6	3	8	-	2	1	1	-	**CO3**
4	Sequential Logic Circuits.	15	22	6	16	-	-	2	2	-	-	**CO4**
5	Semiconductor memories.	8	11	-	11	-	-	-	2	-	-	**CO5**
Total		**60**	**80**	**18**	**44**	**8**	**10**	**6**	**8**	**1**	**1**	

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 5.9

(Model Paper) **C –20, EC -303**

State Board of Technical Education and Training, A. P

Diploma in Electronics and Communication Engineering (DECE)

III Semester

Subject Name: Digital Electronics

Sub Code: EC - 303

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. Convert the following numbers into binary number system (CO1)
   a) 25_{10} b) 72_8 c) AB_{16} d) $2A_{16}$
2. Perform the binary subtraction of following two numbers using 2's complement method (CO1)

   101101_2

   -100110_2

   _____ _____
3. State De-Morgan's theorems (CO1)
4. Classify different logic families (CO2)
5. Define the terms: propagation delay, Noise margin, Fan out of digital ICs (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) Realize AND, OR, NOT operations using NAND, NOR gates (CO1)

   (or)

   (b) Simplify the following Boolean Expression using Karnaugh map (CO1)

   $$Y = A\overline{B}C + AB\overline{C} + \overline{A}\overline{B}C + ABC$$

7. (a) Explain the working of open collector TTL NAND gate with circuit diagram. (CO2)

   (or)

   (b) Explain the working of Totem-pole output TTL NAND gate with circuit diagram. (CO2)
8. (a)Explain 4-bit parallel adder cum 2's compliment subtractor circuit. (CO3)

   (or)

   (b)Explain the operation of Full adder circuit with truth table using Ex-OR gate and basic gates. (CO3)

-o0o-

MODEL PAPER

Diploma in Electronics and Communication Engineering (DECE)

III Semester

Subject Name: Digital Electronics

Sub Code: EC - 303

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) Write one example for combinational logic circuit? (CO3)
   b)Write one example for sequential logic circuit? (CO4)
   c) Write full form of EEPROM (CO5)
   d) Write full form of NV RAM (CO5)
2. Compare the performance of serial and parallel adder (CO3)
3. State the need for preset and clear inputs. (CO4)
4. List the applications of flip flops (CO4)
5. Classify different types of semiconductor memories (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) Explain the working of 4-bit asynchronous counter with circuit diagram and timing diagram. (CO3)

   (or)

   (b) Explain the working of asynchronous decade counter with circuit diagram and timing diagram. (CO3)

7. (a) Explain the working of 4-bit shift left register with Circuit diagram (CO4)

   (or)

   (b) Explain the working of 4-bit shift right register with Circuit diagram. (CO4)
8. (a) Explain working of diode ROM with suitable circuit diagram (CO5)

   (or)

   (b) Explain the working of basic dynamic MOS RAM cell with suitable circuit diagram (CO5)

-o0o-

MODEL PAPER

BOARD DIPLOMA EXAMINATIONS

C-20, EC-303, DIGITAL ELECTRONICS

III SEMESTER

SEMESTER 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. Convert the following numbers into binary number system (CO1)
   a) 25_{10} b) 72_8 c) AB_{16}
2. Perform the following binarysubtraction using 2's complement method (CO1)

   101101_2

   -100110_2

   ---
3. State De-Morgan's theorems (CO1)
4. Classify different logic families (CO2)
5. List types of tri-state buffers.(CO2)
6. Draw Half adder circuit and give its truth table (CO3)
7. Compare the performance of serial and parallel adder (CO3)
8. State the need for preset and clear inputs. (CO4)
9. List the applications of flip flops (CO4)
10. Classify different types of semiconductor memories (CO5)

Part-B **5×8=40**

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.

11. (a) Explain the working of open collector TTL NAND gate with circuit diagram. (CO2)

    (or)

    (b)Explain the working of Totem-pole output TTL NAND gate with circuit diagram.(CO3)

12. (a)Explain 4x1 Multiplexer with logic circuit diagram (CO3)

(or)

(b)Realize one bit digital comparator circuit using gates (CO3)

13. (a)Explain the working of 4-bit shift left register with Circuit diagram (CO4)

(or)

(b)Explain the working of 4-bit shift right register with Circuit diagram. (CO4)

14. (a) Explain the working of master slave JK flip flop (CO4)

(or)

(b)Explain the working of 4-bit asynchronous counter with circuit diagram and draw the timing diagram. (CO4)

15. (a) Explain working of diode ROM with suitable circuit diagram (CO5)

(or)

(b)Explain the working of basic dynamic MOS RAM cell with suitable circuit diagram (CO5)

Part-C **1×10=10**

Instructions: (1) Answer the question given below. It carries 10 marks

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

16 A chemical factory has a microprocessor controlled alarm to activate under certain conditions of Temperature(T), Pressure(P) and Fluid Level (L), Design a combinational circuit to notify the microprocessor to activate the alarm if any of the following conditions satisfy

(i) Temperature and Pressure are high

(ii) Temperature and Fluid Levels Low

(iii) Pressure and Fluid levels are high (CO1)

-o0o-

ANALOG AND DIGITAL COMUNICATION SYSTEMS

Course Code	Course title	No of periods/week	Total no of periods	Marks for FA	Marks for SA
EC-304	Analog and Digital Communication systems	4	60	20	80

S No	Unit Title	No. of Periods	COs Mapped
1	Analog Modulation Techniques	17	CO1
2	Digital communication principles	8	CO2
3	Digital modulation techniques	12	CO3
4	Transmitters and Receivers	16	CO4
5	Multiplexing Techniques	7	CO5
	TOTAL	60	

Course Objectives	1. To familiarize the concepts of analog communication systems and digital communication systems
	2. To equip with various issues related to analog and digital communications such as modulation, demodulation, transmitters, receivers and noise performance
	3. To learn the practical importance and applications of communication systems

CO No		COURSE OUTCOMES
CO1	**EC-304.1**	Describe analog modulation techniques, AM and FM
CO2	**EC-304.2**	Explain the principles of Digital Communication.
CO3	**EC-304.3**	Describe different digital modulation techniques ASK, FSK,PSK, QAM.
CO4	**EC-304.4**	Explain the principles and working of transmitters and receivers.
CO5	**EC-304.5**	Describe the principles of multiplexing techniques.

CO-PO/PSO MATRIX

CO No	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
EC-304.1	3	1	1		1			3	1	1
EC-304.2	3	1	1		1		1	3		1
EC-304.3	3	1	1		1		1	3	1	1
EC-304.4	3	1	2		1			3		1
EC-304.5	3	1	2		1			3		1
Average	3	1	1.4		1		1	3	1	1

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

LEARNING OUTCOMES:

1.0Analog modulation techniques

1.1 Explain the basic elements of a communication system with a block diagram
1.2 Give the frequency spectrum of radio wave and state the usage of different bands of it
1.3 Define modulation and State the need for modulation in communication systems.
1.4 Define the terms base band signal, carrier signal and modulated signal
1.5 Classify various types of continuous wave modulation systems
1.6 i) Define amplitude modulation and draw AM wave
ii) Derive the time-domain equation for an AM signal and Define the modulation index of an AM signal.
iii) Draw the frequency spectrum of an AM wave
iv)Calculate the bandwidth of an AM signal
v)State the effects of over modulation
vi) Derive the relation between total power and carrier power in AM and Solve simple problems
1.7 State the need for DSB-SC and SSB modulation
1.8 List the advantages and disadvantages of SSB
1.9 Explain the concept of VSB transmission and its advantages.
1.10 i) Define angle modulation
ii) List the types of angle modulation
iii) Define Frequency modulation and Phase Modulation.
iv) Derive the time domain equation for FM signal and explain its bandwidth requirements.
v)Define the modulation index of an FM signal
vi) Draw the waveform of FM Wave
1.11 Distinguish between narrow band and wide band FM
1.12 Explain briefly about noise triangle in FM
1.13 Define the terms pre-emphasis and de-emphasis
1.14 List the merits of FM over AM
1.15 Classify different types of noise
1.16 Define the terms: i) signal to noise ratio; ii) noise figure; and iii) noise temperature

2.0 Digital Communication Principles

2.1 Distinguish between analog and digital signals
2.2 List the advantages and disadvantages of digital communication system over analog communication system
2.3 Define information capacity of a channel.
2.4 State sampling theorem and mention its significance in pulse modulation techniques
2.5 Classify pulse modulation techniques.
2.6 Define PAM and its waveform
2.7 Define PWM and its waveform
2.8 Define PPM and its waveform
2.9 Compare PAM, PWM and PPM
2.10 Define the term quantization
2.11 Explain the process of quantization with waveforms.
2.12 State quantization noise.
2.13 Describe the coding and decoding of a PCM signal.

3.0 Digital Modulation Techniques

3.1 State data encoding
3.2 List different analog signal to digital signal encoding schemes
3.3 Explain the process of Asynchronous data communication scheme
3.4 Define Overhead and Efficiency of data communication system
3.5 Explain the process of synchronous data communication
3.6 i) List different error detection schemes
ii) Explain parity check method of error detection.
iii) Explain Checksum method of error detection.
iv) Explain CRC method of error detection with an example.
v) Explain method of error correction using FEC method (Hamming Code).
3.7 State the need for digital modulation
3.8 State the difference between bit rate and baud rate
3.9 Define ASK,FSK and PSK
3.10 Explain Binary ASK modulator with block diagram.
3.11 Explain Binary ASK coherent demodulator with block diagram
3.12 Explain BFSK modulator with block diagram.
3.13 Explain Coherent BFSK demodulator.
3.14 Explain BPSK modulator with block diagram
3.15 Explain BPSK demodulator with block diagram
3.16 Compare ASK,FSK and PSK
3.17 State the need for QAM
3.18 Explain 4QAM Modulator with block diagram

4.0 Transmitters and Receivers

4.1 List the specifications of transmitters.
4.2 Distinguish between low level and high level modulation
4.3 Draw the block diagram for high level modulated transmitter and explain its working
4.4 Draw the low level modulated Transmitter and explain its working
4.5 Draw the block diagram of FM transmitter using reactance method and explain its working
4.6 Draw and explain the block diagram of indirect method of FM generation (Armstrong method)
4.7 Classify radio receivers
4.8 Define sensitivity, selectivity and fidelity of a radio receiver

4.9 i) Draw the block diagram of TRF receiver and explain the function of each block.
ii) State the limitations of TRF Receiver
4.10 Explain the working of super heterodyne AM receiver with a block diagram.
4.11 Define the terms Image frequency and IMRR in a radio receiver.
4.12 State the factors to be considered for choice of IF.
4.13 State the need for AVC (AGC).
4.14 Explain the process of demodulation with Envelope detector in AM receivers
4.15 Draw and explain the circuit diagram of practical AM detector
4.16 Explain the working of super heterodyne FM receiver with a block diagram.
4.17 Explain the process of demodulation with Foster-Seeley discriminator (Phase discriminator) in FM receivers

5.0 Multiplexing techniques

5.1 Define Multiplexing in digital communications
5.2 State the need for multiplexing
5.3 Explain the concept of Frequency Division Multiplexing with block diagram
5.4 Explain the concept of Time Division Multiplexing with block diagram
5.5 Compare TDM and FDM
5.6 State the need for a MODEM in data communications
5.7 List different types of MODEMs
5.8 State the concept of Digital Subscriber Line (DSL) technology
5.9 List the features of Asynchronous Digital Subscriber Line (ADSL) technology

COURSE CONTENT:

1.0 Analog modulation techniques

Elements of a communication system - block diagram- frequency spectrum - need for modulation in communication systems- baseband, carrier, and modulated signals -amplitude modulation- wave form of an AM wave- time-domain equation for an AM signal- modulation index of an AM signal- frequency spectrum of an AM signal- - bandwidth of an AM signal - effects of over modulation- relation between total power and carrier power in AM-Solve simple problems- need for DSBSC and SSB modulation- advantages and disadvantages of SSB - Vestigial side band transmission- Advantages- angle modulation- types of angle modulation-Definition of Frequency modulation& Phase modulation - time domain equation for FM signal-bandwidth of FM signal modulation index of an FM signal- narrow band and wide band FM-- noise triangle in FM- pre-emphasis and de-emphasis- Merits of FM over AM- types of noise- signal to noise ratio, noise figure and noise temperature

2.0 DigitalCommunication Principles.

Distinguish analog, digital signals -Analog, digital communication systems- Information capacity of channel-Sampling theorem,-pulse modulation techniques-PAM-PWM-PPM-Quantization-Coding and decoding of PCM

3.0 Digital Modulation Techniques

Data encoding- Analog, digital encoding schemes- Asynchronous data communication – Overhead, efficiency- synchronous data communication – Error detection – Parity check – Check sum- CRC – Error correction – Digital modulation – bit rate, baud rate - Define ASK,FSK -–Binary ASK- BFSK- BPSK- QAM, Compare ASK, FSK, PSK, QAM

4.0 Transmitters and Receivers.

Specifications of transmitters- Distinguish between low level and high level modulation -block diagram for high level modulated transmitter - block diagram for low level modulated Transmitter - block diagram of FM transmitter(reactance tube) - block diagram of indirect FM transmitter (Armstrong method)-classify radio receivers- sensitivity, selectivity and fidelity- block diagram of TRF receiver - limitations of TRF Receiver-super heterodyne receiver – Define the terms image frequency, IMRR- choice of IF- AVC –Envelop detector –FM receiver- Foster-Seeley discriminator.

5.0 Multiplexing techniques.

Multiplexing techniques- need for Multiplexing –FDM- TDM- comparison of FDM and TDM- modem – need of modem – types of modem -DSL- ADSL

REFERENCE BOOKS:

1. Roy Blake, Thomson Delmar Electronic communications systems
2. George Kennedy- Bernard Davis Electronic Communication System Tata Mcgraw Hill Education Private Limited
3. S.Salivahanam, A.Vallavaraj&C.Gnanapriya, Signal Systems and Communication
4. Herbert Taub& Donald L Schilling, Principles Of Electronic Communication Systems, 3rd Edition-2009.McGraw Hill Education (India) Private Limited
5. G.K.Mithal, Radio communication - khanna publishers
6. Wayne Thomassi, Electronic communication systems 4th edition Pearson publication
7. T.L.Singhal, Analog & Digital communication, McGraw Hill Education

BLUE PRINT:

Sl No	Unit Title	No of Periods	Weightage Allotted	Marks Wise distribution of weightage				Question Wise distribution of weightage				COs mapped
				R	U	Ap	An	R	U	Ap	An	
1	Analog Modulation Techniques	17	20	6	11	3		2	2	1		**CO1**
2	Digital communication principles	8	14	3	11			1	2			**CO2**
3	Digital modulation techniques	12	16	3	3	10		1	1	1		**CO3**
4	Transmitters and Receivers	16	19	3	16			1	2			**CO4**
5	Multiplexing Techniques	7	11	3	8			1	1			**CO5**
		60	80	18	49	13		6	8	2		

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 3.5
Unit Test-II	From 3.6 to 5.9

(Model Paper) **C –20, EC-304**

State Board of Technical Education and Training, A. P

Diploma in Electronics and Communication Engineering (DECE)

III Semester

Subject Name: Analog and Digital Communication Systems

Sub Code: EC-304

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. Write the abbreviations of following terms

   a) DSB-SC (CO1)

   b) VSB (CO1)

   c) SSB (CO1)

   d) PCM (CO2)

2. State the need for modulation in communication systems (CO1)
3. List any three merits of FM over AM (CO1)
4. Classify different types of noise (CO2)
5. Define information capacity of a channel. (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 the basic elements of a communication system with a block diagram (CO1)

   (or)

   (b) Derive the time-domain equation for an AM signal and Define the modulation index of an AM signal. (CO1)

7. (a) i) Explain PAM and Compare PAM, PWM and PPM (CO2)

   (or)

   (b) Describe the coding and decoding of a PCM signal (CO2)

8. (a) Draw the block diagram for high level modulated transmitter and explain its working (CO1)

   (or)

   (b)Explain CRC method of error detection with an example. (CO3)

-o0o-

(Model Paper) **C –20, EC-304**

State Board of Technical Education and Training, A. P

Diploma in Electronics and Communication Engineering (DECE)

III Semester

Subject Name: **Analog and Digital Communication Systems**

Sub Code: **EC - 304**

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. Write the abbreviations of following terms
   a) ASK (CO3)
   b) BFSK (CO3)
   c) IMRR (CO4)
   d) MODEM (CO5)
2. Define Overhead and Efficiency of data communication system (CO3)
3. Compare the basic principle of ASK,FSK and PSK (CO3)
4. List the specifications of transmitters (CO4)
5. State the need for a MODEM in data communications (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)Explain Binary ASK modulator with block diagram (CO3)

   (or)

   (b)Explain BPSK modulator with block diagram (CO3)

7. (a)Draw the block diagram for low level modulated transmitter and explain its working (CO4)

   (or)

   (b)Explain the process of demodulation with Foster-Seeley discriminator in FM receivers (CO4)

8. (a) Explain the concept of Frequency Division Multiplexing with a block diagram (CO5)

   (or)

   (b)Explain the concept of Time Division Multiplexing with a block diagram (CO5)

-o0o-

BOARD DIPLOMA EXAMINATIONS

C-20, EC-304, ANALOG AND DIGITAL COMMUNICATION SYATEMS

III SEMESTER

MODEL PAPER - SEMESTER 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. State the need for modulation in communication systems (CO1)
2. List any three merits of FM over AM (CO1)
3. Classify different types of noise (CO1)
4. Determine the carrier power of AM transmitter radiating a power of 400kW, when modulated to a depth of 75% (CO1)
5. Distinguish between analog and digital signals (CO2)
6. State the need for sampling while converting analog signal to into digital signal (CO2)
7. Define Overhead and Efficiency of data communication system (CO3)
8. Compare the basic principle of ASK,FSK and PSK (CO3)
9. List the specifications of transmitters (CO4)
10. State the need for a MODEM in data communications (CO5)

Part-B **5×8=40**

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.

11. (a) Explain the basic elements of a communication system with a block diagram (CO1)

or

(b) Derive the time-domain equation for an AM signal and Define the modulation index of an AM signal. (CO1)

12. (a) i) Explain PAM and its waveform (CO2)
ii) Compare PAM, PWM and PPM

or

(b) Describe the coding and decoding of a PCM signal (CO2)

13. (a)Draw the block diagram for high level modulated transmitter and explain its working (CO4)

or

(b)Draw the block diagram of superhetrodyne AM receiver and explain (CO4)

14. (a)Draw the block diagram for low level modulated transmitter and explain its working (CO4)

or

(b)Explain the process of demodulation with Foster-Seeley discriminator in FM receivers (CO4)

15. (a) Explain the concept of Frequency Division Multiplexing with a block diagram(CO5)

or

(b)Explain the concept of Time Division Multiplexing with a block diagram (CO5)

Part-C **1×10=10**

Instructions: (1) Answer the question given below. It carries 10 marks
(2) Answer should be comprehensive and the criterion for valuation is the content but not the length of the answer.

16 Using Hamming code, analyse the process of detecting error, if the received data sequence is 101011101101, while sending a data sequence of 101001101101(CO3)

-o0o-

NETWORK ANALYSIS

Course Code	Course title	No of periods/week	Total no of periods	Marks for FA	Marks for SA
EC- 305	Network Analysis	5	75	20	80

S No	Unit Title	No. of Periods	COs Mapped
1	Mesh current and Node voltage analysis	18	CO1
2	Network Theorems	20	CO2
3	Resonance	12	CO3
4	Transient analysis, Laplace transforms and its applications	18	CO4
5	Filters and Attenuators	7	CO5
	TOTAL	75	

Course Objectives	1. To learn network analysis techniques, theorems, transients, filters and attenuators.
	2. To analyze networks using mesh, node analysis, transient analyses, filters, attenuators etc.
	3. To learn the practical importance Network analysis.

CO No		COURSE OUTCOMES
CO1	**EC-305.1**	Apply mesh and node analysis in solving circuits.
CO2	**EC-305.2**	Verify different network theorems.
CO3	**EC-305.3**	Construct resonance circuits and determine different parameters.
CO4	**EC-305.4**	Describe transient analysis, Laplace transforms and applications.
CO5	**EC-305.5**	Explain different filters and attenuators.

CO-PO/PSO MATRIX

CO No	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
EC-305.1	3	3	1	2				3	1	1
EC-305.2	3	3	1	2				3	1	1
EC-305.3	3	3	1	2				3	1	1
EC-305.4	3	3	1	2				3	1	1
EC-305.5	3	3	3	2				3	1	1
Average	3	3	1.4	2				3	1	1

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

LEARNING OUTCOMES:

1.0 Mesh current and Node voltage analysis

1.1 Define the terms: branch, node, junction and loop in circuits
1.2 Determine the number of mesh equations required to solve the given Network
1.3 Write the mesh current equations for a given network and arrange them in matrix form
1.4 Solve the mesh currents using Cramer's rule.
1.5 Determine the number of node voltage equations for a given network
1.6 Write the node voltage equations for a given network and arrange them in matrix form.
1.7 Solve the node voltages using Cramer's rule
1.8 Explain duality of a network
1.9 Draw the dual of given network.

2.0 Network theorems

2.1 State Thevenin's, and Norton's theorems and mention their use
2.2 Apply the above theorems to solve networks
2.3 State superposition theorem
2.4 Solve simple problems using superposition theorem
2.5 State Maximum power transfer theorem for DC & AC circuits.
2.6 Solve simple problems using maximum power transfer theorem
2.7 State the importance of impedance matching.
2.8 State Reciprocity theorem
2.9 State the importance of Reciprocity theorem.
2.10 List the advantages and limitations of above theorems
2.11 Explain star and Delta configurations of resistances
2.12 Give transformation formulas from Star to Delta & Delta to Star (no derivation)
2.13 Solve simple problems on Star/Delta and Delta/Star transformation

3.0 Resonance

3.1 Explain the concept of resonance in RLC series circuit

3.2 i) State the conditions for series resonance
ii) Derive the formula for frequency of resonance in series RLC circuit
iii) Draw the characteristic curves for series resonance
iv) Define bandwidth of a resonant circuit
v) Define lower cut off and upper cut off frequencies
vi) Give formula for lower cut off and upper cut off frequencies
vii) Solve simple problems on series Resonance.

3.3 Explain Parallel AC circuit containing RLC

3.4 List the 3 methods
a) Vector or phasor method
b) Admittance method
c) Vector algebra method for solving AC parallel circuits.

3.5 Solve problems using above 3 methods

3.6 Explain Resonance in parallel circuits

3.7 State the conditions required for parallel resonance

3.8 Derive Equation for resonant frequency in parallel resonant circuit

3.9 Give graphical representation of parallel resonance.

3.10 Compare Series and parallel resonance

3.11 Solve problems on Resonance

3.12 Explain the effect of resistance on Bandwidth.

4.0 Transient analysis, Laplace transform and its applications in circuit analysis

4.1 Define the terms: i) initial conditions; ii) steady state; and iii) transient state

4.2 i) Explain the dc response of RL circuit.
ii) Derive expression for current in RL circuit.

4.3 i) Explain the dc response of RC circuit.
ii) Derive expression for current in an RC circuit.

4.4 Explain the dc response of an RLC circuit.

4.5 Solve simple problems on series RL,RC circuits for DC excitation.

4.6 Define Laplace Transform and know the concept of complex frequency

4.7 State the properties of Laplace Transform – Linear property, First shifting property, Change of Scale property

4.8 Write Laplace transforms of following functions: i) Unit step function ii) exponential function iii) sine and cosine functions iv) hyperbolic sine and cosine functions v) damped sine function vi) damped hyperbolic cosine and sine functions

4.9 Explain second shifting property with examples

4.10 Explain initial value theorem and final value theorem

4.11 State inverse Laplace transform

4.12 Write inverse Laplace transforms corresponding to Laplace transform of the following functions
i) Unit step function ii) exponential function iii) sine and cosine functions iv) hyperbolic sine and cosine functions v) damped sine function vi) damped hyperbolic cosine and sine functions

4.13 Explain Partial fraction expansion

4.14 Explain Heaviside's expansion theorem

4.15 Solve simple network problems using the above concepts.

5.0 Filters and attenuators

5.1 Define the terms: neper, decibel, characteristic impedance, propagation constant and Attenuation

5.2 Define the terms: filter, LPF, HPF, BPF and BSF

5.3 Draw the characteristic curves for the above filters

5.4 Give the expression for f_c for constant K-LPF,HPF

5.5 List the disadvantages of constant K filters.

5.6 State the function of attenuator circuit and list different types of attenuators.

5.7 Explain T & π type attenuators with circuit diagram

COURSE CONTENT

1.0 Mesh current and Node voltage analysis

Define: branch, node, junction, loop - Mesh current equations – Solve problems - Node voltage equations -simple problems - duality

2.0. Network theorems

The venin's, and Norton's theorems – solve problems - superposition theorem- Maximum power transfer theorems- solve problems – impedance matching - Reciprocity theorem - advantages and limitations of above theorems - star and Delta transformation - delta to star transformation-simple problems

3.0. Resonance

Concept of resonance in RLC series circuit -Conditions for series resonance- frequency of resonance in series RLC circuit- Characteristic curves for series resononance- bandwidth of a resonant circuit- Lower cut off and upper cut off frequencies- Formula for lower cut off and upper cut off frequencies- Simple problems on series Resonance- Parallel AC circuit containing RLC- methods a) Vector or pharos method b) Admittance method c) Vector algebra method for solving AC parallel circuits-Simple problems using above 3 methods- Resonance in parallel circuits- Conditions required for parallel resonance- Equation for resonant frequency- Graphical representation of parallel resonance- Series and parallel resonance comparison-Problems on resonance- Effect of Resistance on Bandwidth

4.0 Transient analysis, Laplace transform and its applications in circuit analysis

Definition of initial condition,steady state,transient state-DC response for RL, RC,RLC circuits-Solve the simple problems on series RL,RC circuits of DC excitation- Laplace Transform - properties of Laplace Transform – Laplace transform of standard functions-Second shifting property- initial value theorem and final value theorem-inverse Laplace transform-and write inverse Laplace transforms of standard functions-Partial fraction expansion-Heaviside's expansion theorem- simple network problems using the above concepts.

5.0 Filters and attenuators

Define neper, decibel, characteristic impedance, propagation constant, Attenuation-Define filter, LPF, HPF, BPF, BSF- characteristic curves of filters - constant K-LPF, HPF-disadvantages –Function of attenuator - T& π attenuators

REFERENCE BOOKS

1. Hayt&Kemerly, Engineering Circuit analysis, 8th edition, McGraw Hill Publishers
2. Van Valkenberg, Network analysis, PHI
3. Sudhakar&Shyam Mohan, Circuits and Networks,TMH
4. Joseph Adminster, Network Theory- Schaum Series, McGraw Hill Publishers
5. D Roy Choudhury, Networks and Systems, Wiely Eastern Limited
6. Dr.Shyalashree.N,Dr. Mamatha A.S,Dr.Abhaydeshpande,Dr.V.Sridhar,Nerwork theory: a simplified approach, 3rd Edition, MEDTECH
7. A.Chakrabarti,Circuit Theory(Analysis & syntheses),Dhampat rai & co

BLUE PRINT:

Sl No	Unit Title	No of Periods	Weightage Allotted	Marks Wise distribution of weightage				Question Wise distribution of weightage				COs mapped
				R	U	Ap	An	R	U	Ap	An	
1	Mesh current and Node voltage analysis	18	17	3	3	3	8	1	1	1	1	**CO1**
2	Network Theorems	20	21	3	8		10	1	1		1	**CO2**
3	Resonance	12	14	3	3	8		1	1	1		**CO3**
4	Transient analysis, Laplace transforms and its applications	18	17	9	8			3	1			**CO4**
5	Filters and Attenuators	7	11	3		8		1	1			**CO5**
		75	80	21	22	19	18	7	5	2	2	

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 2.13
Unit Test-II	From 3.1 to 5.7

(Model Paper) **C –20, EC -305**

State Board of Technical Education and Training, A. P

Diploma in Electronics and Communication Engineering (DECE)

III Semester

Subject Name: Network Analysis

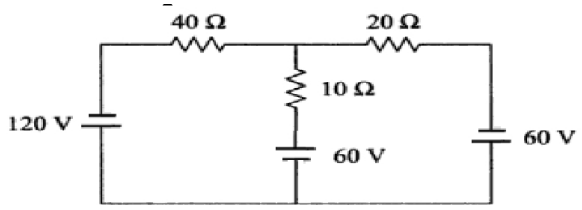
Sub Code: EC - 305

Time : 90 minutes **Unit Test I** **Max.Marks:40**

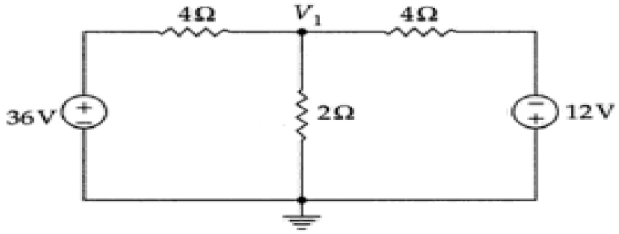
Part-A **16Marks**

Instructions: (1) Answer **all** questions.
(2) First question carries **four** marks, each question of remaining carries **three** marks

1. Fill the following blanks with one word
   a) The connecting path between two nodes is called as _____ (CO1)
   b) _____is the point where two or more elements (RLC) connected together. (CO1)
   c) The internal resistance of ideal voltage source _____ (CO2)
   d) The internal resistance of ideal current source _____ (CO2)
2. Write the mesh current equations for the network shown below (CO1)



3. Find the V_1 node voltage by applying KCL (CO1)

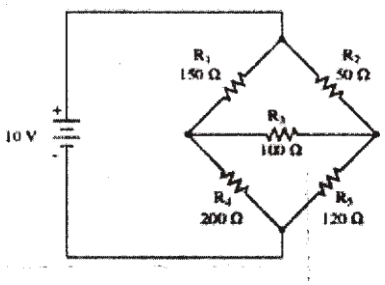


4. State Reciprocity theorem (CO2)
5. Give transformation formulas from Star to Delta (CO2)

Part-B **3×8=24**

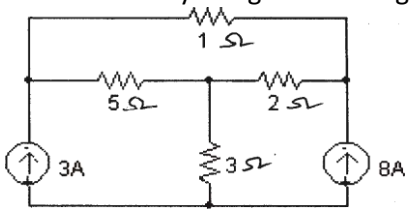
Instructions: (1) Answer **all** questions.
(2) Each question carries **eight** marks
(3) Answer should be comprehensive and the criterion for valuation is the content but not the length of the answer.

6. (a) Solve for mesh currents using Cramer's rule for the given network below (CO1)

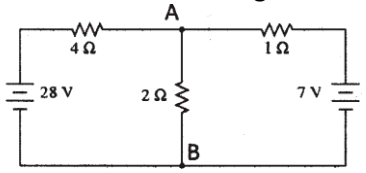


or

(b) Find the voltage across 2 ohm resistor by using node voltage analysis (CO1)

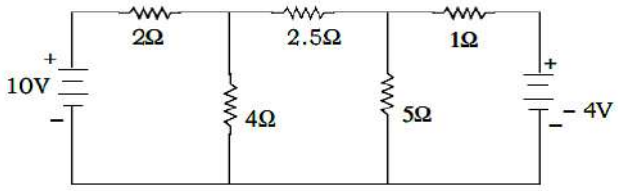


7. (a) Draw the Thevenin's equivalent network for the given network between A and B. (CO2)



or

(b) Find the current through 4 ohm resistor by using superposition theorem (CO2)



8. (a) Explain star and Delta configurations of resistances (CO3)

or

(b) Explain the duality of a network (CO1)

-0o0-

(Model Paper) C –20, EC -305

State Board of Technical Education and Training, A. P

Diploma in Electronics and Communication Engineering (DECE)

III Semester

Subject Name:Network Analysis

Sub Code: EC - 305

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. Fill the following blanks with one word

   a) At resonance the admittance of the parallel RLC circuit is at its maximum and is equal to the conductance of the circuit**(State True/False)** (CO3)

   b) Laplace transform is useful for studying behaviour of a digital system **(State True/False)** (CO4)

   c) Constant K filter signal attenuation rate after the cut off point is not very sharp **(State True/False)** (CO5)

   d) Parallel resonance occurs when the arrangement of components creates the largest impedance.**(State True/False)** (CO3)

2. State the conditions for series resonance (CO3)
3. Define the terms: i) initial conditions; ii) steady state; and iii) transient state (CO4)
4. State the first shifting property of Laplace transform. (CO4)
5. Define the terms: neper and decibel (CO5)

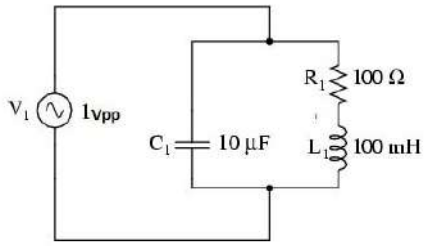
Part-B **3×8=24**

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) A series RLC circuit has a sinusoidal input voltage of 12 Vpeak to peak. If inductance, L= 20 mH, resistance, R = 80 Ω, and capacitance, C = 400 nF, findthe (i) resonant frequency(ii) Inductive reactance and capacitive reactance at resonant frequency (iii) total current through the circuit at resonant frequency (CO3)

(or)

(b) Given the following parallel resonant circuit find the (i) resonant frequency (ii) Inductive reactance and capacitive reactance at resonant frequency (iii) branch currents at resonant frequency (CO3)



7. (a)Explain second shifting property with one example (CO4)

(or)

(b) Explain initial value theorem and final value theorem (CO4)

8. (a)Explain T & π type attenuators with circuit diagram (CO5)

(or)

(b)Design a simple constant K Low Pass π filter with a cut-off frequency of 1KHz (CO5)

***

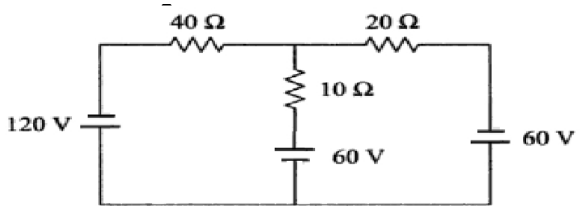
BOARD DIPLOMA EXAMINATIONS
C-20, EC-305, NETWORK ANALYSIS
III SEMESTER
MODEL PAPER - SEMESTER END EXAMINATION

TIME:3 HOURS **MAX MARKS:80**

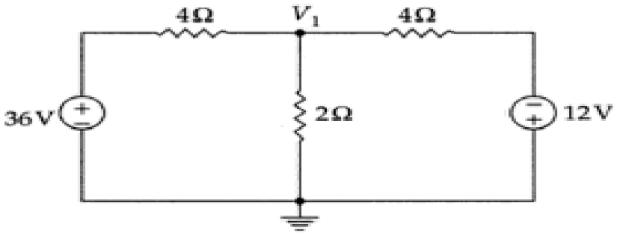
Part-A **10×3=30**

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 terms: branch, node, and loop in circuits (CO1)
2. Write the mesh current equations for the network shown below (CO1)



3. Find node voltage by applying KCL (CO1)

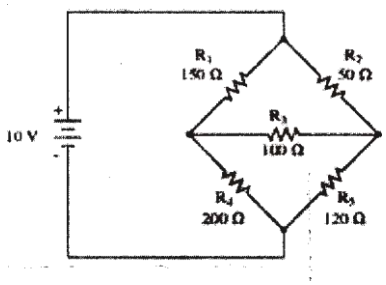


4. State superposition theorem (CO2)
5. State the conditions for series resonance (CO3)
6. Compare Series and parallel resonance (CO3)
7. Define the terms: i) initial conditions; ii) steady state; and iii) transient state (CO4)
8. Write Laplace transforms for unit-step function and exponential function. (CO4)
9. State the first shifting property of Laplace transform. (CO4)
10. Define the terms: neper and decibel (CO5)

Part-B **5×8=40**

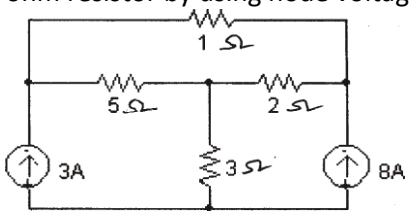
Instructions: (1) Answer **all** questions.
(2) Each question carries **eight** marks
(3) Answer should be comprehensive and the criterion for valuation is the content but not the length of the answer.

11. (a) Solve for mesh currents using Cramer's rule for the given network below (CO1)

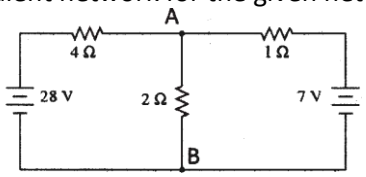


or

(b) Find the voltage across 2 ohm resistor by using node voltage analysis (CO1)

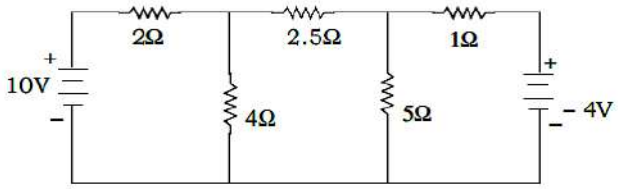


12. (a) Draw the Thevenin's equivalent network for the given network between A and B.(CO2)



or

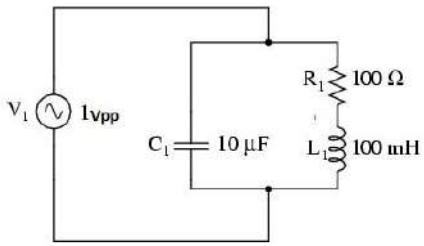
(b) Find the current through 4 ohm resistor by using superposition theorem : (CO2)



13. (a)A series RLC circuit has a sinusoidal input voltage of 12 Vpeak to peak. If inductance, L = 20 mH, resistance, R = 80 Ω, and capacitance, C = 400 nF, findthe (i) resonant frequency(ii) Inductive reactance and capacitive reactance at resonant frequency (iii) total current through the circuit at resonant frequency (CO3)

or

(b) Given the following parallel resonant circuit find the (i) resonant frequency (ii) Inductive reactance and capacitive reactance at resonant frequency (iii) branch currents at resonant frequency (CO3)



14. (a)Explain second shifting property with one example (CO4)

or

(b) Explain initial value theorem and final value theorem (CO4)

15. (a)Explain T & π type attenuators with circuit diagram (CO5)

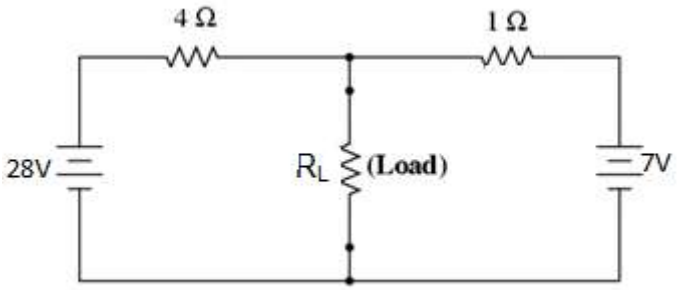
or

(b)Design a simple constant K Low Pass π filter with a cut-off frequency of 1KHz (CO5)

Part-C **1×10=10**

Instructions: (1) Answer the question given below. It carries 10 marks
(2) Answer should be comprehensive and the criterion for valuation is the content but not the length of the answer.

16. Analyse the circuit to determine the maximum power across the R_L. What happens if the two resistors are replaced by capacitors? (CO2)



-o0o-

Electronic Measurements & Consumer gadgets

Course Code	Course title	No of periods/week	Total no of periods	Marks for FA	Marks for SA
EC-306	Electronic Measurements & Consumer gadgets	4	60	20	80

S No	Unit Title	No. of Periods	COs Mapped
1	Analog and Digital measuring Instruments	10	CO1
2	Cathode Ray Oscilloscope	10	CO2
3	Test Instruments	10	CO3
4	Audio Systems	15	CO4
5	Digital Television Fundamentals	15	CO5
	TOTAL	60	

Course Objectives	1. To familiarize with measuring and test instruments, CRO, Audio, Video systems.
	2. To analyze the working of measuring and test instruments, CRO, Audio, Video systems
	3. To learn the practical importance Electronic measurements and consumer gadgets.

CO No		COURSE OUTCOMES
CO1	**EC-306.1**	Explain the working principle and construction of analog and digital measuring instruments.
CO2	**EC-306.2**	Analyse the converstion of single trace CRO into Dual Trace CRO
CO3	**EC-306.3**	Explain the working principle and construction of test instrument
CO4	**EC-306.4**	Describe different Audio systems.
CO5	**EC-306.5**	Describe different video systems.

CO-PO/PSO MATRIX

CO No	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
EC-306.1	3		1		1			3		
EC-306.2	3		1	3	3		1	3	1	2
EC-306.3	3	1	1	3	3		1	3	1	2
EC-306.4	3	1	1	2	3		2	3	1	3
EC-306.5	3	1	1	2	3		2	3	1	3
Average	3	1	1	2.5	2.6		1.5	3	1	2.5

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

LEARNING OUTCOMES:

1.0Analog and Digital measuring instruments

1.1 List the characteristics of ideal Voltmeter and ideal Ammeter.
1.2 Explain the construction and principle of operation of PMMC instrument.
1.3 Explain the principle and working of rectifier type voltmeter
1.4 Explain the principle and working of rectifier type ammeter
1.5 Explain the construction and principle of series and shunt type ohmmeters.
1.6 Explain the working of FET input voltmeter with a circuit diagram
1.7 List any four advantages of digital instruments over Analog instruments.
1.8 Explain the working of Ramp type digital voltmeter with block diagram.
1.9 Explain the working of digital frequency meter with block diagram.
1.10 Define Accuracy and Resolution of a meter.

2.0 Cathode Ray Oscilloscope

2.1 Explain the working of CRT with suitable diagram
2.2 Draw block diagram of general purpose CRO and describe the function of each block.
2.3 Explain the necessity of time base and deflection amplifiers.
2.4 Define deflection sensitivity of CRO
2.5 List the conditions for stationary waveforms.
2.6 Mention the conditions for flicker free waveforms.
2.7 Explain the function of various controls on front panel of CRO
2.8 Explain the method of conversion of single trace CRO into dual trace CRO with block diagram
2.9 Explain how to measure frequency and phase of a signal using Lissajous figures
2.10 Give the basic principle of sampling CRO
2.11 Explain the principle of working of digital storage oscilloscope using block diagram
2.12 List different types of probes and connectors used in oscilloscopes.

3.0 Test instruments

3.1 Explain the working of AF oscillator (sine & square) with block diagram.
3.2 List the front panel controls and specifications of AF Oscillator.
3.3 Explain the working of function generator with block diagram.
3.4 Explain the working of RF signal generator.

3.5 List the specifications of RF signal generator.
3.6 List any three important applications of RF signal generators
3.7 Explain the importance of shielding in RF generators.
3.8 Explain the working of digital IC tester with block diagram.
3.9 Explain the working of logic analyser with block diagram.
3.10 Explain the basic working principle of spectrum analyser and mention its use.
3.11 State the working principle of logic probe.

4.0 Audio systems

4.1 Explain the working of carbon, condenser, Crystal, ribbon and dynamic microphones along with their polar characteristics.
4.2 Explain the constructional features and principle of operation of PMMC Loudspeaker and its ratings.
4.3 Mention the use of woofers and tweeters.
4.4 State the need for Horn loud speaker
4.5 Explain the construction & working of Horn loud speaker with suitable diagram
4.6 Explain the principle, construction and working of magnetic and crystal headphones and their uses.
4.7 List the specifications of Loudspeaker and Microphones
4.8 Define the terms: speech, music and noise.
4.9 State the purpose of equalizer in audio system
4.10 Define the terms: Hi-Fi and Stereo related to audio system
4.11 State the principle of optical recording.
4.12 Define the MP3 & MP4 formats
4.13 Explain the concept of noise reduction using DOLBY system and list its features
4.14 State the features of home theatre sound system

5.0 Digital Television Fundamentals

5.1 Explain formation of picture
5.2 Explain the main characteristic of human eye with regard to perception of colours
5.3 Explain additive and subtractive mixing of colours
5.4 Explain the working principle of digital camera with functional block diagram
5.5 Explain the construction, working principle and characteristics of LCD
5.6 Explain the working principle of LCD monitor with suitable diagram
5.7 Explain the working of digital LCD Television receiver with a functional block diagram
5.8 Draw the block diagram of a Digital TV transmission and reception system and explain.
5.9 Explain the concept of HDTV and List its features.
5.10 Explain the features of SMART TV
5.11 Explain the concept of IP TV
5.12 State the need for satellite for TV broadcasting over wide area.
5.13 Explain DTH system with a block diagram
5.14 Explain the working of Set-top box with a block diagram
5.15 Explain resistive & capacitive touch screen technology

COURSE CONTENT

Analog and Digital measuring instruments

characteristics of ideal Voltmeter and ideal Ammeter-principle of operation of PMMC instrument-rectifier type voltmeter and ammeter -series and shunt type ohmmeters-FET input voltmeter-Advantages of digital instruments-Ramp type digital voltmeter-digital frequency meter-Accuracy and Resolution of a meter.

Cathode Ray Oscilloscope

CRT-block diagram of general purpose CRO -time base and deflection amplifiers-deflection sensitivity of CRO-conditions for stationary waveforms and flicker free waveforms-front panel of CRO-Dual trace oscilloscope-Lissajous figures-sampling CRO-Digital storage oscilloscope - probes and connectors used in oscilloscopes.

Test instruments

AF Oscillator (sine & square)- function generator -RF signal generator- Working-specifications-applications- Shielding- digital IC tester -logic analyser- spectrum analyser- logic probe.

Audio systems.

carbon, condenser, Crystal, ribbon and dynamic microphones- PMMC Loudspeaker- woofers and tweeters- Horn loud speaker-magnetic and crystal headphones –Specifications of loud speakers, microphones- speech, music and noise- equalizer in audio system- Hi-Fi and Stereo- Principle of optical recording- MP3 & MP4 formats- DOLBY system-home theatre sound system.

Digital Television Fundamentals

formation of picture- main characteristic of human eye- additive and subtractive mixing of colours-working of digital camera- working principle LCD- working principle of LCD monitor- digital LCD Television receiver - Digital TV transmission and reception- HDTV- SMART TV-IP TV- Need for Satellite TV broadcasting over wide area- DTH system- Set-top box- Resistive, capacitive touch screen technology

REFERENCE BOOKS:

1. Albert D. Helfrick William David Cooper, Modern Electronic Instrumentation and Measurement techniques, PHI Publications
2. A.K. Sawhney , PuneetSawhney, Electrical and Electronics Measurements and Instrumentation, DhanpatRai& Company, 2010
3. HS Kalsi, Electronic Instrumentation, Tata McGraw Hill
4. Roy Blake, Thomson Delmar, Electronic communication systems
5. R.R.Gulati, Colour Television,TMH publishers
6. Robert L. Goodman, How Electronic Things Work.& What to Do When They Don’t, TMH publishers
7. SP Bali Consumer electronics, Pearson
8. Mark E. Long, Digital Satellite Television Handbook,
9. Gerald W Collins, Fundamentals of Digital television Transmission, John Wiley & Sons

BLUE PRINT:

Sl No	Unit Title	No of Periods	Weightage Allotted	Marks Wise distribution of weightage				Question Wise distribution of weightage				COs mapped
				R	U	Ap	An	R	U	Ap	An	
1	Analog and Digital measuring Instruments	10	14	6	8			2	1			**CO1**
2	Cathode Ray Oscilloscope	10	16	6			10	2			1	**CO2**
3	Test Instruments	10	14	3	11			1	2			**CO3**
4	Audio Systems	15	17	6	3	8		2	1	1		**CO4**
5	Television Fundamentals	15	19	3	8	8		1	1	1		**CO5**
		60	80	24	40	16		8	6	2		

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 3.11
Unit Test-II	From 4.1 to 5.15

(Model Paper) **C –20, EC -306**

State Board of Technical Education and Training, A. P

Diploma in Electronics and Communication Engineering (DECE)

III Semester

Subject Name: Electronic Measurements & Consumer gadgets

Sub Code: EC - 306

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. Answer the following questions in one word
   a) Name any one of front panel controls of CRO (CO1)
   b) Name the probes that are used for CRO (CO2)
   c) Name any one condition for stationary waveforms (CO1)
   d) Mention one condition for obtaining flicker free wave form (CO2)
2. List any four advantages of digital instruments over Analogue instruments (CO1)
3. Define Accuracy and Resolution of a meter (CO1)
4. Define deflection sensitivity of CRO (CO2)
5. List different types of probes and connectors used in oscilloscopes (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 the construction and principle of operation of PMMC instrument (CO1)
   (or)
   (b) Explain the working of Ramp type digital voltmeter with block diagram. (CO1)

7. (a) Explain the constructional features and principle of operation of PMMC Loudspeaker and its ratings. (CO2)
   (or)
   (b)Explain the principle, construction and working of magnetic and crystal headphones and their uses (CO2)
8. (a) Explain the working of function generator with block diagram (CO3)
   (or)
   (b) Explain the working of digital IC tester with block diagram (CO3)

-0o0-

(Model Paper) **C –20, EC -306**

State Board of Technical Education and Training, A. P

Diploma in Electronics and Communication Engineering (DECE)

III Semester

SubjectName:**Electronic Measurements & Consumer gadgets**

Sub Code: **EC - 306**

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. Answer the following questions in one word
   a) A tweeter is the type of speaker driver that produces the highest range frequency. **(State True/False)** (CO4)
   b) Write full form of Hi-Fi (CO4)
   c) MP4 files can only be used for audio, whereas MP3 files can store audio, video, still images, subtitles, and text.**(State True/False)** (CO4)
   d) Write full form of DTH (CO5)
2. State the need for Horn loud speaker (CO4)
3. Define the terms: speech, music and noise (CO4)
4. List the features of home theatre sound system (CO4)
5. List the merits of DTH system (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) Explain the constructional features and principle of operation of PMMC Loudspeaker and its ratings. (CO4)

   (or)

   (b) Explain the principle, construction and working of magnetic and crystal headphones and their uses (CO4)

7. (a)Explain the working principle of digital camera with functional block diagram (CO5)

   (or)

   (b)Explain the working of digital LCD Television receiver with a functional block diagram (CO5)

8. (a)Draw the block diagram of a Digital TV transmission and reception system and explain (CO5)

   (or)

   (b)Explain the working of Set-top box with a block diagram (CO5)

.

-0o0-

MODEL PAPER
BOARD DIPLOMA EXAMINATIONS
C-20, EC-306, ELECTRINIC MEASUREMENTS & CONSUMER GADGETS
III SEMESTER
SEMESTER 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. List any four advantages of digital instruments over Analogue instruments (CO1)
2. Define Accuracy and Resolution of a meter (CO1)
3. Define deflection sensitivity of CRO (CO2)
4. List different types of probes and connectors used in oscilloscopes (CO2)
5. List the specifications of RF signal generator. (CO3)
6. State the working principle of logic probe (CO3)
7. State the need for Horn loud speaker (CO4)
8. Define the terms: speech, music and noise (CO4)
9. List the features of home theatre sound system (CO4)
10. List the merits of DTH system (CO5)

Part-B **5×8=40**

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.

11. (a) Explain the construction and principle of operation of PMMC instrument (CO1)
(or)
(b)Explain the working of Ramp type digital voltmeter with block diagram. (CO1)

12. (a) Explain the working of function generator with block diagram (CO3)
(or)
(b) Explain the working of digital IC tester with block diagram (CO3)

13. (a)Explain the constructional features and principle of operation of PMMC Loudspeaker and its ratings. (CO4)

(or)

(b)Explain the principle, construction and working of magnetic and crystal headphones and their uses (CO4)

14 (a) Explain the working principle of digital camera with functional block diagram(CO5)

(or)

(b) Explain the working of digital LCD Television receiver with a functional block diagram (CO5)

15 (a)Draw the block diagram of a Digital TV transmission and reception system and explain (CO5)

(or)

(b) Explain the working of Set-top box with a block diagram (CO5)

.

Part-C **1×10=10**

Instructions: (1) Answer the question given below. It carries 10 marks
(2) Answer should be comprehensive and the criterion for valuation is the content but not the length of the answer.

16. Analyse the formation of circle/ellipse, when unknown (fy) and known (fx) frequencies are same, also draw Lissajous figures for (i) fy=2fx, (ii) 2fy=3fx, (iii) 2fy=fx (CO2)

***

Electronic Circuits-I Lab

Course Code	Course title	No of periods/week	Total no of periods	Marks for FA	Marks for SA
EC-307	Electronic Circuits-I Lab	6	90	40	60

S No	Unit Title	No. of Periods	COs Mapped
1	Rectifiers and Power supplies	36	CO1
2	Amplifiers	12	CO2
3	Oscillators	24	CO3
4	Circuit simulation using Pspice or equivalent	18	CO4
	TOTAL	90	

Course Objectives	1. To construct and measure various parameters of rectifiers, amplifiers and Oscillators.
	2. To simulate rectifiers, amplifiers and Oscillator circuits using simulation software.
	3. To learn the practical importance of Electronic Circuits.

CO No		COURSE OUTCOMES
CO1	**EC-307.1**	Construct the rectifiers and obtain different parameters.
CO2	**EC-307.2**	Construct the Amplifiers and obtain different parameters.
CO3	**EC-307.3**	Construct Oscillators, obtain output waveform and calculate output frequency.
CO4	**EC-307.4**	Simulate rectifiers, amplifiers and Oscillators using P-spice or equivalent.

CO-PO/PSO MATRIX

CO No	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
EC-307.1	3	2	2	1	1	2		3	1	2
EC-307.2	3	2	2	1	1	2		3	1	2
EC-307.3	3	2	2	1	1	2		3	1	2
EC-307.4	3	2	2	3			2	3	3	3
Average	3	2	2	1.5	1	2	2	3	1.5	2.25

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

LEARNING OUTCOMES:

Rectifiers and Power supplies

1. Obtain output waveforms and measure DC o/p voltage, ripple voltage of a Half- wave rectifier with/ without filter at different loads and compare with that of theoretical values
2. Obtain output waveforms and measure DC o/p voltage, ripple voltage of a centre-tapped full-wave rectifier with/ without filter at different loads and compare with that of theoretical values
3. Obtain output waveforms and measure DC o/p voltage, ripple voltage of a Bridge rectifier with/ without filter at different loads and compare with that of theoretical values
4. Obtain the voltage regulation characteristics ofZener regulator
5. Obtain the voltage regulation characteristics of IC regulator(78XX,79XX,LM317)
6. Construct regulated power supply using 78XX/79XX

Amplifiers

1. Plot the frequency response characteristics of a transformer coupled CE Amplifier
2. Plot the frequency response characteristics of a RC coupled Amplifier.

Oscillators

1. Implement Colpitt's oscillator and verify the effect of varying the tank circuit component values and observe output waveforms on CRO.
2. Implement Hartley oscillator and verify the effect of varying the tank circuit component values and observe output waveforms on CRO.
3. Implement Crystal oscillator and observe output waveforms on CRO
4. Implement RC Phase shift oscillator and verify the effect of varying the RC component values and observe output waveforms on CRO

Circuit simulation using PSPICE or equivalent software

1. Simulate half wave and full wave rectifier circuits
2. Simulate Zener regulator circuit and assess the performance for various loads
3. Simulate of CE amplifier and observe the effect of disconnecting bypass capacitor

4.Simulate RC phase shift oscillator circuit and observe the effect of change in component values

5. Simulate Hartley oscillator circuit and observe the effect of change in component values

Digital Electronics lab

Course Code	Course title	No of periods/week	Total no of periods	Marks for FA	Marks for SA
EC-308	Digital Electronics lab	3	45	40	60

S No	Unit Title	No. of Periods	COs Mapped
1	Logic Gates	6	CO1
2	Combinational logic circuits	15	CO2
3	Sequential Logic Circuits	15	CO3
4	Practice Using PspiceOrcad Tool Software	09	CO4
	TOTAL	45	

Course Objectives	1. To construct different combinational, sequential logic circuits and obtain truth tables..
	2. To simulate combinational and sequential logic circuits using simulation software
	3. To learn the practical importance of Digital Electronic Circuits.

CO No		COURSE OUTCOMES
CO1	**EC-308.1**	Test the truth tables of logic gates.
CO2	**EC-308.2**	Construct combinational logic circuits and verify truth tables.
CO3	**EC-308.3**	Construct Sequential logic circuits and verify truth tables.
CO4	**EC-308.4**	Simulate combinational and sequential logic circuits using P-spice or equivalent.

CO-PO/PSO MATRIX

CO No	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
EC-308.1	3	1	2		2	2		3		2
EC-308.2	3	2	2		2	2		3	2	2
EC-308.3	3	2	2		2	2		3	2	2
EC-308.4	3	2	2	3			3	3	3	2
Average	3	1.75	2	3	2	2	3	3	2.3	2

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

LEARNING OUTCOMES:

Logic Gates

1. Verify the truth tables of AND, OR,NOT, NAND, NOR, XOR Gates
2. Realize AND, OR, NOT, XOR gates using 2 input NAND and NOR Gates

Combinational logic circuits

1. Implement Half adder and full adder circuits using TTL/CMOS gates, and verify the truth tables
2. Verify the function of 4-bit magnitude comparator 7485 IC
3. Verify the truth table of Multiplexer IC 74153
4. Verify the truth table of BCD to 7 segment Decoder 7448 IC
5. Verify the Truth table of 74148 Encoder & 74138 Decoder IC

Sequential Logic Circuits

1. Verify the truth tables RS, JK, T and D Flip-flops
2. Construct a ripple counter using JK-FFs and obtain its timing waveforms
3. Verify the function of 7490 as decade and modulus counter, obtain timing waveforms.
4. verify the function of up/down counter using 74190/ 74193, change the modulus of the counter and verify
5. Verify the function of shift register (ICs like 7495, 74194 etc.)

Practice Using PSPICE Software

1. Simulate AND, OR, NOT, EX-OR Gates Using Universal Gates (ICs 7400 and 7402).
2. Simulate Half Adder And Full Adder Circuits Using ICs 7408,7486, and 7432
3. Simulate 8 × 1 Multiplexer Using IC 74153

Analog and Digital Communication systems Lab

Course Code	Course title	No of periods/week	Total no of periods	Marks for FA	Marks for SA
EC-309	Analog and Digital Communication systems Lab	4	60	40	60

S No	Unit Title	No. of Periods	COs Mapped
1	Analog Communication	20	**CO1**
2	Digital Communication	24	**CO2**
3	Simulation of Analog Communication systems using PSPICE or equivalent software	8	**CO3**
4	Simulation of Digital Communication systems using PSPICE or equivalent software	8	**CO4**
	TOTAL	**60**	

Course Objectives	1. To familiarisation with analog and digital modulation and demodulation techniques.
	2. To simulate Analog and Digital modulation circuits using simulation software.
	3. To learn the practical importance of Analog and Digital modulation.

CO No		COURSE OUTCOMES
CO1	**EC-309.1**	Construct AM, FM, PAM, PWM, PPM modulation and demodulation circuits and observe waveforms.
CO2	**EC-309.2**	Construct PCM, ASK,FSK,PSK modulator and demodulation circuits and TDM, FDM circuits and observe waveforms.
CO3	**EC-309.3**	Simulate Analog modulation circuits using P-spice or equivalent.
CO4	**EC-309.4**	Simulate Digital modulation circuits using P-spice or equivalent.

CO-PO/PSO MATRIX

CO No	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
EC-309.1	3	3	2		2	3		3	1	2
EC-309.2	3	3	2		2	3		3	1	2
EC-309.3	3	3	2	3			3	3	3	2
EC-309.4	3	3	2	3			3	3	3	2
Average	3	3	2	3	2	3	3	3	2	2

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

ANALOG COMMUNICATION

1. Conduct an experiment to observe AM waveform and determine Modulation index using CRO.
2. Conduct an experiment to observe FM waveform.
3. Verify and observe Pulse amplitude modulation and demodulation waveforms on CRO
4. Verify and observe Pulse Width modulation and demodulation waveforms on CRO
5. Observe pulse position modulation and demodulation waveforms on CRO

DIGITAL COMMUNICATION

6. Set up a Pulse code modulator/ Demodulator circuit and observe the waveforms.
7. Set up an ASK modulator and demodulator and observe the waveforms.
8. Set up an FSK modulator and demodulator and observe the waveforms
9. Set up a PSK modulator and demodulator and observe the waveforms
10. Perform an experiment on Time Division Multiplexing/ De-multiplexing circuit and observe the waveforms.
11. Perform an experiment on Frequency Division Multiplexing/ De-multiplexing circuit and observe the waveforms.

Simulation using PSPICE or equivalent software

12. Connect a circuit to generate AM waveform and determine Modulation index
13. Connect a circuit to generate Pulse amplitude modulation and observe waveforms
14. Connect a circuit to generate Pulse Width modulation and observe waveforms
15. Set up an ASK modulator and demodulator and observe the waveforms.
16. Set up an FSK modulator and demodulator and observe the waveforms

Measurements and Network Analysis Lab

Course Code	Course title	No of periods/week	Total no of periods	Marks for FA	Marks for SA
EC-310	Measurements and Network Analysis Lab	4	60	40	60

S No	Unit Title	No. of Periods	COs Mapped
1	Measurements	8	CO1
2	Network Analysis	16	CO2
3	Cathode Ray Oscilloscope	16	CO3
4	Audio and Video Systems	20	CO4
	TOTAL	60	

Course Objectives	1. To measure various parameters of electrical and electronics using measuring and test instruments.
	2. To construct and verify the network theorems.
	3. To learn the practical importance of measuring and test instruments, CRO, Audio, Video systems.

CO No		COURSE OUTCOMES
CO1	**EC-310.1**	Measure the electrical and electronic parameters using test instruments
CO2	**EC-310.2**	Construct the circuits for different network theorems and verify.
CO3	**EC-310.3**	Use CRO for measurement of different parameters.
CO4	**EC-310.4**	Use different audio and video equipments.

CO-PO/PSO MATRIX

CO No	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
EC-310.1	3	3	1	2		2		3	2	
EC-310.2	3	2	1			2		3	2	
EC-310.3	3	1	2	2	3	2	2	3	2	1
EC-310.4	3	1	3	2	3	2	2	3	2	3
Average	3	1.75	1.75	2	3	2	2	3	2	2

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

LEARNING OUTCOMES:

Measurements

1. Measure L,C and R values using LCR meter
2. Test some digital ICs using IC tester
3. Measure frequency of a given signal using digital frequency meter

Resonance and Network theorems

4. Perform an experiment to verify series resonance.
5. Perform an experiment to verify parallel resonance.
6. Perform an experiment to verify Thevenin's theorem.
7. Perform an experiment to verify super position theorem.
8. Perform an experiment to verify maximum power transfer theorem.

Cathode ray Oscilloscope

9. Measure AC and DC voltages using CRO
10. Measure pulse parameters using CRO
11. Measure frequency of an unknown signal using Lissajous figures on CRO

Audio & Video Systems

12. Arrange PA system
13. Use different features of Smart TV
14. Record and reproduce voice digitally
15. Arrange LCD Projector
16. Setup and test 5.1 channel or 7.1 channel audio system

IV Semester

FOURTH SEMESTER

Subject Code	Name of the Subject	Instruction period / week		Total Period / Sem	Scheme of Examination			
		Theory	Practical /Tutorial		Duration (hours)	Sessional Marks	End Exam Marks	Total Marks
THEORY								
EC-401	Engineering Mathematics-III	3		45	3	20	80	100
EC - 402	Electronic Circuits-II	6	-	90	3	20	80	100
EC - 403	Microprocessors	6	-	90	3	20	80	100
EC-404	Microwave & Satellite Communication systems	5	-	75	3	20	80	100
EC-405	Programming in C & MATLAB	5	-	75	3	20	80	100
PRACTICAL								
EC - 406	Electronic Circuits-II Lab	-	4	60	3	40	60	100
EC - 407	Microprocessors lab	-	3	45	3	40	60	100
EC - 408	Communication Skills	-	3	45	3	40	60	100
EC – 409	C & MATLAB practice laboratory	-	3	45	3	40	60	100
EC-410	Advanced Communications Lab	-	4	60	3	40	60	100
	TOTAL	**30**	**12**	**630**	**-**	**300**	**700**	**1000**

ENGINEERING MATHEMATICS-III

Course Code	Course Title	No. of Periods/week	Total No. of periods	Marks for FA	Marks for SA
C-401	Engineering Mathematics-III	3	45	20	80

S.No.	Unit Title	No. of periods	COs mapped
1	Higher order Linear Differential equations with constant coefficients	15	CO1
2	Laplace Transforms	18	CO2
3	Fourier Series	12	CO3
	Total Periods	45	

Course Objectives	(i) To learn the principles of solving differential equations of second and higher order. (ii) To comprehend the concept of Laplace transformations and inverse Laplace transformations. (iii) To understand the concept of Fourier Series expansion of functions.

Course Outcomes	CO1	Solve homogeneous and non-homogeneous differential equations of second and higher order.
	CO2	Find Laplace and inverse Laplace transforms of various functions.
	CO3	Expand given functions as Fourier series and half- range Fourier Sine and Cosine series.

ENGINEERING MATHEMATICS – III

Learning Outcomes

Unit-I

Differential Equations of higher order

C.O. 1 Solve homogeneous and non-homogeneous differential equation of second and higher order.

L.O 1.1 Solve Differential equations of the type $(aD^2 + bD + c)\, y = 0$ where a, b, c are real numbers and provide examples.

1.2 Solve higher order homogeneous differential equations with constant coefficients and provide examples.

1.3 Define complementary function, particular Integral and general solution of a non-homogeneous differential equation.

1.4 Describe the methods of solving *f(D) y = X* where *f(D)* is a polynomial of n^{th} order and *X* is a function of the forms $k,\ e^{ax},\ \sin ax, \cos ax,\ x, x^n$ and their linear combinations where n is a positive integer, with examples.

Unit-II

Laplace Transforms

C.O. 2 Find Laplace and inverse Laplace transforms of various functions.

L.O. 2.1 Define Laplace Transform and explain the sufficient conditions of existence of Laplace Transform

2.2. Obtain Laplace transforms of standard functions and solve simple problems.

2.3 Write the properties of Laplace Transform – Linearity property, First shifting theorem (without proof) and Change of Scale property and solve simple problems.

2.4. Write the Laplace Transform of unit step function and second shifting theorem (without proof) and solve simple problems.

2.5. Write formulae for Laplace transform of functions with multiplication by t^n and division by t, Laplace transform of derivatives, evaluation of some definite integrals using Laplace Transforms and solve simple problems.

Syllabus for Unit test-I completed

2.6 Define inverse Laplace Transform, obtain inverse Laplace Transforms of standard functions and solve simple problems.

2.7 Write linearity property, first and second shifting theorems (without proof), change of scale property of inverse Laplace transform and solve simple problems.

2.8 Write inverse Laplace transforms of derivatives and integrals and solve simple problems.

2.9 Write inverse Laplace transforms of functions with multiplication by s and division by s and solve simple problems.

2.10 Write inverse Laplace transforms of functions using partial fractions and solve some simple problems.

2.10 Define convolution of two functions, state convolution theorem (without proof) and solve simple problems.

Unit-III

Fourier series

C.O. 3 Expand given functions as Fourier series and half- range Fourier Sine and Cosine series

L.O. 3.1 Define the orthogonality of functions in an interval.

3.2 Define Fourier series of a function in the intervals $(c,\ c+2\pi)$ and $(c,\ c+2l)$ and write the Euler's formulae for determining the Fourier coefficients.

3.3 Write sufficient conditions for the existence of Fourier series expansion of a function.

3.4 Find Fourier series of simple functions in the range (0 , 2π) and (-π , π)

3.5 Write Fourier series for even and odd functions in the interval $(-\pi,\ \pi)$ and $(-l, l)$ expand simple functions.

3.6 Write Fourier series expansion of a function over the interval (0, 2l) and $(-l,\ l)$ and expand simple functions.

3.7 Write half-range Fourier sine and cosine series of a function over the interval (0, π) and $(0,\ l)$ and expand simple functions.

Syllabus for Unit test-II completed

Engineering Mathematics – III

CO/PO - Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	3	2	1	1				2	3	2
CO2	3	3	3	3				3	3	3
CO3	3	3	3	3				3	3	3
Avg	3	2.66	2.33	2.33				2.66	3	2.66

3 =Strongly mapped (High), **2 =** Moderately mapped (Medium), **1 =** Slightly mapped (Low)

Note:

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

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

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

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

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

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

C-20

Engineering Mathematics – III

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	45	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	37	82.2%	3	
3	CO1, CO2, CO3	32	71.1%	3	
4	CO1, CO2, CO3	32	71.1%	3	
5					
6					
7					
PSO 1	CO1, CO2, CO3	37	82.2%	3	
PSO 2	CO1, CO2, CO3	45	100%	3	
PSO 3	CO1, CO2, CO3	36	80%	3	

ENGINEERING MATHEMATICS – III

(Common Subject)

Course Content

Unit I: Differential Equations of higher order

1. Solve Homogenous linear differential equations with constant coefficients of order two and higher with emphasis on second order.
2. Solve Non-homogenous linear differential equations with constant coefficients of the form f(D)y = X where X is in the form k(constant), e^{ax}, sinax, cosax, x^n, where n is a positive integer, finding complimentary function, particular integral and general solution.

Unit II: Laplace Transforms

3. Definition, sufficient conditions for existence of LT, LT of elementary functions, linearity property, state first shifting theorem, change of scale property, multiplication by t^n, division by t, LT of derivatives and integrals, LT of unit step function, state second shifting theorem, inverse Laplace transforms- state shifting theorems and change of scale property, multiplication by s^n and division by s, derivatives, integrals, examples of inverse LT using partial fractions, state convolution theorem with simple examples.

Unit III: Fourier series

4. Orthogonality of trigonometric functions, Representation of a function in Fourier series over the interval $(c\ ,\ c+2\pi)$ and $(c\ ,\ c+2l)$, Euler's formulae , sufficient conditions for existence of Fourier series expansion of a function, Fourier series expansion of basic functions limited to k(constant), $x, x^2, \sin ax, \cos ax, e^{ax}$ and their combinations over the intervals $(0,\ 2\pi), (-\pi, \pi), (0,\ 2l), (-l, l)$, Fourier series for even and odd function $(-\pi, \pi)$ and $(-l, l)$, Fourier half-range sine and cosine series over $(0,\ \pi)$ and $(0,\ l)$

Textbook:

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

Reference Books:

1. B.S.Grewal, Higher Engineering Mathematics, Khanna Publishers
2. M.R. Spiegel, Schaum's Outline of Laplace Transforms, Schaums' Series
3. M.Vygodsky, Mathematical Handbook: Higher Mathematics, Mir Publishers, Moscow.

Blue print

S. No	Chapter/ Unit title	No of Periods	Weightage allotted	Marks wise distribution of weightage				Question wise distribution of weightage				COs mapped
				R	U	Ap	An	R	U	Ap	An	
1	Unit – I Higher order Linear Differential equations with constant coefficients	15	28	11	11	3	3	2	2	1	1	CO1
2	Unit - II Laplace Transforms	18	33	11	11	11	0	2	2	2	0	CO2
3	Unit - III Fourier Series	12	19	3	3	3	10	1	1	1	1	CO3
Total		**45**	**80**	**25**	**25**	**17**	**13**	**5**	**5**	**4**	**2**	

R: Remembering Type : 25 Marks
U: understanding Type : 25 Marks
Ap: Application Type : 17 Marks
An: Analysing Type : 13 Marks

C-20
Engineering Mathematics – III
Unit Test Syllabus

Unit Test	Learning Outcomes to be Covered
Unit Test-I	From LO 1.1 to 2.5
Unit Test-II	From LO 2.6 to 3.7

Unit Test I **C –20, EC-401**

State Board of Technical Education and Training, A. P

First Year

Subject Name: Engineering Mathematics-II

Sub Code: EC-401

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. Write the auxiliary equation for given differential equation $\left(D^2+4\right)y=0$ (CO1)
   b. For given differential equation $f(D)y=0$, if roots of auxiliary equation are 1,-1,then $y=$ _____ (CO1)
   c. $L\left\{e^{3t}\right\}=$ _____ (CO2)
   d. $L\{f(t)\}=\overline{f}(s)$ then $L\left\{e^{at}f(t)\right\}=\overline{f}(s+a)$: State TRUE/FALSE (CO2)
2. Solve $\left(D^2-2D+1\right)y=0.$ (CO1)
3. Find the particular integral of $\left(D^2+D+4\right)y=e^x$ (CO1)
4. Evaluate $L\left\{(t-1)^2\right\}$ (CO2)
5. Evaluate $L\left\{t^2+2\cos t+3\sin t\right\}$ (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) Solve $\left(D^4-5D^2+4\right)y=0.$ (CO1)

   or

   B) Solve $\left(D^2+D-6\right)y=1+e^{-3x}.$ (CO1)
7. A) Solve $\left(D^2+3D+2\right)y=x^2+\sin x.$ (CO1)

   or

   B) Solve $\left(D^2-D\right)y=2e^x+3\cos x.$ (CO1)
8. A) Evaluate $L\left\{e^{3t}\cos^2 t\right\}$ (CO2)

   or

   B) Evaluate $L\left\{e^t(t+1)^2\right\}$ (CO2)

-o0o-

Unit Test II **C –20, EC-401**

State Board of Technical Education and Training, A. P

First Year

Subject name: Engineering Mathematics-II

Sub Code: EC-401

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. $L\{f(t)\} = \overline{f}(s)$ then $L\{tf(t)\} = -\frac{d}{ds}\left(\overline{f}(s)\right)$: State TRUE/FALSE (CO2)

   b. $L^{-1}\left\{\frac{1}{s-3}\right\} = ?$ (CO2)

   c. $L^{-1}\left\{\frac{1}{s^2+a^2}\right\} = ?$ (CO2)

   d. Write the Fourier series for the function $f(x)$ in the interval $c < x < c+2\pi$. (CO3)

2. Evaluate $L\{te^t\}$. (CO2)

3. Evaluate $\int_0^\infty e^{-3t}\sin 4t dt$. (CO2)

4. Evaluate $L^{-1}\left\{\frac{3}{s+4}+\frac{2}{s^2+16}-\frac{s}{s^2-4}\right\}$. (CO2)

5. Evaluate Fourier coefficient a_0 for $f(x)$ in the interval $(-\pi,\pi)$. (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) Evaluate $L\left\{te^{-t}\cos t\right\}$. (CO2)

or

B) Evaluate $L\left\{\frac{\cos at-\cos bt}{t}\right\}$. (CO2)

7. A) Evaluate $L^{-1}\left\{\frac{s}{(s+1)(s^2+1)}\right\}$. (CO2)

or

B) Evaluate $L^{-1}\left\{\frac{s}{(s-1)^4}\right\}$. (CO2)

8. A) Obtain the Fourier series for the function $f(x)=e^x$ in the interval $(0,2\pi)$. (CO3)

or

B) Obtain the half range Fourier cosine series of $f(x)=x^2$ in $(0,1)$. (CO3)

-o0o-

END EXAM MODEL PAPER

STATE BOARD OF TECHNICAL EDUCATION, A.P

ENGINEERING MATHEMATICS –EC- 401

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

PART-A

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

1. Solve $\left(D^2-3D+2\right)y=0.$ **CO1**
2. Solve $\left(D^2+D+1\right)y=0.$ **CO1**
3. Find the particular integral of differential equation $\left(D^2+4\right)y=\sin 2x.$ **CO1**
4. Find the particular integral of differential equation $\left(D^2+3D+2\right)y=e^{3x}.$ **CO1**
5. Find $L\left\{2e^{3t}+\sin 3t+\cosh t\right\}.$ **CO2**
6. Find $L\left\{e^t\cos 4t\right\}.$ **CO2**
7. Find $L^{-1}\left\{\frac{1}{s^2}+\frac{4}{s^2+4}+\frac{3s}{s^2-9}\right\}.$ **CO2**
8. Find the value of a_0 in the Fourier expansion of $f(x)=e^x$ in the interval $(0,2\pi).$ **CO3**
9. Find the Fourier coefficients of $f(x)$ in the interval $(-\pi,\pi).$ **CO3**
10. Find the value of a_1 in the half range cosine series of $f(x)=k$ in the interval $(0,\pi).$ **CO3**

PART-B

Answer All questions. Each question carries EIGHT marks. **5x8=40M**

11. A) Solve $\left(D^3-6D^2+11D-6\right)y=0.$ **CO1**

Or

B) Solve $\left(D^2-9\right)y=e^{3x}+e^{-3x}.$ **CO1**

12. A) Solve $\left(D^2-4D+4\right)y=\sin 3x.$ **CO1**

Or

B) Solve $\left(D^2+2D+2\right)y=x^2+x+1.$ **CO1**

13. A) Evaluate $L\left\{te^t \cos t\right\}$. **CO2**

Or

B) Evaluate $L\left\{t^2 \cos 2t\right\}$. **CO2**

14. A) Evaluate $L\left\{\frac{\sin 5t \sin t}{t}\right\}$. **CO2**

Or

B) Evaluate $\int_0^\infty \frac{\sin t}{t} dt$. **CO2**

15. A) Find $L^{-1}\left\{\frac{1}{s(s+1)(s+2)}\right\}$. **CO2**

Or

B) Using convolution theorem find $L^{-1}\left\{\frac{s}{(s^2+1)(s^2+4)}\right\}$. **CO2**

PART-C

Answer the following question. Question carries TEN marks. 1x10=10M

16. Find the Fourier expansion of $f(x) = x + x^2$ in the interval $(-\pi, \pi)$ and hence deduce that $\frac{1}{1^2} - \frac{1}{2^2} + \frac{1}{3^2} - \frac{1}{4^2} + = \frac{\pi^2}{12}$. **CO3**

***

STATE BOARD OF TECHNICAL EDUCATION, A.P
ENGINEERING MATHEMATICS – EC-401

TIME : 3 HOURS **MODEL PAPER- 2** **MAX.MARKS : 80M**

PART-A

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

1. Solve $\left(D^2+4D+4\right)y=0.$ **CO1**
2. Solve $\left(D^2+9\right)y=0.$ **CO1**
3. Find the particular integral of differential equation $\left(D^2-4D+3\right)y=e^{4x}.$ **CO1**
4. Find the particular integral of differential equation $\left(D^2-4D-5\right)y=\cos 2x.$ **CO1**
5. Find $L\left\{2-e^{-2t}+\sinh 6t\right\}.$ **CO2**
6. Find $L\left\{e^{-2t}t^2\right\}.$ **CO2**
7. Find $L^{-1}\left\{\frac{1}{s^2}+\frac{4}{s^2+4}+\frac{3s}{s^2-9}\right\}.$ **CO2**
8. Find the value of a_0 in the Fourier expansion of $f(x)=x+x^2$ in the interval $(-1,1).$ **CO3**
9. Write Euler's formula of Fourier expansion of $f(x)$ in the interval $(c,c+2\pi).$ **CO3**
10. Find the value of a_1 in the half range cosine series of $f(x)=\pi$ in the interval $(0,\pi).$ **CO3**

PART-B

Answer All questions. Each question carries EIGHT marks. **5x8=40M**

11. A) Solve $\left(D^3+1\right)y=0.$ **CO1**

Or

B) Solve $\left(D^2+D-6\right)y=e^{3x}+e^{-3x}.$ **CO1**

12. A) Solve $\left(D^2-3D+2\right)y=\cos 3x.$ **CO1**

Or

B) Solve $\left(D^2+2D+1\right)y=2x+x^2.$ **CO1**

13.A) Evaluate $L\left\{e^{3t}\cos^2 t\right\}$. **CO2**

Or

B) Evaluate $L\left\{t^2\cos 2t\right\}$. **CO2**

14.A) Evaluate $L\left\{\frac{e^{-at}-e^{-bt}}{t}\right\}$. **CO2**

Or

B) Using Laplace transforms evaluate $\int_0^\infty \cos 3t dt$. **CO2**

15.A) Find $L^{-1}\left\{\log\left(\frac{s^2+1}{(s-1)^2}\right)\right\}$. **CO2**

Or

B) Using convolution theorem find $L^{-1}\left\{\frac{1}{(s^2+1)(s+1)}\right\}$. **CO2**

PART-C

Answer the following question. Question carries TEN marks. **1x10=10M**

16. Find the Fourier expansion of $f(x)=(\pi-x)^2$ in the interval $0 \prec x \prec 2\pi$ and hence deduce that $\frac{1}{1^2}+\frac{1}{2^2}+\frac{1}{3^2}+---=\frac{\pi^2}{6}$. **CO3**

***

ELECTRONIC CIRCUITS -II

Course Code	Course title	No of periods/week	Total no of periods	Marks for FA	Marks for SA
EC-402	ELECTRONIC CIRCUITS -II	06	90	20	80

S No	Unit Title	No. of Periods	COs Mapped
1	Wave shaping Circuits	15	CO1
2	Linear Integrated Circuits	20	CO2
3	Op-Amp Applications	20	CO3
4	Timers and PLL	20	CO4
5	A/D & D/A Converters	15	CO5
	TOTAL	**90**	

Course Objectives	1. To learn the principles and working of Linear ICs, A/D and D/A converters and wave shaping circuits.
	2. To analyze the applications of linear ICs.
	3. To learn the practical importance Linear ICs and wave shaping circuits

CO No		COURSE OUTCOMES
CO1	**EC-402.1**	Describe different wave shaping circuits.
CO2	**EC-402.2**	Describe lC manufacturing technologies and principles of OP-AMP
CO3	**EC-402.3**	Analyse the OP-Amp application circuits.
CO4	**EC-402.4**	Analyse the timer and PLL circuits.
CO5	**EC-402.5**	Describe Analog to digital and digital to analog converters.

CO-PO/PSO MATRIX

CO No	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
EC-402.1	3	3	3	1	1			3	1	1
EC-402.2	3	3	3	2	1			3	2	1
EC-402.3	3	3	3	3	3		1	3	3	3
EC-402.4	3	3	3	3	3		1	3	3	2
EC-402.5	3	3	3	3	3		1	3	3	3
Average	3	3	3	2.4	2.2		1	3	2.4	2

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

LEARNING OUTCOMES:

1.0 Wave Shaping Circuits

1.1 Explain the need of wave shaping circuits
1.2 List different linear and non-linear wave shaping circuits
1.3 Explain RC differentiator circuit with wave forms
1.4 Explain RC integrator circuit with wave forms
1.5 Give the classification of clippers
1.6 Explain the working of different unbiased diode clipper circuits
1.7 Explain the working of different biased diode clipper circuits
1.8 Explain the double ended diode clipper with waveforms
1.9 Explain the working of transistor clipper with wave forms
1.10 Explain the working of Zener diode clipper with wave forms
1.11 Explain the working of clamper circuit
1.12 List the applications of clippers and clampers

2.0 Linear Integrated Circuits

2.1 List the advantages and disadvantages of Integrated Circuits over discrete circuits.
2.2 Distinguish between linear and digital ICs
2.3 Classify ICs based on manufacturing process (monolithic, thin film, thick film and hybrid).
2.4 i) List different IC packages.
ii) Draw the shape of above package types
2.5 State various levels of integration(SSI, MSI, LSI, VLSI etc.,).
2.6 i)State the features of Surface Mount Technology (SMT)
ii) List any 6 merits of SMT Technology.
2.7 Explain the working of differential amplifier constructed using BJTs.
2.8 i) Explain the functional block diagram of an operational amplifier.
ii) Draw the circuit symbol of an operational amplifier.

2.9 i) List the characteristics of ideal operational amplifier.
ii) Define the terms: Input impedance, Open loop gain, Slew rate, CMRR, Input offset voltage, Input offset Current and give the typical values of each.

2.10 Draw the pin diagram of IC 741 and state the function of each pin

2.11 State the concept of virtual ground.

2.12 Mention the power supply requirements of Operational Amplifier.

2.13 i) Explain the function of Op Amp as Inverting amplifier with a circuit diagram.
ii) Derive the expression for voltage gain of Inverting amplifier

2.14 Explain the effect of feedback on input impedance and Bandwidth of inverting amplifier

2.15 i) Explain the Non Inverting amplifier configuration of Op Amp.
ii) Derive the equation for Voltage gain of the Non Inverting amplifier

2.16 Explain the effect of feedback on input impedance and Bandwidth of Non inverting amplifier.

.

3.0 Op-Amp Applications

3.1 Explain the function of OP-Amp as: i) inverter ii) Buffer iii) Summer iv)Scale changer v) Integrator and vi) Differentiator

3.2 Explain the working of OP-Amp based Wein-bridge Oscillator circuit

3.3 Give the conditions required for stable operation of above circuit

3.4 Explain the working of OP-Amp based RC Phase shift oscillator circuit

3.5 Define Sweep Voltage and state its use as time-base

3.6 Distinguish between voltage and current time-base generators and list their applications.

3.7 Explain the working of OP-Amp based Bootstrap sweep circuit.

3.8 Explain the working of OP-Amp based Miller sweep circuit

3.9 Explain the working of OP-Amp basedAstable multi-vibrator with waveforms.

3.10 Explain the working of OP-Amp basedMonostable multi-vibrator with waveforms

3.11 Explain the working of OP-Amp based Schmitt trigger circuit with waveforms

3.12 State the use of OP-Amp in analog computer

3.13 Explain the Voltage to current converter circuit.

3.14 List any three applications of Voltage to current converter.

3.15 i) Explain the Current to Voltage converter circuit.
ii) List any three applications of Current to Voltage converter.

4.0 Timers and PLL

4.1 Draw the pin diagram of 555 IC and state the function of each pin

4.2 Draw the internal block diagram of 555 IC and explain the function of each block.

4.3 Draw the circuit of astable multi-vibrator using 555IC and explain its working

4.4 Draw the circuit of mono-stable multi-vibrator using 555IC and explain its working

4.5 Explain the concept of Phase locked loop

4.6 Draw internal block diagram of PLL – LM565 and explain its working

4.7 Explain the operation of VCO (LM566)

4.8 Define lock range of PLL

4.9 Define capture range of PLL.

4.10 Give design rules(Formulas) for implementing PLL circuit

4.11 List any three applications of PLL

4.12 Explain frequency multiplier and FM demodulator using PLL

5.0 A/D & D/A Converters.

5.1 State the need for A/D and D/A conversion.

5.2 Define the terms resolution, Accuracy, Monotonicity and settling time of D/A converter.

5.3 Explain D/A conversion using binary weighted resistors.

5.4 Explain D/A conversion using R-2R ladder network.

5.5 Explain A/D conversion using counter method.

5.6 Explain A/D conversion using successive approximation method

5.7 List IC numbers of any three ADCs

5.8 List IC numbers of any three DACs

COURSE CONTENTS:

1. **Wave Shaping Circuits**
   Need of wave shaping circuit- Linear and non-linear wave shaping networks - RC differentiator circuit - wave forms - RC integrator circuit - wave forms - classification of clippers - working of biased and un biased diode clipper circuits – Transistor clipper circuits – Zener diode clipper circuits - clamper circuit - applications of clippers and clampers

2. **Linear Integrated Circuits**
   advantages and disadvantages of Integrated circuits over discrete circuits- Distingish linear, digital ICs- Classifications of ICs based on manufacturing process -IC packages –Levels of integration – SMT- Differential amplifiers - Operational amplifiers– circuit symbol –block diagram – Input impedance, Open loop gain, Slew rate, CMRR, Input offset voltage, Input offset Current – IC 741- Pin diagram- Virtual ground – power supply requirements – OpAmp as inverting amplifier &Non inverting amplifier

3. **Op-Amp Applications**–OP-Amp as inverter, buffer, summer, scale changer, integrator, differentiator- Wein bridge oscillator –RC Phase shift oscillator - Voltage and current time base generators- Bootstrap & Miller sweep circuits – Astable,Monostablemultivibrators- Schmitt trigger- Use of Op amp in analog computer – Voltage to current converter- applications – current to voltage converter- Applications

4 **Timers and PLL**
   555 IC Pin diagram- Internal block diagram - 555 Timer as Astable and MonostableMultivibrators – Phase locked loop –PLL-LM 565 block diagram & working-voltage Control Oscillators(LM 566) –Lock range of PLL – Capture range of PLL – Design rules for PLL – applications - frequency multiplier and FM demodulator using PLL

5 **A/D & D/A Converters**
   Need for A/D and D/A conversion -Resolution, Accuracy, Monotonicity and settling time of D/A converter - D/A conversion using binary weighted resistors , R-2R ladder network - A/D conversion using counter method and successive approximation method - IC numbers of any three ADCs, DACs

REFERENCE BOOKS

1. Bogart, Electronic Devices and Circuits, TMH
2. Milliman and Hallkias, Integrated Electronics , TMH
3. Ramakanth A.Gaykwad,Opamps & Linear Integrated Circuits, 4th edition,PRENTICE Hall
4. D Roy Chowdary, Linear Integrated Circuits, 4th edition,

5. George Clayton, Operational Amplifiers, 5th edition, Newnes
6. Willam D. Stanley ,Operational Amplifiers with Linear Integrated Circuits, 4th Edition , PEARSON
7. Dr.Sanjay sarma,OPamps &LIC ,Katsonbooks
8. Johanhuijsing, Operational Amplifiers theory & Design, 3rd Edition,SPRINGER Publications

BLUE PRINT:

Sl No	Unit Title	No of Periods	Weightage Allotted	Marks Wise distribution of weightage				Question Wise distribution of weightage				COs mapped
				R	U	Ap	An	R	U	Ap	An	
1	Wave shaping Circuits	15	14	3	3	8	-	1	1	1	-	CO1
2	Linear IC's	20	17	6	3	8	-	2	1	1	-	CO2
3	Op-Amp Applications	20	21	-	3	8	10	-	1	1	1	CO3
4	Timers and PLL	20	14	3	3	8	-	1	1	1	-	CO4
5	A/D & D/A Converters	15	14	3	3	8	-	1	1	1	-	CO5
Total		**90**	**80**	**15**	**15**	**40**	**10**	**5**	**5**	**5**	**1**	

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 5.8

(Model Paper) **C –20, EC-402**

State Board of Technical Education and Training, A. P

Diploma in Electronics and Communication Engineering (DECE)

IV Semester

Subject Name: Electronic circuits II

Sub Code: EC- 402

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 the following blanks with one word
   a) The output wave form shape of non linear wave shaping circuit is same as input wave form (State True/False) (CO1)
   b) Draw RC differentiator circuit (CO1)
   c) What is the input impedance of ideal OPAMP (CO2)
   d) What is the open loop gain of ideal OPAMP (CO2)
2. List different linear and non-linear wave shaping circuits (CO2)
3. Give the classification of clippers (CO1)
4. Distinguish between linear and digital ICs (CO2)
5. List different IC packages. (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 the working of transistor clipper with wave forms (CO1)
   (or)
   (b) Explain RC integrator circuit with wave forms (CO1)

7. (a) Explain the working of differential amplifier constructed using BJTs. (CO2)
   (or)
   (b)Explain the function of Op Amp as Inverting amplifier with a circuit diagram. (CO2)

8. (a) Explain the working of transistor clipper with wave forms (CO1)
   (or)
   (b) Explain the effect of feedback on input impedance and Bandwidth of Non inverting amplifier. (CO2)

-o0o-

(Model Paper) **C –20, EC-402**

State Board of Technical Education and Training, A. P

Diploma in Electronics and Communication Engineering (DECE)

IV Semester

Subject Name: Electronic circuits II

Sub Code: EC - 402

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. Fill the following blanks with one word
   a) It is an active circuit which converts an analog input signal to a digital output signal **(State True/False)** (CO3)
   b) In 555IC which pin provides a discharge path from the timing capacitor to ground when the output is low (CO4)
   c) What is the function of LM566 IC_____ (CO4)
   d) Binary weighted resistors method is used for Analog to Digital conversion **(State True/False)** (CO5)
2. Define lock range of PLL (CO4)
3. Give the pin configuration of 555 IC (CO4)
4. List IC numbers of any three DACs (CO5)
5. Describe the need for A/D and D/A conversion. (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)Explain the working of OP-Amp based Bootstrap sweep circuit. (CO3)
   or
   (b) Explain the working of OP-Amp based Schmitt trigger circuit with waveforms (CO3)
7. (a)Draw internal block diagram of PLL – LM565 and explain its working (CO4)
   or
   (b)Explain frequency multiplier and FM demodulator using PLL (CO4)
8. (a)Explain D/A conversion using R-2R ladder network. (CO5)
   or
   (b)Explain A/D conversion using successive approximation method (CO5)

-o0o-

MODEL PAPER
BOARD DIPLOMA EXAMINATIONS
C-20, EC-402, ELECTRONIC CIRCUITS–II
IV SEMESTER
SEMESTER 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. List different linear and non-linear wave shaping circuits (CO1)
2. Give the classification of clippers (CO1)
3. Distinguish between linear and digital ICs (CO2)
4. List different IC packages. (CO2)
5. State various levels of integration (CO2)
6. Distinguish between voltage and current time-base generators (CO3)
7. Define lock range of PLL (CO4)
8. Give the pin configuration of 555 IC (CO4)
9. List IC numbers of any three DACs (CO5)
10. Describe the need for A/D and D/A conversion. (CO5)

Part-B **5×8=40**

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.

11. (a) Explain the working of transistor clipper with wave forms (CO1)
    or
    (b) Explain RC integrator circuit with wave forms (CO1)
12. (a) Explain the working of differential amplifier constructed using BJTs. (CO2)
    or
    (b)Explain the function of Op Amp as Inverting amplifier with a circuit diagram. (CO2)

13. (a)Explain the working of OP-Amp based Bootstrap sweep circuit. (CO3)

or

(b)Explain the working of OP-Amp based Schmitt trigger circuit with waveforms (CO3)

14. (a)Draw internal block diagram of PLL – LM565 and explain its working (CO4)

or

(b)Explain frequency multiplier and FM demodulator using PLL (CO4)

15. (a)Explain D/A conversion using R-2R ladder network. (CO5)

or

(b)Explain A/D conversion using successive approximation method (CO5)

Part-C **1×10=10**

Instructions: (1) Answer the question given below. It carries 10 marks

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

16. Why are the integrator and differentiator using op-amp, superior to simple RC integrator and differentiator? (CO3)

-o0o-

MICROPROCESSORS

Course Code	Course title	No of periods/week	Total no of periods	Marks for FA	Marks for SA
EC-403	MICROPROCESSORS	06	90	20	80

S No	Unit Title	No. of Periods	COs Mapped
1	Introduction to Microprocessors	10	CO1
2	Architecture of 8086	20	CO2
3	Instruction set of 8086	25	CO3
4	Programming with 8086	25	CO4
5	Advancements in Microprocessors	10	CO5
	Total	**90**	

Course Objectives	1. To familiarize with various microprocessors
	2. To understand the programming of 8086 microprocessor
	3. To learn the practical importance and applications of Microprocessors

CO No		COURSE OUTCOMES
CO1	**EC-403.1**	Explain the concept of microcomputer and microprocessor.
CO2	**EC-403.2**	Describe the Architecture of 8086 microprocessor
CO3	**EC-403.3**	Explain the instruction set of 8086 microprocessor
CO4	**EC-403.4**	Analyse 8086 programming for Arithmetic and Logical operations.
CO5	**EC-403.5**	Describe advancements in microprocessors

CO-PO/PSO MATRIX

CO No	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
EC-403.1	3	3	1		1			3		
EC-403.2	3	3						3		
EC-403.3	3	3						3		
EC-403.4	3	3	3	3	3			3	3	2
EC-403.5	3	3	3	3	3		3	3	3	2
Average	3	3	2.3	3	2.3		3	3	3	2

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

LEARNING OUTCOMES

1.0 Introduction to Microprocessors

1.1 Define microprocessor.
1.2 Explain the basic block diagram of a microcomputer
1.3 Give the evolution of INTEL family of microprocessors
1.4 Define the terms: address bus, data bus, control bus, clock speed, word length
1.5 List any three 8-bit processors
1.6 List any three 16-bit processors
1.7 Compare 8-bit and 16-bit microprocessors
1.8 Compare assembly language, high level language, machine language
1.9 State the need for instruction set
1.10 Define the terms instruction, op-code and operand
1.11 Define fetch cycle, execute cycle and instruction cycle
1.12 List the steps involved in sequential processing
1.13 List the applications of microprocessors

2.0 Architecture of 8086

2.1 State the features of 8086 microprocessor
2.2 Draw the functional block diagram of 8086 and explain
2.3 State the need of bus control logic
2.4 State the need of memory segmentation
2.5 State the importance of segment registers
2.6 State the purpose of Instruction Pointer
2.7 State the function of Instruction Queue
2.8 List different general purpose registers of 8086 and state their function
2.9 State the purpose of pointer and index registers
2.10 Explain the working of ALU and control unit
2.11 List different flags of 8086 and mention their use
2.12 Draw the pin diagram of 8086 and state the function of each pin
2.13 Describe the maximum and minimum mode of operation.
2.14 Illustrate the generation of 20-bit Physical address with an example
2.15 Draw the timing diagrams of memory read and memory write cycles.

2.16 i) State the need of interrupts.
ii) List different types of interrupts
iii) Explain the Interrupt response in 8086

3.0 Instruction set of 8086

3.1 Draw the generalized Instruction format of 8086
3.2 Illustrate the generation of code for any three instructions
3.3 Explain addressing modes of 8086 with examples
3.4 Classify the instruction set of 8086
3.5 Explain the data transfer group of instructions of 8086.
3.6 Explain the arithmetic group of instructions of 8086.
3.7 Explain the Logic group of instructions of 8086.
3.8 Explain the processor control group of instructions of 8086.
3.9 List the instructions affecting flags of 8086.
3.10 Explain the control transfer (branching) instructions of 8086.
3.11 Explain the String manipulation instructions of 8086.

4.0 Programming with 8086

4.1 Describe the use of various assembly language development tools like editor, assembler, linker, locator and debugger
4.2 Describe assembler directives
4.3 Write simple assembly language programs using data transfer instructions
i) To transfer data between registers
ii) To transfer data between register and memory location
iii) To transfer data from one memory location to another memory location

4.4 Write simple assembly language programs using arithmetic instructions
i) To perform addition/ subtraction/ multiplication/ division of two 8/16 bit numbers.
ii) To perform 1's complement subtraction
iii) To perform addition of series of 'n' numbers

4.5 Write simple assembly language programs using logical instructions
i) To perform AND/ OR/ XOR operations on two 8/ 16 bit numbers
ii) To perform conversion of 4 bit binary code to gray code
4.6 Explain conditional and loop statements.
4.7 Write simple assembly language program to find the biggest/ smallest of the given series of numbers
4.8 State the need of subroutine
4.9 Explain CALL, RETURN instructions
4.10 Explain subroutine programming in 8086.
4.11 Write simple assembly language program using subroutine to find the factorial of the given number

5.0 Advancements in Microprocessors

5.1 Describe pipelining.
5.2 Describe instruction level parallelism
5.3 Define hyper threading
5.4 Define cache memory and State the role of cache memory in increasing the performance of a computer
5.5 Define 32-bit processor and List any four 32-bit processors
5.6 Define 64-bit processor and List any four 64-bit processors

5.7 Distinguish between 32-bit and 64-bit processors
5.8 List the major functional difference between single core and dual core processor
5.9 List the important features of
i) Intel core i3 processors
ii) Intel core i5 processors
iii) Intel core i7 processors
5.10 Distinguish between Intel core i3 and i5 processors
5.11 Distinguish between Intel core i5 and i7 processors
5.12 List the advanced features of Intel core i9 compared to core i7 processors

COURSE CONTENTS

1.Introduction to Microprocessors

Microprocessor- basic block diagram of a microcomputer- evolution of Intel family microprocessor-Important terms related to processors- Compare 8-bit and 16-bit microprocessors - Assembly language, high level language, machine language- need for instruction set- op-code and operand- fetch cycle, execute cycle and instruction cycle- applications of microprocessors

2. Architecture of 8086

Features of 8086 microprocessor, functional block diagram of 8086, need of bus control logic , memory segmentation—Segment registers – Instruction pointer – Instruction queue – General purpose registers of 8086 –pointer and index registers – working of ALU and control unit – Different flags of 8086 – pin diagram of 8086 - minimum and maximum modes of operation - calculation of physical address – flag register –timing diagrams of memory read and memory write cycles – Interrupts – interrupt response

3. Instruction set of 8086

Instruction format - Addressing modes - Instruction set – data transfer instructions– Arithmetic and logical instructions – branching instructions – loop control instructions – string manipulation instructions

4. Programming with 8086

Assembly language development tools -Assembler directives –assembly language programs using data transfer instructions , arithmetic instructions, logical instructions , conditional and loop statements- CALL and RETURN instructions –need of subroutine - subroutine programming

5. Advancements in Microprocessors

pipe lining -instruction level parallelism- hyper threading-cache memory -32 bit & 64 bit processors-i3, i5,i7 and i9 processors

Reference Books

1. Ramesh S Gaonkar ,Microprocessor architecture programming, and applications with the 8051, 5th edition
2. A K Roy, Advanced Microprocessors, 2nd edition
3. Berry B Brey,The Intel Microprocessor, Pearson
4. Venugopal and Rajkumar, X86 Microprocessor Programming TMH
5. Yu-Cheng Liu & Glenn A GibsonMicrocomputer systems: The 8086 Family.PHI
6. Rafiquzzaman.,Microprocessors Theory and applications Intel and Motorola,PHI
7. Douglas V. Hall ,Microprocessors and interfacing programming and Hardware, McGraw Hill Publishers

BLUE PRINT:

Sl No	Unit Title	No of Periods	Weightage Allotted	Marks Wise distribution of weightage				Question Wise distribution of weightage				COs mapped
				R	U	Ap	An	R	U	Ap	An	
1	Introduction to Microprocessors	10	11	3	8	-	-	1	1	-	-	CO1
2	Architecture of 8086	20	22	3	11	8	-	1	2	1	-	CO2
3	Instruction set of 8086	25	14	3	3	8	-	1	1	1	-	CO3
4	Programming with 8086	25	24	3	3	8	10	1	1	1	1	CO4
5	Advancements in Microprocessors	10	9	3	6	-	-	1	2	-	-	CO5
Total		**90**	**80**	**15**	**31**	**24**	**10**	**5**	**7**	**3**	**1**	

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 5.14

(Model Paper) **C –20, EC -403**

State Board of Technical Education and Training, A. P

Diploma in Electronics and Communication Engineering (DECE)

IV Semester

Subject name: Microprocessors

Sub Code: EC - 403

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 the following blanks with one word
   a) Write the name of any one 16 bit processor (CO1)
   b) Write the name of any one interrupt in 8086 (CO2)
   c) Write the name of any one flag in 8086 (CO2)
   d) In 8086 micro processor, the address bus is _____ bit wide (CO1)
2. List any three 8-bit processors (CO1)
3. State the features of 8086 microprocessor (CO2)
4. Interpret the need of memory segmentation (CO2)
5. Classify the instruction set of 8086 (CO1)

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 basic block diagram of a microcomputer (CO1)
   or
   (b) Illustrate the terms address bus, data bus, control bus, clock speed, word length (CO1)

7. (a) Draw the functional block diagram of 8086 and explain (CO2)
   or
   (b) Explain the working of ALU and control unit (CO2)

8. (a) Illustrate the generation of 20-bit Physical address with an example (CO2)
   or

(b) Explain the Interrupt response in 8086 (CO2)

-o0o-

(Model Paper) **C –20, EC -403**

State Board of Technical Education and Training, A. P

Diploma in Electronics and Communication Engineering (DECE)

IV Semester

Subjectname:Microprocessors

Sub Code: EC - 403

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. Fill the following blanks with one word
   a) Write the name of any one instruction affecting flags of 8086 (CO3)
   b) Write the name of any one string manipulation instruction of 8086 (CO3)
   c) Write the name of any one32 bit processor (CO5)
   d) Write the name of any one 64 bit processor (CO5)
2. State the need of Subroutine (CO4)
3. Describe assembler directives (CO4)
4. List the advanced features of Intel core i9 compared to core i7 processors (CO5)
5. Describe instruction level parallelism (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) Explain the control transfer (branching) instructions of 8086 (CO3)

   or

   (b) Explain the String manipulation instructions of 8086 (CO3)

7. (a) Explain subroutine programming in 8086. (CO4)

   or

   (b) Explain CALL, RETURN instructions (CO4)

8. (a) Write an assembly language program to perform conversion from binary to gray on 4 bit data (CO4)

   or

(b)Explain the logic to find the largest number in the given series of numbers and write an assembly language program. (CO4) (CO2)

-o0o-

MODEL PAPER
BOARD DIPLOMA EXAMINATIONS
C-20, EC-403, MICROPROCESSORS
IV SEMESTER
SEMESTER 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. List any three 8-bit processors (CO1)
2. State the features of 8086 microprocessor (CO2)
3. Interpret the need of memory segmentation (CO2)
4. Classify the instruction set of 8086 (CO3)
5. List the instructions affecting flags of 8086. (CO3)
6. State the need of Subroutine (CO4)
7. List assembler directives (CO4)
8. List the advanced features of Intel core i9 compared to core i7 processors (CO5)
9. Describe instruction level parallelism (CO5)
10. Distinguish between Intel core i5 and i7 processors (CO5)

Part-B **5×8=40**

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.

11. (a) Explain the basic block diagram of a microcomputer (CO1)

    or

    (b) Illustrate the terms address bus, data bus, control bus, clock speed, word length(CO1)

12. (a) Draw the functional block diagram of 8086 and explain (CO2)

    or

    (b) Explain the working of ALU and control unit (CO2)

13. (a)Illustrate the generation of 20-bit Physical address with an example (CO2)

or

(b)Explain the Interrupt response in 8086 (CO2)

14. (a)Explain addressing modes of 8086 with examples (CO3)

or

(b)Explain the arithmetic group of instructions of 8086 (CO3)

15. (a)Write an assembly language program to perform conversion from binary to gray on 4 bit data (CO4)

or

(b)Explain Subroutine programming in 8086 (CO4)

Part-C **1×10=10**

Instructions: (1) Answer the question given below. It carries 10 marks
(2) Answer should be comprehensive and the criterion for valuation is the content but not the length of the answer.

16. In a given program if DIV is replaced by IDIV, Analyse the output. (CO4)

```
MOV AX, DATA
MOV  DS, AX
MOV AX, 1800H
MOV  BX, 23H
DIV
```

-o0o-

MICROWAVE & SATELLITE COMMUNICATION SYSTEMS

Course Code	Course title	No of periods/week	Total no of periods	Marks for FA	Marks for SA
EC-404	**Microwave & Satellite Communication systems**	05	75	20	80

S No	Unit Title	No. of Periods	COs Mapped
1	Radio Wave Propagation	17	CO1
2	Antennas	16	CO2
3	Microwave Components and Devices	20	CO3
4	RADARs	12	CO4
5	Satellite Communication System	10	CO5
	Total	75	

Course Objectives	1. To familiarize the concepts of Microwave Engineering, Radar and Satellite communication systems.
	2. To equip with various issues related to Microwave Engineering, Radar and Satellite communication systems.
	3. To learn the practical importance and applications of Microwave Engineering, Radar and Satellite communication systems.

CO No		COURSE OUTCOMES
CO1	**EC-404.1**	Describe the radio wave propagation techniques.
CO2	**EC-404.2**	Explain the Radiation patterns of various Antennas.
CO3	**EC-404.3**	Analyse various microwave components and devices.
CO4	**EC-404.4**	Analyse the Radar Engineering.
CO5	**EC-404.5**	Describe the principles of Satellite communication.

CO-PO/PSO MATRIX

CO No	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
EC-404.1	3				1			3		1
EC-404.2	3	2	1		2			3	1	
EC-404.3	3	1	1		1			3		1
EC-404.4	3	3	2	1	2			3		2
EC-404.5	3	3	1	2	3		1	3	1	2
Average	3	1.8	1.25	1.5	1.8			3	1	1.5

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

LEARNING OUTCOMES

1.0 Radio wave propagation

1.1 Define EM wave

1.2 Explain the affects of environment on EM waves (Reflection, Refraction, diffraction and Interference).

1.3 Explain the Ground wave propagation with the equation for electric filed at a distant place.

1.4 List the applications of ground wave propagation

1.5 List the limitations of ground wave propagation

1.6 Classify the layers of ionosphere and briefly explain them

1.7 Explain the ionospheric wave (sky wave) propagation

1.8 Define the terms:
i) Refractive index ii) Phase velocity iii) Reflection coefficient iv) Actual height v) Virtual height

1.9 Define critical frequency and maximum usable frequency

1.10 Explain the concepts of: i) Skip distance ii) Skip zone(dead zone)

1.11 Explain Space wave (trophospheric wave) propagation and factors affecting space wave propagation (LOS)

1.12 Briefly explain i) Duct propagation & ii) Tropospheric Scatter Propagation

2.0 Antennas

2.1 Explain the principle of radiation of EM waves from antennas

2.2 Explain radiation mechanism of an antennafrom transmission line theory

2.3 State the parameters of antenna

2.4 Define the terms

i. Antenna input impedance
ii. Antenna bandwidth
iii. Radiation pattern
iv. Front to back ratio
v. Radiation intensity
vi. Directive gain
vii. Directivity
viii. Power gain
ix. Radiation resistance
x. Antenna beam efficiency
xi. Antenna efficiency
xii. Antenna aperture
xiii. Antenna polarization

2.5 Explain Isotropic radiator

2.6 Classify antennas based on i) Radiation pattern ii) Frequency range iii) Construction iv) Bandwidth

2.7 Describe the function of dipole and folded dipole antennas and give their applications

2.8 State the different microwave antennas

2.9 Explain horn antenna and give its applications

2.10 Give the advantages and disadvantages of horn antennas

2.11 Explain the function of Parabolic reflector (Dish antenna)

2.12 Explain the working principle of Dish antenna

2.13 State the need of antenna arrays

2.14 State the different types of antenna arrays

2.15 Explain about end-fire array and broadside array

3.0. Microwave Components and Devices

3.1 Define microwave frequencies

3.2 State the different microwave frequenciy bands

3.3 List the advantages of microwaves

3.4 State the applications of microwaves

3.5 State the function of waveguides and classify them

3.6 Explain the concept of propagation of wave in waveguides

3.7 Define TE (Transverse Electric) Mode and TM (Transverse Magnetic) Mode

3.8 Explain i) Rectangular wave guides ii) Circular wave guides

3.9 Describe various modes of operations of waveguides

3.10 Define the terms: i) dominant mode, ii) cut-off wavelength, iii) cut-off frequency iv) phase velocity and v) group velocity related to waveguides

3.11 List different Microwave passive devices

3.12 State the uses of i) T-junctions:E-Plane T, H-Plane T & Hybrid T ii) Microwave Bends iii) Microwave tapers

3.13 Explain the working principle of Reflex Klystron
3.14 Explain the working principle of Magnetron and state its applications
3.15 Explain the working principle of Travelling Wave Tube and state its applications
3.16 List different microwave solid state devices
3.17 Explain the working of: i) Gunn diode ii) IMPATT DIODE iii) TRAPATT DIODE

4.0 RADARs

4.1 State the basic working principle of a RADAR
4.2 Derive the free space RADAR range equation
4.3 State the factors affecting range of a RADAR
4.4 Classify RADARs
4.5 Draw the block diagram of a pulse RADAR and explain the function of each block
4.6 State the major advantages & disadvantages of a pulsed RADAR system
4.7 State the need of duplexer
4.8 List the various displays used in RADAR
4.9 Draw and explain the block diagram of continuous wave(CW) RADAR
4.10 Explain the Doppler Effect
4.11 Draw and explain the moving target indicating (MTI) RADAR
4.12 Briefly explain the concept of blind speed
4.13 List the applications of RADARs

5.0 Satellite Communication System

5.1 State the use of satellite for communication
5.2 Explain uplink and down link frequencies
5.3 Draw and explain block diagram of a satellite communication system (Satellite on board)
5.4 List the advantages of satellite communication system over terrestrial communication system
5.5 Draw the block diagram of earth station and explain each block
5.6 List the functions of the satellite transponder
5.7 Explain various types of transponders used in satellite
5.8 Explain the bandwidth of satellite system
5.9 Explain the application of satellite in GPS (Global Position System)
5.10 Explain the application of satellite in Direct to Home (DTH) TV

COURSE CONTENT:

1 . Radio Wave Propagation

Defition of EM wave-Effects of environment-Ground wave propagation -Applications, limitations-layers of ionosphere -sky wave propagation- Refractive index, Phase velocity, Reflection coefficient, Actual height, Virtual height ,Critical frequency - Maximum usable frequency- Skip distance, Skip zone(dead zone)-Space wave (trophospheric wave) propagation-Duct propagation & ii) Tropospheric scaterring

2 Antennas

Radiation of EM waves from antennas- Isotropic radiator - Classify antennas - Antenna Parameters - dipole and folded dipole antennas- different microwave antennas- Horn antenna - Parabolic reflector – end fire array and Broadside array

3 Microwave Components and Devices

Microwave frequencies - Rectangular wave guides - Circular wave guides- TE (Transverse Electric) Mode and TM (Transverse Magnetic) Mode- T-junctions - Microwave Bends - Microwave tapers- Reflex Klystron - Magnetron- Travelling Wave Tube- microwave solid state devices - Gunn diode - IMPATT diode - TRAPATT diode

4 RADARs

Working principle of a RADAR- Radar Range Equation- Pulse Radar -need of duplexer –displays of RADAR-Continuous Wave(CW) Radar- Doppler Effect - Moving Target Indicating (MTI) Radar – blind speed – Applications of RADARs

5 Satellite Communication Systems

Block diagram of a satellite communications system- Advantages - block diagram of earth station- satellite transponders –bandwidth of satellite-application of satellite in GPS (Global Position System), Direct to Home (DTH) TV.

Reference Books:

1. F.E.Terman, Electronic and Radio engineering, McGraw Hill Publishers
2. George F Kenndy, Electronic communication system, McGraw Hill Publishers
3. AthanasiosG.Kanatas, AthanasiosD.Panagopopulos, Radio Wave Propagation and channel modeling for earth-space systems , CRC Press
4. UmeshSinha, Networks and Transmission lines,SatyaPrakashan,Tech India Publications, New Delhi, 2001.
5. Ian A. Glover, Steve pennock , Microwave Devices, circuits and subsystems for Communication engineering, Wiley-Blackwell Publishers
6. Samuel Y. Liao, Microwave Devices and Circuits, Pearson Publishers
7. G.S.N. Raju, Microwave devices, I K International Publishing House Pvt. Ltd
8. E.V.D. Glazier and H.R.L. Lamont ,Transmission and Propagation, The Services Text Book of Radio, vol. 5, Standard Publishers Distributors, Delhi.
9. K D Prasad, Antenna Theory , SatyaPrakashan,Tech India Publications, New Delhi, 2001.
10. A.V. Bakshi, Transmission line and waveguides, Technical Publications, 2009
11. MojojitMitra, Satellite communication , PHI
12. Michael O Kolawole, Satellite communication Engineering, CRC Press

BLUE PRINT:

Sl No	Unit Title	No of Periods	Weightage Allotted	Marks Wise distribution of weightage				Question Wise distribution of weightage				COs mapped
				R	U	Ap	An	R	U	Ap	An	
1	Radio Wave Propagation	17	17	3	14	-	-	1	3	-	-	CO1
2	Antennas	16	17	3	14	-	-	1	3	-	-	CO2
3	Microwave Components and Devices	20	24	3	11	-	10	1	2	-	1	CO3
4	RADARS	12	11	-	3	8	-	-	1	1	-	CO4
5	Satellite Communication System	10	11	-	3	8	-	-	1	1	-	CO5
Total		**75**	**80**	**9**	**45**	**16**	**10**	**3**	**10**	**2**	**1**	

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 3.5
Unit Test-II	From 3.6 to 5.10

(Model Paper) **C –20, EC -404**

State Board of Technical Education and Training, A. P

Diploma in Electronics and Communication Engineering (DECE)

IV Semester

Subject Name: Microwave & Satellite Communication Systems

Sub Code: EC - 404

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 the following blanks with one word

   a) Critical frequency is the highest magnitude of frequency above which the waves penetrate the ionosphere and below which the waves are reflected back from the ionosphere (State True/False) (CO1)

   b) Ionosphere propagation is also called as tropspheric propagation (State True/False) (CO1)

   c) Maximum directivity of an antenna is indicated with which term_____ (CO2)
   d) The radiation pattern of end fire array is bi directional (State True/False) (CO2)

2. Classify the layers of Ionosphere (CO1)
3. Describe briefly about tropospheric scattering (CO1)
4. State the parameters of antenna (CO2)
5. State the need of antenna arrays (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 the Ground wave propagation and ground effects on EM waves (CO1)
   or
   (b) Explain Space wave propagation and factors affecting space wave propagation (CO1)

7. (a) Explain Horn antenna and give its applications (CO2)
   or
   (b) Explain the concepts of: i) Skip distance & ii) Skip zone (dead zone) (CO2)

8. (a) Explain energy absorption and wave path in the ionosphere (CO1)
   or
   (b) Explain the working principle of Travelling Wave Tube and state its applications (CO2)

-o0o-

(Model Paper) **C –20, EC -404**

State Board of Technical Education and Training, A. P

Diploma in Electronics and Communication Engineering (DECE)

IV Semester

Subject Name: Microwave & Satellite Communication Systems

Sub Code: EC - 404

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. Fill the following blanks with one word

   a)Write any one microwave passive device (CO3)

   b) In radar and radio communications systems, duplexer isolates the receiver from the transmitter while permitting them to share a common antenna**(State True/False)** (CO4)

   c) Write the full form of DTH (CO5)
   d) Write the full form of GPS (CO5)

2. Describe various modes of operations of wave guides (CO3)
3. Classify different types of waveguides (CO3)
4. State the factors affecting range of a RADAR (CO4)
5. Interpret the advantages of satellite communication system over terrestrial communication systems (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)Explain the working principle of Magnetron and state its applications (CO3)
   or
   (b)Explain the working principle of Travelling Wave Tube and state its applications(CO3)

7. (a)Draw and explain the block diagram of Continuous Wave(CW) RADAR (CO4)
   or
   (b)Draw and explain the Moving Target Indicator (MTI) RADAR (CO4)

8. (a) Draw and explain block diagram of a satellite communications system (CO5)
   or
   (b)Explain the application of satellite in GPS (Global Position System) (CO5)

-o0o-

MODEL PAPER
BOARD DIPLOMA EXAMINATIONS
C-20, EC-404, MICROWAVE & SATELLITE COMMUNICATION SYSTEMS
IV SEMESTER
SEMESTER 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 critical frequency and maximum usable frequency (CO1)
2. Classify the layers of Ionosphere (CO1)
3. Describe briefly about tropospheric scattering (CO1)
4. State the parameters of antenna (CO2)
5. Classify antenna arrays (CO2)
6. Define beamwidth and bandwidth of an atenna (CO2)
7. Describe various modes of operations of wave guides (CO3)
8. Define dominant mode and cut-off wavelength of a waveguide (CO3)
9. State the factors affecting range of a RADAR (CO4)
10. List the advantages of satellite communication system over terrestrial communication systems (CO5)

Part-B **5×8=40**

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.

11. (a) Explain the Ground wave propagation and ground effects on EM waves (CO1)
or
(b) Explain Space wave propagation and factors affecting space wave propagation(CO1)

12. (a)Explain the working principle of microwave dish antenna (CO2)
or
(b) Distinguish between broadside and end fire array (CO2)

13. (a)Explain the working principle of GUNN diode and state its applications (CO3)

or

(b)Explain the working principle of Travelling Wave Tube amplifier (CO3)

14. (a)Draw and explain the block diagram of Continuous Wave(CW) RADAR (CO4)

or

(b) Draw and explain the Moving Target Indicator (MTI) RADAR (CO4)

15. (a) Draw and explain block diagram of a satellite communications system (CO5)

or

(b)Explain the application of satellite in GPS (Global Position System) (CO5)

Part-C **1×10=10**

Instructions: (1) Answer the question given below. It carries 10 marks
(2) Answer should be comprehensive and the criterion for valuation is the content but not the length of the answer.

16. What is the impact on trajectory of electrons in the interaction space of a magnetron under the influence of RF voltage to produce self-consistent mode of oscillations (CO3)

-o0o-

PROGRAMMING IN C& MATLAB

Course Code	Course title	No of periods/week	Total no of periods	Marks for FA	Marks for SA
EC-405	PROGRAMMING IN C & MATLAB	05	75	20	80

S No	Unit Title	No. of Periods	COs Mapped
1	C Programming Basics	10	CO1
2	Conditional statements and arrays	17	CO2
3	Strings, Functions & Pointers	17	CO3
4	Structures &unions	14	CO4
5	Basics of MATLAB	17	CO5
	Total	**75**	

Course Objectives	1. To familiarize with programming in C language and MATLAB
	2. To understand the programming in C language and MATLAB
	3. To learn the practical importance and applications of programming in C language and MATLAB

CO No		COURSE OUTCOMES
CO1	**EC-405.1**	Describe the basics of C Programming.
CO2	**EC-405.2**	Explain conditional statements and Arrays of C Programming
CO3	**EC-405.3**	Analyse the use of strings, functions and pointers C programming.
CO4	**EC-405.4**	Describe the structures and unions in C-Programming.
CO5	**EC-405.5**	Describe the basics of MATLAB

CO-PO/PSO MATRIX

CO No	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
EC-405.1	3	1			1			3	1	1
EC-405.2	3	2	2		1			3	2	2
EC-405.3	3	2	2		1			3	2	2
EC-405.4	3	2	2		1			3	2	2
EC-405.5	3	2	2	2	1		2	3	2	2
Average	3	1.8	2	2	1		2	3	1.8	1.8

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

LEARNING OUTCOMES

1.0 C Programming Basics

1.1 Give the structure of C program
1.2 Mention the character set of C language.
1.3 Define the Keywords and list them
1.4 List the data types used in C
1.5 i)Define constants and variables
ii)Explain the declaration& initialization of variables.
1.6 List the five Arithmetic Operators supported by C
1.7 Define an expression and show how to evaluate an Arithmetic Expression
1.8 i) Define the assignment statement and give the syntax of assignment statement
ii) Write the syntax for nested assignment statement
iii) List the compound/shorthand assignment operators
1.9 Explain the increment and decrement operators.
1.10 Explain printf () and scanf () functions with examples.
1.11 Mention various type conversion techniques and discuss them
1.12 List the four relational operats used in C
1.13 Give the operator precedence.
1.14 List the three logical operators supported by C
1.15 List the three bitwise logical operators

2.0 Conditional Statements and Arrays

2.1 Describe the conditional expression
2.2 List the four conditional statements supported by C
2.3 Write the syntaxes of the following conditional statements and explain
i. If
ii. If.. else.
iii. Nested if …else
2.4 Write the syntax of switch case statement and explain.

2.5 Write simple programs based on conditional statements.
i) Write a program to find whether a given year is leap year or not
ii) Write a program to find biggest of three numbers
iii) Write a program to check whether a given number is even or odd by using bitwise logical operator
iv) Write a program to check whether a given character is vowel or consonant by using switch case statement
v) Write a program to perform arithmetic operations using switch case statement

2.6 List the three types of iterative statements supported by C

2.7 Write the syntaxes of the following iterative statements and explain
i. while
ii. for
iii. do… while

2.8 Differentiate while & do while loops

2.9 Differentiate break & continue statements

2.10 Write the syntax of nested loops and explain

2.11 Write programs based on iterative statements.
i) Write a program to find sum of n natural numbers
ii) Write a program to find sum of digits of a given number
iii) Write a program to check whether a given number is Armstrong or not
iv) Write a program to print fibonacci series using loops.
v) Write a program to print even and odd numbers
vi) Write a program to check whether a given number is prime number or not
vii) Write a program to print prime numbers between two given numbers
viii) Write a program to check whether a given number is PALINDROMEor not

2.12 i) Define an Array.
ii) Explain declaration and initialization of One Dimensional Array.
iii) Explain accessing the elements in the Array.

2.13 i) Write a C program to find largest / smallest number in an array
ii) Write a C program to sort the numbers in an array in ascending order
iii) Write a C program to find sum of elements of an array

2.14 Explain declaration and initialization of two Dimensional Arrays.

2.15 Write a C program to perform matrix addition/subtraction/Multiplication

3.0 Strings, Functions & Pointers

3.1 Define String

3.2 Explain different functions used for reading and writing strings with examples

3.3 Explain the String manipulation functions strcat(),strcmp(),strcpy() and strlen() with examples.

3.4 State the use of function in C

3.5 Explain declaration of a function in program

3.6 Write the operation of getchar(),getch(),getche() and putchar() functions

3.7 State the use of return statement.

3.8 Explain passing of parameters to the function

3.9 Write simple programs on functions call techniques

3.10 Define a pointer.
3.11 Declare a pointer, assign a pointer, initialize a pointer
3.12 Explain pointer arithmetic operations with examples
3.13 Differentiate address and dereferencing operators.

4.0 Structures & unions

4.1 Define a structure in C
4.2 Write the syntax of structure declarationand explain
4.3 Explain the method of declaring a structure variable
4.4 Explain the method of initializing a structure variable
4.5 Explain the method of accessing of members of a structure
4.6 Illustrate structures with a program to read & print a book database consisting of Title of book, author, no. of pages, price as fields
4.7 Explain how to find size of a structure
4.8 Define a Union
4.9 Differentiate between structure and union
4.10 State the function of pre-processor directives in C
4.11 List the six pre-processor directives.
4.12 Explain the conditional pre-processor directives with examples
4.13 Explain the unconditional pre-processor directives with examples

5.0 Basics of MATLAB

5.1 State the need for MATLAB in solving engineering problems
5.2 List the major differences between C and MATLAB
5.3 List the arithmetic operators, relational operators, logical operators in MATLAB
5.4 Differentiate element wise multiplication/division/power operations and array multiplication/division/power operations
5.5 State the usage of
i)linspace operator
ii)clc,clear,who, whos commands
5.6 Give the syntax and usage of decision making statements : i) if…end statement;
ii) if..else..end statement used in MATLAB
5.7 Give the syntax and usage of loop statements : i) while loop ii) for loop used in MATLAB
5.8 Explain the creation 1D & 2D arrays and mXn matrices in MATLAB
5.9 Illustrate with an example the matrix operations such as : i) addition ;ii) subtraction; iii) multiplication; iv) transpose and v) inverse using MATLAB
5.10 List the common input/output functions in MATLAB.
5.11 Illustrate plot commands such as: i) plot(x,y) ;ii) fplot() iii) title(); iv) xlabel(); v) ylabel(); vi) ezplot() vii) subplot() viii) bar() ix) pie() in MATLAB
5.12 State the usage of :
i) SIMULINK
ii) GUI

COURSE CONTENT

1. C-Programming Basics

Structure of a C program - Character Set –keywords – Data types -Constants, Variables – Arithmetic operators- evaluation of expression– Assignment statement –Nested assignment statement – Compound assignment operators- Increment, Decrement operators- printf() and scanf() functions – Operator precedence – Relational, Logical, Bitwsie logical operators

2. Conditional Statements and arrays

Conditional expression- conditional statements - If, If-else, Nested If else–Switch case statement- iterative statements:-While, for, do-while- Break, Continue -Nested loops - -1D Array declaration, Initialization - 2D Array declaration, Initialization -Accessing of Array elements

3. Strings, Functions & pointers

Define string - Reading and writing strings –String manipulation functions –function call - Return statement, passing parameters to function- Function calls - Pointer declaration-address and dereferencing operators.

4. Structures & Unions

Structure features - structure variable, declaration and Initialization - Accessing of Structure members- Unions -differentiate structure and union – Pre-processor directives

5. Basics of MATLAB

Need for Matlab - Difference between Matlab and C -Arithmetic,relational, logical operators-element wise multiplication/division/power operations and array multiplication/division/power operations –linespaceoperator – clc,clear,who,whos commands-decision making statements -
Loop statements –arrays and matrices -working with matrices –input/output functions – plotting commands- SIMULINK-GUI

REFERENCE BOOKS

1. BalaguruSwamy.E, Programming in ANSI C, , 3rd Edition, TMH
2. Kamthane, Programming with ANSI and Turbo C, Pearson Education
3. Gottfried (Schaum Series), Programming in C, McGraw Hill
4. ReemaThareja, Programming in C by, Oxford university press.
5. YashwantKanetkar, Let us C, BPB Publication, New Delhi
6. Pratap,Getting Started with MATLAB: A Quick Introduction for Scientists and Engineers, Oxford University Press
7. Ram N.patel , Ankush mittal,Programing in MATLAB: aproblem solving approach , PERSON

BLUE PRINT:

Sl No	Unit Title	No of Periods	Weightage Allotted	Marks Wise distribution of weightage				Question Wise distribution of weightage				COs mapped
				R	U	Ap	An	R	U	Ap	An	
1	C Programming Basics	10	6	3	3	-	-	1	1	-	-	CO1
2	Conditional statements and arrays	17	22	3	3	16	-	1	1	2	-	CO2
3	Strings, Functions & Pointers	17	24	3	3	8	10	1	1	1	1	CO3
4	Structures & unions	14	14	3	3	8	-	1	1	1	-	CO4
5	Basics of MATLAB	17	14	3	3	8	-	1	1	1	-	CO5
Total		**75**	**80**	15	15	40	10	5	5	5	1	

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 3.10
Unit Test-II	From 3.11 to 5.12

(Model Paper) **C –20, EC -405**

State Board of Technical Education and Training, A. P

Diploma in Electronics and Communication Engineering (DECE)

IV Semester

Subject Name: Programming in C & MATLAB

Sub Code: EC - 405

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 the following blanks with one word
   a) _____ symbol represents assignment operator (CO1)
   b) ++a is the syntax of post increment (State True/False) (CO1)
   c) Switch case is an example for iterative statement (State True/False) (CO2)
   d) && symbol represents which operator in C _____ (CO1)
2. List six relational operators in C (CO1)
3. Define an Array. (CO2)
4. Distinguish between break and continue statements. (CO2)
5. Define String (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 increment and decrement operators (CO1)

   or

   (b) Explain bitwise logical operators (CO1)

7. (a) Write the syntaxes of the following decision making statements and explain (CO2)
   iv. If.. else statement
   v. Nested if …else statement

   or

   (b)Write the syntaxes of the following loop control statements and explain (CO2)
   iv. for
   v. while

8. (a) Write a C program to sort the numbers in an array in ascending order (CO2)

   or

   (b) Write a C program to perform matrix addition. (CO2)

-o0o-

(Model Paper) **C –20, EC -405**

State Board of Technical Education and Training, A. P

Diploma in Electronics and Communication Engineering (DECE)

IV Semester

Subject Name:Programming in C & MATLAB

Sub Code: EC- 405

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. Fill the following blanks with one word

   a) _____key word is used in the declaration of structure (CO4)

   b) Pointer is a variable which stores the address of anothervariable **(State True/False)** (CO3)

   c) Write any one conditional pre-processor directive (CO4)

   d) In MATLAB declaration of variables is necessary before we initialize them **(State True/False)** (CO5)

2. Define a pointer (CO3)
3. Define a structure in C (CO4)
4. Differentiate structure and union in any three aspects (CO4)
5. Distinguish the major differences between C and MATLAB (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) Explain pointer arithmetic operations with examples. (CO3)

   or

   (b)Explain passing of parameters to the function (CO3)

7. (a)Explain the method of accessing of members of a structure. (CO4)

   or

   (b)Illustrate structures with a program to read & print a book database consisting of Title of book, author, no. of pages, price as fields (CO4)

8. (a)Explain with an example the matrix operations such as :i) addition ;ii) subtraction; iii) multiplication; iv) transpose and v) inverse using MATLAB (CO5)

   or

   (b)Illustrate plot commands such as: i) plot(x,y) ;ii) fplot() iii) title(); ivi) xlabel(); v) ylabel(); vi) subplot() in MATLAB

-o0o-

MODEL PAPER
BOARD DIPLOMA EXAMINATIONS
C-20, EC-405, PROGRAMMING IN C & MATLAB
IV SEMESTER
SEMESTER 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. List any six relational operators used in C. (CO1)
2. Write the syntax for nested assignment statement (CO1)
3. Define an Array. (CO2)
4. Distinguish between break and continue statements. (CO2)
5. Define a String (CO3)
6. Describe the use of return statement in C (CO3)
7. Define a structure in C (CO4)
8. Differentiate structure and union in any three aspects (CO4)
9. State the need for MATLAB in solving engineering problems (CO5)
10. Distinguish the major differences between C and MATLAB (CO5)

Part-B **5×8=40**

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.

11. (a) Write the syntaxes of the following decision making statements and explain (CO2)
    vi. If statement
    vii. If.. else statement
    viii. Nested if …else statement

    or

    (b)Write the syntaxes of the following loop control statements and explain (CO2)
    vi. for
    vii. while
    viii. do… while

12. (a) Write a C program to sort the numbers in an array in ascending order (CO2)

    or

    (b) Write a C program to perform matrix addition. (CO2)

13. (a)Explain the String handling functions strcat(),strcmp(),strcpy() and strlen() with examples. (CO3)

or

(b)Write a c program to check whether a given number is palindrome or not (CO3)

14. (a)Explain the method of accessing of members of a structure. (CO4)

or

(b)Illustrate structures with a program to read & print a book database consisting of Title of book, author, no. of pages, price as fields (CO4)

15. (a)Explain with an example the matrix operations such as : i) addition ;ii) subtraction; iii) multiplication; iv) transpose and v) inverse using MATLAB (CO5)

or

(b)Illustrate plot commands such as: i) plot(x,y) ;ii) fplot() iii) title(); ivi) xlabel(); v) ylabel(); vi) subplot() in MATLAB (CO5)

Part-C **1×10=10**

Instructions: (1) Answer the question given below. It carries 10 marks
(2) Answer should be comprehensive and the criterion for valuation is the content but not the length of the answer.

16. With an example, analyse for values parameters namely pointer and value in a function before and after its modification (CO3)

-o0o-

Electronic Circuits-II Lab

Course Code	Course title	No of periods/week	Total no of periods	Marks for FA	Marks for SA
EC-406	Electronic Circuits-II Lab	04	60	40	60

S No	Unit Title	No. of Periods	COs Mapped
1	Wave Shaping Circuits	08	CO1
2	Operational Amplifier Circuits	28	CO2
3	Timers	08	CO3
4	PSpice or equivalent software simulation	16	CO4
	Total	60	

Course Objectives	1. To construct wave shaping circuits, OP-AMP circuits, timers and observe waveforms..
	2. To simulate wave shaping circuits, OP-AMP circuits, timers using simulation software.
	3. To learn the practical importance of wave shaping circuits, OP-AMP circuits, timers.

CO No		COURSE OUTCOMES
CO1	**EC-406.1**	Construct the waveshaping circuits and observe the waveforms.
CO2	**EC-406.2**	Construct the Circuits using OP-AMP and observe the waveforms.
CO3	**EC-406.3**	Construct Timer circuits using 555 IC timer.
CO4	**EC-406.4**	Simulate wave shaping circuits, OP-AMP circuits, timers using P-spice or equivalent.

CO-PO/PSO MATRIX

CO No	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
EC-406.1	3		2			3		3		
EC-406.2	3	2	2		2	3		3	2	2
EC-406.3	3	2	2		2	3		3	2	2
EC-406.4	3	2	2	3	2		3	3	3	2
Average	3	2	2	3	2	3	3	3	2.3	2

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

LEARNING OUTCOMES:

I. Wave shaping circuits

1. Construct different Positive and negative clipper circuits and obtain output waveforms with sinusoidal input
2. Realize a Clamper circuit and observe the input and output waveforms on CRO

II. Operational Amplifier Circuits

3 Implement and test 741 Op-Amp as a) inverting amplifier, b) Non Inverting amplifier and c) Voltage follower (Buffer) – observe wave forms

4. Implement and test 741 Operation amplifier as
   a) Summer b) Differentiator c) Integrator d) Scale changer

5 Implement Monostable multi vibrator using Op-Amp and observe output waveform on CRO

6. Implement Astablemultivibrator using Op-Amp and observe output waveform on CRO

7 Implement Schmitt trigger using Op-Amp and observe output waveform on CRO

8. Implement RC-phase shift oscillator Circuit using Op-Amp and observe output waveform on CRO

9.Implement Wien bridge oscillator Circuit using Op-Amp and observe output waveform on CRO

III. 555 Timer

10. Implement Monostable multi vibrator using 555 IC and observe output waveform on CRO
11. Implement Astable multi vibrator using 555 IC and observe output waveform on CRO

IV. PSpiceor equivalent software simulation

12 Simulate a) Summer b) Differentiator c) Integrator and c) Scale changer using Op-Amp

13 Simulate Monostablemultivibrator using Op-Amp

14 Simulate Astablemultivibrator using Op-Amp

15 Simulate Monostableand Astablemultivibrator using 555 IC

Microprocessors lab

Course Code	Course title	No of periods/week	Total no of periods	Marks for FA	Marks for SA
EC-407	**Microprocessors lab**	03	45	40	60

S No	Unit Title	No. of Periods	COs Mapped
1	Familiarization of Assembler (TASM /MASM/EMU8086)	3	CO1
2	8086 programs to practice data transfer instructions	6	CO2
3	8086 programs to practice Arithmetic instructions	12	CO3
4	8086 programs to practice logical/bit manipulation instructions	9	CO4
5	8086 programs to practice branching instructions	15	CO4
	Total	45	

Course Objectives	1. To familiarize with programming in Assembly language of 8086 microprocessors
	2. To understand the programming in Assembly language of 8086 microprocessors
	3. To learn the practical importance and applications of programming in Assembly language of 8086 microprocessors

CO No		COURSE OUTCOMES
CO1	**EC-407.1**	Describe the usage of TASM/MASM/EMU8086
CO2	**EC-407.2**	Apply data transfer instructions in Assembly language of 8086 microprocessors
CO3	**EC-407.3**	Apply Arithmetic instructions in Assembly language of 8086 microprocessors
CO4	**EC-407.4**	Apply bit manipulation and branching instructions in Assembly language of 8086 microprocessors

CO-PO/PSO MATRIX

CO No	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
EC-407.1	3	1		2				3	2	1
EC-407.2	3	2	3	2				3	2	
EC-407.3	3	2	3	2				3	2	
EC-407.4	3	2	3	2				3	2	
Average	3	1.75	3	2				3	2	1

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

LEARNING OUTCOMES:

1. **Familiarization of Assembler (TASM /MASM/EMU8086)**

2. **8086 programs to practice data transfer instructions**
   i) Program to perform block transfer of data
   ii) Program to perform block interchange
   iii) Program to fill a given block of memory with 00h or FFh

3. **8086 programs to practice arithmetic instructions**
   i) Program to perform 16-bit addition.
   ii) Program to perform 16-bit subtraction
   iii) Program to perform 16-bit multiplication.
   iv) Program to perform 16-bit division
   v) Program to find factorial of 8-bit data

4. **8086 programs to practice logical/bit manipulation instructions**
   i) Program to find 2's complement of given 16 bit number
   ii) Program to check whether the given number is even or odd
   iii) Program to convert binary code to gray code

5. **8086 programs to practice branching instructions**
   i) Program to find the sum of first 'n' natural numbers
   ii) Program to find the sum of given 'n' numbers
   iii) Program to find biggest/smallest number in the given array
   iv) Write an assembly language program to count number of ones and zeros in a given binary number.

Communication Skills

Course Code	Course Title	No. of Periods/Week	Total No. of Periods	Marks for FA	Marks for SA
EC-408	Communication Skills	3	45	40	60

S. No.	Unit Title	No of Periods	COs Mapped
1	**Listening Skills**	6	CO1
2	**Introducing Oneself**	3	CO1, CO2, CO3
3	**Short Presentation (JAM)**	6	CO1, CO2, CO3
4	**Group Discussion**	6	CO1, CO2, CO3
5	**Preparing Resume with Cover Letter**	3	CO3
6	**Interview Skills**	9	CO1, CO2, CO3
7	**Presentation Skills**	9	CO1, CO2
8	**Work place Etiquette**	3	CO1, CO2
Total Periods		**45**	

Course Objectives	To comprehend the features of communication needed for professional success and display the use of these competently
	To present ideas, opinions in group discussions and presentations on topics of general and technical interest
	To prepare for job selection processes

CO No.	Course Outcomes
CO1	Interacts in academic and social situations by comprehending what is listened to when others speak.
CO2	Demonstrates effective English communication skills while presenting ideas, opinions in group discussions and presentations on topics of general and technical interest.
CO3	Exhibits workplace etiquette relevant in classroom situations for easy adaptation in professional setting in the future.

CO-PO Matrix

Course Code EC-408	**Course Title: English Number of Course Outcomes: 4**				**No. of Periods: 45**
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 Communication Skills Course however interactive 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	CO1, CO2, CO3	11	25%		>60%: Level 3
PO6	CO1, CO2, CO3	27	60%		16 -59%: Level 2
PO7	CO1, CO2, CO3	7	15%		Up to 15%: Level 1

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

Mapping Course Outcomes with Program Outcomes:

CO	**PO 1**	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**
CO 1					✓	✓	✓
CO 2					✓	✓	✓
CO3					✓	✓	✓

Blue Print for evaluation based on Course Outcomes for SA:

Note: Every Question based on CO has to be given marks for the following parameters of communication in the rubric.

- Fluency and Coherence
- Lexical Resource (Vocabulary)
- Grammatical Range and Accuracy

***Rubric Descriptors 'Good/ Competent / Fair /Poor' for Communication**

LEVEL OF COMPETENCE	Fluency and Coherence	Lexical Resource (Vocabulary)	Grammatical Range and Accuracy
GOOD (9-10*)	Speaks at length without noticeable effort or loss of coherence. May demonstrate language-related hesitation at times, or some repetition and/or self-correction.	Uses vocabulary resources flexibly during discussion. Uses paraphrase effectively.	Uses a range of complex structures with some flexibility.
	Uses a range of connectives and discourse markers with some flexibility. **Articulates and adapts to near naturalization.**	Uses some less common vocabulary and shows some awareness of style and collocation	Mostly produces error-free sentences.
COMPETENT (6-8)	Is willing to speak at length, though may lose coherence at times due to occasional repetition, self-correction or hesitation.	Has enough vocabulary to discuss topics and make meaning clear in spite of inappropriacies.	Uses a mix of simple and complex structures, but with limited flexibility.
	Uses a range of connectives and discourse markers but not always appropriately.	Generally paraphrases successfully	May make mistakes with complex structures though these rarely cause comprehension problems.
FAIR (3-5)	Tries to maintain a flow of speech but t uses repetition, self correction and/or slow speech to keep going.	Manages to talk about familiar and unfamiliar topics but uses vocabulary with limited flexibility.	Produces only basic sentence forms, however, errors persist.
	Produces simple speech fluently, but more complex communication causes fluency problems.	Attempts to use paraphrase but with mixed success.	Uses a limited range of more complex structures, but these usually contain errors and may cause some comprehension problems
POOR (0 *-2)	Speaks with long pauses. Pauses lengthy before most words. **Merely imitates**	Uses simple vocabulary to convey personal information	Attempts basic sentence forms but with limited success, or relies on apparently memorized utterances
	Has limited ability to link simple sentences	Has insufficient vocabulary for less familiar topics	Makes numerous errors except in memorized expressions
	Gives only simple responses and is frequently unable to convey basic message	Only produces isolated words or memorized utterances	Struggles to produce basic sentence forms

s*10 marks to be awarded only if competence level shows flawless expertise in English.
***0 marks to be awarded when student shows incoherence and gives irrelevant responses.**

Blue Print for evaluation based on Course Outcomes for SA of each student:

Note: Marks are awarded for each student as per the Rubric descriptors.

S. No.	Questions based on Course Outcomes	Periods Allocated for practical work	Marks Wise Distribution of Weightage	Marks allotment for each Student in the Rubric*				Mapping of COs
				Poor 0-2	Fair 3-5	Competent 6-8	Good 9-10	
1	Describe the given object in a minute	6	10					CO 2
2	Exchange ideas/ views in a group discussion on _____ issue (academic, technical or social)	6	10					CO1, CO 2
3	Present your ideas /opinions on the given issue/ topic (individual to an audience)	9	10					CO1, CO2, CO 3
4	Role play an imaginary work-place situation	6	10					CO1, CO2, CO 3
5	Individual interaction with the Examiner duly submitting Resume (Facing the Interview) – Introducing oneself and answering questions	12	10					CO1, CO2, CO 3
6	*Listen to and comprehend any audio communication/ content	6	10					CO1, CO2, CO 3
TOTAL		**45**	**60**					

***Listen to and comprehend the given audio content**: Giving the Students time to read the questions (Fill in the Blanks, Select from Alternatives, True or False, Table fill, etc.) in chunks before listening to audio inputs also played in chunks.

Blue Print for evaluation based on Course Outcomes for Formative Assessment:

Note: Every Question based on CO has to be given marks for the following parameters in the rubric.

- Fluency and Coherence
- Lexical Resource
- Grammatical Range and Accuracy

S. No.	Questions based on Course Outcomes	Periods Allocated for practical work	Marks Wise Distribution of Weightage	Marks allotment for each Student in the Rubric*				Mapping of COs
				Poor 0-2	Fair 3-5	Competent 6-8	Good 9-10	
Formative Assessment - 1								
1	Describe the given object in a minute	3	10					CO 2
2	Exchange ideas/ views in a group discussion on _____ issue (academic, technical or social)	6	10					CO1, CO 2
3	Present your ideas /opinions on the given issue/ topic (individual to an audience)	6	10					CO1, CO2, CO 3
4	*Listen to and comprehend any audio communication/ content	3	10					CO1, CO2, CO 3
Total		**18**	**40**					
Formative Assessment -2								
1	Present your ideas /opinions on the given issue/ topic (individual to an audience)	3	10					
2	Role play an imaginary work-place situation	6	10					CO1, CO2, CO 3
3	Individual interaction with the Examiner duly submitting Resume (Facing the Interview) – Introducing oneself and answering questions	15	10					CO1, CO2, CO 3
4	*Listen to and comprehend any audio communication/	3	10					CO1, CO2, CO 3

	content							
TOTAL		**27**	**40**					

Learning Outcomes

1. **Listening Skills:**
   - 1.1 Listen to audio content (dialogues, interactions, speeches, short presentations) and answer questions based on them
   - 1.2 Infer meanings of words / phrases / sentences / after listening to audio content as mentioned above
2. **Introducing Oneself:**
   - 2.1 Prepare a grid different aspects for presentation about a person / oneself
   - 2.2 Present a 1 or 2 minute introduction of oneself for an audience
3. **Short Presentation:**
   - 3.1 Define an object
   - 3.2 Describe an object, phenomenon, event, people
   - 3.3 Speak on a topic randomly chosen
4. **Group Discussion:**
   - 4.1 Practice Group Discussion. Techniques
   - 4.2 Participate in group discussions
5. **Resume Writing and Cover Letter:**
   - 5.1 Prepare resumes of different sorts – one's own and others.
   - 5.2 Write an effective cover letter that goes with a resume
6. **Interview Skills:**
   - 6.1 Prepare a good Curriculum Vitae
   - 6.2 Exhibit acceptable (Greeting, Thanking, Answering questions with confidence)
7. **Presentation Skills:**
   - 7.1 Prepare Posters, Charts, PPT's on issue of general and technical interest
   - 7.2 Present one's ideas before an audience with confidence using audio visual aids and answer questions that are raised.
8. **Workplace Etiquette:**
   - 8.1 Show positive attitude & adaptability / appropriate body language to suit the work place
   - 8.2 Display basic of etiquette like politeness, good manners.

C& MATLAB Practice Laboratory

Course Code	Course title	No of periods/week	Total no of periods	Marks for FA	Marks for SA
EC-409	C & MATLAB Practice Laboratory	03	45	40	60

S No	Unit Title	No. of Periods	COs Mapped
1	C compiler Basics, programs on Decision & Loop Control Statements	9	CO1
2	Programs on functions, Arrays, Strings in C	9	CO2
3	Programs on Pointers, Structures and Unions in C	9	CO3
4	MAT Lab Practice	18	CO4
	Total	45	

Course Objectives	1. To familiarize with programming in C and MATLAB
	2. To understand the programming concepts of C and MATLAB
	3. To learn the practical importance and applications of programming in C and MATLAB.

CO No		COURSE OUTCOMES
CO1	**EC-409.1**	Describe the usage of C Compiler, programs on Decision & Loop Control Statements
CO2	**EC-409.2**	Apply functions , arrays and strings in C language
CO3	**EC-409.3**	Apply pointers, structures and unions in C Language.
CO4	**EC-409.4**	Practice on basics of MATLAB.

CO-PO/PSO MATRIX

CO No	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
EC-409.1	3	2	2					3	1	
EC-409.2	3	2	2		1			3	1	1
EC-409.3	3	2	2		1			3	1	1
EC-409.4	3	2	2	3	1		3	3	3	1
Average	3	2	2	3	1		3	3	1.5	1

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

LEARNING OUTCOMES:

I. C Programming Basics

1. Familiarize with turbo C Compiler or equivalent compiler features
2. Practice formatted Input / Output (printf and scanf) functions.
3. Practice with various operators in C

II. Decision & Loop Control Statements

1. Practice with decision & control (if, if-else, nested if –else) Statements
2. Practice with decision control (Switch –case structure) statements
3. Practice with loop control Statements

III. Exercises on functions

1. Practice the use of functions in C

IV. Arrays, Strings and Pointers in C

1. Write and run small programs using single dimensional integer arrays
2. Write and run small programs using multidimensional integer arrays
3. Write and run small programs using string functions for string comparison, copying and concatenation
4. Write and run small programs using with pointers in 'C'

V. Structures and Unions

1. Write and run small programs using Structures& Unions in C

VI. MAT LAB PRACTICE

1. Familiarize with MATLAB Compiler environment, command line arguments, HELP and know about various tool boxes available in MATLAB
2. Write simple programs on decision making statements (if-end, if-else-end, nested if –else-end)
3. Write simple programs on loop control statements (while , for loops)
4. Write simple programs to create simple 1D & 2D arrays and perform addition & subtraction operations

5. Write simple programs to create 3X3 matrixes and perform : i) addition ;ii) subtraction; iii) multiplication; iv) transpose and v) inverse operations
6. Write simple programs to illustrate plot commands such as: i) plot(x,y) ;ii) fplot() iii) title(); iv) xlabel(); v) ylabel(); vi) legend() in MATLAB
7. Know the procedure to convert MATLAB program to C code

Advanced Communications Lab

Course Code	Course title	No of periods/week	Total no of periods	Marks for FA	Marks for SA
EC-410	Advanced Communications Lab	04	60	40	60

S No	Chapter/ Unit Title	No. of Periods	COs Mapped
1.	Microwave Communications	35	CO1, CO2
2.	Antennas	25	CO3, CO4
	Total	60	

Course Objectives	1. To familiarise with microwave devices, Antennas.
	2. To handle the microwave bench to perform various measurements.
	3. To learn the practical importance of microwave devices and Antennas.

CO No		COURSE OUTCOMES
CO1	**EC-410.1**	Use different microwave components and devices.
CO2	**EC-410.2**	Conduct experiments on Microwave work bench for measurement of Impedence, frequency and VSWR.
CO3	**EC-410.3**	Study the Antenna Trainer kit working
CO4	**EC-410.4**	Plot the radiation patterns of different Antennas.

CO-PO/PSO MATRIX

CO No	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
EC-410.1	3	2		2		3	2	3	1	1
EC-410.2	3	2	2	2	1	3	2	3	2	2
EC-410.3	3	2		2		3	2	3	2	2
EC-410.4	3	2	2	2	3	3	3	3	2	3
Average	3	2	2	2	2	3	2.25	3	1.75	2

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

LEARNING OUTCOMES:

1.0 Microwave Communications

1. Study of microwave components such as rectangular wave guide, fixed attenuators (x-5000 series), tunable probe, wave guide detectable mount (tunable),
2. Study of Klystron mount, circulators, slide screw tuners, multitone directional couplers,
3. Study of E-plane Tee, H-plane Tee, Magic Tee, Movable short, matched termination, pyramidal wave guide horn antenna,
4. Conduct an experiment to plot the Characteristics of Reflex Klystron
5. Conduct an experiment to plot the Characteristics of Gunn diode
6. Conduct an experiment to measure VSWR
7. Conduct an experiment to determine the unknown impedance of a rectangular wave guide
8. Conduct an experiment to determine the frequency in a rectangular wave guide

2.0 Antennas

1. Plot the radiation pattern of simple dipole antenna
2. Plot the radiation pattern of simple half wave dipole antenna
3. Plot the radiation pattern of simple folded dipole antenna
4. Study the radiation pattern of parabolic antenna

V SEMESTER

FIFTH SEMESTER

Subject Code	Name of the Subject	Instruction period / week		Total Periods / Sem	Scheme of Examination			
		Theory	Practical /Tutorial		Duration (hours)	Sessional Marks	End Exam Marks	Total Marks
THEORY								
EC -501	Industrial Management & Smart Technologies	5		75	3	20	80	100
EC-502	Microcontrollers And Applications	5	-	75	3	20	80	100
EC-503	Optical & Mobile Communications	5	-	75	3	20	80	100
EC-504	Industrial Electronics	5	-	75	3	20	80	100
EC-505	Computer Hardware &Networking	5	-	75	3	20	80	100
PRACTICAL								
EC-506	Microcontrollers lab	-	4	60	3	40	60	100
EC-507	Industrial Electronics Lab	-	4	60	3	40	60	100
EC-508	Life Skills	-	3	45	3	40	60	100
EC-509	Computer Hardware &Networking lab	-	3	45	3	40	60	100
EC-510	Project Work	-	3	45	3	40	60	100
TOTAL		**25**	**16**	**630**	**-**	**300**	**700**	**1000**

INDUSTRIAL MANAGEMENT & SMART TECHNOLOGIES

Course Code	Course title	No of periods/week	Total no of periods	Marks for FA	Marks for SA
EC-501	INDUSTRIAL MANAGEMENT & SMART TECHNOLOGIES	05	75	20	80

S.no	Unit Title	No.of Periods	CO'S Mapped
1	Basics of Industrial Management, Organisation structure & Organisational behaviour	20	**CO1**
2	Electronic Product design and Development stages	20	**CO2**
3	Electronic Product testing & documentation	15	**CO3**
4	EntrepreneurshipDevelopment.	10	**CO4**
5	Smart technologies	10	**CO5**
Total Periods		**75**	

COURSE OBJECTIVES:

COURSE OBJECTIVES	(i)	To familiarise the concepts of management, ownership styles, organisationstructures and smart technologies.
	(ii)	To get Exposure to organisational behavioural concepts, basics of Electronic Product design, Development, testing and documetation stages in Electronic industries.
	(iii)	To Understand the concept EntrepreneurshipDevelopment inindustries.

COURSE OUTCOMES:

CO No		COURSE OUTCOMES
CO1	**EC-501.1**	Explain the basics of management, Organisation structure & Organizational behaviour as applied to industry
CO2	**EC-501.2**	Explain Product Design and Development Stages applied to electronic industries
CO3	**EC-501.3**	Analyse the testing standardisation for Electronic products.
CO4	**EC-501.4**	Describe the role of entrepreneur in economic development and in improving the quality of life
CO5	**EC-501.5**	Explain about Smart technologies

CO-PO/PSO MATRIX

CO No	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
EC-501.1	1							1		
EC-501.2	3	2	3		2		2	3	2	2
EC-501.3	3	2	3	3	2		2	3	2	2
EC-501.4	1				1			1		3
EC-501.5	3			3	3		3	3	2	2
Average	2.2	2	3	3	2		2.3	2.2	2	2.25

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

LEARNING OUTCOMES:

1. Basics of IndustrialManagement, OrganizationStructure&organizationalbehaviour

1.1 Define industry, commerce (Trade) andbusiness.

1.2 State the need formanagement.
1.3 State the functions ofManagement.
1.4 Explain the principles of scientificmanagement.
1.5 Differentiate: i) management andadministration.
ii) Supervisory, middle and Top levelmanagement
1.6 Explain: types of ownerships; the organisation structure of an industry; and, the behaviour of an individual in an organisation.
1.7 Explain the line, staff and Functionalorganizations; Authority and ResponsibilityRelationships
1.8 Distinguish between delegation anddecentralization
1.9 Explain the factors of effectiveorganisation.
1.10 State motivationtheories.
1.11 ExplainMaslow'sHierarchyofneeds.
1.12 List out different leadershipmodels.
1.13 Explain the trait theory ofleadership and behavioural theory ofLeadership
1.14 Explain the process of decisionmaking.
1.15 Explain assessment of Human resourcerequirements
1.16 Explain the concepts of Job analysis, Job description, jobspecifications, the process of recruitment, selection, training anddevelopment
1.17 Explain different types of businessownerships and compare them
1.18 List the objectives of Employeeparticipation
1.19 Define socialresponsibilities and Corporate socialresponsibility

2. Electronic Product design and Development stages

2.1 Explain the concept of product development with a block diagram.
2.2 Give classification of Electronic Products.
2.3 Explain the Techno Commercial Feasibility of a product.
2.4 Explain customer requirements
2.5 Explain R&D prototype Assessment of reliability.
2.6 Explain factors for reliability of equipment.
2.7 Explain quality considerations.
2.8 List reasons for failure of an electronic product
2.9 Explain Bath tub curve
2.10 Explain the concept of ergonomic and aesthetic considerations of pilot production
2.11 Explain Product packaging and storage
2.12 Estimate power supply requirements of an electronic product
2.13 List two types of power supply protection devices
2.14 Define noise reduction.
2.15 Explain grounding, shielding and guarding techniques
2.16 Explain Thermal management

3. Electronic Product testing & documentation

3.1 Explain the importance of product testing and Environmental testing
3.2 Explain Dry heat testing, Vibration testing, random testing and Bump testing
3.3 Explain Temperature extreme testing for linear and step stress profiles
3.4 Explain Vibration & temperature cycling
3.5 Explain EMI and EMC compliance testing standardization
3.6 Explain UL and CE Certification of industrial electronic products.
3.7 Explain the importance of documentation
3.8 List types of documentation.
3.9 Explain types of documents
3.10 List rules for preparation of effective document

3.11 Explain PCB documentation
3.12 Explain Assembly and fabrication related documentation for Laminate grade
3.13 Explain the preparation a manual document
3.14 Explain the details of service manual
3.15 Explain test report/manuals
3.16 Explain product documentation, Bill of materials, Production test specifications

4. EntrepreneurshipDevelopment.

4.1 Define the wordentrepreneur.
4.2 Explain the requirements of anentrepreneur.
4.3 Determine the role of entrepreneurs in promoting Small ScaleIndustries.
4.4 Describe the details of self-employmentschemes.
4.5 Characteristic of successfulentrepreneurs
4.6 Explain the method of siteselection.
4.7 List the financial assistanceprogrammes.
4.8 List out the organisations that help anentrepreneur
4.9 Explain the use of EDPProgrammes
4.10 Understand the concept of make in India, Zero defect and zeroeffect
4.11 Understand the importance forstart ups
4.12 Explain the conduct of demandsurveys
4.13 Explain the conduct of a marketsurvey
4.14 Evaluate Economic and Technicalfactors.
4.15 Prepare feasibility reportstudy

5. Smart Technologies

5.1 Define the term*Internet of Things* (IoT)
5.2 Explain the concept of IoT
5.3 List the key features ofIoT
5.4 List the components of IoT : hardware, software, technology andprotocols
5.5 List the advantages and disadvantages ofIoT
5.6 List the applications of IoT
5.7 Explain the application of IoT in the context of SmartCities
5.8 Explain the application of IoT in the context of Smart Energy and the SmartGrid
5.9 Explain the application of IoT in the context of Smart Transportation andMobility
5.10 Explain the application of IoT in the context of Smart Home, Smart Buildings andInfrastructure
5.11 Explain the application of IoT in the context of Smart Factory and SmartManufacturing
5.12 Explain the application of IoT in the context of SmartHealth
5.13 Explain the application of IoT in the context of Food and Water Tracking andSecurity
5.14 Explain the application of IoT in the context of Social Networks

COURSE CONTENT

1. Basics of IndustrialManagement, Organisation Structure & organisational behaviour

Introduction: Industry, Commerce and Business; Definition of management; Functions of management - Principles of scientific management: –Administration and management;- levels of management; types of ownerships- Organisation structure- behaviour of individual in an organisation-authority and responsibility-delegation an decentralisation- effective organisation-

Motivational Theories; -Leadership Models; -decision making-Human resources requirement- Job analysis, description, specification- process of recruitment, selection, training and development- Forms of Business ownerships:- Employee participation in management; -Socialresponsibility and Corporate Socialresponsibility

2. Electronic Product design and Development stages :

Introduction, Explain The Techno Commercial Feasibility of specifications, Explain R&D prototype Assessment of reliability, Concept of Ergonomic and aesthetic considerations of pilot production, Estimating power supply requirements, Power supply protection devices, Noise reduction,. Grounding, Shielding and guarding techniques, Thermal management,

3. **Electronic Product testing and Documentation:**

Introduction to product testing,Environmental testing: Dry heat, Vibration < temperature cycling, Bump and Humidity tests as specified in IS standards, EMI EMC compliance testing standardization, UL and CE Certification of industrial electronic products-PCB documentation, Assembly and fabrication related documentation Laminate grade, drilling details Plating, bare board testing, product documentation User manual service maintenance manual Bill of materials Production test specifications

4. EntrepreneurshipDevelopment.

Definition of Entrepreneur; Role of Entrepreneur; Concept of Make In India, ZERO defect, Zero Effect, Concept of Start-up Company, Entrepreneurial Development: Role of SSI, MSME, DICs, Entrepreneurial development schemes; Institutional support, financial assistance programmes; Market survey and Demand survey; Preparation of Feasibility studyreports

5.Smart Technologies

Overview of IoT - Define IoT, how IoT work, key features of IoT, components of IoT : hardware, software, technology and protocols, advantages and disadvantages of IoT - IoT Applications - Smart Cities, Smart Energy and the Smart Grid, Smart Transportation and Mobility, Smart Home, Smart Buildings and Infrastructure, Smart Factory and Smart Manufacturing, Smart Health, Food and Water Tracking and Security, Participatory Sensing, Social Networks and IoT.

REFERENCE BOOKS

1. O.P Khanna, Industrial Engineering and Management
2. Buffa, Production Management
3. Banga& Sharma, Engineering Economics and Management Science
4. Flippo, Personnel Management
5. S.N. Chary, Production and Operations Management
6. Converging_Technologies_for_Smart_Environments_and_Integrated_Ecosystems_IERC_Book_Open_Access_2013 pages-54-76
7. Electronic Product Design, R.G.Kaduskar, V.B.Baru, Wiley India
8. Electronic testing and fault diagnosis –G.C. Loveday (Ah wheeler Publication, India)

BLUE PRINT:

Sl No	Unit Title	No of Periods	Weightage Allotted	Marks Wise distribution of weightage				Question Wise distribution of weightage				COs mapped
				R	U	Ap	An	R	U	Ap	An	
1	Basics of Industrial Management, Organisation structure & Organisational behaviour	20	17	6	11			2	2		-	CO1
2	Electronic Product design and Development stages	20	19	3	16			1	2		-	CO2
3	Electronic Product testing & documentation	15	16	3	3	10		1	1	1		CO3
4	EntrepreneurshipDevelopment.	10	14	3	11			1	2		-	CO4
5	Smart technologies	10	14	3	11			1	2		-	CO5
Total		**75**	**80**	**18**	**52**	**10**	**0**	**6**	**9**	**1**	**0**	

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 2.16
Unit Test-II	From 3.1 to 5.14

(Model Paper) **C –20, EC -501**

State Board of Technical Education and Training, A. P

Diploma in Electronics and Communication Engineering (DECE)

V Semester

Subject Name: Industrial Management & Smart Technologies

Sub Code: EC - 501

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. Answer the following questions with **one word** only
   a) Name any one objective of employee participation (CO1)
   b) Name any one power supply protection device (CO2)
   c) Name any one leadership model (CO1)
   d) Name any one functional organization (CO1)
2. List out different leadershipmodels. (CO1)
3. Distinguish between delegation anddecentralization (CO1)
4. Define noise reduction (CO2)
5. Describe any three customer requirements (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 the trait theory ofleadership and behavioural theory ofLeadership (CO1)
   or
   (b) Explain the principles of scientificmanagement (CO1)

7. (a) Explain the concept of ergonomic and aesthetic considerations of pilot production (CO2)
   or
   (b) Explain grounding, shielding and guarding techniques (CO2)

8. (a) Explain different types of businessownerships and compare them (CO1)

Or

(b) Explain the concept of ergonomic and aesthetic considerations of pilot production (CO2)

-o0o-

(Model Paper) C –20, EC -501

State Board of Technical Education and Training, A. P

Diploma in Electronics and Communication Engineering (DECE)

V Semester

Subject Name: Industrial Management & Smart Technologies

Sub Code: EC - 501

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. Answer the following questions with one word
   a) Write full form of EMI and EMC (CO2)
   b) Write any one characteristic of successful entrepreneurs (CO4)
   c) Write full form of IoT (CO5)
   d) Write any one application of IoT (CO5)
2. Give any three details of service manual (CO3)
3. State the rules needed for preparation of effective document (CO3)
4. Describe any three financial assistance programmes for the entrepreneurship (CO4)
5. Interpret any three key features of IoT that are used in smart technologies (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) Explain EMI and EMC compliance testing standardization (CO3)

   or

   (b) Explain Assembly and fabrication related documentation for Laminate grade(CO3)

7. (a) Explain the use of EDP Programmes (CO4)

   or

   (b) Explain the conduct of a market survey (CO4)

8. (a)Explain the application of IoT in the context of Smart Energy and the SmartGrid (CO5)

or

(b) Explain the application of IoT in the context of Social Networks (CO5)

-o0o-

MODEL PAPER
BOARD DIPLOMA EXAMINATIONS
C-20, EC-501, INDUSTRIAL MANAGEMENT & SMART TECHNOLOGIES
V SEMESTER
SEMESTER 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 industry, commerce (Trade) andbusiness.
2. List out different leadershipmodels. (CO1)
3. Distinguish between delegation anddecentralization (CO1)
4. Define noise reduction (CO2)
5. Describe Dry heat testing (CO2)
6. State the rules needed for preparation of effective document (CO3)
7. Define the wordentrepreneur (CO4)
8. Describe any three financial assistanceprogrammes for the entrepreneurship (CO4)
9. Define the termInternet of Things (IoT) (CO5)
10. Interpret any three key features ofIoT that are used in smart technologies (CO5)

Part-B **5×8=40**

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.

11. (a) Explain the trait theory ofleadership and behavioural theory ofLeadership (CO1)

or

(b) Explain the principles of scientificmanagement (CO1)

12. (a) Explain the concept of ergonomic and aesthetic considerations of pilot production (CO2)

or

(b) Explain grounding, shielding and guarding techniques (CO2)

13. (a) Explain R&D prototype Assessment of reliability. (CO3)

or

(b) Explain Bath tub curve(CO3)

14. (a) Explain the use of EDPProgrammes (CO4)

or

(b) Explain the conduct of a marketsurvey (CO4)

15. (a) Explain the application of IoT in the context of Smart Energy and the SmartGrid (CO5)

or

(b) Explain the application of IoT in the context of Social Networks (CO5)

Part-C **1×10=10**

Instructions: (1) Answer the question given below. It carries 10 marks

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

16. Analyze UL and CE Certifications of industrial electronic products for their Qualityand safety (CO3)

-o0o-

MICROCONTROLLERS AND APPLICATIONS

Course Code	Course title	No of periods/week	Total no of periods	Marks for FA	Marks for SA
EC-502	Microcontrollers and Applications	05	75	20	80

S No	Unit Title	No. of Periods	COs Mapped
1	Architecture of Microcontroller 8051	20	CO1
2	Instruction set of 8051 micro controller	15	CO2
3	8051 Programming Concepts	15	CO3
4	Interfacing Simple I/O devices	15	CO4
5	Advanced Microcontrollers	10	CO5
	Total	75	

Course Objectives	1. To familiarize with various microcontrollers
	2. To understand the programming and applications of 8051 microcontrollers
	3. To learn the practical importance and applications of Microcontrollers.

CO No		COURSE OUTCOMES
CO1	**EC-502.1**	Describe the Architecture of 8051 microcontroller
CO2	**EC-502.2**	Explain the instruction set of 8051 microcontroller
CO3	**EC-502.3**	Analyze 8051 programming for Arithmetic and Logical operations
CO4	**EC-502.4**	Describe the Interfacing techniques of I/O devices with 8051 micro controller.

CO5	**EC-502.5**	Describe advancements in microcontrollers.

CO-PO/PSO MATRIX

CO No	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
EC-502.1	3							3		
EC-502.2	3	3						3		
EC-502.3	3	3	3		3			3	3	3
EC-502.4	3	3	3		3		2	3	3	3
EC-502.5	3	3	3		3		3	3	3	3
Average	3	3	3		3		2.5	3	3	3

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

LEARNING OUTCOMES:

1.0 Architecture of Microcontroller 8051

1.1 List the features of micro controllers.
1.2 Compare microprocessors and microcontrollers
1.3 Give the details of 8051 microcontroller family chips
1.4 Draw the functional block diagram of 8051 microcontroller and state the function of each block
1.5 Draw the pin diagram of 8051 micro controller and specify the purpose of each pin
1.6 Explain the internal memory organization of 8051 with suitable diagram
1.7 Explain the external memory organization of 8051
1.8 List various special function registers of 8051 and state their functions
1.9 Explain PSW register of 8051
1.10 Explain the SFRs associated with timer/counters of 8051
1.11 Explain the modes of operations of counters & timers in 8051
1.12 List the interrupts of 8051
1.13 Explain the SFRs associated with interrupts of 8051
1.14 Explain the SFRs associated with serial communication of 8051
1.15 List the modes of operation of serial communication with 8051
1.16 Describe various I/O ports of 8051

2.0 Instruction set of 8051 micro controller

2.1 State the need for an instruction set
2.2 Mention the instruction format of 8051
2.3 State the terms operation code, operand and illustrate these terms by writing an instruction
2.4 Distinguish between machine cycle and T-state.

2.5 Classify the 8051 instructions into one byte, two byte and three byte instructions
2.6 Classify the 8051 instructions based on their function
2.7 List the various addressing modes of 8051and explain them with examples.
2.8 Explain various data transfer group of instructions of 8051 with examples
2.9 Explain various arithmetic instructions of 8051
2.10 State the effect of arithmetic operations on flags of 8051 with examples
2.11 Explain the logic instructions and recognize the flags that are set or reset for given data conditions
2.12 List various bit manipulation instructions of 8051 and illustrate with examples
2.13 Explain unconditional jump instructions of 8051
2.14 Explain conditional jump instructions of 8051
2.15 Explain CALL and RET instructions of 8051
2.16 State the use of NOP instruction of 8051

3.0 8051 Programming Concepts

3.1 List the various symbols used in drawing flow charts
3.2 Write programs in 8051 assembly language to illustrate the application of data copy instructions
3.3 Write programs in 8051 assembly language to perform single byte and double byte addition and subtraction.
3.4 Write programs in 8051 assembly language which use jump instructions
3.5 Write a delay subroutine to introduce time delay of given time period (in milliseconds) without using 8051 internal timer.
3.6 Write a program to introduce time delay of given time period (in milliseconds) using 8051 internal timer.
3.7 Define a subroutine and state its use.
3.8 Explain the sequence of program when subroutine is called and executed.
3.9 Explain information exchange between the program counter and the stack and identification of stack pointer register when a subroutine is called and executed.
3.10 Illustrate PUSH, POP instructions with an example.
3.11 Define the term debugging a program
3.12 Explain the principles of single step and break point debugging techniques

4.0 Interfacing Simple I/O devices

4.1 Explain the Interfacing concepts of push button switches and LEDs with 8051
4.2 Draw a diagram to connect an LED to a port pin and Write an 8051 assembly language program to blink it with a given time delay.
4.3 Interface a common cathode/anode seven segment display with 8051 and write a program to display a given decimal number
4.4 List reasons for the popularity of LCDs
4.5 State the functions of pins of 16×2 LCD module
4.6 List the instruction command codes for programming 16×2 LCD module
4.7 Explain Interfacing of 16×2 LCD module to 8051
4.8 Write an 8051 ALP to display a given message on 16×2 LCD module
4.9 Describe key bouncing problem and de-bouncing solutions
4.10 Explain the Interfacing concepts of a 4x4 Matrix Key Board with 8051 with diagram

5.0 Advanced Microcontrollers

5.1 List any four micro controller families other than 8051 family
5.2 Classify PIC microcontrollers based on number of bits
5.3 State the features of CISC architecture
5.4 State the features of RISC architecture
5.5 Compare the features of RISC and CISC architectures

5.6 State the important features of PIC16F877
5.7 List different versions of ARM processors (ARM7/ARM9/ARM11/CORTEX)
5.8 List the important features of ARM7
5.9 List any three differences between ARM7 and ARM9
5.10 Define embedded System
5.11 Compare embedded system and general computing system
5.12 List any five applications of embedded System
5.13 State the need of Real Time Operating System (RTOS)
5.14 Compare Normal OS and RTOS.

COURSE CONTENTS:

1. Architecture of Microcontroller 8051

Features of micro controllers, Compare Microprocessors and Microcontrollers, block diagram of 8051 microcontroller, pin diagram of 8051 microcontroller, internal memory & external memory organizations, various special function registers, PSW, SFRs , counters & timers, interrupts in 8051, Serial communication of 8051, I/O ports of 8051,

2. Instruction set of 8051 micro controller

Need for an instruction set, instruction format of 8051,opcode, operand, machine cycle and T-state,major groups in the instruction set, various addressing modes of 8051, data transfer, arithmetic, logical, branching and boolean instructions, one byte, two byte and three byte instructions, , unconditional and conditional jump instructions, CALL and RET instructions, NOP instruction

3. 8051 Programming Concepts

Various symbols used in drawing flow charts, programs in mnemonics to illustrate the application of data copy instructions, programs to perform single byte, double byte and multi byte addition and subtraction, the application of jump instruction in the program, program using delay subroutines, subroutine and its use, PUSH, POP instructions, single step and break point debugging techniques.

4. Interfacing Simple I/O devices

Interfacing of push button switches and LEDs, Seven segment display interface, functions of pins of LCD, Interfacing 16x2 LCD to 8051, Program LCD in assembly language, Interfacing of a 4x4 Matrix Key Board, key bouncing problem and de-bouncing solutions

5. Advanced Microcontrollers

Micro controller families, study about PIC micro controller family-CISC,RISC architectures - Compare CISC and RISC Architecture - Features of PIC16F877, ARM- Different versions of ARM- Embedded System- Application areas- Real Time Operating System- Compare normal OS and RTOS

REFERENCE BOOKS:

1. Mazidi and Mazidi, The 8051 Microcontroller and Embedded Systems Using Assembly and C, 2nd edition Pearson
2. Kenneth J.Ayala, 8051 Microcontroller
3. MykePredko , Programming customizing the 8051 Microcontroller,TMH
4. Ajay V Deshmukh , Microcontrollers (theory andapplications)
5. Subratha Ghospal,8051 Microcontroller (Instruction, programme & interfacing), PEARSON
6. Kenneth Ayalla,The 8051 Microcontroller, 3rd Edition, CENGAGE learning India Edition
7. Dr. Rajiv Kapadia,8051 Microcontroller Embedded systems, Jico student Edition

BLUE PRINT:

Sl No	Unit Title	No of Periods	Weightage Allotted	Marks Wise distribution of weightage				Question Wise distribution of weightage				COs mapped
				R	U	Ap	An	R	U	Ap	An	
1	**Architecture of Microcontroller 8051**	**20**	19	11	8	-	-	2	1	-	-	**CO1**
2	**Instruction set of 8051 micro controller**	**15**	17	9	8	-	-	3	1	-	-	**CO2**
3	**8051 Programming Concepts**	**15**	19	3	-	16	-	1	-	2	-	**CO3**
4	**Interfacing Simple I/O devices**	**15**	16	6	-	-	10	2	-	-	1	**CO4**
5	**Advanced Microcontrollers**	**10**	9	9	-	-	-	3	-	-	-	**CO5**
Total		**75**	**80**	**38**	**16**	**16**	**10**	**11**	**2**	**2**	**1**	

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 2.16
Unit Test-II	From 3.1 to 5.14

(Model Paper) **C –20, EC -502**

State Board of Technical Education and Training, A. P

Diploma in Electronics and Communication Engineering (DECE)

V Semester

Subject Name: Microcontrollers And Applications

Sub Code: EC - 502

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. Write the importance of following registers in one sentence
   a) Stack pointer (CO1)
   b) Program counter (CO1)
   c) Accumulator (CO1)
   d) PSW (CO1)
2. List any three featured of microcontrollers (CO1)
3. Distinguish between machine cycle and T-state (CO2)
4. List any three data transfer instructions of 8051 microcontroller. (CO2)
5. Explain the status of flag register after executing the following two instructions. (CO2)

   MOV A, #42H

   ADD A, #44H

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) Draw the functional block diagram of 8051 microcontroller and explain about each block (CO1)

or

(b) Draw the PIN diagram of 8051 microcontroller and explain the function of each PIN (CO1)

7. (a) Explain the internal memory organization of 8051 with suitable diagram (CO1)

or

(b) Explain the SFRs associated with timer/counters of 8051 microcontroller. (CO1)

8. (a)Explain the operation carried out on execution of the following instructions. (CO2)
(i) MUL AB (ii) DIV AB (iii) DA A (iv) ADDC A, @R0

or

(b) Explain various addressing modes of 8051microcontroller with suitable examples. (CO2)

-o0o-

(Model Paper) **C –20, EC -502**

State Board of Technical Education and Training, A. P

Diploma in Electronics and Communication Engineering (DECE)

V Semester

Subject Name: Microcontrollers And Applications

Sub Code: EC - 502

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 symbols used in flow charts to indicate the following
   a) End or Beginning (CO3)
   b) Process (CO3)
   c) Decision (CO3)
   d) Input and Output (CO3)
2. Draw the interfacing diagram of push button switch and LED with 8051. (CO4)
3. List the reasons for the popularity of LCDs (CO4)
4. Compare the features of RISC and CISC architectures. (CO5)
5. State the need of Real Time Operating system. (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) Write an assembly language to generate a Square wave of 1 KHz from the P1.0 pin of 8051, using Timer-1 mode-1. Assume Clock Frequency of 12 MHz. (CO3)

(or)

(b) Write an assembly language to add a series of 10 bytes. The series begins from location 2000H in External RAM. Store the result at locations 3000 and 3001H. (CO3)

7. (a) Explain the Interfacing concepts of push button switches and LEDs with 8051 (CO4)

(or)

(b) Explain Interfacing of 16×2 LCD module to 8051 (CO4)

8. (a) State the features of RISC and CISC architectures (CO5)

(or)

(b) Compare the features of RISC and CISC architectures (CO5)

-o0o-

MODEL PAPER
BOARD DIPLOMA EXAMINATIONS
C-20, EC-502, MICROCONTROLLERS AND APPLICATIONS
V SEMESTER
SEMESTER 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. List any three features of microcontrollers (CO1)
2. Distinguish between machine cycle and T-state (CO2)
3. List any three data transfer instructions of 8051 microcontroller. (CO2)
4. Mention the instruction format of 8051 (CO2)
5. Explain PUSH and POP instructions. (CO3)
6. List the reasons for the popularity of LCDs (CO4)
7. Draw the interfacing diagram of push button switch and LED with 8051. (CO4)
8. Compare the features of RISC and CISC architectures. (CO5)
9. Define embedded system (CO5)
10. State the need of Real Time Operating system. (CO5)

Part-B **5×8=40**

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.

11. (a) Draw the functional block diagram of 8051 microcontroller and explain about each block (CO1)

or

(b) Draw the PIN diagram of 8051 microcontroller and explain the function of each PIN (CO1)

12. (a) Explain the internal memory organization of 8051 with suitable diagram (CO1)

or

(b) Explain the SFRs associated with timer/counters of 8051 microcontroller. (CO1)

13. (a) Explain the operation carried out on execution of the following instructions. (CO2)
(i) MUL AB (ii) DIV AB (iii) DA A (iv) ADDC A, @R0

or

(b) Explain various addressing modes of 8051microcontroller with suitable examples.(CO2)

14. (a) Write an assembly language to generate a Square wave of 1 KHz from the P1.0 pin of 8051, using Timer-1 mode-1. Assume Clock Frequency of 12 MHz. (CO3)

or

(b) Write an assembly language to add a series of 10 bytes. The series begins from location 2000H in External RAM. Store the result at locations 3000 and 3001H. (CO3)

15. (a) Define debugging and Explain about single step and break point debugging techniques.

or

(CO3)

(b)Define subroutine and explain the sequence of program when subroutine is called and executed. (CO3)

Part-C **1×10=10**

Instructions: (1) Answer the question given below. It carries 10 marks

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

16. Design a 4x4 Matrix Key Board for interface with 8051 microcontroller (CO4)

-o0o-

OPTICAL &MOBILE COMMUNICATIONS

Course Code	Course title	No of periods/week	Total no of periods	Marks for FA	Marks for SA
EC-503	Optical & Mobile Communications	05	75	20	80

S No	Unit Title	No. of Periods	COs Mapped
1	Over View of Fibre Optic Communication	10	CO1
2	Fibre Optic components and Devices	15	CO2
3	Telephony and Mobile Communication	12	CO3
4	Cellular system design fundamentals and Multiplexing Techniques	20	CO4
5	Digital Cellular mobile system	18	CO5
	Total	75	

Course Objectives	1. To familiarize the concepts of Fiber optic,Telephony and Cellular communication systems.
	2. To equip with various issues related to Fiber optic, Telephony and Cellular communication systems.
	3. To learn the practical importance and applications of Fiber optic,Telephony and Cellular communication systems.

CO No		COURSE OUTCOMES
CO1	**EC-503.1**	Describe fiber optic communication techniques.

CO2	**EC-503.2**	Describe fiber optic components and devices
CO3	**EC-503.3**	Analyze Telephony and mobile communication
CO4	**EC-503.4**	Analyze cellular systems and multiplexing Techniques
CO5	**EC-503.5**	Describe the Digital cellular mobile systems

CO-PO/PSO MATRIX

CO No	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
EC-503.1	3	3	1		2			3		2
EC-503.2	3	3	1		2		2	3	2	2
EC-503.3	3	3	3	2	3		2	3	2	2
EC-503.4	3	3	3	2	3		2	3	2	2
EC-503.5	3	3	3	2	3		3	3	3	2
Average	3	3	2.2	2	2.6		2.25	3	2.25	2

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

LEARNING OUTCOMES

1.0 Over View of Fibre Optic Communication

1.1 State the advantages of lightwavecommunication system over EM wave systems.
1.2 Explain the structure of optical fibre
1.3 Classify optical fibres based on refractive index profile
1.4 List the types of fibres based on core diameter
1.5 Define Single mode fibre (SMF) and multimode fibre (MMF)
1.6 Define Snell's law in optics
1.7 Explain light wave propagation in OFC
1.8 Define acceptance angle and Cone of acceptance.
1.9 Define numerical aperture (NA)
1.10 Derive the expression for NA interms of refractive **indices** of core and cladding

2.0 Fibre Optic Components and Devices

2.1 List various fibre optic components
2.2 State the need of splicing in optical fibres
2.3 State the need for optical coupler/splitter
2.4 List two types of sources used in OFC
2.5 List the salient features of an optical source
2.6 List two types of detectors used in OFC
2.7 List the salient features of an optical detector

2.8 State the principle of LASER
2.9 Explain the construction and working of LASER source
2.10 Draw the block diagram of fibre optic communication system and explain each block
2.11 Explain intrinsic and extrinsic losses in optical fibres
2.12 Classify different types of dispersion losses occur in optical fibres.
2.13 State the limitations of TDM in fiber optic communications
2.14 State the need for WDM in fibre optic communication
2.15 Draw the block diagram of WDM system and explain
2.16 Draw the block diagram of DWDM system and explain

3.0 Telephony and Mobile Communication

3.1 Introduction to Telephone Systems
3.2 Advantages of Electronic Telephony over Manual Telephony
3.3 Block diagram showinghierarchy of a telephony system.
3.4 State the concept of in-band and out-band telephone signals.
3.5 Distinguish between Pulsed and DTMF dialling
3.6 Define Local loop
3.7 List the various signals present on Local loop
3.8 List the limitations of conventional mobile phone system.
3.9 Give the evolution of cellular mobile communication system.
3.10 Draw the block diagram of a basic cellular system
3.11 Define the terms mobile station and base station
3.12 State the functions of Mobile Switching Centre (MSC)
3.13 Define forward and reverse channels in mobile communication
3.14 Define voice and control channels in mobile communication

4.0 Cellular system design fundamentals and Multiplexing Techniques

4.1 Explain the process of call progress in a cellular telephone system
4.2 State the need for hexagonal cell site
4.3 Explain the concept of Frequency reuse
4.4 Define the terms cell and cluster related to Mobile communications
4.5 Explain the capacity of a cellular system
4.6 Define Hand-off in mobile communication
4.7 Explain the frequency of analog cellular system (AMPS)
4.8 List the drawbacks of analog cellular system.
4.9 State the need for multiple access techniques
4.10 List the three types of multiple access techniques.
4.11 List the features of FDMA and TDMA
4.12 Explain the frame structure of a TDMA
4.13 Explain the concept of spread spectrum technique
4.14 Explain CDMA and list its features
4.15 Compare FDMA, TDMA and CDMA

5.0 Digital Cellular mobile system

5.1 List the features of digital cellular system.
5.2 Explain the frequency spectrum of Global system for mobile communication (GSM) system
5.3 Explain the architecture of GSM.
5.4 List various interfaces in GSM architecture
5.5 List the service and security aspects of GSM.
5.6 Explain the authentication and encryption process used in GSM security.

5.7 List the advantages of GSM
5.8 List the draw backs of GSM system.
5.9 List the features of GPRS and EDGE systems
5.10 Compare the features of GSM, GPRS and EDGE systems
5.11 List the salient features of 3G system
5.12 List the advantages of 3G over earlier versions
5.13 List the basic concepts of 4G Cellular system
5.14 Explain the VoLTE architecture of IP Multimedia Subsystem (IMS)
5.15 List different IMS applications

COURSE CONTENTS:

1. Over View of Fibre Optic Communication

Advantages of Light wave communication system over EM wave systems- structure of optical fibre-Classification of optical fibres based on refractive index profile- types of fibres based on core diameter - Single mode(SMF) and Multimode fibre (MMF)-Snell's law in optics -light wave propagation in OFC-acceptance angle and Cone of acceptance-numerical aperture (NA)-intrinsic and extrinsic losses-Classification of different types of dispersion losses occur in optical fibres- WDM in fibre optic communication- block diagram of WDM system

2.Fibre Optic Components and Devices

List of fibre optic components- function of splice in optical fibres-need for optical coupler/splitter-sources used in OFC- two types of detectors used in OFC- feature of an optical detector-principle of LASER-construction and working of LASER source- block diagram of fibre optic communication system and explain each block.

3.Telephony and Mobile Communication

Introduction to Telephone Systems- Advantages of Electronic Telephony over Manual Telephony-Block diagram of Electronic Telephone exchange-In-band and out-band telephone signals-Pulsed and DTMF dialling-conventional mobile phone system-Evolution of cellular mobile communication system- mobile station and base station-functions of Mobile switching centre (MSC)- voice and control channels in mobile communication

4.Cellular system design fundamentals and Multiplexing Techniques

Block diagram of a basic cellular system- call progress in a cellular telephone system- hexagonal cell site- Frequency reuse-Cell and cluster- capacity of a cellular system-Hand-off in mobile communication-drawbacks of analog cellular system-need for multiple access techniques-three types of multiple access techniques TDMA ,FDMA and CDMA -Compare FDMA, TDMA and CDMA

5.Digital Cellular mobile system

Features of digital cellular system- Global system for mobile communication (GSM) with block diagram-interfaces in GSM architecture-service and security aspects of GSM-advantages of GSM-draw backs of GSM system-GPRS and EDGE-salient features of 3G system-advantages of 3G over earlier versions-basic concepts of 4G aspects - IP Multimedia Subsystem (IMS) - IMS applications

REFERENCE BOOKS

1. Raj Pandya, Mobile and Personal communication sytems and services,PHI
2. Theodore S. Rappaport, PEARSON Wireless communications-Principles andpractice
3. Willium C. Y. Lee Mobile Cellular Telecommunications-Analog and Digital systems, McGrawHill
4. Jochen Schiller Mobile Communications ,PEARSON

5. GerdKeise,OpticalFiberCommunications
6. Anuradha De Optical fiber and Laser- Principles and applications, New Agepublications
7. John M. Senior Optical fiber communications-Principles and practice, PearsonPublications
8. S.C.Gupta, 2004 Optical Fiber Communications and Its Applications ,PHI.

BLUE PRINT:

Sl No	Unit Title	No of Periods	Weightage Allotted	Marks Wise distribution of weightage				Question Wise distribution of weightage				COs mapped
				R	U	Ap	An	R	U	Ap	An	
1	**Over View of Fibre Optic Communication**	**10**	11	3	8			1	1			**CO1**
2	**Fibre Optic components and Devices**	**15**	14	3	11			1	2			**CO2**
3	**Telephony and Mobile Communication**	**12**	11	3	8			1	1			**CO3**
4	**Cellular system design fundamentals and Multiplexing Techniques**	**20**	24	3	8	3	10	1	1	1	1	**CO4**
5	**Digital Cellular mobile system**	**18**	20	6	11	3		2	2	1		**CO5**
TOTAL		**75**	**80**	**18**	**46**	**6**	**10**	**6**	**7**	**2**	**1**	

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 3.5
Unit Test-II	From 3.6 to 5.13

(Model Paper) **C –20, EC -503**

State Board of Technical Education and Training, A. P

Diploma in Electronics and Communication Engineering (DECE)

V Semester

Subject Name: Optical & Mobile Communications

Sub Code: EC - 503

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. Answer the following questions with one word
   a) Write any one optical source (CO2)
   b) Write any one optical detector (CO2)
   c) Write full form of WDM (CO1)
   d) Write full form of LASER (CO2)
2. Classify fibers based on refractive index profile and core diameter. (CO1)
3. Define critical angle and numerical aperture. (CO1)
4. List various fiber optic components. (CO2)
5. Write the need for splice and optical coupler. (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)Draw the block diagram of DWDM system and explain (CO1)
   or
   (b) Explain intrinsic and extrinsic losses in optical fibres (CO1)
7. (a) Draw the block diagram of fiber optic communication system and explain. (CO2)
   or
   (b) Explain the construction and working of LASER source. (CO2)
8. (a) Draw the block diagram of electronic telephone exchange and explain. (CO3)

or

(b) Explain the evolution of cellular communication in detail. (CO3)

o0o-

(Model Paper) C –20, EC -503

State Board of Technical Education and Training, A. P

Diploma in Electronics and Communication Engineering (DECE)

V Semester

Subject Name: Optical & Mobile Communications

Sub Code: EC - 503

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. Answer the following questions with one word
   a) List any one type of multiple access techniques (CO4)
   b) Write any one application of IP Multimedia Subsystem (CO5)
   c) Write full form of GPRS (CO5)
   d) Write full form of GPS (CO5)
2. Define the terms mobile station and base station. (CO3)
3. Define the terms cell and cluster. (CO4)
4. State the functions of Mobile Switching Centre (CO3)
5. List the salient features of 3G system (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) Draw the block diagram of electronic telephone exchange and explain (CO3)

   or

   (b) Explain the evolution of cellular communication in detail. (CO3)

7. (a)Explain the process of call progress in cellular telephone system. (CO4)

   or

   (b) Explain TDMA and it's frame structure. (CO4)
8. (a) Draw the block diagram of GSM architecture and explain. (CO5)

or

(b) Compare the features of GSM, GPRS and EDGE systems. (CO5)

o0o-

MODEL PAPER
BOARD DIPLOMA EXAMINATIONS
C-20, EC-503, OPTICAL & MOBILE COMMUNICATIONS
V SEMESTER
SEMESTER 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. Classify fibers based on refractive index profile and core diameter. (CO1)
2. List various fiber optic components. (CO2)
3. List the salient features of optical detectors. (CO2)
4. List the advantages of electronic telephony over manual telephony. (CO3)
5. Define the terms cell and cluster. (CO4)
6. List the applications of Spread spectrum technique. (CO4)
7. List the various interfaces used in GSM architecture. (CO5)
8. Distinguish between GPRS and EDGE. (CO5)
9. List the salient features of 3G systems. (CO5)
10. List the different applications of IMS. (CO5)

Part-B **5×8=40**

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.

11. (a) Define numerical aperture and derive its expression. (CO1)

or

(b) Explain the principle of light propagation through an optical fiber. (CO1)

12. (a) Draw the structure of LASER diode and explain its working. (CO2)

or

(b) Explain the block diagram of DWDM system. (CO2)

13. (a) Draw the block diagram of hierarchy in telephony syatem and explain. (CO3)

or

(b) Explain the evolution of cellular communication in detail. (CO3)

14. (a)Explain the process of call progress in cellular telephone. (CO4)

or

(b) Explain the frane structure of TDMA system. (CO4)

15. (a) Draw the block diagram of GSM architecture and explain. (CO5)

or

(b) Draw and explain the VoLTE architecture for IMS. (CO5)

Part-C **1×10=10**

Instructions: (1) Answer the question given below. It carries 10 marks

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

16. Given a PN sequence of 1011001, analyse the data retrieval process at the direct sequence spread spectrum receiver with suitable waveforms (CO4)

-o0o-

INDUSTRIAL ELECTRONICS

Course Code	Course title	No of periods/week	Total no of periods	Marks for FA	Marks for SA
EC-504	INDUSTRIAL ELECTRONICS	05	75	20	80

S No	Unit Title	No. of Periods	COs Mapped
1	**Power Electronic Devices**	**20**	CO1
2	**Opto-electronic Devices**	**15**	CO2
3	**Transducers and Ultrasonics**	**15**	CO3
4	**Industrial Heating & control systems**	**15**	CO4
5	**Inverters, SMPS, UPS &PLCs**	**10**	CO5
	Total	**75**	

Course Objectives	1. To learn the principles and working of power Electronic devices, opto electronic devices, Transducers,SMPS,UPS,PLC etc..
	2. To analyze the Industrial heating, and Control systems
	3. To learn the practical importance Industrial electronic devices and circuits.

CO No		COURSE OUTCOMES
CO1	**EC-504.1**	Describe Various Power Electronic Devices like SCR, DIAC, TRIAC etc.
CO2	**EC-504.2**	Describe Various Opto electronic Devices like Photo diode, Photo Transistor, LED etc.
CO3	**EC-504.3**	Describe Transducers and Ultrasonics
CO4	**EC-504.4**	Analyze Industrial Heating for heating of metals and Dielectrics.
CO5	**EC-504.5**	Explain the working of Inverters, SMPS,UPS and PLCs

CO-PO/PSO MATRIX

CO No	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
EC-504.1	3	2	2	2	2		2	3		
EC-504.2	3	2	2	2	2		2	3		
EC-504.3	3	2	3	2	3		2	3	1	2
EC-504.4	3	2	3	2	3		2	3	1	2
EC-504.5	3	2	3	3	3		3	3	3	3
Average	3	2	2.6	2.2	2.6		2.2	3	1.6	2.3

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

LEARNING OUTCOMES

1.0 Power Electronic Devices

1.1 List different thyristor family devices.
1.2 Sketch the ISI circuit symbols of SCR, SCS, SBS, SUS, DIAC, TRIAC and GTO SCR
1.3 Explain the construction and working of SCR
1.4 Explain the Two-transistor model of SCR and its VI Characteristics
1.5 Mention the ratings of SCR
1.6 Explain the construction and working of GTO SCR
1.7 Explain construction and working of DIAC & TRIAC
1.8 Explain Volt-ampere characteristics of DIAC & TRIAC
1.9 State the different modes of TRIAC triggering.
1.10 Compare the features of SUS, SBS, SCS & LASCR
1.11 Explain the construction and working of UJT
1.12 Define intrinsic stand-off ratio of UJT
1.13 Explain negative resistance region of UJT
1.14 Explain SCR triggering using UJT
1.15 Explain about speed control of DC motor using SCR
1.16 List the applications of DIAC, TRIAC & SCR

2.0 Opto Electronic Devices

2.1 Explain the construction, operation and characteristics of photo diode.
2.2 Explain the construction, operation and characteristics of photo transistor.
2.3 List the applications of photo diode and photo transistor

2.4 Explain the construction and working of LDR
2.5 State the concept of photovoltaic effect
2.6 Explain the construction and working of photovoltaic cell
2.7 List any 3 important specifications of photovoltaic cells.
2.8 List any 3 applications of photovoltaic cells.
2.9 Explain the construction, working principle and characteristics of LED
2.10 Explain the working of opto-coupler
2.11 List the applications of opto-couplers
2.12 List the applications of LED

3.0 Transducers and Ultrasonics

3.1 Define the term transducer
3.2 Classify different electrical/electronic transducers on the basis of principle of operation and applications.
3.3 List different Resistive, Inductive and Capacitive transducers
3.4 Explain the working principle, construction and applications of resistance strain gauge.
3.5 Explain the working principle, construction and applications of potentiometric transducer.
3.6 Explain the construction and working of LVDT
3.7 State the concept of piezo-electric effect
3.8 Explain the construction and working of Piezo-electric transducer
3.9 Explain the construction and working of Thermocouple transducer
3.10 Explain the working principle of Accelerometer
3.11 Define the term ultrasonics
3.12 State the concept of magnetostriction effect
3.13 Explain the construction and working of magnetostrictionultrasonic generator
3.14 Explain the construction and working of piezoelectric ultrasonic generator
3.15 List the applications of ultrasonics
3.16 Explain the construction and working of pulsed-echo ultrasonic flaw detector

4.0 Industrial Heating and Control Systems

4.1 Classify different industrial heating methods
4.2 Explain the principle of induction heating
4.3 List the applications of induction heating
4.4 Explain about HF power source for induction heating
4.5 Explain the principle of dielectric heating
4.6 List the applications of dielectric heating
4.7 List different types of electrical welding
4.8 Explain the principle of resistance welding
4.9 Draw the basic circuit of AC resistance welding and explain its working.
4.10 List the applications of resistance welding
4.11 Give the classification of control systems
4.12 Explain an open loop control system with some examples
4.13 List the merits and demerits of open loop control system
4.14 Explain closed loop system with the help of a block diagram
4.15 Give some examples for closed loop systems.
4.16 Compare open loop and closed loop control systems.
4.17 Define the term Transfer function in the context of control systems

5.0 Inverters, SMPS, UPS &PLCs

5.1 State the need of inverters

5.2 State the principle of operation of inverter
5.3 Explain the working of MOSFET based Inverter circuit
5.4 Explain Voltage control of inverter using PWM
5.5 List the applications of inverters
5.6 Explain the working of SMPS with block diagram
5.7 List the applications of SMPS
5.8 Explain the working of Off Line UPS and Online UPS
5.9 List the applications of UPS
5.10 State the need of industrial automation
5.11 State the need for PLC
5.12 Explain the PLC system with block diagram
5.13 List any six applications of PLC in the industry

COURSE CONTENTS

1. Power Electronic Devices

Thyristor family devices- ISI circuit symbols - working of SCR-Two-transistor model of SCR and its VI Characteristics-ratings of SCR- working of GTO SCR- working of DIAC & TRIAC- Volt-ampere characteristics of DIAC & TRIAC-modes of TRIAC triggering-SUS, SBS, SCS & LASCR -construction and working of UJT-intrinsic stand-off ratio of UJT-negative resistance region of UJT-SCR triggering using UJT, Speed control of DC motor using SCR,applications of SCR,TRIAC and DIAC.

2. OptoEelectronic Devices

Construction, operation and characteristics of photo diode- Construction, operation and characteristics of photo transistor- Applications of photo diode and photo transistor- Working Principle of LDR-Principle of photovoltaic cell- Important specifications of photovoltaic cells- Applications of photovoltaic cells- working of opto-coupler- Construction, working principle and characteristics of LED - Applications of LED in discrete displays, dot-matrix and seven segment displays.

3. Transducers &Ultrasonics

Introduction, classification of transducers, Resistive, Inductive, capacitive transducers, Strain gauge, Potentiometric transducer, LVDT. Piezoelectric effect, Piezoelectric transducer, Thermocouple transducer, accelerometers,Ultrasonic generation –Pulsed echo ultrasonic flaw detector

4. Industrial Heating and Control systems

Industrial heating methods, induction heating, Dielectric heating, Resistance welding, Definition of system and Control system-open loop control system-merits and demerits of open loop control-closed loop system-comparison between open loop and closed loop control systems-Transfer function

5 Inverters, SMPS,UPS& PLCs

Need of inverters -MOSFET based Inverter circuit- PWM Voltage control of Inverter -SMPS with block diagram-applications of SMPS -Off Line UPS and Online UPS- Industrial automation-PLC Block diagram- applications of PLC in the industry.

REFERENCE BOOKS

1. Bimbhra P.S, Power Electronics, Khanna Publishers Delhi
2. P.C.Sen.,PowerElectronics, McGraw Hill Education, India
3. S.K.Bhattacharya, S.Chatterjee, Industrial Electronics andControl, McGraw Hill Education, India
4. User manuals of PLCs,SCADA

5. Nagarath&Gopal, Control system Engineering, 5th edition, New age international Publishers
6. Muhammad H. Rashid ,Power electronics (Devices , circuits & applications), 4th edition, PERSON
7. V.R Moorthi, Power electronics : Devices , circuits & Industrial applications, OXFORD Publications

BLUE PRINT

Sl No	Unit Title	No of Periods	Weightage Allotted	Marks Wise distribution of weightage				Question Wise distribution of weightage				COs mapped
				R	U	Ap	An	R	U	Ap	An	
1	**Power Electronic Devices**	**20**	24	3	6	8	-	1	2	1	-	**CO1**
2	**OptoEelectronic Devices**	**15**	14	3	8	3	-	1	1	1		**CO2**
3	**Transducers and Ultrasonics**	**15**	14	3	8	3	-	1	1	1	-	**CO3**
4	**Industrial Heating & control systems**	**15**	17	6	8	-	10	2	1	-	1	**CO4**
5	**Inverters, SMPS, UPS &PLCs**	**10**	11	8	3	-	-	1	1	-	-	**CO5**
TOTAL		**75**	**80**	**23**	**30**	**17**	**10**	**6**	**5**	**4**	**1**	

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 2.12
Unit Test-II	From 3.1 to 5.13

(Model Paper) **C –20, EC -504**

State Board of Technical Education and Training, A. P

Diploma in Electronics and Communication Engineering (DECE)

V Semester

Subject Name: Industrial Electronics

Sub Code: EC - 504

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. Draw the circuit symbols of following components
   a) GTO SCR (CO1)
   b) SCS (CO1)
   c) LASCR (CO1)
   d) SUS (CO1)
2. Define intrinsic stand-off ratio of UJT (CO2)
3. Draw VI characteristics of DIAC (CO1)
4. Compare the features of SUS, SBS (CO1)
5. Write any three applications of photo diode? (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 the triggering of TRIAC in different modes (CO1)

   or

   (b) Explain about speed control of DC motor using SCR (CO1)

7. (a) Explain the construction and working of UJT (CO1)

   or

   (b) Explain the construction, operation and characteristics of photo transistor. (CO2)

8. (a) Explain the construction and working of photovoltaic cell (CO2)

or

(b) Explain the construction, working principle and characteristics of LED (CO2)

-o0o-

(Model Paper) C –20, EC -504

State Board of Technical Education and Training, A. P

Diploma in Electronics and Communication Engineering (DECE)

V Semester

Subject Name: Industrial Electronics

Sub Code: EC - 504

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 components
   a) Write any one application of ultrasonics (CO3)
   b) Write any one the application of induction heating (CO4)
   c) Write any one application of UPS (CO5)
   d) Write any one application of SMPS (CO5)
2. Define the term transducer. (CO3)
3. Define the term Transfer function in the context of control systems (CO4)
4. Compare open loop and closed loop control systems. (CO4)
5. Draw the block diagram of PLC (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) Explain the working principle, construction and applications of resistance strain gauge. (CO3)

   or

   (b) Explain the working principle of accelerometer. (CO3)

7. (a)Explain the principle of dielectric heating and write its applications. (CO4)

   or

   (b)Explain the principle of resistance welding. (CO4)

8. (a) Explain the working of SMPS with block diagram and write its applications. (CO5)

   or

(b)Explain voltage control of inverter using PWM. (CO5)

-o0o-

MODEL PAPER
BOARD DIPLOMA EXAMINATIONS
C-20, EC-504, INDUSTRIAL ELECTRONICS
V SEMESTER
SEMESTER 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. Compare the features of SUS, SBS and SCS. (CO1)
2. Sketch the ISI circuit symbols of SCR, DIAC and TRIAC (CO1)
3. Distinguish between SCR and GTO (CO1)
4. List any three applications of LED (CO2)
5. Describe the concept of photovoltaic effect. (CO2)
6. Define the term transducer. (CO3)
7. State the concept of piezo-electric effect (CO3)
8. List any three applications of induction heating (CO4)
9. Define the term Transfer function in the context of control systems (CO4)
10. Draw the block diagram of PLC (CO5)

Part-B **5×8=40**

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.

11. (a) Explain the construction and working of SCR (CO1)

or

(b) Explain the construction and working of UJT (CO1)

12. (a) Explain the construction, operation and characteristics of photo diode. (CO2)

or

(b) Explain the working of opto-couplers and write its applications. (CO2)

13. (a) Explain the working principle, construction and applications of resistance strain gauge. (CO3)

or

(b) Explain the working principle of accelerometer. (CO3)

14. (a)Explain the principle of dielectric heating and write its applications. (CO4)

or

(b)Explain the principle of resistance welding. (CO4)

15. (a)Explain the working of SMPS with block diagram and write its applications. (CO5)

or

(b)Explain voltage control of inverter using PWM. (CO5)

Part-C **1×10=10**

Instructions: (1) Answer the question given below. It carries 10 marks

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

16. Why is dielectric heating more useful method for heating of insulators over other heating methods? (CO4)

-o0o-

Computer Hardware & Networking

Course Code	Course title	No of periods/week	Total no of periods	Marks for FA	Marks for SA
EC-505	Computer Hardware & Networking	05	75	20	80

S No	Unit Title	No. of Periods	COs Mapped
1	Basic computer hardware	15	CO1
2	PC assembly and software installation	10	CO2
3	Basics of Data communication and OSI Reference Model	10	CO3
4	Physical Layer and Data Link Layer	20	CO4
5	Network Layer, Transport Layer and Application Layer	20	CO5
	Total	75	

Course Objectives	1. To familiarize with computer hardware,pc assembly,software installation,networking models and layers
	2. To analyze data communication techniques and network protocols
	3. To learn the practical importance and applications of computer hardware and networking

CO No		COURSE OUTCOMES
CO1	**EC-505.1**	Describe Various assemblies of PC.
CO2	**EC-505.2**	Describe PC assembly and software installation
CO3	**EC-505.3**	Describe data communication and OSI model
CO4	**EC-505.4**	Describe Physical and data link layers

CO5	**EC-505.5**	Analyze network layers and protocols

CO-PO/PSO MATRIX

CO No	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
EC-505.1	3	2	2		3		3	3	1	
EC-505.2	3	2	2	3	3		3	3	3	3
EC-505.3	3	3	1		3		1	3		1
EC-505.4	3	3	2		3		1	3		1
EC-505.5	3	3	2	3	3		3	3	3	3
Average	3	2.6	1.8	3	3		2.2	3	2.3	2

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

LEARNING OUTCOMES:

1.0 Basic computer hardware

1.1 Draw the component layout of PC-AT motherboard and explain briefly about the function of each component
1.2 List different expansion slots available on the motherboard.
1.3 List the functions of chipsets.
1.4 List the important features of chipsets
1.5 List the specifications of processor
1.6 List the features of DDR2SDRAM and DDR3SDRAM
1.7 Explain about accelerated graphics port.
1.8 List various SMPS power supply connectors used in PC-AT and State their use
1.9 Give the connector details of mouse, keyboard and USB.
1.10 Give any four reasons for popularity of USB ports
1.11 Explain the working of Hard Disk and data access.
1.12 List any five specifications of LED monitor.
1.13 Explain the working of LED monitor.
1.14 Explain the working principle of optical mouse

2.0 PC assembly and software installation

2.1 Explain the steps in assembling a PC.
2.2 List the steps involved in editing of CMOS set up
2.3 Describe the process of formatting.
2.4 State the need for disk partitioning
2.5 Define Power On Self Test (POST).
2.6 Explain the booting procedure.

2.7 Compare File Allocation Table (FAT) and NTFS
2.8 Describe the structure and uses of windows registry
2.9 Explain general steps involved in the installation of WINDOWS OS
2.10 State the need for installation of device drivers
2.11 List different types of viruses and various ways of removing viruses
2.12 List any six popular Anti-Virus Software available in market

3.0 Basics of Data communication and OSI Reference Model

3.1 Define data communication
3.2 Define computer network and state its use
3.3 State the need for data communication networking.
3.4 Define network topology
3.5 List different network topologies
3.6 Explain Bus, Star, Ring network topologies
3.7 Compare the performances of the above three topologies.
3.8 Draw the ISO: OSI 7 layer architecture and State the functions of each layer.
3.9 Draw TCP/IP reference model and State the functions of each layer
3.10 Compare ISO :OSI 7 layer model with TCP/IP reference model

4.0 Physical Layer and Data Link Layer

a) Physical Layer:

4.1 List the different types of physical transmission media used in networking
4.2 Explain the cross sectional diagrams of UTP, STP, Coaxial and Fiber optic cables and their use in networking.
4.3 List the three types of switching techniques used in networking
4.4 Explain circuit switching and packet switching
4.5 Define virtual circuit and datagram approaches in packet switching
4.6 State the use of repeater/ hub

b) Data Link Layer:

4.7 Define the word *protocol* used in computer networks
4.8 State the need for protocols in computer networks.
4.9 Explain CSMA/CD, CSMA/CA
4.10 Explain Ethernet LAN
4.11 Give the frame format for Ethernet and State the different fields in it.
4.12 Explain the working of token ring network
4.13 Explain the topology of wireless LAN and explain its frame format (IEEE 802.11)
4.14 State the features of Controlled Area Network (CAN) and SkyWAN
4.15 State the features of Bluetooth technology.
4.16 Explain the use of switch, bridge in constructing networks
4.17 Differentiate between repeater, switch and bridges.
4.18 Explain the use of wi-fianalyzer

5.0 Network Layer, Transport Layer and Application Layer

a) Network Layer:

5.1 Define the terms Internet and Intranet.
5.2 Explain classful addressing in IPv4.
5.3 Explain classless addressing (CIDR) in IPv4.
5.4 State the use of routers in networking
5.5 Explain the concept of routers and routing packets in computer networks

5.6 Distinguish among cut through, store-and-forward and adaptive switch mechanisms.
5.7 Explain the packet transfer mechanism using routers and IP address.

b) Transport Layer

5.8 List the features of Transmission Control Protocol (TCP)
5.9 Explain the flow control in TCP
5.10 Explain error control in TCP
5.11 Explain the connectivity of systems using TCP (Three way hand shake)
5.12 Explain end-to-end connectivity in TCP using ports and sockets.
5.13 Describe the features of User Datagram Protocol (UDP)
5.14 Compare the features of TCP and UDP
5.15 State the use of Gateway Router.

c) Application Layer:

5.16 Mention the role of DNS server
5.17 Explain how email is transferred
5.18 Discuss POP server and SMTP server
5.19 Explain file transfer operation using FTP
5.20 Explain the working of Web server
5.21 Describe the web browser architecture
5.22 Explain the internal architecture of ISP
5.23 Write the purpose of proxy server
5.24 Explain remote login

COURSE CONTENTS:

1.0 Basic computer hardware

Layout of motherboard, different expansion slots, functions of chipsets, important features of chipsets , specifications of processor, features of DDR2SDRAM and DDR3SDRAM , accelerated graphics port. SMPS power supply connectors, connector details of serial port, mouse, keyboard and USB, reasons for popularity of USB ports, Working of Hard Disk and data access, specifications of LED monitor, working of LED monitor, working principle of optical mouse.

2.0 PC assembly and software installation

Steps in assembling a PC, CMOS set up, the process of formatting, disk partitioning, POST, booting procedure , usage of File Allocation Table (FAT) and NTFS, structure and uses of Windows registry, Installation procedure of WINDOWS OS, need for installation of device drivers- types of viruses and ways of removing viruses, antivirus softwares

3.0 Basics of Data communication and OSI Reference Model

Need for data communication networking, network topology, different network topologies, Bus, Star, Ring network topologies, OSI 7 layer architecture- functions of each layer, TCP/IP reference model- functions of each layer

4.0 Physical Layer and Data Link Layer

a) Physical Layer:

Different physical transmission media- UTP, STP, Coaxial and Fiber optic cable, switching techniques - circuit switching, packet switching and message switching, virtual circuit and datagram approaches in packet switching, use of repeater/hub

b) Data Link Layer:

Protocol, need for protocols, need for framing, need for flow control and error control protocols, Medium access control (MAC) - its functions, CSMA/CD and CSMA/CA, Local area network - its use, Ethernet and its frame format, working of token ring network, wireless LAN and explain its frame format, Bluetooth technology, use of switch, bridge in constructing networks, WiFianalyzer

5.0 Network Layer,Transport Layer and Application Layer

a) Network Layer:

Internet and Intranet, classful addressing and classless addressing in IPv4,use of routers in networking, concept of routers and routing, cut through & store-and-forward and adaptive switch mechanism, packet transfer mechanism using routers and IP address.

b) Transport Layer

Features of Transmission Control Protocol (TCP), flow control in TCP, error control in TCP, connectivity of systems using TCP (Three way hand shake), end-to-end connectivity in TCP using ports and sockets, features of User Datagram Protocol (UDP), use of Gateway Router

c) Application Layer:

Role of DNS server, how email is transferred, POP server and SMTP server, FTP working of Web server, web browser architecture, internal architecture of ISP, purpose of proxy server, remote login

Reference Books:

1. Ata Elahi Thomson, Network communicationTechnology
2. Godbole, Data Communication and Networking,TMH
3. William Stallings ,Data and Computer Communications, 7th edition.PHI
4. BehrouzForouzan, Data Communication and Networking, 3rdedition.TMH
5. PeterNorton,MichealDesmond,completeguidetoPCupgrades, 2nd editionPHI
6. PeterNorton,ScottClark,NewinsidethePC,PHI
7. N. Mathivanan , Microprocessors & PC Hardware and interfacing,PHI
8. M. David Stone and Alfred Poor, Trouble shooting yourPC,PHI
9. Thomson, Enhanced guide to managing and maintaining your PC-ThirdEdition

BLUE PRINT:

Sl No	Unit Title	No of Periods	Weightage Allotted	Marks Wise distribution of weightage				Question Wise distribution of weightage				COs mapped
				R	U	Ap	An	R	U	Ap	An	
1	Basic computer hardware	15	14	3	8	3		1	1	1		**CO1**
2	PC assembly and software installation	10	14	11	3			2	1			**CO2**
3	Basics of Data communication and OSI Reference Model	10	14	3	8	3		1	1	1		**CO3**
4	Physical Layer and Data Link Layer	20	17	6	8	3	-	2	1	1	-	**CO4**
5	Network Layer, Transport Layer and Application Layer	20	21		8	3	10		1	1	1	**CO5**
Total		**75**	**80**	**23**	**35**	**12**	**10**	**6**	**5**	**4**	**1**	

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 3.10
Unit Test-II	From 4.1 to 5.24

(Model Paper) **C –20, EC -505**

State Board of Technical Education and Training, A. P

Diploma in Electronics and Communication Engineering (DECE)

V Semester

Subject Name: Computer Hardware &Networking

Sub Code: EC - 505

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. a) Write any one antivirus software name available in market (CO2)
   b) What is the full form of NTFS (CO1)
   c) What is the full form of USB (CO1)
   d) What is the full form of FAT (CO1)
2. List various SMPS power supply connectors (CO1)
3. Define power on self test(POST). (CO2)
4. State the need for disk partitioning (CO2)
5. State the need for data communication networking (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 working of Hard Disk and describe how to access data from a hard disk. (CO1)
   or
   (b) Explain the working of LED monitor. (CO1)

7. (a) List the steps involved in editing of CMOS set up. (CO2)

or

(b) List and explain general steps involved in the installation of windows operating system. (CO2)

8. (a) Explain Bus, Star, Ring network topologies. (CO3)

or

(b) Describe TCP/IP reference model and State the functions of each layer (CO3)

-o0o-

(Model Paper) C –20, EC -505

State Board of Technical Education and Training, A. P

Diploma in Electronics and Communication Engineering (DECE)

V Semester

Subject Name: Computer Hardware &Networking

Sub Code: EC - 505

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) What is the full form of STP (CO4)
   b) What is the full form of STP (CO4)
   c) What is the full form of TCP (CO5)
   d) What is the full form of UDP (CO5)
2. Define virtual circuit (CO4)
3. Differentiate between repeater, switch and bridges. (CO4)
4. List the features of Transmission Control Protocol (CO5)
5. State the use of routers in networking. (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) Explain the flow control in TCP. (CO5)

or

(b) Explain the working of token ring network (CO4)

7. (a)Explain CSMA/CD and CSMA/CA. (CO4)

or

(b)Explain circuit switching and packet switching . (CO4)

8. (a) Explain file transfer operation using FTP. (CO5)

or

(b)Describe the web browser architecture. (CO5)

-o0o-

MODEL PAPER
BOARD DIPLOMA EXAMINATIONS
C-20, EC-505, COMPUTER HARDWARE & NETWORKING
V SEMESTER
SEMESTER 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. List any 4 expansion slots available on motherboard. (CO1)
2. Draw and give the connector details of USB. (CO1)
3. Define power on self test(POST). (CO2)
4. Distinguish between FAT and NTFS file systems. (CO2)
5. Define network topology (CO3)
6. Draw the ISO: OSI 7 layer architecture. (CO3)
7. Define virtual circuit (CO4)
8. Differentiate between repeater, switch and bridges. (CO4)
9. Draw the cross section of an optical fibre cable. (CO4)
10. State the use of routers in networking. (CO5)

Part-B **5×8=40**

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.

11. (a) Explain the working of Hard Disk and describe how to access data from a hard disk. (CO1)

or

(b) Explain the working of LED monitor. (CO1)

12. (a) Explain the steps involved in editing of CMOS set up. (CO2)

or

(b) List and explain general steps involved in the installation of windows operating system. (CO2)

13. (a) Explain Bus, Star, Ring network topologies. (CO3)

or

(b) Describe TCP/IP reference model and State the functions of each layer . (CO3)

14. (a) Explain CSMA/CD and CSMA/CA. (CO4)

or

(b) Explain circuit switching and packet switching . (CO4)

15. (a) Explain file transfer operation using FTP. (CO5)

or

(b) Describe the web browser architecture. (CO5)

Part-C **1×10=10**

Instructions: (1) Answer the question given below. It carries 10 marks
(2) Answer should be comprehensive and the criterion for valuation is the content but not the length of the answer.

16. What are consequences that occur in packet transfer mechanism using router and IP address? (CO5)

-o0o-

MICROCONTROLLERS LAB

Course Code	Course title	No of periods/week	Total no of periods	Marks for FA	Marks for SA
EC-506	Microcontrollers Lab	04	60	40	60

S No	Unit Title	No. of Periods	COs Mapped
1	Familiarization with Keil software and Microcontroller Kit	04	CO1
2	Basic programming using Microcontroller kit/Keil	20	CO2
3	Interfacing IO devices with 8051	24	CO3
4	Application development using Proteus	08	CO4
5	Dumping/Burning into Microcontroller chip	04	CO4
	Total	60	

Course Objectives	1. To familiarize with 8051 Microcontroller kit and Keil compiler
	2. To understand the programming and interfacing concepts of 8051 Microcontroller
	3. To learn the practical importance and applications of programming and interfacing of 8051 Microcontroller chip

CO No		COURSE OUTCOMES
CO1	**EC-506.1**	Describe the usage of 8051 Microcontroller kit and Keil Compiler
CO2	**EC-506.2**	Apply Instruction set of 8051 Microcontroller in AL programming
CO3	**EC-506.3**	Apply Instruction set of 8051 Microcontroller for interfacing of I/O devices
CO4	**EC-506.4**	Simulate Interfacing circuits using Proteus and learn the burning of firmware into Microcontroller chip

CO-PO/PSO MATRIX

CO No	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
EC-506.1	3	3	3	3			3	3	3	
EC-506.2	3	3	3	3	3			3	3	3
EC-506.3	3	3	3	3	3	1	3	3	3	3
EC-506.4	3	3	3	3	3	1	3	3	3	3
Average	3	3	3	3	3	1	3	3	3	3

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

LEARNING OUTCOMES:

I. Familiarization with Microcontroller Kit & Simulators

1. Familiarize with 8051 Microcontroller Kit
2. Familiarize with 8051 simulator KEIL (or equivalent software)

II. Basic programming using Microcontroller kit/Keil

1. Write an ALP to perform Block move - 10bytes of data from 0X30-0X39 to 0X40-0X49
2. Write an ALP to perform Block exchange – 10bytes of data between 0X30-0X39 to 0X40-0X49
3. Write an ALP to perform: Addition , subtraction , division and multiplication of two 8 bit numbers
4. Write an ALP to perform addition of two16-bit numbers
5. Write an ALP to perform subtraction of two16-bit numbers
6. Write an ALP to the find Smallest/Largest number in 10bytes of data stored from 0X30 to 0X39 and store the result in the next location i.e., 0X3A
7. Write an ALP to find the 2's complement of given 8-bit number

III. To practice Interfacing Techniques

1. Write a program to make an LED connected to port pin P1.5, light up for specific time on pressing a switch connected to port pin P2.3
2. Write a Program to make an LED connected to pin P1.7 to blink at a specific rate
3. Interface a 7 segment LED display with 8051 microcontroller and write a program to display a given decimal digit

4. Interface a small DC motor with 8051 and write a program to rotate the motor in clockwise/anti clockwise direction

IV. Application development using proteus

1. Familiarization with proteus software
2. Perform experiments given in 10 and 11 above using proteus

V. Dumping/Burning into Microcontroller

1. Perform burning/loading of .HEX file of experiments given in 10and 11 above into flash memory for 89C51 and test it in development kit

INDUSTRIAL ELECTRONICS LAB

Course Code	Course title	No of periods/week	Total no of periods	Marks for FA	Marks for SA
EC-507	INDUSTRIAL ELECTRONICS LAB	04	60	40	60

S No	Unit Title	No. of Periods	COs Mapped
1	Power electronic devices	24	CO1
2	Optoelectronic devices	16	CO2
3	Transducers	8	CO3
4	PLCs	12	CO4
	Total	60	

Course Objectives	1. To familiarize with power Electronic devices, opto electronic devices, Transducers
	2. To familiarize with PLC
	3. To learn the practical importance and applications of Industrial electronics devices and PLC

CO No		COURSE OUTCOMES
CO1	**EC-507.1**	Plot V-I characteristics of Power Electronic devices.
CO2	**EC-507.2**	Plot V-I characteristics of Opto Electronic devices.

CO3	**EC-507.3**	Plot V-I characteristics of Transducers.
CO4	**EC-507.4**	Describe the usage of PLC.

CO-PO/PSO MATRIX

CO No	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
EC-507.1	3	3	1	1	3	3	1	3	1	1
EC-507.2	3	3	1	1	3	3	2	3	1	1
EC-507.3	3	3	1	2	3	3	2	3	2	3
EC-507.4	3	3	3	3	3	3	3	3	3	3
Average	3	3	1.5	1.75	3	3	2	3	1.75	2

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

LEARNING OUTCOMES:

I. Power electronic devices

1. Perform an experiment to obtain VI characteristics of SCR
2. Perform an experiment to obtain VI characteristics of TRIAC
3. Perform an experiment to obtain VI characteristics of DIAC
4. Perform an experiment to obtain VI characteristics of UJT
5. construct UJT relaxation oscillator circuit and observe the output waveforms on CRO
6. Construct a circuit to trigger SCR by UJT and control output Power

II. Optoelectronic devices

1. Perform an experiment to plot the characteristics of Photodiode
2. Perform an experiment to plot the characteristics of Photo transistor
3. Perform an experiment to plot the VI characteristics of different colour LEDs & determine their cut-in voltages
4. Perform an experiment to plot the characteristics of LDR
5. Perform an experiment to plot the characteristics of Opto-coupler

III. Transducers

1. Obtain the performance characteristics of LVDT by conducting an experiment
2. Obtain the performance characteristics of thermocouple by conducting an experiment

IV. Programmable Logic Controllers

1. Familiarize with PLC tutor or PSIM
2. Implement basic gates and universal gates using PLC
3. Implement XOR, XNOR gates using PLC

LIFE SKILLS

Course Code	Course Title	No. of Periods/Week	Total No. of Periods	Marks for FA	Marks for SA
Common 508	Life Skills	3	45	40	60

S. No.	Unit Title	No of Periods	COs Mapped
1	**Attitude**	**4**	CO1
2	**Adaptability**	**4**	CO1, CO2
3	**Goal Setting**	**4**	CO1, CO2, CO3
4	**Motivation**	**4**	CO1, CO2, CO3
5	**Time Management**	**4**	CO2
6	**Critical thinking**	**4**	CO3
7	**Creativity**	**4**	CO3
8	**Problem Solving**	**5**	CO3
9	**Team Work**	**4**	CO4
10	**Leadership**	**4**	CO4
11	**Stress Management**	**4**	CO4
Total Periods		**45**	

CO No.	Course Outcomes
CO1	Demonstrates positive attitude and be able to adapt to people and events
CO2	Fixes personal and professional goals and manages time to meet targets

Course Objectives	To understand the importance of Life skills for acceptable, sustainable and ethical behaviour in academic, professional and social settings
	To exhibit language competence appropriate to acceptable social and professional behaviour.
	To demonstrate time management, stress management, team skills, problem solving ability to manage oneself in academic, professional and social settings.

CO3	Exhibits critical and lateral thinking skills for problem solving.
CO4	Shows aptitude for working in teams in a stress free manner and sometimes/ very often/ mostly display leadership traits.

CO-PO Matrix

Course Code Common-508	**Course Title: English Number of Course Outcomes: 4**				**No. of Periods: 45**
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 Life Skills Course. However activities that use content and situations from academic, professional and social settings relevant to the Programme shall be exploited for triggering thought and interaction in the Course.			
PO2					
PO3					
PO4					
PO5	CO1, CO2, CO3, CO 4	11	25%		>60%: Level 3
PO6	CO1, CO2, CO3, CO4	27	45%		16 -59%: Level 2
PO7	CO1, CO2, CO3, CO4	7	30%		Up to 15%: Level 1

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

Mapping Course Outcomes with Program Outcomes:

CO	**PO 1**	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**
CO 1					✓	✓	✓
CO 2					✓	✓	✓
CO3					✓	✓	✓
CO4					✓	✓	✓

Blue Print for evaluation based on Course Outcomes for SA:

Note: Every Activity based Question that focuses on COs and responses as exhibited through communication has to be given marks for the following parameters

- Clarity of Thinking as Exhibited through Content
- Features of Etiquette

***Rubric Descriptors 'Outstanding/ Very Good/ Good/ Satisfactory/ Poor' levels of Competence**

Level of Competence	Parameters of Assessment	
	Clarity of thinking as exhibited through content	**Features of etiquette**
Outstanding 10	**Thinking** is **extremely logical** and suggested course of action is **feasibile** Shows **creativity and uniqueness** Exhibits **expert use of expression** (organizational devices and discourse markers) that denote clarity in thought.	Exhibits **courtesy to all most appropriately** with **confidence**
Very Good 8/9	**Thinking** is **clear and logical** Suggested **course of action is feasible**	Exhibits **courtesy to all to a considerable level.**

	Shows **traces of creativity** Exhibits **good expression** (organizational devices and discourse markers) that denote clarity in thought.	
Good 6/7	**Thinking is clear and logical most of the time**. Lacks creativity or out of the box thinking as expressed through content.	Exhibits **courtesy / politeness to an acceptable level.**
Satisfactory 4/5	**Thinking is logical**; However **expressing content is disjointed and disorganized.**	Has courtesy but often fumbles with language.
Poor 3 or less than 3	**Thoughts** as expressed through content are **incoherent.Language skills are very limited.**	Fails to show courtesy to others.

Blue Print for evaluation based on Course Outcomes for SA of each student:
Note: Marks are awarded for each student as per the Rubric descriptors.

S No.	**Questions based on Course Outcomes**	**Periods Allocated for practical work**	Max Marks	Poor >3	Satisfactory 4 /5	Good 6/7	Very Good 8/9	Outstanding 10
1	Short presentation on GOALS with Timeline and Action Plan	12	10					
2	State what you will do in the given situation (Assesses adaptability and critical thinking skills, leadership, team skills)	12	10					
3	In how many different and creative way can you use _____ (Object) other than its primary use	8	10					
4	What solutions can you think of for _____ problem.	13	10					

	Total	45	60					

Note: The marks that are awarded for the student for 40 to be increased proportionally for 60.

Learning Outcomes

1. **Attitude Matters :**
   - 1.1 Understand the importance of positive attitude and the consequences of negative attitude.
   - 1.2 Demonstrate positive attitude in dealing with work-related issues and in personal life.
2. **Adaptability….*makes life easy :***
   - 2.1 Understand the significance of adaptability.
   - 2.2 Show adaptability whenever needed, both at place of work and on personal front.
3. **Goal Setting … *life without a Goal is a rudderless boat!***
   - 3.1 Understand the SMART features of goal-setting.
   - **3.2** State one's short-term and long-term goals and spell out plans to achieve them.

4. **Motivation … *triggers success!***
   - 4.1 Comprehend the need for motivation in order to achieve success in life.
   - 4.2 State how one is motivated in life.
   - 4.3 Show the impact of motivation on one's life

5. **Time Management… *the need of the Hour!***
   - 5.1 Understand the value of time management and prioritizing in life
   - 5.2 Demonstrate the effect of time management on one's professional work.

6. **Critical Thinking … *logic is the key!***
   - 6.1 Distinguish between facts and assumptions
   - 6.2 Use logical thinking in dealing with professional matters

7. **Creativity … *the essential you!***

7.1 Understand the importance of thinking out of the box in dealing with critical issues

7.2 Solve problems using creativity / imagination

8. **Problem Solving …** ***there is always a way out!***

8.1 Understand the need for and importance of problem solving.

8.2 Use logic or creativity to solve a problem at workplace or home.

9. **Team Work…** ***together we are better!***

9.1 Understand the need for team skills / team building

9.2 Demonstrate one's skills as a team player

10. **Leadership…** ***the meaning of a leading!***

10.1 Understand the need for team skills / team building

10.2 Demonstrate one's skills as a team player

11. **Stress Management…** ***live life to the full!***

11.1 Understand what causes stress and how to cope with stress at workplace.

11.2 Demonstrate how stress can be overcome in a healthy way.

Computer Hardware & Networking Lab

Course Code	Course title	No of periods/week	Total no of periods	Marks for FA	Marks for SA
EC-509	Computer Hardware & Networking Lab	03	45	40	60

S No	Unit Title	No. of Periods	COs Mapped
1.	Mobile Communications	3	CO1
2.	Fibre Optics	06	CO2
3.	Computer Hardware	15	CO3

4.	Computer Networking	15	CO4
5	Familiarization of advanced communication gadgets	06	CO4
	Total	45	

Course Objectives	1. To familiarization with Computer hardware assemblies and networking.
	2. To handle the Optical bench to perform various measurements.
	3. To learn the practical importance of Computer hardware, Networking and fiber optic communication methods.

CO No		**COURSE OUTCOMES**
CO1	**EC-509.1**	Use GSM Trainer.
CO2	**EC-509.2**	Conduct experiments on Optical work bench.
CO3	**EC-509.3**	Conduct experiments on Computer hardware assemblies and software installation
CO4	**EC-509.4**	Conduct experiments on Computer Networking and handle advanced communication gadgets

CO-PO/PSO MATRIX

CO No	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
EC-509.1	3	3	3	3	3	3		3	3	3
EC-509.2	3	3	3	3	3	3	3	3	3	3
EC-509.3	3	3	3	3	3	3	3	3	3	3
EC-509.4	3	3	3	3	3	3	3	3	3	3
Average	3	3	3	3	3	3	3	3	3	3

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

LEARNING OUTCOMES:

1.0 Mobile Communications

1. Study of Global System for Mobile Communication (GSM) trainer

2.0 Fiber Optics

1. Set up fiber optic analogue link and demonstrate voice communication
2. Set up a fiber optic digital link and demonstrate digital data communication

3.0 Computer Hardware

1. A) Identify and note down mother board, components and chips
   B) Identify various Internal and external slots in the mother board and clean them with blower/
   brush
   C) Practice Inserting and Removing RAM with care
2. Measure the Output voltages of SMPS
3. Disassemble the PC
4. Assemble the PC
5. Change the CMOS Setup
6. Install Windows Operating system
7. Perform Partition and format of hard disks.

4.0 Computer Networking

1. Identify and note down the specifications of various networking devices & Cables, Jacks , Connectors, tools etc used in local area networks
2. Prepare the UTP cable for cross and direct connections using crimping tool
3. Configure Host IP, Subnet Mask and Default Gateway in a system in LAN (TCP/IP Configuration).
4. Setup LAN and a) transfer files between systems in LAN b)share the printer in a network
5. Test the network using ipconfig, ping / tracert and netstat utilities and debug the network issues
6. Install and Configure wireless NIC and transfer files between systems in LAN and wireless LAN
7. Test the WIFI network performance using WIFI analyzer

5.0 Advanced communication gadgets/apps

1. i) Perform bluetooth pairing between smartphone and bluetooth headset/speaker and transferaudio signal
   ii) Perform video transfer from smart phone to internet connected desktop PC/Laptop through IP based streaming
   iii) Perform file transfer from one smart phone to another through bluetooth based Shareitapplication
   iv) Perform Remote login using Team viewer

v) Perform scanning QR code/Bar code using scanner App in smart phone

vi) Know the usage and features of health band by performing an experiment

v) Perform audio conference through googleduo

PROJECT WORK

Course Code	Course title	No of periods/week	Total no of periods	Marks for FA	Marks for SA
EC-510	PROJECT WORK	03	45	40	60

LEARNING OUTCOMES:

1.0 Project work

1.1 Identify different works to be carried out in the Project

1.2 Collect data relevant to the project work

1.3 Carryout need survey

1.4 Select the most efficient method from the available choices based on preliminary investigation

1.5 Design the required elements of the project work as per standard practices

1.6 Prepare the working modules / equipment required for the project work

1.7 Estimate the cost of project, technological need, computer skills, materials and other equipment

1.8 Prepare the plan and schedule of starting time and sequence of operations to be carried out at various stages of the project work in detail

1.9 Prepare critical activities at various stages of the project work

1.10 Test various conditions with different electrical input parameter if required

1.11 Implement project work and record the results.

1.12 Preparation of project report.

VI Semester

DIPLOMA IN ELECTRONICS & COMMUNICATION ENGINEERING
SCHEME OF INSTRUCTIONS AND EXAMINATIONS
C-20-VI Semester

EC-601 INDUSTRIAL TRAINING

Sl.No.	Subject	Duration	Scheme of evaluation		
			Item	Nature	Max. Marks
1	Industrial Training	6 months	1.First Assessment at Industry (After 12 Weeks)	Assessment of learning outcomes by both the faculty and training mentor of the industry	120
			2.Second Assessment at the Industry (After 20 weeks))	Assessment of learning outcomes by both the faculty and training mentor of the industry	120
			Final Summative assessment at institution level	Training Report	20
				Demonstration of any one of the skills listed in learning outcomes	30
				Viva Voce	10
TOTAL MARKS					300

The Industrial Training shall carry maximum 300 marks. Students can be trained in either in In-house/Industry/Cisco CCNA Training. Pass mark is 50% in first and second assessment put together and also 50% in final summative assessment at the institution level.

INDUSTRIALTRAINING

Course Code	Course Title	Duration	Marks for Formative Assessment	Marks for Summative Assessment
EC-601	**Industrial Training**	**24 weeks**	**240**	**60**

Time schedule

S.NO	Code	TOPICS	Duration
1	EC-601	• Practical training in Industry • Training Report Preparation Report Preparation: Title Page, Certificate, Acknowledgements, Abstract, Contents (introduction of Industry, Plant Layout, Organization Chart, List of Major Equipments, List of Processes: Skills Acquired, Conclusions, References	Six Months

Course Objectives and Course Outcomes

Upon completion of the course the student shall be able to		
Course Objectives		1.Expose to real time working environment 2. Enhance knowledge and skill already learnt in the institution. 3. Acquire the required skills of troubleshooting of various electronic devices, assembling, servicing, and supervising in the engineering fields. 4. Install the good qualities of integrity, responsibility and self confidence.
COURSE OUT COMES	CO1	Apply theory to practical work situations
	CO2	Cultivate sense of responsibility and good work habits
	CO3	Exhibit the strength, teamwork spirit and self-confidence
	CO4	Write report in technical projects

PO-CO Mapping

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

3: High, 2: Moderate,1: Low

Learning Outcomes

The student shall be able to display the following skill sets

1) Use appropriate tools/instruments for a given purpose and measure the values using instruments
2) Assembling and Disassembling of circuits
3) Coding and debugging
4) Troubleshoot/ Rectification of the problem
5) Design and Fabrication of the circuit
6) Soft skills and Reporting

Scheme of evaluation

Sl. No.	***Course***	***Duration***	***Scheme of evaluation***		
			Item	***Nature***	***Max. Marks***
1	***Industrial Training***	***6 months***	***1.First Assessment at Industry (After 12 Weeks)***	***Assessment of Learning outcomes by both the faculty and training Mentor of the industry***	***120***
			2.Second Assessment at the Industry (After 22 weeks)	***Assessment of Learning outcomes by both the faculty and training Mentor of the industry***	***120***
			Final Summative assessment at institution level	***Training Report***	***20***
				Demonstration of any one of the skills listed in learning outcomes	***30***
				Viva Voce	***10***
TOTAL MARKS					***300***

Weightage of marks for Assessment of Skill sets during first and second assessment.

Skill Set Sl.No	***SKILL SET***	***Max Marks Allotted For each parameter***
1	*Use appropriate tools/instruments for a given purpose and measure the values using instruments*	*15*
2	*Assembling and Disassembling of circuits*	*20*
3	*Programming/Coding/debugging*	*15*
4	*Troubleshoot/ Rectification of the problem*	*20*
5	*Design and Fabrication of the circuit*	*25*
6	*Softskills and Reporting Skills*	*25*
	Total	*120*

During assessment the performance of the students shall be assessed in those skills in which the student has been trained and be awarded the marks as per the weightage assigned as above. In case the student has undergone training in a few skill sets then the total marks obtained shall be raised to 120 marks for the given assessment i.e. either assessment 1 or 2. However the performance of the student shall be assessed at the most skill sets listed above but not less than three skill sets.

Illustration

If the student has undergone training in only 4 skill sets (namely serial number 1, 3, 4, 5 of above skill sets) and marks awarded during assessment is 50 out of 80 marks, then the marks of 50 shall be enhanced to 120 proportionately as (50/80)*120=75.

GUIDELINES FOR INDUSTRIAL TRAINING

1. Duration of the training: 6 months.
2. Eligibility: The As per SBTET norms
3. Training Area: Students may be trained in the fields Fabrication/Foundry/Manufacturing/Service/Drafting/Maintenance etc.
4. The candidate shall put a minimum of 90% attendance during Industrial Training.
5. If the student fails to secure 90% attendance during industrial training, the student shall reappear for 6 months industrial training.
6. Formative assessment at industry level shall be carried out by the Mentor from of the industry, where the student is undergoing training and the faculty in charge (Guide) from the concerned section in the institution.
7. 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.
8. If the student fails to secure 50% marks in final summative assessment at institution level, the student should reappear for final summative assessment in the subsequent board examination.
9. Final Summative assessment at institution level is done by a committee including Head of the section (**of concerned discipline ONLY**), External examiner and Faculty members who assessed the students during Industrial Training as members.

Guidelines and responsibilities of the faculty members who are assessing the students performance during industrial training:

- Shall guide the students in all aspects regarding training.
- Shall create awareness regarding safety measures to be followed in the industry during the training period, and shall check it scrupulously.
- Shall check the logbook of the students during the time of their visit for the assessment.
- Shall monitor progress at regular intervals and make appropriate suggestions for improvement.
- Shall visit the industry and make first and second assessments as per stipulated schedules.
- Shall assess the skill sets acquired by the students during their assessment.
- Shall award the marks for each skill set as per the marks allotted for that skill set during 1st and 2nd assessments
- Shall voluntarily supplement students learning through appropriate materials like photographs, articles, videos etc.
- Shall act as co-examiner along with other examiners in the final assessment at institution.
- Shall act as liaison between the student and mentor.
- Shall maintain a diary indicating his observation with respect to the progress of students learning in all three domains (Cognitive, Psychomotor and Affective).

Guidelines to the Training Mentor in the industry:

- Shall train the students in all the skill sets as far as possible.
- Shall assess and award the marks in both the assessments along with the faculty member.
- Shall check and approve the log books of the students.
- Shall approve the attendance of each student at the end of the training period.
- Shall report to the guide about student's progress, personality development or any misbehavior as the case may be.
- ✓ **Every Teacher (including HoD if not holding any FAC) shall be assigned a batch of students of 10 to 15 for industrial training irrespective of student's placements for training.**

Rubrics for assessment:

Department of Technical Education
Name of the institution
Industrial training assessment

PIN: **Name of the student:**

Skill Set Sl.No	***SKILL SET***	**Max Marks Allotted For each parameter**	**Precisely completes the task**	**Completes the task, mistakes are absent, but not Precise**	**Completes the task, Mistakes are a few**	**Makes attempt, Mistakes are many**
1	***Use appropriate tools/instruments for a given purpose and measure the values using instruments (15)***					
	(i)Identification of tools and instruments	*5*	*5*	*3*	*2*	*1*
	(ii)Testing of components and devices	*5*	*5*	*3*	*2*	*1*
	(iii) Measuring the parameter	*5*	*5*	*3*	*2*	*1*
2	***Assembling and Disassembling the equipment with proper tool (20)***					
	(i) Disassembling	*10*	*10*	*7*	*6*	*3*
	(ii) Assembling	*10*	*10*	*7*	*6*	*3*
3	***Programming/Coding/Debugging (15)***	*10*	*10*	*7*	*6*	*3*
	(i) Programming/Coding	*5*	*5*	*3*	*2*	*1*
	(ii) Debugging					
4	***Troubleshooting/Rectification of the problem*.(20)**					
	(i) Fault-Finding	*10*	*10*	*7*	*6*	*3*
	(ii)Removal and Replacement of spare parts	*5*	*5*	*3*	*2*	*1*
	(iii) Testing the working condition.	*5*	*5*	*3*	*3*	*2*

5	***Design and Fabrication of the Circuits(25)***					
	(i) Designing of circuit.	*15*	*15*	*10*	*9*	*6*
	(ii) Fabrication of Circuits	*10*	*10*	*7*	*6*	*3*
6	***Soft skills and Reporting skills(25)***					
	(i)Communication Skills (oral/writing skills)	*5*	*5*	*4*	*3*	*2*
	(ii) Human relations.	*5*	*5*	*3*	*3*	*2*
	(iii) Supervisory abilities.	*5*	*5*	*3*	*3*	*2*
	(iv) Reporting technical issues	*5*	*5*	*4*	*3*	*2*
	(v)Maintenance of records in the industry.	*5*	*5*	*3*	*3*	*2*
	Total Marks	*120*	*120*	*80*	*67*	*38*

*Mistakes are with reference to Technique, Procedure & precautions, while precision refers to technique, procedure, precautions, time & result

(Marks awarded in words:)

Signature of the Training In-charge (Mentor)
Name
Designation

Signature of the faculty incharge (Guide)
Name
Designation