GOVERNMENT OF ANDHRA PRADESH

STATE BOARD OF TECHNICAL EDUCATION AND TRAINING

Andhra Pradesh :: Amaravathi

Globally Competetive
CURRICULUM (C-16)
For Polytechnic Diploma Courses
In Andhra Pradesh

INTERNET of THINGS

**DIPLOMA IN
ELECTRONICS & COMMUNICATION
ENGINEERING**

Front Cover Page

Objective of the New Curriculum (C-16)

To make the students 'Globally Competetive & Employable' by learning industry relevant subjects & undergoing Industrial training

Suggestions from Industrialists have been incorporated in the Curriculum by organising **Industry Institute Interaction Meet.**

Highlights of the Curriculum (C-16)

❖ 6 months /1 year industrial training in all the Diploma Courses.

❖ 1 year industrial training in collaboration with BOAT (Board of Apprenticeship & Training (SR), Chennai).

❖ Virtual labs for ECE & Computer Branches & Strengthening of Skill Development Centers to provide industrial training to students.

Fundamentals of 'Internet of Things' (IoT) is included for all the Branches in the Subject "Industrial Management & Smart Technologies".

"Communication Skills" and "Life Skills" have been introduced as practical subjects for all the Branches.

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"Computer Fundamentals Laboratory" is introduced for all the Branches in First year. AutoCAD specific to the Branch has been given emphasis in the Curriculum.

C Language, Programmable Logic Controllers (PLC), Microcontrollers, Solar Energy are introduced in Electrical Engineering Branch.

Mobile Communications, Consumer Electronics are introduced in Electronics and Communication Branch

CAD/ CAM, CNC Machines, Power Plant Engineering are introduced in Mechanical Engineering Branch.

OOPS through JAVA, Web Designing, Computer Hardware & Networking are introduced in Computer Engineering Branch.

Automobile Chassis and Body Engineering, Recent Trends In Automobile Engineering, Motor Transport Organization etc are introduced in Automobile Engineering Branch.

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Journal (JPAP)

The Department of Technical Education, A.P. has a bi-annual 'Journal of Polytechnics of Andhra Pradesh' JPAP

JOURNAL OF POLYTECHNICS IN ANDHRA PRADESH

Volume - 1, Issue - 1, Jan - Jun, 2017

CISCO ACADEMIES IN POLYTECHNICS

- 70 Government Polytechnics chosen to have Cisco Academies
- Course Content of CISCO has been incorporated into the ECE and Computer Diploma Courses
- CISCO to train Staff of Polytechnics in two phases to enable them to run the courses effectively
- Students to get 'Certificate from CISCO' along with Diploma Certificate.

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CURRICULUM-2016
(C-16)

FOR DIPLOMA COURSES IN ANDHRA PRADESH

PREAMBLE

The State Board of Technical Education and Training, Andhra Pradesh under the aegis of the Department of Technical Education, Andhra Pradesh generally reviews the Curricula once in every five years. However, recognizing the needs of the industries and enhancing the employability skills of Polytechnic students, the Government of Andhra Pradesh constituted a committee vide G.O.Rt.No:95 of Higher Education (TE) Dept dated: 29-4-2016 and G.O.Rt.No:98 of Higher Education (TE) Dept dated: 4-5-2016 for updation of polytechnic curriculum under the chairmanship of Sri. S. Balasubrahmanyam, IAS (Retd.,). The committee submitted a report on 31-5-2016 making certain recommendations and suggesting new initiatives to be incorporated in the curriculum. An Industry Institute Interaction Meet was organized with Industry experts and subject experts on 26-12-2016 and the suggestions from Industrialists have also been incorporated in the curriculum. The new Curricula for the different diploma courses have been designed with the active participation of the members of the faculty teaching in the Polytechnics of Andhra Pradesh, besides reviewed by Expert Committee constituted with eminent academicians.

The primary objective of the curricular change is to produce best technicians in the country by correlating growing needs of the industries with the academic input.

The revised New Curriculum i.e., Curriculum–2016 (C-16) is approved by BoG of SBTET for its implementation with effect from 2016-17.

<u>Salient Features:</u>

1. Duration of course is either 3 years / 3½ years duration of Regular Academic Instruction.
2. The Curriculum is prepared in Semester Pattern. However, First Year is maintained as Year-wise pattern.
3. 6 Months/ 1 year Industrial Training is introduced for all the Diploma courses.

4. Fundamentals of Internet of Things (IOT) is introduced for all the Diploma courses in the subject.

5. Modern subjects relevant to the industry are introduced in all the Diploma courses.

6. CISCO course content has been incorporated into the ECE and CME courses to get certification from CISCO along with Diploma.

7. 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.

8. 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 introduced for all the branches.

9. Modern topics relevant to the needs of the industry and global scenario suitable to be taught at Diploma level are also incorporated in the curriculum.

10. AutoCAD specific to the branch has been given more emphasis in the curriculum. Preparing drawings using CAD software has been given more importance.

11. Every student is exposed to the computer lab at the 1st year itself in order to familiarize himself with skills required for keyboard/mouse operation, internet usage and e-mailing.

12. Upon reviewing the existing C-14 curriculum, it is found that the theory content is found to have more weightage than the Practical content. In the revised C-16 curriculum, more emphasis is given to the practical content of Laboratories and Workshops, thus strengthening the practical skills.

13. 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.

14. 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 at the Polytechnics. The experiments /exercises that are chosen for the practical sessions are identified to conform to the field requirements of industry.

15. The Members of the working group are grateful to Sri G.S. Panda Das, I.A.S., Special Commissioner of Technical Education & Chairman of SBTET, AP. and Sri. Adityanath Das, I.A.S., Principal Secretary of Higher Education for their guidance and valuable inputs in revising, modifying and updating the curriculum.

16. The Members acknowledge with thanks the cooperation and guidance provided by Sri. A.Nirmal Kumar Priya, 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

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 BM 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 Common Entrance Test for admissions into Polytechnics (POLYCET) conducted by the State Board of Technical Education and Training, Andhra Pradesh, Vijayawada.

Only the candidates satisfying the following requirements will be eligible to appear for

the Common Entrance Test for admissions into Polytechnics (POLYCET).

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 making application to the Common Entrance Test for admissions into Polytechnics (POLYCET). In case of candidates whose results of their Qualifying Examinations is pending, their selection shall be subject to production of proof of their passing the qualifying examination in one attempt or compartmentally at the time of admission

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

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

6 ELIGIBILITY OF 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 upto 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 next.

7 READMISSION

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

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

   b) For Industrial Training: before commencement of the Industrial training.

2. Within 30 days after commencement of class works 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, after readmission is granted.

8   SCHEME OF EXAMINATION

a) First Year

THEORY EXAMINATION: Each Subject carries 80% marks with examination of 3 hours duration, along with 20% marks for internal evaluation. (Sessional marks). However, there are no minimum marks prescribed for sessionals.

PRACTICAL EXAMINATION: There shall be 40% Marks for regular practical work done, i.e. sessional marks for each practical subject 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 EXAMINATION: Each subject carries usually 80 marks and 30 marks in respect of specified subjects of 3hours duration, along with 20 marks for internal evaluation (sessional marks) respectively.

PRACTICAL EXAMINATION: Each subject carry 60/30 marks of 3hours duration 40/20 sessional marks.

9   INTERNAL ASSESSMENT SCHEME

a) Theory Subjects: Theory Subjects carry 20% sessional marks, Internal examinations will be conducted for awarding sessional marks on the dates specified. **Three unit tests will be conducted for I year students and two Unit Tests for semesters.** Average of marks obtained in all the prescribed tests will be considered for awarding the sessional marks.

b) Practical Subjects: Student's performance in Laboratories / Workshop shall be assessed during the year/ semester of study for 40% marks in each practical subject. Allotment of marks should be discrete taking into consideration of the students' skills, accuracy, recording and performance of the task assigned to him /

her. Each student has to write a record / log book for assessment purpose. In the subject of Drawing, which is also considered as a practical paper, the same rules hold good. Drawing exercises are to be filed in seriatum.

c) Internal assessment in Labs / workshops / Survey field work etc., during the course of study shall be done and sessional marks shall be awarded by the concerned Lecturer / Senior Lecturer / Workshop superintendent as the case may be.

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 any local Industry/ nearby Government Polytechnic/ Local Government Organization. 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 all the experiments / exercise prescribed.

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

g) **In case of Diploma courses *having* Industrial Training**, the training assessment shall be done and the marks are to be awarded in the following manner.

Industrial assessment	:	200 marks (in two spells of 100 marks each)
Maintenance of log book	:	30 marks
Record Work	:	30 marks
Seminar / viva-voce	:	40 marks

TOTAL	:	300 marks

The assessment at the institution level (Seminar/Viva-voce)shall be done by three members, viz., Internal Faculty member, External Examiner and Head of Section and be averaged.

10 **MINIMUM PASS MARKS**

THEORY EXAMINATION:

For passing a theory subject, 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 subject, 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 subjects of D.C.C.P course.

11. **PROVISION FOR IMPROVEMENT**

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

2. Improvement is allowed in any 4 (Four) subjects of the Diploma.

3. 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 <u>FIVE</u> years from the year of first admission.

4. No improvement is allowed in Practical / Lab subjects or Project work or Industrial Training assessment. However, improvement in drawing subject(s) is allowed.

5. If improvement is not achieved, the marks obtained in previous Examinations hold good.

6. Improvement is not allowed in respect of the candidates who are punished under Mal-practice in any Examination.

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

8. 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 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 examination if he/she

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

ii)   Should not have failed in more than Four backlog subjects 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 examination if he/she

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

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

For IVC& ITI Lateral Entry students:

i)   Puts the required percentage of attendance in the 5th semester
ii)   Should not have failed in more than Four backlog subjects 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 pay 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 Industrial Training assessment (Seminar/Viva-voce)

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

      Training

   ii) Should get eligibility to appear for 4th Semester Examination.

For IVC & ITI Lateral Entry students:

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

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

1.   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.
2.   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.
3.   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

i) Puts the required percentage of attendance in the 4th semester
ii) Should not have failed in more than <u>Four backlog subjects of 1st year.</u>

For IVC & ITI Lateral Entry students:

(i) Puts the required percentage of attendance in the 4th semester

4. 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.

5. 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.

6. 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.

7. 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

i) Puts the required percentage of attendance in the 7th semester
ii) Should get eligibility to appear for 4th semester Examination.

For IVC & ITI Lateral Entry students:

i) Puts the required percentage of attendance in the 7th semester
ii) Should not have failed more than four backlog subjects of 3rd Semester

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 I 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 I spell of Industrial training.

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.

1. 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.

2. 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.

3. 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

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

ii)   Should not have failed in more than Four backlog subjects 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

4. 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

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

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

For IVC & ITI Lateral Entry students:

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

        iv)   Should not have failed in more than Four backlog subjects of 3rd Semester

5. 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

i) Puts the required percentage of attendance in 6th semester and

ii) should get eligibility to appear for 4th Semester Examination.

For IVC & ITI Lateral Entry students:

i)   Puts the required percentage of attendance in 6th semester.
ii) should get eligibility to appear for 5th Semester Examination.

6. A candidate shall be promoted to 7th semester provided he/she puts 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

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

For IVC & ITI Lateral Entry students:

i) Puts the required percentage of attendance, ie., 90% in 7th semester Industrial Training.
ii) 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 Industrial training shall commence 10 days after the completion of the last theory examination of 6th Semester.

13.   STUDENTS PERFORMANCE EVALUATION

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

1.   First Class with Distinction shall be awarded to the candidates who secure an overall aggregate of 75% marks and above.

2.   First Class shall be awarded to candidates who secure overall aggregate of 60% marks and above and below 75% marks.

3.   Second Class shall be awarded to candidates who secure a pass with an overall aggregate of below 60%.

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.

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.

4.   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 from time to time.

15. STRUCTURE OF END EXAMINATION QUESTION PAPER:

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 subject be considered Examination paper is of 3/6/9 hours duration.

a) Each theory paper consists of Section 'A' and Section 'B'. Section 'A' contains 10 short answer questions. All questions are to be answered and each carries 3 marks Max. Marks: 10 x 3 = 30.
Section B contains 8 essay type questions including Numerical questions, out of which 5 questions each carrying 10 marks are to be answered.

Max.Marks: 5 x 10 = 50.

Total Maximum Marks: 80.

b) For Engineering Drawing Subject (107) consist of section 'A' and section 'B'. Section 'A' contains four (4) questions. All questions in section 'A' are to be answered and each carries 5 marks. Max. Marks: 4 x 5=20. Section 'B' contains six (6) questions. Out of which four (4) questions to be answered and each question carries 10 Marks. Max. Marks 4 x 10 = 40.

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

Max. Marks for an experiment / exercise   : 50%

Max. Marks for VIVA-VOCE   : 10%

Total   : 60% (of total marks for the subject)

In case of practical examinations with 50 marks, the marks will be worked out basing on the above ratio.

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

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.

17. MAXIMUM PERIOD FOR COMPLETION OF DIPLOMA COURSES:

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 fulfils the

following academic regulations.

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

ii.   He / she has completed all the subjects.

Students who fail to fulfill all the academic requirements for the award of the Diploma within 6 / 7 academic years from the year of admission shall forfeit their seat in the course & their seat shall stand cancelled.

For IVC & ITI Lateral Entry students:

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

ii.   He / she has completed all the subjects.

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

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

2.   Photo copies of valued answer scripts will be issued to all theory subjects and Drawing subject(s).

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

4.   No application can be entertained from third parties.

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

1. 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.

2. Re-verification of valued answer script shall be done for all theory subjects and

    Drawing subject(s).

3. The Re-verification committee constituted by the Secretary, SBTETAP with subject

    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).

2) 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.

4. 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-traceable certificate* from the Department of Police. In case of damage of original Diploma Certificate, he / she may obtain a duplicate certificate by surrendering the original damaged certificate on payment of prescribed fee to the State Board of Technical Education and Training, A.P.

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

DIPLOMA IN ELECTRONICS & COMMUNICATION ENGINEERING

(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 Devices & Power Supplies	5	-	150	3	20	80	100
EC-106	Elements of Electrical Engineering	4	-	120	3	20	80	100
PRACTICAL:								
EC-107	Engineering Drawing	-	6	180	3	40	60	100
EC-108	Basic Electronics Laboratory& wiring fundamentals	-	5	150	3	40	60	100
EC-109	Physics Laboratory	-	3	90	3	20	30	50
EC-110	Chemistry Laboratory	-			3	20	30	50
EC-111	Computer Fundamentals Laboratory	-	3	90	3	40	60	100
	TOTAL	24	18	1260	-	280	720	1000

EC-101, 102, 103,104, 107, 109, 110, 111 common with all branches

DIPLOMA IN ELECTRONICS & COMMUNICATION ENGINEERING
SCHEME OF INSTRUCTIONS AND EXAMINATIONS
DECE   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	5	-	75	3	20	80	100
EC -302	Electronic Circuits	6	-	90	3	20	80	100
EC -303	Digital Electronics	6	-	90	3	20	80	100
EC-304	Analog and Digital Communication Systems	6	-	90	3	20	80	100
EC-305	Network Analysis	6	-	90	3	20	80	100
PRACTICAL:								
EC-306	Electronic Circuits lab	-	3	45	3	40	60	100
EC-307	Digital Electronics lab	-	4	60	3	40	60	100
EC-308	Analog and Digital Communication systems Lab	-	3	45	3	40	60	100
EC-309	Communication Skills Practice	-	3	45	3	40	60	100
TOTAL		29	13	630	-	260	640	900

DIPLOMA IN ELECTRONICS & COMMUNICATION ENGINEERING (DECE)
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	Linear ICs and Applications	6	-	90	3	20	80	100
EC - 402	Programming in C and MATLAB	6	-	90	3	20	80	100
EC - 403	Microprocessors	6	-	90	3	20	80	100
EC - 404	Electronic Measurements & consumer gadgets	6	-	90	3	20	80	100
EC-405	Microwave & Satellite Communication systems	6	-	90	3	20	80	100
PRACTICAL:								
EC - 406	Linear ICs Lab	-	3	45	3	40	60	100
EC - 407	Microprocessors lab	-	3	45	3	40	60	100
EC - 408	C & MATLAB practice laboratory	-	3	45	3	40	60	100
EC - 409	Consumer Electronics & Measurements Lab	-	3	45	3	40	60	100
	TOTAL	30	12	630	-	260	640	900

DIPLOMA IN ELECTRONICS & COMMUNICATION ENGINEERING
SCHEME OF INSTRUCTIONS AND EXAMINATIONS
V 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 -501	Industrial Management & Smart Technologies	5		75	3	20	80	100
EC-502	Microcontrollers	6	-	90	3	20	80	100
EC-503	Computer Hardware & Networking	6	-	90	3	20	80	100
EC-504	Optical & Mobile Communications	6	-	90	3	20	80	100
EC-505	Industrial Electronics	6	-	90	3	20	80	100
PRACTICAL:								
EC-506	Advanced Communications & Networking Lab	-	4	60	3	40	60	100
EC-507	Microcontrollers lab	-	3	45	3	40	60	100
EC-508	Life Skills	-	3	45	3	40	60	100
EC-509	Industrial Electronics Lab	-	3	45	3	40	60	100
TOTAL		29	13	630	-	260	640	900

DIPLOMA IN ELECTRONICS AND COMMUNICATION ENGINEERING
SCHEME OF INSTRUCTIONS AND EXAMINATIONS

C-16-VI SEMESTER
EC - 601 INDUSTRIAL TRAINING

S.NO	Subject	Duration	Items	Max Marks	Remarks
1	Practical Training in the Industry	6 Months	1.First Assessment (at the end of 3rd month)	100	
			2. Second Assessment (at the end of 6th month)	100	
			3.Training Report a)Log Book b)Record	30 30	
			4. Seminar	40	
			TOTAL	**300**	

The industrial training shall carry **300** marks and pass marks are **50**%.A candidate failing to secure the minimum marks should complete it at his own expenses. No apprenticeship training stipend is payable in such case

During Industrial training the candidate shall put in a minimum of **90%**attendance.

FIRST YEAR

DIPLOMA IN ELECTRONICS & COMMUNICATION ENGINEERING
(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 Devices & Power Supplies	5	-	150	3	20	80	100
EC-106	Elements of Electrical Engineering	4	-	120	3	20	80	100
PRACTICAL:								
EC-107	Engineering Drawing	-	6	180	3	40	60	100
EC-108	Basic Electronics Laboratory& wiring fundamentals	-	5	150	3	40	60	100
EC-109	Physics Laboratory Practice	-	3	90	3	20	30	50
EC-110	Chemistry Laboratory Practice	-			3	20	30	50
EC-111	Comp. Fundamentals Laboratory	-	3	90	3	40	60	100
	TOTAL	24	18	1260	-	280	720	1000

EC-101, 102, 103,104, 107, 109, 110, 111 common with all branches

C-16-COMMON-101- ENGLISH
(Common to all Branches)

Subject Title   :   **ENGLISH**

Subject Code   :   **Common - 101**

Periods per Week   :   **3**

Periods per Year   :   **90**

Time Schedule& Weightage

Sl No	Major Topics	Titles of the Lessons	No. of Periods	Weightage of Marks	No of Short Answers	No of Long Answers
1	Vocabulary& Need for English	Lessons 1,2& Regular and essential vocabulary	5	13	1	1
2	Grammar	Lessons 11,12 & 19 to 26	30	31	7	1
3	Reading	Lessons 13 To 18	10	10	-	1
4	Writing	Lessons 27 To 40	30	40	-	4
5	English in Action	Lessons 3 To 10	15	16	2	1
		Total	90	110	10	08

Rationale and Scope

Globalization has ushered in an era of opportunities for those who have the necessary competencies. Effective communication is one among them. This shift demands strengthening of English in polytechnics. In C-16 Curriculum the focus is on the special needs of English for technicians.

This course aims at integration of the four fold language abilities viz., listening, speaking, reading and writing. The use of English for learning technical subjects and for performing technical functions like, writing reports, giving instructions and interpreting graphics/data is of great importance. Therefore the curriculum C-16 focuses on improving communicative abilities equipping the students to become industry- ready and employable.

On completion of this course the student will be able to:

1.0   Build vocabulary in the direction of future needs
2.0   Learn various grammatical structures
3.0   Read and comprehend English and understand the details and draw inferences
4.0   Learn to be competent in various forms of written communication (writing composition and data interpretation)
5.0   Practice spoken communication suited to various situations.

1.0   Extend their vocabulary in the direction of their future needs
1.1   Locate words, learn spellings, understand meanings
1.2   Pronounce words intelligibly
1.3   Find synonyms and antonyms
1.4   Use affixation
1.5   Comprehend meanings of words by understanding meanings of roots

2.0   Learn various grammatical structures
2.1   Identify and use nouns
2.2   Identify and use pronouns
2.3   Use the present tense
2.4   Use the past tense
2.5   Use the future tense
2.6   Identify and use adjectives
2.7   Identify and use adverbs
2.8   Use prepositions
2.9   Use linkers
2.10   State basic sentence structures
2.11   Construct different types of sentences
2.12   Frame questions to elicit information
2.13   Frame questions for confirmation
2.14   Use active voice
2.15   Use passive voice
2.16   Use direct speech
2.17   Use indirect speech
2.18   Identify and correct errors

3.0   Read and comprehend English
3.1   Identify the main ideas
3.2   Identify the specific details
3.3   Draw inferences
3.4   Give contextual meanings of the words
3.5   Perceive tone in a text

4.0   Learn to excel in various forms of written communication (writing composition and data interpretation)

4.1   Identify components of a good paragraph
4.2   Write types of paragraphs
4.3   Distinguish between formal and informal letters
4.4   Write personal letters
4.5   Write leave letters
4.6   Write official letters
4.7   Write letters of complaints
4.8   Prepare a resume
4.9   Write a cover letter
4.10   Write short messages
4.11   Report incidents
4.12   Report experiments
4.13   Report Industrial visits
4.14   Write work done statements
4.15   Write maintenance reports
4.16   Make notes using Cue method and Mapping method
4.17   Summarize Paragraphs
4.18   Present and Interpret Data from flow charts, tree diagrams, bar graphs, tables, pie charts

Practice spoken communication suited to various situations.

4.19   Use appropriate expressions to greet and take leave
4.20   Use proper expressions to make requests
4.21   Use apt expressions for asking and giving directions
4.22   Use suitable expressions to seek and offer suggestions
4.23   Use suitable expressions to state intentions
4.24   Use suitable expressions to state feelings
4.25   Use appropriate expressions to state agreement and disagreement
4.26   Use proper expressions to make complaints
4.27   Use suitable expressions to express obligations

Course Material

The textbook prepared by the faculty of English of Polytechnics in AP.

Reference Books

1. Essential English Grammar (Intermediate Level)   Raymond Murphy
2. Learn English (A Fun Book of Functional Language, Grammar and Vocabulary) SantanuSinhaChaudhuri
3. Grammar Builder (Entire Series)   Oxford University Press
4. High School English Grammar (Revised Edition)   Wren and Martin
5. Sentence skills with Readings (fourth Edition, Tata McGraw Hill)
                                                                          John Langan, Paul Langan
6. Word Power Made Easy   Norman Lewis
7. Spoken English   Shashi Kumar and Dhamija

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Engineering Mathematics - I

(Common to all Branches)

Subject Title : **Engineering Mathematics - I**

Subject Code : **Common- 102**

Periods per Week : **5**

Periods per Year : **150**

Time Schedule

S. No	Major Topic	No of Periods		Weightage of Marks	Short Type			Essay Type		
	Unit - I : Algebra	Theory	Practice		R	U	App	R	U	App
1	Logarithms	3	0	0	0	0	0	0	0	0
2	Partial Fractions	5	0	3	0	1	0	0	0	0
3	Matrices and Determinants	10	10	16	2	0	0	0	0	1
	Unit - II : Trigonometry									
4	Trigonometric Ratios	2	0	0	0	0	0	0	0	0
5	Compound Angles	3	2	3	1	0	0	0	0	0
6	Multiple and Submultiple angles	4	4	3	0	1	0	0	0	0
7	Transformations	4	4	5	0	0	0	1/2	0	0
8	Inverse Trigonometric Functions	3	2	5	0	0	0	0	1/2	0
9	Trigonometric Equations	3	2	5	0	0	0	1/2	0	0
10	Properties and solutions of triangles	4	4	5	0	0	0	0	0	1/2
11	Hyperbolic Functions	2	0	0	0	0	0	0	0	0
12	Complex Numbers	4	2	3	1	0	0	0	0	0
	Unit III : Co-ordinate									

S. No	Major Topic	No of Periods		Weightage of Marks	Short Type			Essay Type		
		Theory	Practice		R	U	App	R	U	App
	Geometry									
13	Straight Lines	5	3	6	1	1	0	0	0	0
14	Circle	4	2	5	0	0	0	0	1/2	0
15	Conic Sections	4	3	5	0	0	0	0	1/2	0
	Unit – IV : Differential Calculus									
16	Limits and Continuity	4	2	3	0	1	0	0	0	0
17	Differentiation	18	10	23	1	0	0	1	1	0
S. No	Major Topic	No of Periods		Weightage of Marks	Short Type			Essay Type		
	Unit - V : Applications of Differentiation	Theory	Practice		R	U	App	R	U	App
18	Geometrical Applications	3	2	5	0	0	0	0	0	1/2
19	Physical Applications	2	2	5	0	0	0	0	0	1/2
20	Maxima and Minima	3	4	5	0	0	0	0	0	1/2
21	Errors and Approximations	2	0	5	0	0	0	0	0	1/2
	Total	92	58	110	6	4	0	2	2 1/2	3 1/2
				Marks	18	12	0	20	25	35

R:	**Remembering type**	38 marks
U:	**Understanding type**	37 marks
App:	**Application type**	35 marks

ENGINEERING MATHEMATICS – I

COMMON TO ALL BRANCHES – 102

Objectives

Upon completion of the course the student shall be able to:

UNIT – I

Algebra

1.0 Use Logarithms in engineering calculations

    1.1 Define logarithm and list its properties.

    1.2 Distinguish natural logarithms and common logarithms.

    1.3 Explain the meaning of e and exponential function.

    1.4 State logarithm as a function and its graphical representation.

    1.5 Use the logarithms in engineering calculations.

2.0 Resolve Rational Fraction into sum of Partial Fractions in engineering problems

    2.1 Define the following fractions of polynomials:

        1. Rational,

        2. Proper and

        3. Improper

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

$$i)\quad \frac{f(x)}{(x+a)(x+b)(x+c)} \qquad ii)\quad \frac{f(x)}{(x+a)^2(x+b)(x+c)}$$

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

3.0 Use Matrices for solving engineering problems

    3.1 Define a matrix and order of a matrix.

    3.2 State various types of matrices with examples (upto 3rd order square matrices).

    3.3 Compute sum, scalar multiplication and product of matrices.

    3.4 Illustrate the properties of these operations such as associative, distributive, commutative properties with examples and counter examples.

3.5   Define the transpose of a matrix and write its properties.

3.6   Define symmetric and skew-symmetric matrices.

3.7   Resolve a square matrix into a sum of symmetric and skew- symmetric matrices with examples in all cases.

3.8   Define minor, co-factor of an element of 2X2 and 3x3 square matrices with examples.

3.9   Expand the determinant of a 3 x 3 matrix using Laplace expansion formula.

3.10   Distinguish singular and non-singular matrices.

3.11   State properties of determinants with simple examples.

3.12   Define multiplicative inverse of a matrix and list properties of adjoint and inverse.

3.13   Compute adjoint and multiplicative inverse of a square matrix.

3.14   Representation of system of linear equations (2 variables in 2 equations and 3 variables in 3 equations) in matrix form.

3.15   Solve system of linear equations using Cramer's rule.

3.16   Solve system of linear equations by matrix inversion method

3.17   State elementary row operations.

3.18   Solve a system of linear equations by Gauss- Jordan method

UNIT – II

Trigonometry :

4.0   Understand Trigonometric Ratios
4.1   Define trigonometric ratios of any angle.

4.2   List the values of trigonometric ratios at specified values.

4.3   Draw graphs of trigonometric functions

4.4   Explain periodicity of trigonometric functions.

5.0   Solve simple problems on Compound Angles
5.1   Define compound angles and state the formulae of $\sin(A\pm B)$, $\cos(A\pm B)$, $\tan(A\pm B)$ and $\cot(A\pm B)$

5.2   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.

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

5.4   Solve simple problems on compound angles.

6.0   Solve problems using the formulae for Multiple and Sub- multiple Angles

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

   6.2   Derive useful allied formulas like sinA= (1- cos2A)/2 etc.,

   6.3   Solve simple problems using the above formulae

7.0   Apply Transformations for solving the problems in Trigonometry

   7.1   Derive the formulae on transforming sum or difference of two trigonometric ratios in to a product and vice versa- examples on these formulae.

8.0   Use Inverse Trigonometric Functions for solving engineering problems

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

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

   8.3   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.

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

   8.5   Derive formulae like $\tan^{-1} x + \tan^{-1} y = \tan^{-1}\left(\dfrac{x + y}{1 - xy}\right), \quad where \ \ x \geq 0, y \geq 0, xy < 1$ etc., and solve simple problems.

9.0   Solve Trigonometric Equations in engineering applications

   9.1   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.

   9.2   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.

10.0   Appreciate Properties of triangles and their solutions

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

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

   10.3   List various formulae for the area of a triangle.

   10.4   Solve problems using the above formulae.

10.5   Solve a triangle when (i) three sides, (ii) two sides and an included angle, (iii) two sides and an opposite angle-case of two solutions and (iv) one side and two angles are given.

11.0   Represent the Hyperbolic Functions in terms of logarithm functions

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

11.2   Represent inverse hyperbolic functions in terms of logarithms.

12.0   Represent Complex numbers in various forms

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

12.2   Define the operations on complex numbers with examples.

12.3   Define amplitude of a complex number

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

12.5   State DeMoivre's theorem and its applications to complex numbers e.g., finding the roots, powers, simplifications of a complex number with illustrative examples

UNIT - III

Coordinate Geometry

13.0   Solve the problems on Straight lines

13.1   Write the different forms of a straight line – point slope form, two point form, intercept form, normal form and general form

13.2   Solve simple problems on the above forms

13.3   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.

14.0   Solve the problems on Circles

14.1   Define locus of a point – circle and its equation.

14.2   Find the equation of a circle given

        (i)   Center and radius

        (ii)   Two ends of a diameter

        (iii)   Centre and a point on the circumference

        (iv)   Three non collinear points

14.3   Write the general equation of a circle and find the centre and rad

15.0   Appreciate the properties of Conics in engineering applications

15.1   Define a conic section.

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

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

15.4   Describe the properties of Parabola, Ellipse and Hyperbola in standard form.

UNIT - IV

Differential Calculus

16.0   Use the concepts of Limit and Continuity for solving the problems

16.1   Explain the concept of limit and meaning of $\lim\limits_{x \to a} f(x) = l$ and state the properties of limits.

16.2   Mention the Standard limits $\lim\limits_{x \to a} \dfrac{x^n - a^n}{x - a}$, $\lim\limits_{x \to 0} \dfrac{\sin x}{x}$, $\lim\limits_{x \to 0} \dfrac{\tan x}{x}$, $\lim\limits_{x \to 0} \dfrac{a^x - 1}{x}$,

$\lim\limits_{x \to 0} \dfrac{e^x - 1}{x}$, $\lim\limits_{x \to 0} (1 + x)^{\frac{1}{x}}$, $\lim\limits_{x \to \infty} \left(1 + \dfrac{1}{x} \right)^x$ (All without proof).

16.3   Solve the problems using the above standard limits

16.4   Evaluate the limits of the type $\lim\limits_{x \to l} \dfrac{a x^2 + b x + c}{\alpha x^2 + \beta x + \gamma}$ and $\lim\limits_{x \to \infty} \dfrac{f(x)}{g(x)}$

16.5   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.

17.0   Appreciate Differentiation and its meaning in engineering situations

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

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

17.3   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.

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

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

17.6 Explain the method of differentiation of a function of a function (Chain rule) with illustrative examples such as

(i) $\sqrt{t^2 + \dfrac{2}{t}}$ (ii) $x^2 \sin 2x$ (iii) $\dfrac{x}{\sqrt{x^2 + 1}}$ (iv) $\log\left(\sin(\cos x)\right)$.

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

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

17.9 Find the derivatives of hyperbolic functions.

17.10 Explain the procedures for finding the derivatives of implicit function with examples.

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

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

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

17.14 Explain the definition of Homogenous function of degree n

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

UNIT - V

Applications of the Differentiation

18.0 Understand the Geometrical Applications of Derivatives

18.1 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.

18.2 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.

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

18.4 Explain the concept of angle between two curves and procedure for finding the angle between two given curves with illustrative examples.

19.0   Understand the Physical Applications of Derivatives

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

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

20.0   Use Derivatives to find extreme values of functions

20.1   Define the concept of increasing and decreasing functions.

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

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

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

21.0   Use Derivatives to find Errors and Approximations

21.1   Find the absolute error, approximate error, relative error and percentage error in functions of single variable.

COURSE CONTENT

Unit-I

Algebra

1. Logarithms :

   Definition of logarithm and its properties, natural and common logarithms; the meaning of e and exponential function, logarithm as a function and its graphical representation.

2. Partial Fractions :

   Rational, proper and improper fractions of polynomials. Resolving rational fractions in to their   partial fractions covering the types mentioned below:

$$i) \quad \frac{f(x)}{(x+a)(x+b)(x+c)} \qquad ii) \quad \frac{f(x)}{(x+a)^2(x+b)(x+c)}$$

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

Matrices:

3. Definition of 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 2 or 3 variables-Solutions by Cramer's rule, Matrix inversion method-examples-Elementary row operations on matrices -Gauss-Jordan method to solve a system of equations.

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: trigonometric ratios of multiple angles 2A,3A and submultiple angle 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 :

sin x =k , cos x= k, tan x =k.

Solutions of simple quadratic equations, equations involving usage of transformations-problems.

10. Properties and solutions of triangles: relation between sides and angles of a triangle- sine rule, cosine rule, tangent rule and projection rule-area of a triangle- solving 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- Amplitude (polar) form, Exponential form (Euler) form of a complex number- Problems. DeMoivre's Theorem and its applications in complex numbers- Simple problems.

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) center 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 center, radius.

15. Definition of a conic section, equation of a conic when focus directrix and eccentricity are given. Properties of parabola, ellipse and hyperbola, 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. Angle between the curves - 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. Applications of derivative in finding errors and approximations of functions and simple problems.

Reference Books :

1. A text book of matrices by Shanti Narayan,
2. Plane Trigonometry, by S.L Loney
3. Co-ordinate Geometry, by S.L Loney
4. Thomas Calculus, Pearson Addison-Wesley publishers
5. Calculus – I, by Shanti Narayan and Manicavachgam Pillai, S.V Publications

ENGINEERING PHYSICS

Subject Title   :   **Engineering Physics**
Subject Code   :   **Common -103**
Periods per week   :   **04**
Total periods per year :   **120**

TIME SCHEDULE

S.No	Major Topics	No. of Periods	Weightage of Marks	Short Answer Type	Essay Type
1.	Units and Dimensions	08	03	1	-
2.	Elements of Vectors	12	13	1	1
3.	Kinematics	14	13	1	1
4.	Friction	08	10	-	1
5.	Work, Power and Energy	12	10	-	1
6.	Simple Harmonic Motion	12	13	1	1
7.	Heat & Thermodynamics	12	13	1	1
8.	Sound	12	13	1	1
9.	Properties of matter	10	06	2	-
10.	Electricity & magnetism	12	13	1	1
11.	Modern Physics	08	03	1	-
	Total:	**120**	**110**	**10**	**8**

OBJECTIVES
Upon completion of the course the student shall be able to

1.0 Understand the concept of Units and dimensions
    1.1   Explain the concept of Units
    1.2   Define the terms
           a) Physical quantity, b) Fundamental physical quantities and
           c) Derived physical quantities
    1.3   Define unit
    1.4   Define fundamental units and derived units
    1.5   State SI units with symbols
    1.6   State Multiples and submultiples in SI system
    1.7   State Rules of writing S.I. units
    1.8   State advantages of SI units
    1.9   Define Dimensions
    1.10   Write Dimensional formulae
    1.11   Derive dimensional formulae of physical quantities
    1.12   List dimensional constants and dimensionless quantities
    1.13   State the principle of Homogeneity of Dimensions
    1.14   State the applications of Dimensional analysis
    1.15   State the limitations of dimensional analysis
    1.16   Solve problems

2.0 Understand the concept of Elements of Vectors
    2.1   Explain the concept of Vectors
    2.2   Define Scalar and Vector quantities
    2.3   Give examples for scalar and vector quantities

2.4   Represent vectors graphically
2.5   Classify the Vectors
2.6   Resolve the vectors
2.7   Determine the Resultant of a vector by component method
2.8   Represent a vector in space using unit vectors (I, j, k)
2.9   State triangle law of addition of vectors
2.10   State parallelogram law of addition of vectors
2.11   Illustrate parallelogram law of vectors in case of flying bird and sling.
2.12   Derive expression for magnitude and direction of resultant of two vectors
2.13   State polygon law of addition of vectors
2.14   Explain subtraction of vectors
2.15   Define Dot product of two vectors with examples (Work done, Power)
2.16   Mention the properties of Dot product
2.17   Define Cross products of two vectors with examples (Torque, Linear velocity)
2.18   Mention the properties of Cross product.
2.19   Solve the related numerical problems

3.0   Understand the concept of Kinematics
3.1   Write the equations of motion in a straight line
3.2   Explain the acceleration due to gravity
3.3   Derive expressions for vertical motion
        a) Maximum Height, b) time of ascent, c) time of descent, and d) time of flight
3.4   Derive height of a tower when a body projected vertically upwards from the top of a tower.
3.5   Explain projectile motion with examples
3.6   Explain Horizontal projection
3.7   Derive an expression for the path of a projectile in horizontal projection
3.8   Explain oblique projection
3.9   Derive an expression for the path of projectile in oblique projection
3.10   Derive formulae for projectile in oblique projection
        a) Maximum Height, b) time of ascent, c) time of descent, and d) time of flight
        e) Horizontal Range, f) Maximum range
3.11   Solve the related numerical problems

4.0   Understand the concept of Friction
4.1   Define friction
4.2   Classify the types of friction and define
4.3   Explain the concept of Normal reaction
4.4   State the laws of friction
4.5   Define coefficients of friction
4.6   Explain the Angle of friction
4.7   Derive an expression for acceleration of a body on a rough horizontal surface
4.8   Derive an expression for the displacement and time taken to come to rest over a rough horizontal surface
4.9   Define Angle of repose
4.10   Derive expressions for acceleration of a body on a smooth inclined plane (up and down)
4.11   Derive expressions for acceleration of a body on a rough inclined plane (up and down)
4.12   List the Advantages and Disadvantages of friction

4.13 Mention the methods of minimizing friction
4.14 Solve the related numerical problems

5.0   Understand the concepts of Work, Power, and Energy
5.1   Define the terms 1.Work, 2. Power and Energy
5.2   State SI units and dimensional formulae for 1.Work, 2. Power, and Energy
5.3   Define potential energy and state examples
5.4   Derive the expression for Potential energy
5.5   Define kinetic energy and state examples
5.6   Derive the expression for kinetic energy
5.7   State and derive Work- Energy theorem
5.8   Derive the relation between Kinetic energy and momentum
5.9   State the law of conservation of energy and mention examples
5.10   Verify the law of conservation of energy in the cases of a freely falling body and vertically projected body in the upward direction
5.11   Solve the related numerical problems

6.0   Understand the concept of Simple harmonic motion
6.1   Define Simple harmonic motion
6.2   Give examples for Simple harmonic motion
6.3   State the conditions of Simple harmonic motion
6.4   Explanation of SHM in terms of projection of circular motion on any one of the diameters of the circular path
6.5   Derive expression for displacement
6.6   Derive expression for velocity
6.7   Derive expression for acceleration
6.8   Derive expression for Time period and frequency of S H M
6.9   Define phase of S H M and explain from the expression of displacement
6.10   Define Ideal simple pendulum and derive expression for Time period of simple pendulum
6.11   State the laws of motion of simple pendulum and mention formulae
6.12   Solve the related numerical problems

7.0   Understand the concept of Heat and thermodynamics
7.1   Explain the concept of expansion of gases
7.2   State and explain Boyle's law and also express it in terms of density
7.3   Define absolute zero temperature
7.4   Explain absolute scale of temperature
7.5   State Charles laws in terms of absolute temperature and explain
7.6   Define ideal gas and distinguish from real gas
7.7   Derive Ideal gas equation
7.8   Define Specific gas constant and Universal gas constant
7.9   Explain why universal gas constant is same for all gases
7.10   State SI unit and dimensional formula of universal gas constant
7.11   Calculate the value of universal gas constant
7.12   State the gas equation in different forms (as a function of density and mass)
7.13   Distinguish between r and R
7.14   State and Explain Isothermal process
7.15   State and Explain adiabatic process
7.16   Distinguish between isothermal and adiabatic processes
7.17   State first and second laws of thermodynamics and state applications

7.18 Define specific heats & molar specific heats of a gas and differentiate them
7.19 Derive the relation $C_p - C_v = R$ (Mayer's Equation)
7.20 Solve the relavent numerical problems

8.0 **Understand the concept of Sound**
8.1 Define the term sound
8.2 Explain longitudinal and transverse wave motion and state differences
8.3 Distinguish between musical sound and noise
8.4 Explain noise pollution and state SI unit for intensity level of sound
8.5 Explain causes of noise pollution
8.6 Explain effects of noise pollution
8.7 Explain methods of minimizing noise pollution
8.8 Explain the phenomenon of beats
8.9 State the applications of beats
8.10 Define Doppler effect
8.11 List the Applications of Doppler effect
8.12 Define reverberation and reverberation time
8.13 Write Sabine's formula and name the parameters contained
8.14 Define and Explain echoes and also state its applications
8.15 State conditions of good auditorium
8.16 Solve the related numerical problems

9.0 **Understand the properties of matter**
9.1 Define the term Elasticity
9.2 Define the terms stress and strain and also define different types of stress and strain
9.3 State the units and dimensional formulae for stress and strain
9.4 State and explain Hooke's law
9.5 Define surface tension and state examples
9.6 Explain Surface tension with reference to molecular theory
9.7 Define angle of contact
9.8 Define capillarity
9.9 Write the formula for surface tension based on capillarity and name the parameters
9.10 Explain the concept of Viscosity
9.11 Mention examples of Viscosity
9.12 State Newton's formula for viscous force and explain
9.13 Define co-efficient of viscosity and write its units and dimensional formula
9.14 Explain the effect of temperature on viscosity of liquids and gases
9.15 State Poiseulle's equation for Co-efficient of viscosity and name the physical quantities involved
9.16 Solve the related numerical problems

10.0 **Understand the concept of Electricity and Magnetism**
10.1 Explain the concept of Electricity
10.2 State Ohm's law and write the formula
10.3 Explain Ohm's law
10.4 Define specific resistance, conductance and state their units
10.5 State Kichoff's laws

10.6 Explain Kichoff's laws

10.7 Describe Wheatstone's bridge with legible sketch

10.8 Derive an expression for balancing condition of Wheatstone's bridge

10.9 Describe Meter Bridge experiment for the determination of resistivity with a neat circuit diagram

10.10 Write the formula in Meter Bridge to determine specific resistance

10.11 Explain the concept of magnetism

10.12 State the Coulomb's inverse square law of magnetism

10.13 Define magnetic field and magnetic lines of force and write the properties of magnetic lines of force

10.14 State the Magnetic induction field strength and mention its units and dimensionsal formula

10.15 Derive an expression for the moment of couple on a bar magnet placed in a uniform magnetic field

10.16 Derive Magnetic induction field strength at a point on the axial line

10.17 Derive Magnetic induction field strength at a point on the equatorial line

10.18 Solve the related numerical problems

11.0 Understand the concept of Modern physics

11.1 State and Explain Photo-electric effect

11.2 Write Einstein's photoelectric equation and explain

11.3 State laws of photoelectric effect

11.4 Explain the Working of photoelectric cell

11.5 List the Applications of photoelectric effect

11.6 Recapitulate refraction of light and its laws

11.7 Define critical angle

11.8 Explain the Total Internal Reflection

11.9 Explain the principle and working of Optical Fiber

11.10 Mention types of optical fibbers

11.11 List the applications of Optical Fiber

11.12 Define super conductor and superconductivity and mention examples for superconductors

11.13 State the properties of superconducting materials

11.14 List the applications of superconductors

COURSE CONTENT

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- - 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. Kinematics

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 - problems

4. Friction:

Introduction to friction- Causes- Types of friction- Laws of friction- Angle of repose- Angle of friction— Motion of a body over a horizontal surface- smooth inclined plane- 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 r and R- Isothermal and adiabatic processes- Laws of thermodynamics- Specific heats - molar specific heats of a gas –Derivation of Mayer's Equation- 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- 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 's laws- 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

REFERENCE BOOKS

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

Blue Print for setting question paper at different levels

S.No	Major Topics	No. of Periods	Weightage of Marks	Short answer type			Essay type		
				K	U	A	K	U	A
1.	Units and Dimensions	08	03	1	0	0	0	0	0
2.	Elements of Vectors	12	13	0	0	1	0	1	0
3.	Kinematics	14	13	0	1	0	1	0	0
4.	Friction	08	10	0	0	0	0	1	0
5.	Work, Power and Energy	12	10	0	0	0	0	1	0
6.	Simple Harmonic Motion	12	13	0	0	1	0	1	0
7.	Heat & Thermodynamics	12	13	0	1	0	1	0	0
8.	Sound	12	13	0	1	0	0	0	1
9.	Properties of Matter	10	06	1	1	0	0	0	0
10.	Electricity & magnetism	12	13	0	1	0	0	1	0
11.	Modern Physics	08	03	1	0	0	0	0	0
	Total:	**120**	**110**	**3**	**5**	**2**	**2**	**5**	**1**

C – 16, ENGINEERINGCHEMISTRY &ENVIRONMENTALSTUDIES
(Common to all Branches)

Subject Title   **: Engineering Chemistry & Environmental Studies**
Subject Code   **: Common-104**
Periods per week   **: 04**
Total periods per year **: 120**

Scheme of instruction and examination Time Schedule

S.No	Major topic	No of Periods	Weight age of marks	Short type (3marks)			Essay type (10 marks)			remarks
				R	U	A	R	U	A	
A. ENGINEERING CHEMISTRY										
1	Fundamentals of Chemistry	18	16	1	0	1	0	1	0	
2	Solutions	10	8	1	0	0	0	0	1/2	5 mark
3	Acids and bases	10	8	0	0	1	0	1/2	0	5 mark
4	Principles of Metallurgy	10	10	0	0	0	1	0	0	
5	Electrochemistry	14	13	0	1	0	0	0	1	
6	Corrosion	8	10	0	0	0	0	1	0	
7	Water Technology	14	13	1	0	0	1	0	0	
8	Polymers	12	13	1	0	0	1	0	0	
9	Fuels	6	3	1	0	0	0	0	0	
B. ENVIRONMENTALSTUDIES		18	16	1	1	0	0	1	0	
	total	120	110	6	2	2	3	3 1/2	1 1/2	
				18	6	6	30	35	15	

OBJECTIVES

Upon completion of the course the student shall be able to

A.ENGINEERINGCHEMISTRY

1.0   Understand the concept of Atomic structure

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

1.2   Explain the concept to f atomic number and mass number.

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

1.4   Explain the significance of four Quantum numbers.

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

1.6   Define Orbital in an atom.

1.7   Draw the shapes of s,pandd - Orbitals .

1.8   Distinguish between Orbit and Orbital

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

1.10   Explain the significance of chemical bonding

1.11   Explain the Postulates of Electronic theory of valency

1.12   Define the types of Chemical bonding viz., Ionic, Covalent bonds.

1.13   Explain the types of Chemical bonding viz., Ionic, Covalent bonds with examples.

1.14   Explain bond formation in NaCl and MgO.

1.15   List Properties of Ionic compounds

1.16   Explain bond formation in Hydrogen molecule, Oxygen molecule, and Nitrogen molecule using Lewis dot method.

1.17   List Properties of Covalent compounds

1.18   Distinguish between properties of ionic compounds and covalent compounds.

1.19   Structures of ionic solids-define a) Unit cell b) co-ordination number.

1.20   Structures of Unit cells of NaCl and CsCl.

1.21   Define the term. Oxidation number.

1.22   Calculate the Oxidation Number of underlined atoms in the following examples

a)$K\underline{Mn}O_4$ b) $K_2\underline{Cr}_2O_7$ c) $H\underline{N}O_3$ d) $H_2\underline{S}O_4$ e) $\underline{Cl}O_4^-$ f) $\underline{N}H_4^+$

1.23   Differentiate between Oxidation Number and Valency

2.0   Calculate Molarity and Normality of given Solution

2.1   Define the terms 1.Solution, 2.Soluteand 3.Solvent

2.2   Classify solutions based on physical state and solubility

2.3   Define mole

2.4   Problems on 'Mole concept'

2.5   Define the terms 1. Atomic weight, 2.Molecular weight and 3. Equivalent weight

2.6   Calculate Molecular weight and Equivalent weight of given Acids,($HCl, H_2SO_4 HNO_3$)Bases (NaOH, KOH, $Ca(OH)_2$) and Salts (NaCl, Na_2CO_3, $CaCO_3$)

2.7   Define 1.Molarity, 2.Normality of solutions

2.8   Solve Numerical problem son 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   Understand the concepts of Acids and bases

3.1   Explain Arrhenius theory of Acids and Bases

3.2   State the limitations of Arrhenius theory of Acids and Bases

3.3   Explain Bronsted – Lowry theory of acids bases

3.4   State the limitations of Bronsted – Lowry theory of acids bases

3.5   Explain Lewis theory of acids and bases

3.6   State the limitations of Lewis theory of acids and bases

3.7   Explain the Ionic product of water

3.8   Define pH and explain Sorens on scale

3.9   Solve the Numerical problems on pH(Strong Acids and Bases)

3.10   Define Buffer solution

3.11   Give atleast three examples for Buffer solutions

3.12   State the applications of Buffer solution

4.0   Understand the Principles of Metallurgy

4.1   List at least eight Characteristics of Metals

4.2   Distinguish between Metals and Non Metals

4.3   Define the terms 1.Mineral, 2.Ore, 3. Gangue, 4.Fluxand 5.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 Metals by Electrolytic Refining

4.7   Define an Alloy

4.8   Write the Composition of the following alloys:1.Brass, 2.Germansilver, 3 Nichrome

4.9   List the uses of the following Alloys: 1. Brass, 2.Germansilver, 3.Nichrome

5.0   Understand the concepts of Electrochemistry

5.1   Define the terms1. Conductor, 2. Insulator, 3.Electrolyte 4.Non–electrolyte

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 based on Faraday's laws of electrolysis

5.7   Define Galvanic cell

5.8   Explain the construction and working of Galvanic cell

5.9   Distinguish between electrolytic cell and galvanic cell

5.10   Explain the electrode potentials and standard electrode potentials

5.11   Explain the electro chemical series and its significance

5.12   Explain the emfofa cell.

5.13   Solve the numerical problems on emfof the cell based on standard electrode potentials.

6.0   Understand the concept of 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 coaitings)

b) Cathodic protection(Sacrificial anode process and

Impressed–voltage process)

7. 0   Understand the concept of Water Technology

7.1   State the various Sources of water like Surface water and sub-surface water.

7.2   Define the terms soft water and hard water with respect to soap consumption.

7.3   Define the term hardness of water

7.4   Types of hardness of water 1.Temporary hardness 2. Permanent hardness

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

7.6   State the disadvantages of using hard water in industries

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

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

7.9   Concept of Osmosis and Reverse Osmosis with examples .

7.10   State the applications of Reverse Osmosis.

7.11   State essential qualities of drinking water.

8.0   Understand the concepts of Polymers

8.1   Explain the concept of polymerisation

8.2   Describe the methods of polymerization a) addition polymerization of Ethylene b)condensation polymerization of phenol and formaldehyde(Only flow chart i.e. without chemical equations)

8.3   Define the term plastic

8.4   Classify the plastics with examples

8.5   Distinguish between the rmo and thermo setting plastics

8.6   List the Characteristics of plastics

8.7   State the advantages of plastics over traditional materials

8.8   State the disadvantages of using plastics.

8.9   Explain the methods of preparation of the following plastics:

1.Polythene, 2. PVC, 3.Teflon, 4. Polystyrene and 5. Urea formaldehyde

8.10   Explain the uses of the following plastics:

1.Polythene, 2. PVC, 3.Teflon, 4.Polystyrene and 5. Urea formaldehyde

8.11   Define the term natural rubber

8.12   write the structural formula of Natural rubber

8.13   Explain the processing of Natural rubber from latex

8.14   List the Characteristics of natural rubber

8.15   Explain the process of Vulcanization

8.16   List the Characteristics of Vulcanized rubber

8.17   Define the term Elastomer

8.18   Describe the preparation of the following synthetic rubbers a) Buna-s and b)Neo prene rubber

8.19   List the uses of the following synthetic rubbers   a) Buna-s and b)Neo prene rubber

9.0   Understand the concepts of Fuels

9.1   Define the term fuel

9.2   Classify the fuels based on physical state–solid, liquid and gaseous fuels,

9.3   Classify the fuels based on occurrence-primary and secondary fuels

9.4   List the characteristics of good fuel

9.5   State the composition and uses of gaseous fuels:
a)water gas,   b)producer gas, c)natural gas, d)coal gas, e)Biogas and f) acetylene

B.   ENVIRONMENTALSTUDIES

1.1   Define the term environment

1.2   Explain the scope and importance of environmental studies

1.3   Segments of environment 1).Lithosphere, 2).Hydrosphere, 3).Atmosphere, 4).Biosphere,

1.4   Define the following terms 1)Pollutant, 2).Pollution, 3).Contaminant, 4)receptor, 5)sink, 6) particulates, 7)dissolved oxygen, 8)Threshold limit value, 9).BOD, and 10).COD   11) eco system .

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

1.6   Define the terms:

1).Producers, 2).Consumers and 3).Decomposers with examples.

1.7   Explain bio diversity and threatst obiodiversity

1.8   Define air pollution

1.9   Classify the air pollutants-based on origin and physical state of matter.

1.10 Explain the causes of Air pollution.

1.11 Explain the effects of air pollution on human beings, plants and animals.

1.12 State the uses of forest resources.

1.13 State the deforestation and its causes and effects.

1.14 Explain the 1.) Green house effect , 2) Ozone layer depletion and 3) Acidrain.

1.15 Explain the methods of control of Air pollution

1.16 Define Water pollution

1.17 Explain the causes of Water pollution

1.18 Explain the effects of Water pollution on living and Non-living things.

1.19 Explain the methods of control of Water pollution.

COURSE CONTENT

A.   ENGINEERINGCHEMISTRY

1.   Fundamentals of Chemistry

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

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

,**Oxidation Number**- calculations, differences between Oxidation Number and Valency.

2.   Solutions

Introduction-concentration methods – Mole concept, Molarity, Normality, Equivalent weights, 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– pH and related numerical problems–Buffer solutions–Applications.

4.   Principles of Metallurgy

Characteristics of Metals and distinction between Metals and Non Metals, Metallurgy, ore, Gangue, Flux, 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, insulators, electrolytes– electrolysis – Faraday's laws of electrolysis- numerical problems – Galvanic cell – standard electrode potential – electrochemical series–emf and numerical problems on emfofa cell

6. Water technology

Introduction–soft and hard water–causes of hardness–types of hardness –dis advantages of hard water – degree of hardness (ppm) – softening methods – permut it process – ion exchange process– drinking water –Osmosis, Reverse Osmosis –Applications of Reverse osmosis

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

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 – preparationandusesofthefollowingplastics:1.Polythene 2.PVC 3.Teflon 4.Polystyrene 5. Urea formal dehyde – Rubber – Natural rubber – processing from latex –Vulcanization – Elastomers, Buna-s, Neoprene rubber and their uses.

9. Fuels

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

B. ENVIRONMENTALSTUDIES

Introduction– environment –scope and importance of environmental studies important terms– renewable and non-renewable energy sources–Concept of ecosystem, producers, consumers and decomposers – Biodiversity, definition and threats to Bio diversity.

Air pollution – causes-Effects– forest resources: uses and over exploitation, deforestation, acid rain, greenhouse effect –ozone depletion – control of air pollution – Water pollution – causes – effects – control measures,

REFERENCEBOOKS

1. Intermediate chemistry Vol 1&2   Telugu Academy

2. Intermediate chemistry Vol 1&2   Vikram Publishers

3. Intermediate chemistry Vol 1&2   Vignan Publishers &Deepthi Publishers

4. Engineering Chemistry   Jain & Jain

5. Engineering Chemistry   O.P. Agarwal, Hi-Tech.

6. Engineering Chemistry   Sharma

7. Engineering Chemistry   A.K. De

ELECTRONIC DEVICES & POWER SUPPLIES

Subject Title : **Electronic Devices & Power Supplies**
Subject Code : **EC-105**
Periods/Week : **05**
Periods/Year : **150**

TIME SCHEDULE

Sl. No	Major Topics	No. of periods	Weightage of marks	Short Answer Questions	Essay Questions
1	Passive Components	24	19	3	1
2	Switches and Relays	10	3	1	-
3	PCBs	10	13	1	1
4	Semiconductor Physics	20	13	1	1
5	Semiconductor Diode	25	18	1	1½
6	BJT	25	18	1	1½
7	Field Effect Transistor	20	13	1	1
8	DC Power Supplies	16	13	1	1
	Total	150	110	10	8

OBJECTIVES
On completion of the course the student should be able to

1.0 Comprehend passive components

1.1 Define the term resistance
1.2 Classify types of resistors.
1.3 List the specifications of a resistor, and state their importance.
1.4 State the physical factors that affect the value of a resistor.
1.5 Identify Resistance Value by using Colour Code.
1.6 Compare the features of carbon and wire wound potentiometers
1.7 Describe the working of rheostat and mention its application.
1.8 Explain the effects of temperature on resistance
1.9 Define temperature co-efficient of resistance and explain $R_t = R_0 (1+ \propto_o t)$
1.10 Describe the working of thermistor and sensistor and mention their applications.
1.11 Define the term inductance
1.12 Classify inductors.
1.13 Draw the symbol of different types of inductors
1.14 List the specifications of inductors.
1.15 Explain the terms Stray inductance and stray capacitance
1.16 List various core materials used in the construction of inductors
1.17 Explain the use of Ferrites in the construction of high frequency inductors
1.18 List the applications of A.F. and R.F chokes.
1.19 Define the term capacitance.
1.20 Classify the types of capacitors.
1.21 List the specifications of a capacitor and state their importance.
1.22 State the factors affecting the capacitance of a capacitor.
1.23 Define Di-electric constant and Di-electric strength of a material.
1.24 State different types of variable capacitors and mention their applications.

2.0 Familiarise with different types of 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   Mention specifications and applications of relays.
2.12   Explain the working of general-purpose electromagnetic relay.

3.0 Comprehend PCB materials and their fabrication
4.1   Explain the need of PCB in electronic equipment
4.2   Classify PCBs and list types of laminates used in PCBs.
4.3   Mention the methods of layout preparation of PCB.
4.4   List the methods of transferring layout on the copper clad sheet.
4.5   List the steps involved in screen-printing for making PCBs.
4.6   List the materials used in screen-printing.
4.7   Describe the methods of etching, cleaning and drilling of PCB.
4.8   Describe the steps involved in making double-sided PCB.
4.9   State the need for multilayer PCBs
4.10   Explain Surface mount Technology (SMT) and its uses
4.11   List the materials used in soldering.
4.12   List the soldering methods of PCBs.

4.0   Understand the fundamentals of Semiconductor Physics
4.1   Explain important electrical property 'Conductivity/ resistivity' its equation
4.2   Describe Energy Level and Energy Band diagrams
4.3   Compare conductors, semiconductors and Insulators , explain Valance, Conduction and Forbidden bands
4.4   Explain Semiconductor materials using Energy Band diagrams
4.5   Explain Hole conduction, bi polar nature of Semiconductor materials
4.6   Describe Intrinsic Semiconductors and Fermi level
4.7   Describe extrinsic Semiconductors , their EBDs and Fermi level
4.8   Identify Majority and Minority carriers in P and N Type materials
4.9   Distinguish between Drift and Diffusion current
4.10   Compare P-type, N-type semiconductors
4.11   Exact and approximate conductivity equations of P & N materials

5.0   Understand the working of 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   Explain the Energy Band Diagram of PN diode
5.4   Explain potential barrier using Energy band diagram
5.5   Explain diode equation
5.6   Sketch the forward and Reverse Bias VI characteristics of diode.
5.7   Reverse breakdown phenomenon
5.8   Distinguish Avalanche &Zener breakdown
5.9   Interpret the manufacturer specifications of a given diode from data sheet.
5.10   Describe the construction and working of Zener diode.
5.11   Sketch the characteristics of Zener breakdown.
5.12   Mention the applications of diode and zener diode

6.0   Understand the working of BJT
1.0   Explain the formation of transistor
1.1   Draw the symbol of transistor.
1.2   Explain the construction of PNP and NPN transistors
1.3   Explain the working of PNP and NPN Transistors.
1.4   Draw the different transistor configurations.
1.5   Sketch the input/output characteristics of CB, CE and CC configurations.
1.6   Know cut off, saturation and active regions.
1.7   Define alpha, beta and gamma Factors.
1.8   Relate alpha, beta and gamma Factors.
1.9   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}
1.10   Compare the performance characteristics of CB, CE and CC configurations
1.11   Explain transistor as a switch

7.0   Understand the working of FET
7.1.   Classify different types of FETs
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 Enhancement type MOSFET
7.8.   Explain the construction & working of Depletion type MOSFET
7.9.   Compare JFET and MOSFET
7.10.   Drain & Transfer Characteristics of MOSFET

8.0   Understand the working of DC Power Supplies

8.1   Explain the necessity of D.C. power supply for Electronic circuits.
8.2   Describe the working of HW, FW and Bridge section circuits with wave forms
8.3   Give the equations for RMS value and average /DC value of voltages and currents for above rectifiers
8.4   Define ripple factor and efficiency for the above circuits.
8.5   Give the formulae for ripple factor and efficiency.
8.6   Compare HW, FW , Centre tapped Rectifiers
8.7   Define Voltage Regulation.
8.8   Explain the need for a filter circuit in power supplies.
8.9   Explain the operation of a rectifier circuit using RC, CRC, CLC filters.
8.10   Draw the Waveforms of RC,CRC,CLC filters
8.11   Explain the need of swinging choke
8.12   Explain the significance of bleeder resistor
8.13   Give reasons for not using very large capacitor filters to reduce the ripple
8.14   State the need for a regulated power supply and list its specifications.
8.15   Explain the working of a simple Zener regulated DC Power supply.

Note: Emphasis is to be given to practice drawing Component symbols and circuits.

COURSE CONTENTS

1. Passive components
Resistors: Define resistance-Classification of resistors, colour code, Specifications, Carbon film metal film wire wound resistors, characteristics and applications. Effect of temperature on resistance. Thermistors, sensistors,.
Inductors : Classification, specifications of inductors, AF and RF Chokes, use of ferrites in inductors.
Capacitors: Classification, specifications of capacitors, dielectric constant, dielectric strength.

2. Switches, connectors and Relays: Different types of switches and connectors used in Electronic circuits, their specifications, Fuses. Types of relays-, working of relays.

3. PCBs: Classification of PCBs, screen-printing of PCBs, double sided PCBs, soldering methods of PCBs, standard PCB specifications.

4.Semiconductor Physics: Conductivity, Conductors, Insulators, Energy Band Diagrams, E_g, Intrinsic Semiconductors, Intrinsic concentration, Hole conduction, Fermi energy level, Extrinsic Semiconductors, P & N type semiconductors,Drift and diffusion currents, Exact & approximate conductivity equations of P & N type semiconductor materials.

5. Semiconductor diodes: PN junction diode, VI characteristics of diode, diode equation, Reverse breakdown, zener breakdown and avalanche breakdown, Zener diode, applications,

6.Bi-polar junction Transistor :Construction, working of NPN and PNP transistors, CB, CE and CC configurations, current equations in transistor, O/p & i/p characteristics of CB, CE and CC transistor, Active, Cut-off and saturation regions of operation, Transistor as switch.

7. **Field Effect Transistor :**Constructionand working of N-channel and P-channel JFET, Drain & mutual characteristics, MOSFET, Enhancement type MOSFET, Depletion type MOSFET. Advantages of FET over BJT.

8. DC Power Supplies: Need of DC power supply- Half wave, Full wave and Bridge rectifiers. RMS value, Ripple factor, Voltage regulation.Filters – RC, CRC, and CLC.Zener regulator.

TEXTBOOKS

1. Electronic Devices and Circuits   by G.K.Mithal
2. Electronic devices and applications by B. Somanathan Nair, PHI.
3. Electronic components   by Dr.K.Padmanabham.
4. Electronic Instruments and Systems by B.P Gupta TMH

REFERENCE BOOKS

1. P.C.Bs   by   Boshart TMH
2. Basic Electronics   by   Grob.   TMH
3. Electronic devices & Circuits   by   Millman&Halkias   TMH
4. Electronic Components   by   F.J. Waters.

ELEMENTS OF ELECTRICAL ENGINEERING

Subject Title	:	**Elements of Electrical Engineering**
Subject Code	:	**EC-106**
Periods/Week	:	**04**
Periods/Year	:	**120**

TIME SCHEDULE

SI	Major topics	No of periods	Weightage of marks	Short Answer Questions	Essay Questions
1	Electro Magnetism	17	21	2	1 ½
2	Electrostatics	23	21	2	1 ½
3	AC fundamentals	25	26	2	2
4	Transformers	19	16	2	1
5	DC motors	18	13	1	1
6	AC motors&Special Motors	18	13	1	1
	Total	**120**	**110**	**10**	**8**

After completing this unit the learner will be able to

1.0 Know the Electromagnetism
1.1   State coulombs laws of magnetism.
1.2   Define the terms Absolute and relative permeability of medium.
1.3   Explain the concept of lines of force & magnetic Field.
1.4   Define field intensity, Magnetic potential, Flux , Flux density .
1.5   Give the relation between Absolute and relative permeability
1.6   State Laplace law (Biot-Savart's Law)
1.7   State the Flemming's left hand rule
1.8   Define ampere
1.9   Define magneto motive force (mmf), permeability, flux and Reluctance
1.10   Compare magnetic circuit with electric circuit
1.11   Explain the terms leakage flux and leakage co-efficient
1.12   State Faraday's laws of electro - magnetic induction
1.13   Explain dynamically and statically induced E.M.F.
1.14   State Lenz's law and Flemming's right hand rule

2.0 Understand Electrostatics
2.1   State Coulomb's law of electrostatics and define unit charge
2.2   Define absolute and relative permittivity.
2.3   Understand electrostatic field.
2.4   Compare electrostatic and magnetic fields
2.5   State electric field intensity
2.6   Explain electric potential and potential difference
2.7   Give the Permittivity of commonly used die- electric materials
2.8   State unit of capacitance
2.9   State the formula for capacitance of a parallel plate capacitor
2.10   State the expression for equivalent capacitance of Capacitors connected in series and parallel;

2.11   Explain charging and discharging of capacitor.

2.12   Give the expression for energy stored in a capacitor

2.13   Solve simple problems on the above

3.0   Understand 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 Inductive reactance, Impedance, admittance, conductance and Power Factor

3.4   Explain Active and Reactive components of AC current

3.5   Explain Active and Reactive and apparent power in a AC circuit.

3.6   Define *Q factor* of a coil.

3.7   Explain AC through Resistance and capacitance connected in series.

3.8   Explain series RLC circuits, problems on Series RLC circuits

3.9   Explain Parallel AC circuit containing RLC

3.10   List the 3 methods a) Vector or phasor method b) Admittance method c) Vector algebra method.for solving AC parallel circuits.

4.0 Understand the working of Transformers

4.1   Explain the working principle of transformer

4.2   Give constructional details of a) Core type transformer b) Shell type transformer

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   Classify transformer based on power rating, construction and applications

4.8   Understand the working of an auto transformer

4.9   Explain the applications of a transformer a)potential transformer b) current transformer c) impedance matching transformer d) isolation transformer

4.10   List important specifications of a transformer and explain

5.0   Understand the working of DC Machines

5.1   Explain the principle of DC Motor.

5.2   Explain the significance of back EMF

5.3   Derive voltage equation of DC motor and condition for maximum power.

5.4   Give equation for speed of a) DC series motor b) DC shunt motor

5.5   Define speed regulation of DC motor

5.6   Explain torque-speed behaviour of DC motor

5.7   Explain DC motor characteristics a) DC series motor b)DC shunt motor

5.8   Compare DC series motor and DC shunt motor

5.9   Explain the need for starter.

5.10   List important specifications of a motor and explain

5.11   List the various applications and choice of particular motor for a given application.

6.0   Understand the working of AC Motors & Special motors

6.1   Classify ac motors based on the principle of operation, type of current and structural features

6.2   Explain the principle of induction motors

6.3   Define slip, synchronous speed of an induction motor and give the relationship between them

6.4   Write the equation for the frequency of rotor current
6.5   Draw the torque speed characteristics of ac motor and explain
6.6   List important specifications of an ac motor and explain
6.7   List the various applications of ac motors
6.8   Explain the working principle of capacitor start single phase induction motor.
6.9   Briefly explain the working principle of a) stepper motors b) Servo motors
6.10   Explain the choice of selecting a motor for a particular application
6.11   List the applications of stepper motors and servomotors

COURSE CONTENT

1.   **Electro Magnetism**
      Coulombs laws -permeability –lines of force-BiotSavart Law(Laplace Law) - Fleming's left hand rule -
      Ampere - Magnetic circuit- Magneto motive force – flux - reluctance - Comparison of Magnetic circuit
      with electric circuit Electro Magnetic Induction-Faraday's laws - Dynamically and statically induced E.M.F -
      Lenz's Law & Fleming's right hand rule.

2.   **Electrostatics**
      Coulombs Laws of Electrostatics – Permittivity -Electrostatic field - Comparison of electrostatic and
      magnetic lines of force -Strength of electric field- Flux density - Electric potential- potential difference –
       - Capacitance -Capacitor - types - Capacitors in series   and parallel

3.   **AC Fundamentals:**Self Inductance, mutual inductance, coefficient of coupling, A.F. and R.F. chokes, d
      specifications. –RL, RC and RLC circuits

4.   **Transformers**
       Principle of transformer- Core type transformer-Shell type transformer-Laminations-transformation ratio-

      efficiency and regulation of transformer -auto transformer- applications of transformers

5.   **DC Motors**
      Principles of D.C. motors back E.M.F., speed torque equations, characteristics of series, shunt motors,
      motor starters, speed control

6.   **AC MOTORS &SpecialMotors**
      Single phase induction motors, split phase, Capacitor start single phase induction motor - features of stepper

      motors, Servo motors - choice of selecting a motor-applications for each of above

REFERENCE

1.   Electrical Technology by B L Theraja,

ENGINEERING DRAWING

Subject Title   :   **Engineering Drawing**

Subject Code   :   **107 (Common to all Branches)**

Periods/Week   :   **06**

Periods Per Year   :   **180**

<u>Time Schedule</u>

Sno	Major Topics	No. of Periods	Weightage of marks	Short Answer Questions	Essay type Questions
1	Importance of Engineering Drawing	01	-	-	-
2	Engineering Drawing Instruments	05	-	-	-
3	Free hand lettering & Numbering	06	5	1	-
4	Dimensioning Practice	09	5	1	-
5	Geometrical Constructions	21	15	1	1
6	Projection of points, Lines, Planes & Solids	21	10	-	1
7	Auxiliary views	06	5	1	-
8	Sectional views	27	10	-	1
9	Orthographic Projection	33	10	-	1
10	Pictorial drawing	30	10	-	1
11	Development of surfaces	21	10	-	1
	Total	**180**	**80**	**04**	**06**

The course is aimed at developing basic graphic skills so as to enable them to use these skills in preparation of engineering drawings, their reading and interpretation

OBJECTIVES

Upon completion of the subject the student shall be able to

1) Understand the basic concepts of Engineering Drawing
   a) State the importance of drawing as an engineering communication medium
   b) State the necessity of B.I.S. Code of practice for Engineering Drawing
   c) Explain the linkages between Engineering drawing and other subjects of study in diploma course

2) Use of Engineering Drawing Instruments
   a) Select the correct instruments and draw lines of different orientation
   b) Select the correct instruments and draw small and large Circles
   c) Select the correct instruments for measuring distances on the drawing
   d) Use correct grade of pencil for different types of lines, thickness and given function
   e) Select and use appropriate scales for a given application
   f) Identify different drawing sheet sizes as per I.S. and Standard Layouts
   g) Prepare Title block as per B.I.S. Specifications
   h) Identify the steps to be taken to keep the drawing clean and tidy

3) Write Free Hand Lettering and Numbers
   a) Write titles using slanting letters and numerals of 7mm, 10mm and 14mm height
   b) Write titles using vertical letters and numerals of 7mm, 10mm and 14mm height
   c) Select suitable sizes of lettering for different layouts and applications

4) Understand Dimensioning Practice
   a) Define "Dimensioning"
   b) State the need of dimensioning the drawing according to accepted standards
   c) Identify notations of Dimensioning used in dimensioned drawing
   d) Identify the system of placement of dimensions in the given dimensioned drawing
   e) Dimension a given drawing using standard notations and desired system of dimensioning
   f) Dimension standard features applying necessary rules
   g) Arrange dimensions in a desired method for a given drawing
   h) Identify the departures if any made in the given dimensioned drawing with reference to SP-46-1988, and dimension the same correctly

5) Apply Principles of Geometric Constructions
   a) Divide a given line into desired number of equal parts internally
   b) Draw tangent lines and arcs
   c) Use General method to construct any polygon
   d) Explain the importance of conics
   e) Construct ellipse by concentric circles method
   f) Construct parabola by rectangle method
   g) Construct rectangular hyperbola from the given data
   h) Construct involute from the given data

i) Construct cycloid and helix from the given data

j) State the applications of the above constructions in engineering practice

6) Apply Principles of Projection of points, lines, planes & solids
a) Visualize the objects
b) Explain the I-angle and III-angle projections
c) Practice the I-angle projections
d) Draw the projection of a point with respect to reference planes (HP&VP)
e) Draw the projections of straight lines with respect to two reference planes (cases of lines parallel to one plane and inclined to other plane only)
f) Draw the projections of planes (cases of planes perpendicular to one plane and inclined to other plane only)
g) Draw the projections of solids (cases of axis perpendicular to one plane and inclined to other plane only)

7) Understand the need of auxiliary views
a) State the need of Auxiliary views for a given engineering drawing
b) Draw the auxiliary views of a given engineering component
c) Differentiate between auxiliary view and apparent view

8) Appreciate the need of Sectional Views
a) Explain the need to draw sectional views
b) Select the section plane for a given component to reveal maximum information
c) Explain the positions of section plane with respect to reference planes
d) Differentiate between true shape and apparent shape of section
e) Draw sectional views and true sections of regular solids discussed in chapter-6 above
f) Apply principles of hatching

9) Apply principles of orthographic projection
a) Explain the principles of orthographic projection with simple sketches
b) Draw the orthographic view of an object from its pictorial drawing
c) Draw the minimum number of views needed to represent a given object fully

10) Prepare pictorial drawings
a) State the need of pictorial drawings
b) Differentiate between isometric scale and true scale
c) Prepare Isometric views for the given orthographic drawings

11) Interpret Development of surfaces of different solids
a) State the need for preparing development drawing
b) Prepare development of simple engineering objects (cubes, prisms, cylinders, cones, pyramids) using parallel line and radial line methods
c) Prepare development of surface of engineering components like trays, funnels, 90^0 elbows & rectangular ducts

COURSE CONTENT

NOTE
1) **B.I.S Specifications should invariably be followed in all the topics.**
2) **A-3 Size Drawing Sheets are to be used for all Drawing Practice Exercises.**
3) **First Angle Projection is to be followed for all Orthographic projection exercises**

1) 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) Engineering drawing Instruments

Classification: Basic tools, tools for drawing straight lines, tools for curved lines, tools for measuring distances and special tools like mini drafter & drafting machine – Mention the names under each classification and their brief description -Scales: Recommended scales reduced & enlarged scales-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

Drawing Plate 1: Consisting of two exercises on use of drawing instruments

3) Free hand lettering & numbering

Importance of lettering – Types of lettering -Guide Lines for Lettering- Practicing letters & numbers of given sizes (7mm, 10mm and 14mm) Advantages of single stroke or simple style of lettering

Drawing plate 2: Consisting of five to six exercises on freehand Lettering & Numbering

4) Dimensioning practice

Purpose of engineering Drawing, Need of B.I.S code in dimensioning -Shape description of an Engineering object - Dimensioning size, Location 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 dimensioning of narrow spaces

Drawing Plate 3: Consisting of 8 exercises on Dimensioning methods and rules

5) Geometric Constructions

Division of a line: to divide a straight line into given number of equal parts internally and it's examples in engineering applications. Construction of tangent lines: to draw tangent lines touching circles internally and externally. 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 of given side using general method. Conical Curves: Explanation of Ellipse, Parabola, Hyperbola, as sections of a double cone and loci of a moving point, Eccentricity of above curves – Their Engg. applications viz. Projectiles, reflectors, P-V Diagram of a Hyperbolic process - Construction of ellipse by concentric circles method - Construction of parabola by rectangle method - Construction of rectangular hyperbola - General Curves: Involute, Cycloid and Helix, explanations as locus of a moving point, their engineering applications, viz, Gear tooth profile, screw threads, springs etc. - their construction.

<u>Drawing Plate 4</u>: Consisting of eight exercises on construction of polygons

<u>Drawing Plate 5</u>: Consisting of eight exercises on construction of conics

<u>Drawing Plate 6</u>: Consisting of eight exercises on involute, cycloid and helix

6) Projection of points, lines, planes & solids

Projecting a point on two planes of projection -Projecting a point on three planes of projection - Projection of straight line i) Parallel to both the planes ii) Perpendicular to one of the planes iii) Inclined to one plane and parallel to other plane - Projection of regular planes- i) Plane perpendicular to HP and parallel to VP and vice versa ii) Plane perpendicular to HP and inclined to VP and vice versa - Projection of regular solids with i) Axis perpendicular to one of the planes ii) Axis parallel to VP and inclined to HP and vice versa

<u>Drawing Plate 7</u>: Consisting of eight exercises on projection of points and Lines

<u>Drawing Plate 8</u>: Consisting of eight exercises on projection of planes

<u>Drawing Plate 9</u>: Consisting of eight exercises on projection of solids

7) Auxiliary views

Need for drawing auxiliary views - Explanation of the basic principles of drawing auxiliary views, explanation of reference plane and auxiliary plane - Partial auxiliary view.

<u>Drawing plate 10</u>: Consisting of four exercises on auxiliary views

8) Sectional views

Need for drawing sectional views – what is a sectional view - Location of cutting plane – Purpose of cutting plane line – Selection of cutting plane to give maximum information (vertical and offset planes) - Hatching – Section of regular solids inclined to one plane and parallel to other plane

Drawing Plate 11: Consisting of six exercises on sections of solids

9) Orthographic Projections

Meaning of orthographic projection -Using a viewing box 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 number of engineering objects - Explanation of first angle projection. – Positioning of three views in First angle projection - Projection of points as a means of locating the corners of the surfaces of an object – Use of mitre 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

Drawing Plate 12: Consisting of 12 exercises on orthographic projections of engineering objects

10) Pictorial Drawings

Brief description of different types of pictorial drawing viz., Isometric, oblique, and perspective and their use - Isometric drawings: Iso axis, angle between them, meaning of visual distortion in dimensions - Need for an isometric scale, difference between Isometric scale, and ordinary 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 - Use of box and offset methods

Drawing plate 13: Consisting of 12 exercises on Isometric views of engineering objects

11) 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 plane and parallel to the other -Development of simple solids like cubes, prisms, cylinders, cones, pyramids -Types of development: Parallel line and radial line development -Procedure of drawing development - drawings of trays, funnels, 90^0 elbow pipes and rectangular ducts.

Drawing plate 14: Consisting of 5 exercises on development problems

REFERENCE BOOKS

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

Engineering Drawing   by   Basant Agarwal & C.M Agarwal - (McGraw-hill)

Engineering Drawing   by   N.D.Bhatt.

T.S.M. & S.S.M on " Technical Drawing" prepared by T.T.T.I., Madras.

SP-46-1998 – Bureau of Indian Standards.

Subject title   : Basic Electronics Laboratory & wiring fundamentals
Subject code   : EC-108
Periods per week   : 5
Periods / Semester   : 150

TIME SCHEDULE

SI NO	Major Topics	Periods
1	1. Soldering practice	20
2	2. Preparation of PCB	30
3	3. Study and use of Electronic equipment	20
4	4. Testing, obtaining characteristic of electronic devices	35
5	5. Electrical wiring	45
	Total Periods	150

List of the Experiments

6. Identifying different components R, L, C, Diodes, Transistors, Relays, Switches etc.
7. Technique of using soldering iron, Soldering different components and ICs
8. Soldering components on to general PCB as per the given circuit diagram
9. Technique of de-soldering using de-soldering pump and wick.
10. Draw PCB for simple circuits and etch them on to a copper clad
11. Preparing PCB for soldering and soldering components on the PCB
12. Study of TPS units, CROs, Function Generators, RF Signal generators DMMs, Analog multimeter and other meters using their manuals and write down the steps in using each equipment.
13. Measure R, L and C usingmultimeter and compare with the calculated value using the code.
14. Identify different terminals of diode, zener diode, BJT, FET using multimeter
15. Obtain VI characteristics of diode, zener diode
16. Obtain o/p and i/p characteristics of CB and CE transistor
17. Switch ON and OFF a light (load) using a relay
18. Arrange PA system with multi speakers and microphones (with cord and cordless)
19. Obtain drain characteristics of FET

Elelctrical wiring :

1. Working with Tools used in Electrical Wiring

a) Identifying   1. wire stripper . 2. Insulation remover 3. Pocket knife 5.Electrical Tester   4.Phillips Head

Screwdrivers 5.Mallet 6. Rawl plug jumper 7 .Standard wire Gauge

2. Identifying and Working with Pliers

a) Identify and Know the various functions of cutting pliers, Nose pliers, Pipe pliers, Flush   cutter, top cutting

pliers, Electronics pliers,   Insulated cutting pliers

b) perform the following operations 1. Holding 2. Wire cutting 3. Component bending

4. Twisting the wire

3.. Identification of different wires and cables

1.Hookup wires a. PVC wire b. Teflon wires c.single strand d. multi strand

Wires used for electrical wiring   a) Service wire b) TRS wires /PVC Wires (Al and Cu) c) .single strand   d) Multi strand e) twisted Flexible pair wires f) Enameled copper wire

Power cord, UTP cable, Co axial cables, Flat ribbon cable for antennas,Telephone cable,Ethernet cable, Ribbon cables, Optical fiber

4.Practice of wire joints

Perform the following wire joints operations a) Twisting b) Splicing c) Insulating d) Western union joint e)

Married joint f) Britania (straight Joint) g) Tee joint h) Joining running cables ,Pigtail or rat tail joint

Removing the insulation,   Taping the joint, Make the joint professionally and tape

6. Identifying the Electrical accessories

a) SPST Switch ,SPDT switch , Two pin and 3pin Sockets and plugs ,Power Socket and Power plugs

Lamp holders, Ceiling rose, Mains Switch,MCB ,Kitkat Fuse – Fuse wire ratings

7. Know the mains supply Phase ,Neutral ,Ground

 Identification Phase and Neutral   terminals in mains supply, Know the purpose of earthin 2pin and 3pin Plug connections

8.   Make simple switch connections using low voltage transformer

 1. Connecting a 6V lamp to a switch (toggle)

 2. 2 way switch connections

 3. Series and parallel connection of lamps

know the use of two way switch for stair case wiring

11.Tube light connections (To be done in the presence of Instructor)

Make the tube light connections as per the circuit and Test

Connect a CFL Lamp and draw comparison

PHYSICS LABORATORY

Subject Title	:	Physics Laboratory
Subject Code	:	Common -109
Periods per week	:	03
Total periods per year	:	45

TIME SCHEDULE

S.No	Name of the Experiment	No. of Periods
1.	Hands on practice on Vernier Calipers	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)	03
7.	Refractive index of solid using traveling microscope	03
8.	Surface tension of liquid using traveling microscope	03
9.	Coefficient of viscosity by capillary method	03
10.	Boyle's law verification	03
11.	Meter bridge	03
12.	Mapping of magnet lines of force	03
	Revision	06
	Test	03
	Total:	**45**

Objectives:
Upon completion of the course the student shall be able to

1.0   Practise with Vernier calipers to determine the volumes and areas of a cylinder and sphere and their comparison etc .
2.0   Practise 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   Determine the surface tension of a liquid using travelling microscope

9.0   Determine the viscosity of a liquid using capillary method
10.0   Verify the Boyle's law employing a Quill tube
11.0   Determine the specific resistance of material of a wirel using Meter Bridge
12.0   Drawing magnetic lines of force under N-S and N-N methods and locate null points

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 Vernier Calipers(03)	• Find the Least count • Fix the specimen in posit • Read the scales • Calculate the physical quantities of given object	• Read the scales • Calculate the requisite physical quantities of given objects
2. Hands on practice on Screw gauge(03)	• Find the Least count • Fix the specimen in posit • Read the scales • Calculate thickness of glass place and cross section of wire and other quantities	• Read the scales • Calculate thickness of given glass plate • Calculate cross section of wire and other quantities
3. Verification of Parallelogram law of forces and Triangle law of forces(03)	• Fix suitable weights • Note the positions of threads on drawing sheet • Find the angle at equilibrium point • Construct parallelogram • Compare the measured diagonal • Construct triangle • Find the length of sides • Compare the ratios	• Find the angle at equilibrium point • Constructing parallelogram • Construct triangle • Compare the ratios of force and length
4. Simple pendulum(03)	• Fix the simple pendulum to the stand • Adjust the length of pendulum • Find the time for number of oscillations • Find the time period • Calculate the acceleration due to gravity • Draw l-T and l-T^2 graph	• Find the time for number of oscillations • Find the time period • Calculate the acceleration due to gravity • Draw l-T and l-T^2 graph

Name of the Experiment(Periods)	Competencies	Key competencies
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. 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

Name of the Experiment	Competencies	Key competencies
9. 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
Name of the Experiment	**Competencies**	**Key competencies**
10. 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
11. 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
12. 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

CHEMISTRY LABORATORY

Subject Title	:	Chemistry Laboratory	
Subject Code	:	Common -110	
Periods per week	:	03	
Total periods per year	:	45	

TIME SCHEDULE

S.No	Name of the Experiment	No. of Periods
1.	Familiarization of methods for Volumetric analysis	03
2.	Preparation of Std Na_2CO_3 and making solutions of different	03
3.	Estimation of HCl solution using Std. Na_2CO_3 solution	03
4.	Estimation of NaOH using Std. HCl solution	03
5.	Estimation of H_2SO_4 using Std. NaOH solution	03
6.	Estimation of Mohr's Salt using Std. $KMnO_4$	03
7.	Determination of acidity of water sample	03
8.	Determination of alkalinity of water sample	03
9.	Determination of total hardness of water using Std. EDTA	03
10.	Estimation of Chlorides present in water sample	03
11.	Estimation of Dissolved Oxygen (D.O) in water sample	03
12.	Determination of pH using pH meter	03
13.	Determination of conductivity of water and adjusting ionic strength	03
14.	Determination of turbidity of water	03
15.	Estimation of total solids present in water sample	03
	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.

2.0 Practice making standard solutions with pre weighed salts and to make solutions of desired dilutions using appropriate techniques.

3.0 Conduct titrations adopting standard procedures and using Std. Na_2CO_3 solution for estimation of HCl

4.0 Conduct titrations adopting standard procedures and using Std. HCl solution for estimation of NaOH

5.0 Conduct titrations adopting standard procedures 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's Salt

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   Conduct titrations adopting standard procedures 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 (03)	--	--
Preparation of Std Na_2CO_3 and making solutions of different dilution (03)	▪ Weighing the salt to the accuracy of .01 mg ▪ Measuring the water with volumetric flask, measuring jar, volumetric pipette and 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
Name of the Experiment (No of Periods)	**Competencies**	**Key competencies**
Estimation of HCl solution using Std. Na_2CO_3 solution (03) 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) 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)	▪ Cleaning the glassware and rinsing with appropriate solutions ▪ Making standard solutions ▪ Measuring accurately the standard solutions and titrants ▪ Filling the burette with titrant ▪ Fixing the burette to the stand ▪ Effectively Controlling the flow of the titrant ▪ Identifying the end point ▪ Making accurate observations ▪ Calculating the results	▪ Making standard solutions ▪ Measuring accurately the standard solutions and titrants ▪ Effectively Controlling the flow of the titrant ▪ Identifying the end point ▪ Making accurate observations

Estimation of Dissolved Oxygen (D.O) in water sample (By electrometric method) (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 pH using pH meter (03)		
Determination of conductivity of water and adjusting ionic strength to required level (03)		
Determination of turbidity of water (03)		
Name of the Experiment (No of Periods)	**Competencies**	**Key competencies**
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

COMPUTER FUNDEMENTALS LABORATORY
(Common to all Branches)

Subject Title : Computer Fundamentals Laboratory
Subject Code : EC-111
Periods/Week : 03
Periods/Year : 90

Time Schedule

S. No.	Major Topics	No. of sessions each of 3 periods duration	No. of Periods
I.	Computer hardware Basics	02	06
II.	Windows Operating System	02	06
III.	MS Word	08	24
IV.	MS Excel	09	27
V.	MS PowerPoint	09	27
	Total	30	90

Rationale: The knowledge of Computer usage has become a must for everyone, due to wide spread computer usage and related applications in all fields. This laboratory is designed to give the students hands on practice of Windows Operating System and MS Office to enable the students to use these skills in future courses.

I. Computer Hardware Basics (Not for end examination)

1. a) To familiarize with a Computer System and its hardware connections.
   b) To start and Shutdown a Computer correctly.
   c) To check the software details of the computer
   d) To practice Internal and External DOS commands
2. To check the hardware present in your computer.

II. Windows's operating system (Not for end examination)

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 practice Excel Graphs and Charts
20. To format a Worksheet in Excel, Page Setup and Print

V. Practice with MS-POWERPOINT

21. To familiarize with Ribbon layout features of PowerPoint 2007.
22. To create a simple PowerPoint Presentation
23. To set up a Master Slide in PowerPoint
24. To insert Text and Objects
25. To insert a Flow Charts
26. To insert a Table
27. To insert a Charts/Graphs
28. To insert video and audio
29. To practice Animating text and objects
30. To Review presentation

Competencies and Key Competencies to be achieved by the students

Exp No.	Name of the Experiment	Competencies	Key Competencies
1 (a).	To familiarize with Computer system and hardware connections	a. Identify the Parts of a Computer system a). CPU b) Monitor c) CD/DVD Drive d) Power Switch e) Start Button f) 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 Keyboard	a. Login and logout as per the standard procedure b. Operate mouse & Keyboard
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
1(d).	To practice Internal and External DOS commands	a. Practice Internal commands b. Practice External commands	Familiarize with MS-DOS Commands
2.	To check the software details of the computer	c. Find the details of Operating System being used d. Find the details of Service Pack installed	Access the properties of computer and find the details
3.	To check the hardware present in your computer	a. Find the CPU name and clock speed b. Find the details of RAM and Hard disk present c. Access Device manager using Control Panel and check the status of devices like mouse and key board d. Use My Computer to check the details of Hard Disk Drives and partitions e. Use the Taskbar	a. Access device manager and find the details b. Type /Navigate the correct path and Select icon related to the details required
4.	Working with Files and Folders	a. Create folders and organizing files in different folders b. Use copy / paste or move commands to organize files and folders	a. Create files and folders rename , arrange and search for the required folder/file

Exp No.	Name of the Experiment	Competencies	Key Competencies
	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 for 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 Paint to create /Edit pictures and save in the required format.
6.	To familiarize with Ribbon layout of MS Word. – Home – Insert- Page Layout- References- Review-View	a. Create/Open a document b. Use Save and Save as features c. Work on two 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 MS- word f. Use Undo and Redo Features g. Use spell check to correct Spellings and Grammar	a. Use keyboard and mouse to enter/edit text in the document. b. Use shortcuts c. Use spell check/ Grammar features for auto corrections.
8.	To practice Formatting techniques	a. Formatting Text b. Formatting Paragraphs c. Setting Tabs d. Formatting Pages e. The Styles of Word f. Insert bullets and numbers g. Themes and Templates h. Insert page numbers, header and footer	a. Format Text and paragraphs and use various text styles. b. Use bullets and numbers to create lists c. Use Templates /Themes d. Insert page numbers date, headers and footers

Exp No.	Name of the Experiment	Competencies	Key Competencies
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 Bookmarks. b. Create an organization chart c. Practice examples like preparing an Examination schedule notice with a hyperlink to Exam schedule table.	a. Insert hyperlinks &Bookmarks b. Create organization charts/flow charts
11.	To Use Mail merge feature of MS Word	a. Use mail merge to prepare individually addressed letters b. Use mail merge to print envelopes.	Use Mail merge feature
12.	To use Equations and symbols features.	a. Explore various symbols available in MS Word b. Insert a symbol in the text c. Insert mathematical equations in the document	Enter Mathematical symbols and Equations in the word document
13.	To Practice with MS-EXCEL	a. Open /create an MS Excel 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 Worksheet-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

Exp No.	Name of the Experiment	Competencies	Key Competencies
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. Sort and filter data in a worksheet b. Perform Mathematical Calculations verify -AutoSum c. 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 Practice Excel Graphs and Charts	a. Produce an Excel Pie Chart b. Produce an Excel Column Chart c. Practice creating any Chart	a. Use data in Excel sheet to Create technical charts and graphs Produce Excel Line Graph b. Produce a Pictograph in Excel
20.	To format a Worksheet in Excel, page setup and print	a. Shade alternate rows of data b. Add currency and percent 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
21.	To familiarize with Ribbon layout &features of PowerPoint 2007.	Use various options in Home, insert, design, animation , slideshow, Review &View in the PowerPoint	Access required options in the tool bar

Exp No.	Name of the Experiment	Competencies	Key Competencies
22.	To create a simple PowerPoint Presentation	a. Insert a New Slide into PowerPoint b. Change the Title of a PowerPoint Slide c. PowerPoint Bullets d. Add an Image to a PowerPoint Slide e. Add a Textbox to a PowerPoint slide	a. Create simple PowerPoint presentation with photographs/ClipArt and text boxes b. Use bullets option
23.	To Set up a Master Slide in PowerPoint and add notes	a. Create a PowerPoint Design Template b. Modify themes c. Switch between Slide master view and Normal view d. Format a Design Template Master Slide e. Add a Title Slide to a Design Template f. The Slide Show Footer in PowerPoint f. Add Notes to a PowerPoint Presentation	a. Setup Masterslide and format b. Add notes
24.	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 WordArt f. Use 3d features g. Arrange objects	Inset Text and Objects Use 3d features
25.	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
26.	To insert a Table	a. PowerPoint Tables b. Format the Table Data c. Change Table Background d. Format Series Legend	Insert tables and format
27.	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.

Exp No.	Name of the Experiment	Competencies	Key Competencies
28.	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
29.	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
30.	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) Handout	a. Use Spell check and Grammar feature b. Setup slide show c. Add timing to the slides d. Setup automatic slide show

III Semester

DIPLOMA IN ELECTRONICS & COMMUNICATION ENGINEERING
SCHEME OF INSTRUCTIONS AND EXAMINATIONS
DECE   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	5	-	75	3	20	80	100
EC -302	Electronic Circuits	6	-	90	3	20	80	100
EC -303	Digital Electronics	6	-	90	3	20	80	100
EC-304	Analog and Digital Communication Systems	6	-	90	3	20	80	100
EC-305	**Network Analysis**	6	-	90	3	20	80	100
PRACTICAL:								
EC-306	Electronic Circuits lab	-	3	45	3	40	60	100
EC-307	Digital Electronics lab	-	4	60	3	40	60	100
EC-308	Analog and Digital Communication systems Lab	-	3	45	3	40	60	100
EC-309	**Communication Skills Practice**	-	3	45	3	40	60	100
	TOTAL	29	13	630	-	260	640	900

ENGINEERING MATHEMATICS – II
(Common to all Branches)

Subject Title	:	**Engineering Mathematics-II**
Subject Code	:	**EC-301**
Periods per week	:	**05**
Periods per Semester	:	**75**

Blue print

S. No	Major Topic	No of Periods	Weightage of Marks	Short Type			Essay Type		
	Unit - I			R	U	App	R	U	App
1	**Indefinite Integration**	15	21	1	1	0	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$
	Unit - II								
2	**Definite Integration and its applications**	35	60	1	1	3	1	1	$2\frac{1}{2}$
	Unit - III								
3	**Differential Equations**	25	29	2	1	0	1	1	0
	Total	75	110	4	3	3	$2\frac{1}{2}$	$2\frac{1}{2}$	30
			Marks:	12	9	9	25	25	30

R:	**Remembering type**	37 marks
U:	**Understanding type**	34 marks
App:	**Application type**	39 marks

Upon completion of the subject the student shall be able to
OBJECTIVES
Unit-I
1.0   Indefinite Integration
   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 ∫ (u + v) *dx* and   ∫ *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*)*   ∫ *f(ax + b) dx where   f(x) dx* is in standard form*.*
      ii*)*   ∫ *[f(x)]^n f ′(x) dx*
      iii*)*   ∫ *f ′(x)/[f(x)] dx*
      iv*)*   ∫ *f {g(x)} g ′(x) dx*

1.5   Find the Integrals of *tan x, cot x, sec x* and *cosec x* using the above.

1.6   Evaluate the integrals of the form $\int Sin^m \theta\ Cos^n \theta.\ d\theta$ where m and n are positive integers.

1.7   Evaluate integrals of 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

$$\int \frac{1}{a \pm b\, Sin\theta} d\theta, \int \frac{1}{a \pm b\cos\theta} d\theta\ \text{and}\ \int \frac{1}{a\cos\theta \pm b\sin\theta \pm c} d\theta\ .$$

1.10   Evaluate integrals using decomposition method.

1.11   Evaluate integrals using integration by parts with examples.

1.12   State the 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
(a)   Understand definite integral and its properties

2.1   State the fundamental theorem of integral calculus

2.2   Explain the concept of definite integral.

2.3   Calculate the definite integral over an interval.

2.4   State various properties of definite integrals.

2.5   Evaluate simple problems on definite integrals using the above properties.

(b)   Real life applications of definite integrals

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 volumes of solids of revolution.

2.9   Obtain the mean value and root mean square value of the functions in any given interval.

2.10   Explain the Trapezoidal rule, Simpson's 1/3 rules for approximation of integrals and provide some examples.

(c) Certain special integrals: Laplace Transforms

2.11   Write the definition of Laplace Transform and explain sufficient conditions for its existence.

2.12   Provide formulae for Laplace transforms of standard functions.

2.13   State Linear property, First shifting property, Change of Scale property for Laplace transforms. Solve simple problems using these properties.

2.14 Write formulae for Laplace transform of $t^n f(t)$, $\dfrac{f(t)}{t}$, $f^{(n)}(t)$, $\displaystyle\int_0^t f(u)\,du$ in terms

of Laplace transform of $f(t)$. Provide simple examples on these functions.

2.15 Define unit step function and write the Laplace Transform of unit step function.

State second shifting property.

2.16 Define inverse Laplace Transform and write inverse Laplace Transform of standard functions. Solve simple problems.

2.17 Write first shifting property of inverse Laplace Transform with examples

2.18 Define convolution of two functions and state convolution theorem with few examples for understanding only.

(d)   Understand the Fourier series expansion of functions

2.19 Define Fourier series of a function on the interval $(c, c + 2l)$ and state sufficient conditions for its existence. Write the Euler's formulae for determining the Fourier coefficients.

2.20 Find Fourier series of simple functions in the
range $(0,2l),\,(0,2\pi),\,(-l,l)\ and\ (-\pi,\pi)$.

2.21 Find Fourier coefficients for even and odd functions in the interval
$(-l,l)\ and\ (-\pi,\pi)$ in simple examples.

2.22 Define half range Fourier sine and cosine series of a function over the interval

$(0,\ l)$ with examples.

3.0   Introduction to Differential Equations

3.1 Define a Differential equation, its order, degree
3.2 Form a differential equation by eliminating arbitrary constants.
3.3 Solve the first order first degree differential equations by the following methods:
    i.   Variables Separable.
    ii.   Homogeneous Equations.
    iii.   Exact Differential Equations
    iv.   Linear differential equation of the form dy/dx + Py = Q,
            where P and Q are functions of x or constants.
    iv.   Bernoulli's Equation (Reducible to linear form.)

3.4 Solve Differential equations of the type $(aD^2 + bD + c)y = 0$ when the roots
of the auxiliary equation are real and different, real and repeated,
Complex conjugates.

3.5 Solve the higher order homogeneous differential equations with constant
coefficients.

3.6   Explain the concept of complementary function, particular Integral and general solution of a differential equation.

3.7   Solve n^{th} order differential equation of the type *f(D) y = X* where *f(D)* is a polynomial of nth order and *X* is a function of the form *k, e^{ax} , Sinax, Cosax, x^n.*

3.8   Solve simple problems leading to engineering applications

COURSE CONTENT

Unit-I
Indefinite Integration:

1.   Integration regarded as anti-derivative – Indefinite integral of standard functions. Properties of indefinite integral. Integration by substitution or change of variable. Integrals of the form
$\sin^m\theta. \cos^n \theta.$ where m and n are positive integers. Integrals of tan x, cot x, sec x, cosec x and   powers of tan x, sec x 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.

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. Volumes of solids of revolution. Mean and RMS   values of a function on a given interval. Trapezoidal rule, Simpson's 1/3 rule to evaluate an   approximate value of a define integral.

Definition, sufficient conditions for existence of Laplace Transform (LT), LT of elementary functions, linearity property, scale change property, first shifting property, multiplication by t^n, division by t, LT of derivatives and integrals, unit step function, LT of unit step function, second shifting theorem, inverse Laplace transforms- shifting theorems and change of scale property, multiplication by s^n and division by s – examples of inverse LT using partial fractions – convolution theorem (no proof).

Representation of a function in Fourier series over the interval $(c, c + 2l)$, Give sufficient conditions for existence of Fourier series. Euler's formulae for Fourier coefficients, Finding Fourier coefficients for simple functions, elementary even and odd functions. Define half range Fourier series

Unit -III
Differential Equations:

Definition of a differential equation-order and degree of a differential equation- formation of differential equations-solution of differential equation of first order, first degree: variable-separable, homogeneous, exact, linear differential equation, Bernoulli's equation.

Homogenous linear differential equations with constant coefficients of order two and higher with emphasis on second order.

Non-homogenous linear differential equations with constant coefficients of the form $f(D)y = X$, where X is in the form k, e^{ax}, sin ax, cos ax, x^n, (n= 1,2) – complimentary function, particular integral and general solution.

Reference Books:
1. Integral Calculus Vol.I, by M.Pillai and Shanti Narayan
2. Thomas' Calculus, Pearson Addison –Wesley Publishers
3. A Text book of Engineering Mathematics by B.S.Grawel
4. A Text book of Engineering Mathematics by B.V.Ramana- T.Mc Graw Hill Publishers

ELECTRONIC CIRCUITS

Subject Title : **Electronic Circuits**
Subject Code : **EC-302**
Periods/Week : **06**
Periods/Semester : **90**

TIME SCHEDULE

SI	Major Topics	Periods	Weightage of Marks	Short Answer Questions	Essay Type Questions
1	Transistor Biasing and stabilization	15	26	2	2
2	Small Signal Amplifiers	25	29	3	2
3	Large Signal Amplifiers and Oscillators	25	26	2	2
4	Wave shaping circuits & Multivibrators	15	16	2	1
5	Special Semiconductor Devices and circuits	10	13	1	1
	TOTAL	90	110	10	8

OBJECTIVES:

1.0 Transistor biasing and stabilization
1.1 Explain the concept of DC and AC load lines.
1.2 Explain the importance of transistor biasing
1.3 Explain the selection of proper operating point.
1.4 List the factors affecting the Q point.
1.5 List the types of biasing circuits
1.6 Explain the fixed bias network
1.7 Define stability factors and give their equations
1.8 Explain thermal runaway
1.9 Explain the importance of bias stabilization
1.10 Explain the drawbacks with fixed bias network
1.11 Explain collector to base bias network
1.12 Explain advantages and disadvantages of collector to base bias
1.13 Explain self bias network and its advantages
1.14 Explain the importance of emitter by-pass capacitor, C_e
1.15 Explain thermal stabilization techniques
1.16 Briefly explain bias stabilization and compensation techniques
1.17 Explain the importance of heat sink

2.0 Small signal Amplifiers
  2.1   Define h-paramaters of BJT
  2.2   Draw h-model of CB, CE and CC transistor
  2.3   Calculate A_I, A_V, R_i, R_o of a transistor circuit using its h-model
  2.4   Draw and explain the approximate model
  2.5   Explain the difference between low frequency model and high frequency model
  2.6   Draw and explain the small signal model of a FET
  2.7   Draw the practical transistor CE amplifier
  2.8   Classify the amplifiers based on frequency, period of conduction, and coupling.
  2.9   Explain the need for Multistage amplifier (Cascading of amplifiers)
  2.10 Define gain, frequency response and bandwidth of an amplifier
  2.11 Explain the operation of two-stage RC coupled amplifier with circuit diagram
  2.12 Explain the frequency response of RC coupled amplifier
  2.13 Explain the principle of operation of two-stage transformer coupled amplifier with circuit diagram
  2.14 Explain the frequency response of transformer-coupled amplifier
  2.15 Explain the working of direct coupled amplifier with circuit diagram
  2.16 Explain the operation of Darlington pair with the help of circuit diagram
  2.17 List three applications of Darlington pair
  2.18 Explain the concept of feedback
  2.19 Explain the block diagram of negative feedback amplifier
  2.20 Derive the expression for the gain of negative feedback amplifier
  2.21 List the four types of negative feedback amplifiers
  2.22 Draw the block diagrams of voltage series, current series, current shunt and voltage Shunt feedback amplifiers
  2.23 Explain the effect of negative feedback on gain, bandwidth, input and output impedances
  2.24 List important merits of negative feedback amplifiers
  2.25 Compare characteristics of the above feedback amplifiers

3.0 Large signal Amplifiers and Oscillators
  3.1   Explain the need for Power Amplifier
  3.2   List three performance measures of power amplifier
  3.3   Give the classification of power amplifiers based on period of conduction
  3.4   Explain the operation of Class A, Class B, Class AB & Class C amplifiers with waveforms
  3.5   Explain the working of Class-B Push-pull amplifier circuit
  3.6   Explain the working of complementary Push-pull amplifier circuit
  3.7   List distortions in power amplifiers
  3.8   Explain the working of Class-AB Push-pull amplifier circuit
  3.9   Mention the applications of Class C Amplifiers as Harmonic Generator and Frequency multiplier
  3.10 Compare Efficiency of different types of amplifiers
  3.11 Draw the frequency response of tuned amplifier(single, double tuned)
  3.12 State the condition for an amplifier to work as an oscillator
  3.13 Explain the Barkhausen criteria in oscillators
  3.14 Give the classification of oscillator circuits
  3.15 Explain the working of an RC phase shift oscillator with a circuit diagram

3.16 Explain the working of tuned collector oscillator with a circuit diagram

3.17 Explain the generalized LC oscillator and condition for oscillation

3.18 Explain the working of Hartley oscillator with a circuit diagram

3.19 Explain the working of Colpitts oscillator with a circuit diagram

3.20 Write the expressions for frequency of oscillations and condition for sustained oscillations of the above circuits

3.21 Explain the equivalent circuit of crystal

3.22 Explain the working of transistor crystal oscillator with a circuit diagram

3.23 List the advantages of crystal oscillators over other types

4.0 Wave shaping circuits and multivibrators

4.1 Explain the need of wave shaping networks

4.2 List different linear and non-linear wave shaping networks

4.3 Explain RC differentiator circuit with wave forms

4.4 Explain RC integrator circuit with wave forms

4.5 Give the classification of clippers

4.6 Explain the working of un biased clipper circuits

4.7 Explain the working of clamper circuit

4.8 List the applications of clippers and clampers

4.9 Give the classification of multivibrators

4.10 Explain the working of transistorized collector coupled bi-stable multivibrator

4.11 Explain the working of transistorized emitter coupled bi-stable multivibrator

4.12 Explain the hysteresis effect and wave forms of Schmitt trigger

4.13 Explain the working of transistorized collector coupled mon-stable multivibrator with waveforms

4.14 Explain the working of transistorized collector coupled astable multivibrator with waveforms

5.0 Special Semiconductor devices and circuits

5.1 Explain the construction and working of Varactor diode

5.2 List the applications of Varactor diode

5.3 Explain the construction, operation and characteristics of photo diode

5.4 Explain the construction, operation and characteristics of photo transistor

5.5 Explain the construction and working of LDR

5.6 Explain the photovoltaic effect

5.7 Explain the construction and working of photovoltaic cell

5.8 List the applications of photovoltaic cells

5.9 Explain the construction and working of LEDs

5.10 Explain the working of opto-couplers

5.11 List the applications of opto-couplers

5.12 Explain the working principle of LCDs

5.13 Explain the operation of transistor series voltage regulator

5.14 Explain the disadvantages of series Voltage Regulator

5.15 Explain the operation of transistor shunt voltage regulator

5.16 Explain the use of JFET as current source

COURSE CONTENT:

1.0 Understand transistor biasing

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, thermal stabilization techniques, bias stabilization and compensation techniques, heat sinks

2.0 Small signal Amplifiers

Practical transistor CE amplifier - h parameters of a transistor-Classification of amplifiers based on frequency, period of conduction and coupling- Multistage amplifier - gain, frequency response and bandwidth of amplifier- RC coupled amplifier - frequency response of RC coupled amplifier- transformer coupled - Frequency response of transformer-coupled amplifier- direct coupled amplifier - Darlington pair - applications of Darlington pair- Positive and Negative 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- characteristics of feedback amplifiers.

3.0   Large signal Amplifiers and Oscillators

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 Transistor Push-pull amplifier circuit- Distortions in power amplifiers- Choice of Class A , Class B Class AB Amplifier and Class C Amplifiers- Applications of Class C Amplifiers as Harmonic Generator and Frequency multiplier- Efficiencies of different types of amplifier

Condition for an amplifier to work as an oscillator - Barkhausen criteria in oscillators- Oscillator circuits- RC phase shift oscillator- tuned collector oscillator- Generalized LC oscillator - Hartley oscillator- Colpitts oscillator - Equivalent circuit of crystal - crystal oscillator - Advantages of crystal oscillator- Merits and demerits of RC and LC oscillators.

4.0   Wave shaping networks
Linear and non-linear wave shaping networks - RC differentiator circuit - wave forms - RC integrator circuit - wave forms - classification of clippers - working of un biased clipper circuits - clamper circuit - applications of clippers and clampers - classification of multivibrators - transistorized collector coupled bi-stable multivibrator – Schmitt trigger - transistorized collector coupled mono-stable multivibrator - transistorized collector coupled astable multivibrator

6.0 Special Semiconductor devices
Varactor diode - applications of Varactor diode - construction, operation and characteristics of photo diode - construction, operation and characteristics of photo transistor - construction and working of LDR - photovoltaic effect - construction and working of photovoltaic cell - applications of photovoltaic cells - construction and working of LEDs - working principle of LCD - operation of transistor series voltage

regulator - disadvantages of series Voltage Regulator - operation of transistor shunt voltage regulator - JFET as current source

REFERENCE BOOKS:

1. Electronic Devices and Circuits by .G.K.Mithal

2. Electronic Devices and Circuits by .David A.Bell 4th edition PHI

3. Electronic Devices and Circuits – T.F. Bogart Jr, J.S.Beasley and G.Rico, Pearson Education,6th edition, 2004.

4. Electronic Principles by Albert Malvino. – J Bates. 7th edition Tata McGraw-Hill Education (TMH) Publishers.

5. Principles of Electronics by V.K. Mehta. S Chand & Company, 2008

DIGITAL ELECTRONICS

Subject Title	:	**DIGITAL ELECTRONICS**
Subject Code	:	**EC-303**
Periods/Week	:	**06**
Periods/Semester	:	**90**

TIME SCHEDULE

S.No	Major topics	No. of periods	Weightage of marks	Short Answer Questions	Essay Questions
1	Basics of Digital Electronics.	24	29	3	2
2	Logic Families.	12	16	1	1
3	Combinational Logic circuits.	20	26	2	2
4	Sequential Logic Circuits.	22	29	3	2
5	Registers and semiconductor memories.	12	10	1	1
	Total	**90**	**110**	**10**	**8**

OBJECTIVES

1.0 Understand the basics of Digital Electronics

1.1 Explain Binary, Octal, Hexadecimal number systems.
1.2 Compare the above number systems with Decimal number system.
1.3 Convert a given decimal number into Binary, Octal, and Hexadecimal numbers and vice versa.
1.4 Convert a given binary number into octal and hexadecimal number system and vice versa.
1.5 Perform binary addition, subtraction, Multiplication and Division.
1.6 Write 1's complement and 2's complement numbers for a given binary number.
1.7 Perform subtraction of binary numbers in 2's complement method.
1.8 Compare weighted and Un-weighted codes.
1.9 State the use of codes in digital electronics.
1.10 Write Binary equivalent number for a number in 8421, Excess-3 and Gray Code and vice-versa.
1.11 Mention the use of alphanumeric codes (ASCII & EBCDIC)
1.12 State the importance of parity Bit.
1.13 State different postulates in Boolean algebra.
1.14 Explain the basic logic gates AND, OR, NOT gates with truth tables.
1.15 Explain the working of universal logic gates (NAND, NOR gates) with truth tables.
1.16 Explain the working of an exclusive – OR gate with truth table.

1.17 State De-Morgan's theorems.

1.18 Realize AND, OR, NOT operations using NAND, NOR gates.

1.19 Apply De-Morgan's theorems and other postulates to simplify Boolean expressions (up to three variables).

1.20 Explain standard representations for logical functions (SOP and POS form)

1.21 Write Boolean expressions from the given truth table.

1.22 Explain how to simplify Boolean Expression using Karnaugh map (up to 3 variables only)

2.0 Logic families.

2.1 Classify different logic families.

2.2 List the important characteristics of Digital ICs of different logic families.

2.3 Explain logic levels and Voltage requirements of TTL and CMOS ICs.

2.4 Define the terms: propagation delay, Noise margin, Fan-in, Fan-out, Power dissipation of digital 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 Logic gates.

3.0 Understand the working of combinational logic circuits

3.1 Explain the concept of combinational logic circuits.

3.2 Explain Half adder circuit using Ex-OR gate and an AND gate.

3.3 Explain Half-adder using i) NAND gates only and ii) NOR gates only.

3.4 Explain the operation of Full adder circuit with truth table using basic gates.

3.5 Explain realization of full-adder using two Half-adders and an OR gate

3.6 Explain the working of 4 Bit parallel adder using full adders.

3.7 Explain 4 bit parallel adder cum 2's compliment subtractor circuit.

3.8 Explain the working of a serial adder with block diagram.

3.9 Compare the performance of serial and parallel adder.

3.10 Draw and explain 4x1 Multiplexer.

3.11 Give the IC numbers of TTL & CMOS Multiplexers.

3.12 Mention any 3 applications of multiplexers.

3.13 Draw and explain 1x4 De-multiplexer.

3.14 Give the IC numbers of TTL & CMOS De-multiplexers.

3.15 Mention any 3 applications of De-multiplexers.

3.16 Explain the working of 3x8 decoder circuit.

3.17 Mention any 3 applications of decoders.

3.18 Explain the working of BCD to decimal decoder.

3.19 Explain the function of BCD to 7 segment decoder cum driver 7448 IC.

3.20 Explain the working of Decimal to BCD encoder.

3.21 State the need for a tri-state buffer.

3.22 Draw and explain a simple tri-state buffer circuit.

3.23 List the two types of tri-state buffers with IC numbers

3.24 Explain the working of two bit digital comparator circuit

3.25 Explain the function of 4-bit magnitude comparator 7485 IC.

4.0 Understand the working of Sequential logic circuits
    4.1   Explain the concept of Sequential logic circuits.
    4.2   Explain NAND and NOR latches with truth tables.
    4.3   State the necessity of clock.
    4.4   Differentiate between level clocking and edge triggering,
    4.5   Explain clocked SR flip flop using NAND gates.
    4.6   State the need for preset and clear inputs.
    4.7   Explain level clocked JK flip flop (using S-R flip-flops) with truth table and race around condition.
    4.8   Explain the master slave JK flip flop with necessary diagrams.
    4.9   Explain the level clocked D and T flip flops with the help of truth table, circuit diagram and timing diagram.
    4.10 Give the concept of edge triggering using RC differentiator
    4.11 Give only the truth tables of edge triggered D and T flip flops with symbols.
    4.12 List the applications of flip flops.
    4.13 Give the definition of modulus of a counter.
    4.14 Draw and explain the working of 4-bit asynchronous counter with Timing diagram.
    4.15 Draw and explain the working of asynchronous decade counter with Timing diagram.
    4.16 Draw and explain the working of 4-bit synchronous counter with Timing diagram.
    4.17 Distinguish between synchronous and asynchronous counters.
    4.18 Draw and Explain the working of asynchronous 3 bit up-down counter with Timing   diagram.
    4.19 List any 2 commonly used IC numbers of flip flops, registers and counters.
    4.20 Draw and explain the working of 4-bit ring counter and Johnson counter.

5.0 Understand working of Registers and Semiconductor memories
    5.1 State the necessity of Registers and classify registers basing on data i/o
    5.2 Draw and Explain the working of 4-bit shift left and shift right registers with timing diagram.
    5.3 Draw and explain the working of 4-bit bi-directional shift register with timing diagram.
    5.4 Draw & Explain parallel in parallel out shift register with timing diagram.
    5.5 List four common applications of shift registers.
    5.6 Classify different types of memories.
    5.7 Explain the terms memory read operation, write operation, access time, memory capacity, and address lines and word length.
    5.8 Differentiate: i) Read Only Memory & Read write memory;
                            ii) Sequential access memory & Random Access Memory
    5.9 Explain working of diode ROM.
    5.10 Distinguish between EEPROM and UVEPROM
    5.11 Explain the working of basic dynamic MOS RAM cell
    5.12 Compare static RAM and dynamic RAM
    5.13 State the difference between Flash ROM and NV RAM

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   Different 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 -truth table- Half-adder using NAND gates only &NOR gates only- Full adder circuit - Truth table- 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- IC numbers -applications-3x8 decoder- BCD to decimal decoder- 7448 IC - Decimal to BCD encoder- IC numbers - Applications - Tri-state buffer- working of simple tri state buffer -Types of tri-state buffers - Digital comparator.-7485 IC.

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 and timing diagram- Symbols of above Flip Flops- Truth tables of edge triggered D and T flip flops - Applications for each type of flip flop- IC numbers 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 –IC numbers for flip flops, Registers and counters - Ring counter and Johnson counter .

5.0 Registers and Semiconductor memories

Need for a Register - Types of registers- 4 bit shift left and shift right registers - 4-bit bi-directional shift Register - Parallel in parallel out shift register - Applications of shift registers 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- NVRAM- Differences between Flash ROM and NV RAM

REFERENCE BOOKS:

1. Digital Computer Electronics by Malvino and leach. 3rd edition Tata McGraw-Hill Education

2. Modern Digital Electronics By RP JAIN TMH

3.Digital Electronics: Principles & Applications by Roger L. Tokheim -McGraw-Hill Education, 2008

4. Digital Electronics by GK Kharate, Oxford University Press.

5.Digital Electronics by V.K.Puri,Tata McGraw-Hill.

ANALOG AND DIGITAL COMMUNICATION SYSTEMS

Subject Title   : **Analog and Digital Communication systems**
Subject Code   : **EC-304**
Periods/Week   : **06**
Periods/Semester : **90**

TIME SCHEDULE

Sl	Major topics	No. of periods	Weightage of marks	Short Answer Questions	Essay Questions
1	Analog Modulation Techniques	28	39	3	3
2	Digital communication principles	10	13	1	1
3	Digital modulation techniques	20	16	2	1
4	Transmitters and Receivers	20	26	2	2
5	Multiplexing Techniques	12	16	2	1
	Total	**90**	**110**	**10**	**8**

OBJECTIVES

1. Analog modulation techniques

1.1 Describe the basic elements of a communication system with a block diagram.
1.2 Explain the terms time domain and frequency domain signals.
1.3 Explain briefly how a signal contains multiple frequency components, use Fourier series for explanation.
1.4 Define Periodic and Non-periodic signals.
1.5 Explain how a frequency spectrum represents information contents at different frequencies using an example graph
1.6 Define Bandwidth and know its significance in a communication system.
1.7 Explain the relationship between channel bandwidth, baseband bandwidth and transmission time.
1.8 Define modulation and State the need for modulation in communication systems.
1.9 Classify the various types of continuous wave modulation systems
1.10 Define amplitude modulation
1.11 Derive the time-domain equation for an AM signal and Define the modulation index of an AM signal.
1.12 Draw the time domain and frequency domain wave forms of an AM wave
1.13 Describe the effects of over modulation.
1.14 Calculate the bandwidth of an AM signal.
1.15 Derive the relation between total power and carrier power in AM and Solve simple problems
1.16 Explain the need for DSB-SC and SSB modulation
1.17 List the advantages and disadvantages of SSB

1.18   Explain the concept of VSB transmission and its advantages.
1.19   Define Frequency modulation and Phase Modulation.
1.20   Derive the time domain equation for FM signal
1.21   Define the modulation index of an FM signal
1.22   Draw the waveform of FM Wave, narrow band and wide band FM
1.23   Explain briefly about noise triangle in FM
1.24   Define pre-emphasis and de-emphasis
1.25   Explain the merits of FM over AM
1.26   Give the classification of different types of noise
1.27   Define signal to noise ratio, noise figure and noise temperature

2. Principles of Digital Communication

2.1   Explain the differences between analog and digital signals.
2.2   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 explain its significance in pulse modulation systems
2.5   Classify pulse modulation techniques.
2.6   Explain PAM, PWM and PPM with waveforms
2.7   List the advantages and disadvantages of PAM, PWM and PPM.
2.8   Compare PAM, PWM and PPM.
2.9   Describe the coding and decoding of a PCM signal.
2.10   Define quantization
2.11   Explain the process of quantization with waveforms.
2.12   Explain about quantization noise.
2.13   Define bit rate, and dynamic range for PCM systems.
2.14   List other pulse digital modulation schemes
2.15   State the need for data compression and list different data compression techniques

3. Digital Modulation Techniques

3.1   State data encoding and list different analog data to digital signal encoding schemes
3.2   Explain the process of Asynchronous data communication scheme
3.3   Define Overhead and Efficiency of data communication system
3.4   Explain the process of synchronous data transmission
3.5   Explain the conversion between parallel and serial data with the help of the UART block diagram.
3.6   List different error detection schemes
3.7   Explain parity check method of error detection.
3.8   Explain VRC method of error detection with an example.
3.9   Explain LRC method of error detection with an example.
3.10   Explain Checksum method of error detection.
3.11   Explain CRC method of error detection with an example.
3.12   State the advantages of CRC method of error detection.
3.13   List different error correction techniques.
3.14   Explain retransmission method of error correction.
3.15   State the need for digital modulation
3.16   Explain the difference between bit rate and baud rate
3.17   List the three basic types of digital modulation techniques.
3.18   Define ASK,FSK and PSK
3.19   Explain ASK modulator with block diagram.

3.20   Explain ASK coherent demodulator with block diagram
3.21 List advantages and disadvantages of ASK,FSK and BPSK
3.22 Explain BFSK modulator with block diagram.
3.23 Explain Coherent BFSK demodulator.
3.24 Draw and explain BPSK modulator.
3.25 Draw and explain BPSK demodulator.
3.26 Explain QAM

4. Transmitters and Receivers

4.1   List the requirements and 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 the block diagram of indirect FM transmitter (Armstrong method & PLL method) and explain
4.7   Classify different types of radio receivers
4.8   Define sensitivity, selectivity and fidelity of a radio receiver
4.9   Draw the block diagram of TRF receiver and explain the function of each block.
4.10 State the limitations of TRF Receiver
4.11 Explain the working of super heterodyne receiver with a block diagram.
4.12 Explain the terms Image frequency and IMRR in a radio receiver.
4.13 Explain the factors to be considered for choice of IF.
4.14 Explain the need for AVC (AGC).
4.15 Explain the process of demodulation with Envelope detector in AM receivers
4.16 Explain the process of demodulation with Foster-Seeley discriminator (Phase shift discriminator) in FM receivers

5. Principles of Multiplexing techniques

5.1   Define Multiplexing
5.2   Explain the difference between multiplexing and multiple access.
5.3   State the need for multiplexing
5.4   Explain Frequency Division Multiplexing
5.5   Explain Time Division Multiplexing.
5.6   List four advantages and disadvantages of TDM
5.7   Compare TDM and FDM
5.8   State the need for a modem in data communication.
5.9   List different types of modems.
5.10 Describe the operation of telephone modem.
5.11 Explain Digital Subscriber Line (DSL).
5.12 Explain Asynchronous Digital Subscriber Line (ADSL) technology

COURSE CONTENT

Basics of Signals, Communication systems, and analog modulation techniques

elements of a communication system - block diagram- frequency spectrum - frequencies for different applications- modulation- need for modulation in communication systems- amplitude modulation- wave form of an AM wave- Frequency modulation - waveform of FM Wave- phase modulation- baseband, carrier, and modulated signals - relationship between channel bandwidth, baseband bandwidth and transmission,

time-domain equation for an AM signal- modulation index of an AM signal- frequency spectrum of an AM signal- effects of over modulation- bandwidth of an AM signal- relation between total power and carrier power in AM-Solve simple problems- need for DSBSC and SSB modulation- advantages and disadvantages of SSB- applications of SSB- Vestigial side band transmission

angle modulation- types of angle modulation- time domain equation for FM signal- modulation index of an FM signal- noise triangle in FM- - narrow band and wide band FM- pre-emphasis and de-emphasis- need for pre-emphasis and de-emphasis in FM

types of noise- signal to noise ratio, noise figure   and noise temperature

Transmitters and Receivers.

requirements and specifications of transmitters- block diagram for high level modulated transmitter - low level modulated Transmitter -Distinguish between low level and high level modulation- block diagram of FM transmitter(reactance tube) - block diagram of indirect FM transmitter (Armstrong method)-Types of radio receivers- sensitivity, selectivity and fidelity, image rejection ratio- AVC (AGC)- block diagram of TRF receiver - limitations of TRF Receiver- need for super heterodyning in radio receiver- working of super heterodyne receiver - block diagram- choice of IF- Explain the process of demodulation in AM receivers- block diagram of FM receiver - Foster-seely discriminator.

Digital Communication Principles .

Introduction to digital communication, Sampling theorem, pulse modulation, pulse code modulation, , vocoders and data compression techniques.

Data coding, asynchronous transmission, synchronous Transmission, error detection and

correction: Parity check, VRC, LRC, Checksum, CRC

Digital Modulation Techniques

Digital modulation, Amplitude shift keying(ASK), frequency shift keying (FSK), phase shift keying (PSK, quadrature amplitude modulation (QAM).

Multiplexing techniques.

Multiplexing techniques: FDM and TDM, Types of modem - Telephone modem-DSL- ADSL

REFERENCE BOOKS:
1.   Electronic communications systems by Roy Blake, Thomson Delmar,2002.

2.   Electronic Communication System by George Kennedy- Bernard DavisTata Mcgraw Hill Education Private Limited

3.   Signal Systems and Communication by-S.Salivahanam,A.Vallavaraj&C.Gnanapriya

4.   Principles Of Electronic Communication Systems by Herbert Taub& Donald L Schilling, 3rd Edition-2009**.**McGraw Hill Education (India) Private Limited

5.   Radio communication by G.K.Mithal- khanna publishers

6.   Electronic communication systems Wayne Thomassi

NETWORK ANALYSIS

Subject Title   :   **NETWORK ANALYSIS**
Subject Code   :   **EC- 305**
Periods/Week   :   **06**
Periods/Semester :   **90**

TIME SCHEDULE

SI	Major topics	No. of periods	Weight age of marks	Short Answer Questions	Essay Questions
1	Basics of electrical circuits and Kirchoff's laws	10	16	2	1
2	Mesh current and Node voltage analysis	22	26	2	2
3	Network Theorems	22	26	2	2
4	Transient analysis, Laplace transforms and its applications	26	26	2	2
5	Filters and Attenuators	10	16	2	1
	Total	**90**	**110**	**10**	**8**

OBJECTIVES

1.0   Understand the basics of electrical circuits and Kirchoff's laws
1.1   Define active and passive elements.
1.2   Explain about ideal voltage source and ideal current source
1.3   Convert ideal voltage source to ideal current source and vice versa
1.4   State ohm's law and mention it's limitations
1.5   State Kirchhoff's current law and Kirchhoff's voltage law.
1.6   Solve problems on KCL,KVL

2.0   Mesh current analysis and Node voltage analysis
2.1   Define the terms: branch, node, junction and loop in circuits.
2.3   Determine the number of mesh equations required to solve the given Network
2.4   Write the mesh current equations for a given network and arrange them in matrix form.
2.5   Solve for mesh currents using Crammer's rule.
2.6   Determine the number of node voltage equations.
2.7   Write the node voltage equation for a given network and arrange them in matrix form.
2.8   Solve for node voltages using Crammer's rule.
2.10   Explain duality of a network
2.11   Draw the dual of given network.

3.0 Understand the network theorems
3.1   State Thevenin's, and Norton's theorems and mention their use
3.2   Apply the above theorems to solve networks.

3.3   State superposition theorem
3.4   Solve simple problems using superposition theorem
3.5   State Maximum power transfer theorems for DC & AC circuits.
3.6   Solve simple problems using the above theorem.
3.7   State the importance of impedance matching.
3.8   State Reciprocity theorem
3.9   State the importance of Reciprocity theorem.
3.10 List the advantages and limitations of above theorems
3.11 Explain star and Delta configurations of resistances
3.12 Give transformation formulas from Star to Delta & Delta to Star (no derivation)
3.13 Solve simple problems on Star/Delta and Delta/Star transformation

4.0 Understand the transient analysis, Laplace transform and its applications in circuit analysis

4.1   Define the terms initial conditions, steady state and transient.
4.2   Explain the dc response for an RL circuit.
4.3   Derive expression for current in an RL circuit.
4.4   Explain the dc response for an RC circuit.
4.5   Derive expression for current in an RC circuit.
4.6   Explain the dc response of an RLC circuit.
4.7   Solve simple problems on series RL,RC circuits for DC excitation.
4.8   Define Laplace Transform and know the concept of complex frequency
4.9   Understand the properties of Laplace Transform – Linear property, First shifting property, Change of Scale.
4.10 Write Laplace transforms of important functions: i) Unit step function, ii) exponential function, iii) sine function, iv) hyperbolic sine and cosine function v)damped sine function, vi) damped hyperbolic cosine and sine function
4.11 Explain second shifting property with examples
4.12 Explain initial value theorem and final value theorem
4.13 State inverse Laplace transform
4.14 Write inverse Laplace transforms corresponding to Laplace transform of the functions mentioned in objective 4.10
4.15 Explain Partial fraction expansion
4.16 Explain Heaviside's expansion theorem
4.17 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 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 attenuators with circuit diagram

COURSE CONTENT

1.0 Understand the basics of electrical circuits and Kirchoff's laws

active and passive elements-ideal voltage source and ideal current source- ohm's law
- Kirchhoff's current law and Kirchhoff's voltage law-Solve problems on KCL,KVL

2.0 Apply Mesh current analysis and Node voltage analysis

Mesh current analysis-Node voltage analysis –duality-simple problems

3.0. Understand the network theorems

Thevenin's, and Norton's theorems -superposition theorem- Maximum power transfer theorems- Reciprocity theorem- simple problems using the above theorems- star and Delta transformation and delta to star transformation-simple problems

4.0 Understand the transient analysis, Laplace transform and its applications in circuit analysis

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 important functions-- second shifting property - initial value theorem and final value theorem-inverse Laplace transform and write inverse Laplace transforms to standard functions-Partial fraction expansion-Heaviside's expansion theorem- simple network problems using the above concepts.

5.0 Understand the filters and attenuators

Define neper, decibel, characteristic impedance, propagation constant, Attenuation-Define filter, LPF, HPF, BPF, BSF-Draw the characteristic curves for the above.-constant K-LPF, HPF.-disadvantages of constant K filters- T & π attenuators

REFERENCE BOOKS

1.   Circuit analysis by Hayt & Kemerly.
2.   Network analysis by Van Valkenberg.
3. Circuits and Networks	Sudhakar & Shyam Mohan TMH
4.   Network Theroy-Joseph Adminster-Schaum Series
5.   Networks and Systems by D Roy Choudhury, Wiely Eastern Limited

Electronic Circuits Lab

Subject title : **Electronic Circuits Lab**
Subject code : **EC-306**
Periods per week : **3**
Periods / Semester : **45**

S.No	Major Topics	No. of Periods
I.	Rectifiers and Power supplies	9
II.	Amplifiers and Oscillators	12
III.	Wave shaping circuits	12
IV.	Special Devices	6
V	Circuit simulation using Pspice or equivalent	6
		45

List of Experiments:

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 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 at different loads and compare with that of theoretical values

4. Obtain the voltage regulation characteristics of Zener regulator

Amplifiers and Oscillators
5. Plot the frequency response characteristics of a single stage CE Amplifier
6. Plot the frequency response characteristics of a RC coupled Amplifier.

7. Implement Colpitt's oscillator and verify the effect of varying the tank circuit component values and observe output waveforms on CRO.

8. Implement Hartley oscillator and verify the effect of varying the tank circuit component values and observe output waveforms on CRO.

9. Implement Crystal oscillator and observe output waveforms on CRO

10. Implement RC Phase shift oscillator and verify the effect of varying the RC component values and observe output waveforms on CRO

Wave shaping circuits

11. Implement transistor Bi-stable/ Astable/ Mon-stable multivibrator circuit and observe the waveforms on CRO

12. Implement RC integrator, apply a square wave and observe the output waveform on CRO

13. Implement RC differentiator, apply a square wave and observe the output waveform on CRO

14. Assemble Positive and negative clipper circuits and obtain output waveforms with sinusoidal input

15. Realize a Clamper circuit and observe the input and output waveforms on CRO

Special devices

16. Plot the characteristics of Photodiode

17. Plot the characteristics of photo transistor

18. Plot the VI characteristics of different color LEDs & determine cut-in voltage
19. Plot the characteristics of LDR
20. Implement a Twilight switch using a Phototransistor and a Relay; Replace Phototransistor with LDR and test

PSPICE modelling using eCAD software
21. Simulate half wave and full wave rectifier circuits

22. Simulate 12v Zener regulator circuit and assess the performance for various loads

23. Simulate of CE amplifier and observe the effect of disconnecting bypass capacitor

24. Simulate Hartley oscillator circuit and observe the effect of change in component values

25. Simulate transistor Astable-multivibrator/ Bistable/ Mon-stable circuit and observe the effect of change in component values.

Digital Electronics lab

Subject Title	:	**Digital Electronics lab**
Subject Code	:	**EC 307**
Periods/Week	:	**04**
Periods/Semester	:	**60**

S. No.	Major Topics	No. of Periods
I.	Logic Gates	10
II.	Combinational logic circuits	15
III.	Multiplexers and Demultiplexers.	08
IV.	Flip-Flops	08
V.	Counters, Registers and Memories.	12
VI	Practice Using Pspice Orcad Tool Software	12
		60

LIST OF EXPERIMENTS

Logic Gates
1. Verify the truth tables of AND, OR,NOT, NAND, NOR Gates
2. Realize AND, OR, NOT, functions using 2 input NAND and NOR Gates

Combinational logic circuits
3. Implement EX-OR Logic using basic gates and verify the truth table
4. Implement EX-OR Logic using 2 input NAND Gates and NOR Gates and verify the   truth table.
5. Implement a 4bit complement generator (controlled inverters) using 7486 quad EX-OR IC
6. Implement Half adder and full adder circuits using TTL/CMOS gates, and verify the truth tables
7. Verify the function of 4-bit magnitude comparator 7485 IC

Multiplexers /De-multiplexers and Decoders /encoders
8. Verify the truth table of Multiplexer IC 74153
9. Verify the truth table of BCD to 7 segment Decoder 7448 IC
10. Verify the Truth table of 74138 Decoder IC
11. Verify the function of 74148 Encoder and write the truth table

Flip Flops

12. Construct clocked RS FF using NAND gates and Verify its truth table.
13. Verify the Truth table of JK FF using 7476 IC
14. Construct D and T flip flops using 7476 and verify the truth tables

Counters, Registers and memories

15. Construct a ripple counter using JK FFs and obtain its timing waveforms
16. Verify the function of 7490 as decade and modulus counter, obtain timing waveforms.
17. verify the function of up/down counter using 74190/ 74193, change the modulus of the counter and verify
18. Verify the function of shift register (ICs like 7495, 74194 etc.)
19. Identify Various Memory ICs and Note down their pin Configuration from the data sheets : a) RAM b) ROM c) EPROM d) EEPROM

Practice Using Pspice Orcad Tool Software

20. Simulate AND, OR, NOT, EX-OR Gates Using Universal Gates (ICs 7400 and 7402).
21. Simulate Half Adder And Full Adder Circuits Using ICs 7408,7486, and 7432
22. Simulate a 4-Bit Magnitude Comparator Using 7485 IC
23. Simulate 8 × 1 Multiplexer Using IC 74153
24. Simulate 3 To 8 Decoder Using IC 74138

Analog and Digital Communication systems Lab

Subject Title	: **Analog and Digital Communication systems Lab**
Subject Code	: **EC-308**
Periods/Week	: **03**
Periods/Semester	: **45**

SNo	Major Topics	No. of Periods
1	ANALOG COMMUNICATION	25
2	DIGITAL COMMUNICATION	20
	Total	45

OBJECTIVES:

ANALOG COMMUNICATION

1. Conduct an experiment to observe AM signal waveform and determine Modulation index using CRO.
2. Conduct an experiment to observe FM signal waveform and determine Modulation index using CRO.
3. Identify different sections in AM radio receiver
4. Obtain waveforms at different test points of AM radio receiver
5. Identify different sections FM radio receiver.
6. Obtain waveforms at different test points of FM radio receiver
7. Identify different sections of AM/ FM transmitter
8. Verify and observe Pulse amplitude modulation and demodulation waveforms on CRO
9. Verify and observe Pulse Width modulation and demodulation waveforms on CRO
10. Observe pulse position modulation and demodulation waveforms on CRO

DIGITAL COMMUNICATION
11. Set up a Pulse code modulator/ Demodulator circuit and observe the waveforms.
12. Set up an ASK modulator and demodulator and observe the waveforms.
13. Set up an FSK modulator and demodulator and observe the waveforms
14. Set up a PSK modulator and demodulator and observe the waveforms
15. Perform an experiment on Time Division Multiplexing/ De-multiplexing circuit and observe the waveforms.
16. Perform an experiment on Frequency Division Multiplexing/ De-multiplexing circuit and observe the waveforms.

Communication Skills Practice

(Common to all Branches)

Subject title : **Communication skills Practice**

Subject code : **EC - 309**

Periods per week : **3**

Periods per semester : **45**

Introduction :

 In the context of globalization , competence in speaking skills is the need of the hour The gap between the needs of the industry and the curriculum can be bridged by enabling the students to hone their speaking and listening skills. This course aims at providing opportunities for practicing speaking.

Time Schedule

Sno.	Topic	Periods	Weightage of marks (End Exam)	Sessional marks	Total
1	Listening I	3			
2	Listening II	3	10	10	20
3	Introducing oneself	3			
4	Describing objects	3			
5	Describing events	3			
6	Reporting past incidents	3			
7	Speaking from observation / reading	3	50	30	80
8	JAM	6			
9	Group discussion	6			
10	Mock interviews	6			
11	Making presentations	6			
		45	60	40	100

Objectives :

On completion of the course the students will be able to

- Strengthen their listening skills
- Strengthen their speaking skills

Competencies and key competencies to be achieved by the student

Topic	Teacher's input/ methodology	Students competence
Listening I Listening II	Pre- Listening –eliciting, pictures While - Listening Post –Listening –project , writing	Identifying the main idea, Identifying specific details, Identifying parallel and contradictory ideas Drawing inferences, Reasoning
Introducing oneself	Kinds of introduction --official/ personal, dynamic vocabulary, Body language, Model introduction, Use of line ups	Use of simple present tense, Sequencing, Appropriate vocabulary
Reporting incidents	Group work /pair work, Elicit, Use of past tense, Student presentations	Use of past tense, Relevant vocabulary

Describing objects	Vocabulary , Use of adjectives, Games—I spy, Group presentations	Use of adjectives, Dimensions,shapes Compare and contrast, Sequence
Describing events	Group work/pair work Use of appropriate tense	Use of appropriate tense, Sequencing
Reporting past incidents	Use of past tense, Vocabulary Student presentations	Use of past tense , sequencing
Speaking from observation/re	Group work/pair work,	Use of past tense,

ading	Reading techniques ,	Summarising , evaluating, comprehension
JAM	Effective techniques , Good beginning , conclusion, tips, Use of line ups	Vocabulary, Sequencing, Fluency, Thinking spontaneously
Group discussion	Expressing opinion, body language,	Expressing opinion, agree/ disagree, fluency,Persuasive and leadership skills
Mock interview	FAQs , body language	Role play, body language,
Making presentations	Student presentations	Using charts , pictures, interpreting data, sequencing,PPTs

Communicative methodology (CLT) should be used to create an interactive class. Apart from the suggestions given teachers are free to innovate to use any activity to improve the language competence of students . Attention can also be given to improve the accent and intonation of students.

Note:

* This subject   is a theory subject.

** The workload should be calculated as theory workload.

***Examinations in the subject will be treated as a practical one.

IV Semester

DIPLOMA IN ELECTRONICS & COMMUNICATION ENGINEERING (DECE)
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	Linear ICs and Applications	6	-	90	3	20	80	100
EC - 402	Programming in C & MATLAB	6	-	90	3	20	80	100
EC - 403	Microprocessors	6	-	90	3	20	80	100
EC - 404	Electronic Measurements & consumer gadgets	6	-	90	3	20	80	100
EC-405	Microwave & Satellite Communication systems	6	-	90	3	20	80	100
PRACTICAL:								
EC - 406	Linear ICs Lab	-	3	45	3	40	60	100
EC - 407	Microprocessors lab	-	3	45	3	40	60	100
EC - 408	C & MATLAB Practice Laboratory	-	3	45	3	40	60	100
EC - 409	Consumer Electronics & Measurements Lab	-	3	45	3	40	60	100
	TOTAL	30	12	630	-	260	640	900

LINEAR ICs AND APPLICATIONS

Subject Title	:	**LINEAR ICs AND APPLICATIONS**	
Subject Code	:	**EC- 401**	
Periods/Week	:	**06**	
Periods/Semester	:	**90**	

TIME SCHEDULE

SI	Major Topics	Periods	Weightage of Marks	Short Answer Questions	Essay Type Questions
1	IC Manufacturing	8	13	1	1
2	Operational Amplifier	14	16	2	1
3	Op-Amp Applications	18	26	2	2
4	Timers and PLL	18	26	2	2
5	Instrumentation amplifiers, A/D & D/A Converters	17	29	3	2
		90	**110**	**10**	**8**

OBJECTIVE:

1.0   IC Manufacturing

1.0   List the advantages and disadvantages of Integrated Circuits over discrete assembly.

1.1   Distinguish between linear and digital ICs

1.2   Classify ICs based on manufacturing process (monolithic, thin film, thick film and hybrid).

1.3   List different IC packages.

1.4   Draw the shape of above package types

1.5   Mention the power rating of above packages.

1.6   Explain various levels of integration (SSI, MSI, LSI, VLSI etc.,).

1.7   Explain the Surface Mount Technology (SMT)

1.8   List 6 merits of SMT Technology..

2.0   Operational amplifier
2.0   Explain the working of differential amplifier constructed using BJTs.
2.1   Explain the functional block diagram of an operational amplifier.
2.2   Explain about the symbol of an operational amplifier.
2.3   List the characteristics of ideal operational amplifier.
2.4   Define Input impedance, Open loop gain, Slew rate, CMRR, Input offset voltage, Input offset Current and give the typical values of each.
2.5   Draw the pin out diagram of IC 741 and explain function of each pin
2.6   Explain the power supply requirements of Operational Amplifier.
2.7   Explain the Inverting amplifier configuration of Op Amp.
2.8   Explain the concept of virtual ground.
2.9   Derive the equation for voltage gain of the Inverting amplifier
2.10 Explain the effect of feedback on input impedance and Bandwidth of inverting amplifier
2.11 Explain the Non Inverting amplifier configuration of Op Amp.
2.12 Derive the equation for Voltage gain of the Non Inverting amplifier
2.13 Explain the effect of feedback on input impedance and Bandwidth of Non inverting amplifier.
2.14 Give the list of IC regulators and give their advantages
2.15 Explain the operation of fixed positive and negative voltage regulators.(using 7800 series and 7900 series)
2.16 Explain the operation of adjustable voltage regulator (LM317)
.
3.0   Operational Amplifier applications
3.0   Explain the working of OP-Amp Wein-bridge Oscillator circuit
3.1   Give the conditions required for stable operation of above circuit
3.2   Draw and Explain RC Phase shift oscillator circuit using OP Amp
3.3   Define Sweep Voltage and explain its use as time-base.
3.4   Distinguish between voltage and current time-base generation and list their applications.
3.5   Explain the working of Bootstrap sweep circuit using op Amp
3.6   Explain the working of Miller's sweep circuit using op Amp.
3.7   Explain the working of OP-Amp   Astable multi vibrator with waveforms.
3.8   Explain the working of OP-Amp   Monostable multi vibrator with waveforms
3.9   Explain the working of OP-Amp Schmitt trigger with waveforms
3.10 Explain how the mathematical operations i) inverter , ii) Buffer   iii) Summer iv)Scale changer   v) Integrator and vi) Differentiator are simulated using operational amplifier
3.11 State the use of analog computer

4.0   Timers and PLL
4.0   Give the pin configuration of 555 IC
4.1   Draw the block diagram of 555 IC and explain about the function of each pin.
4.2   Explain the working of astable multivibrator using 555 IC.
4.3   Explain the working of Monostable Multivibrator using 555 IC.
4.4   Explain the concept of Phase locked loop
4.5   Draw and explain the block diagram of PLL – LM565.
4.6   Explain the operation VCO (LM566)
4.7   Define lock range of PLL
4.8   Define capture range of PLL.

4.9 Give design rules(Formulas) for implementing PLL circuit

4.10 List the applications of PLL.

4.11 Explain frequency multiplier and FM demodulator using PLL.

5.0   Instrumentation amplifiers, A/D and D/A Converters.

5.0 Draw and explain the instrumentation amplifier using three Op-Amps

5.1 Advantages of instrumentation amplifier.

5.2 Explain the *Voltage to current* converter circuit.

5.3 List 3 applications of *Voltage to current* converter.

5.4 Explain the *Current to Voltage* converter circuit.

5.5 List 3 applications of *Current to Voltage* converter.

5.6 State the need for *A/D* and *D/A* conversion.

5.7 Explain the terms resolution, Accuracy, Monotonicity and settling time of D/A converter.

5.8 Explain D/A conversion using binary weighted resistors.

5.9 Explain D/A conversion using R-2R ladder network.

5.10 Explain A/D conversion using counter method.

5.11 Explain A/D conversion using successive approximation method

5.12 Explain the pin out diagram of MAX1112 serial ADC

COURSE CONTENTS:

1. **IC Manufacturing** Classifications of ICs based on manufacturing process, IC packages , IC Regulators Transistor series and shunt regulators.
2. **Operational amplifiers** Differential amplifiers and Operational amplifiers**.** Parameters definitions.
3. **Operational Amplifier applications** –OP-Amp as summer, integrator, differentiator, inverter and multiplier.,OP-Amp as Sine Wave and Square Wave generator(Wein Bridge Oscillators and multivibrators).
4 **Non Linear Wave Shaping Circuits** Like Clippers and Clamper Circuits,555 Timer block diagram, 555 Timer as Astable and Monostable Multivibrator , voltage Control Oscillators and PLL.
5 **Instrumentation amplifiers** (three op-Amps type), A/D and D/A Converters, define the terms the terms resolution, Accuracy, Monotonicity and settling time of D/A converter. DAC and ADC using op-Amps.

REFERENCE BOOKS
1. Electronic Devices and Circuits by Bogart, TMH
2. Integrated Electronics by Milliman and Hallkias, TMH
3. Linear Integrated Circuits by Gaykwad,
4. Linear Integrated Circuits by Roy Chowdary
5. Linear Integrated Circuits by Clayton.

PROGRAMMING IN C & MATLAB

Subject Title	:	**PROGRAMMING IN C & MATLAB**
Subject Code	:	**EC- 402**
Periods / Week	:	**06**
Periods / Sem.	:	**90**

TIME SCHEDULE

Sl.	Major Topics	Periods	Weightage of marks	Short Type	Essay Type
1	C Programming Basics	13	16	2	1
2	Conditional statements and arrays	15	26	2	2
3	Strings, Functions & Pointers	15	26	2	2
4	Structures & unions	12	26	2	2
5	Basics of MATLAB	20	16	2	1
	Total	**75**	**110**	**10**	**08**

OBJECTIVES

1.0   C Programming Basics.
1.1   Give the structure of C program
1.2   List the character set of C language
1.3   Explain the data types in C
1.4   List the five Arithmetic Operators
1.5   Define an expression and show how to evaluate.
1.6   Explain writing the assignment statement.
1.7   Explain the increment and decrement operators.
1.8   Identify compound Assignment Operators.
1.9   Explain the Nested assignments.
1.10   Explain printf ()and scanf () functions
1.11   Mention various type conversion techniques and discuss them.
1.12   List the four   relational operators.
1.13   List the three logical operators supported by 'C'
1.14   Give the operator precedence.
1.15   Evaluate a logical expression.
1.16   Explain bitwise logical operators.

2.0 Conditional Statements & Arrays

2.1   State the importance of conditional expression.
2.2   List the four conditional statements supported by C
2.3   Explain If, If-else and If-else-If statements.
2.4   Explain Switch Case statement.
2.5   Write simple programs based on conditional statements.
2.6   List the three types of iterative statements supported by C.
2.7   Explain while loop, Do-While and For loops.
2.8   Explain the nested loops
2.9   write simple programs based on nested loops
2.10   Differentiate break and continue statements.
2.11   Define one dimensional and two dimensional arrays.
2.12   Explain the initialization of the above arrays & Access Array elements.

3.0 Strings, Functions & Pointers
3.1   Define string
3.2   List three functions used for reading strings
3.3   List three functions used for writing strings.
3.4   Write the operation of getchar(), getch(), getche() and putchar() functions.
3.5   Write the operations of string manipulation functions strcat(), strchr(), strcmp(),
       strncmp(),   strcpy(), and strlen()
3.6   Write simple programs based on string manipulation functions
3.7   Define a function.
3.8   State the use of return statement.
3.9   Explain passing parameters to the function
3.10 Write programs using function call technique.
3.11 Declare a pointer, assign a pointer, and initialize a pointer.
3.12 Discuss pointer arithmetic.
3.13 Differentiate address and dereferencing operators.

4.0 Structures and unions
4.1 Define a structure
4.2 Describe structure variable.
4.3 Explain initialization of structures.
4.4 Explain the accessing of members of a structure.
4.5 Illustrate concept of structure assignment
4.6 Explain how to find size of a structure.
4.7 Define a Union
4.8   Explain the use of a union.
4.9   Differentiate between structure and union
4.10 State the use of preprocessor directives with examples

5.0 MATLAB Basics
5.1   State the need for MATLAB in solving engineering problems
5.2   List the major differences between C and MATLAB
5.3   Give the significance of MATLAB over other high level languages
5.4   List the arithmetic operators, relational operators, logical operators and special
        operators in MATLAB
5.5   List the data types in MATLAB
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(); ivi) xlabel(); v) ylabel(); vi) legend() in MATLAB
5.12 Know about the usage of :
  i)   Communication system tool box
  ii) Control system tool box
  iii) Signal processing tool box
  iv) SIMULINK

COURSE CONTENT

1.   C-Programming Basics

Structure of a C program, Character Set, Constants, Variables, Data types, Type conversion. Arithmetic, Logical, Relational operators and precedence – Assignment, Increment, Decrement operators, evaluation of expressions. Console IO formatted and unformatted functions.

2.   Decision and Loop control Statements and arrays

If, If-else, Nested If else, Break, Continue, Switch statements Loops:- For, While, Do-while, Nesting of Loops. 1 D Array declaration, Initialization, 2 D Array declaration, Initialization, Accessing of Array elements

3.   Strings and Functions and pointers in C

Character Arrays declaration and Initialization of Strings, Display of strings with format. Function-Definition, Declaration, Return statement, passing parameters to function-Function calls, Pointer declaration, Arithmetic operations and pointers, Pointers and Arrays

4.   Structures and Unions

Structure features, Declaration and Initialization, Accessing of Structure members, Structures and functions, Unions. Preprocessor directives.

5.   Matlab Basics

Matlab elements –data types – operators-relational, logical - decision making statements – loop statements –arrays and matrices -working with matrices –input/output functions – plotting commands- uses

REFERENCE BOOKS

1. Programming in ANSI C,Balaguru Swamy.E , 3rd Edition, TMH
2. Programming with ANSI and Turbo C by Kamthane, Pearson Education
3. Programming in C by Gottfried (Schaum Series)

4. Programming in C by Reema Thareja, Oxford university press.

5. Let us C, by Yashwant Kanetkar, BPB Publication, New Delhi

6. Getting Started with MATLAB: A Quick Introduction for Scientists and Engineers by Pratap, Oxford University Press, 2014

MICROPROCESSORS

Subject Title   :   **Microprocessors**

Subject Code   :   **EC-403**

Periods/Week   :   **06**

Periods/Semester   :   **90**

TIME SCHEDULE

Sl.	Major Topics	No. of Periods	Weightage of marks	Short Answer Questions	Essay Questions
1	Overview of 8085	10	13	2	1
2	Architecture of 8086	20	26	2	2
3	Instruction set of 8086	20	26	2	2
4	Programming with 8086	20	13	2	1
5	Introduction to Advanced microprocessors	20	26	2	2
	Total	**90**	**110**	**10**	**8**

OBJECTIVES

1.0   Overview of 8085
1.1   Draw and explain the functional block diagram of 8085
1.2   List the features of 8085 microprocessor
1.3   Explain multiplexing of Address and Data Bus
1.4   List different registers in 8085 and state their function.
1.5   Draw the pin out diagram of 8085
1.6   Explain the terms operation code, operand and illustrate these terms by writing an instruction. Understand the hex code for the same
1.7   Define fetch cycle, execution cycle and instruction cycle
1.8   Give the syntax and function of STA, LDA, IN, OUT instructions.
1.9   Draw the timing diagrams of the above instructions, and understand thoroughly in terms of clock cycles

2.0   Understand the Architecture of 8086
2.1   Give the evolution of INTEL family microprocessors
2.2   Compare 8-bit and 16-bit microprocessors
2.3   Explain the concepts of Sequential processing, Parallel processing and Pipelining
2.4   State the need of memory segmentation
2.5   State the features of 8086 microprocessor
2.6   Draw and explain the functional block diagram of 8086.
2.7   State the need of bus control logic
2.8   State the importance of segment registers
2.9   Mention the function of Instruction Pointer and its importance
2.10 Explain the Instruction Queue and its storage

2.11 List different General purpose registers and explain
2.12 State the purpose of Pointer and Index registers
2.13 Explain the working of ALU and control unit
2.14 List different flags of 8086 and mention their use
2.15 Draw and explain the pin diagram of 8086.
2.16 Describe the maximum and minimum mode operation.
2.17 Illustrate the generation of 20-bit Physical address with an example
2.18 Draw the timing diagrams of memory read and memory write cycles.
2.19 State the need of interrupts.
2.20 Explain the Interrupt response in 8086
2.21 List different types of interrupts

3.0 Instruction set of 8086 and programming
 3.1   Draw the generalized Instruction format of 8086
 3.2   Illustrate the generation of code with few examples
 3.3   Explain Addressing modes of 8086 with examples
 3.4   Classify the Instruction set of 8086
 3.5   Understand the data transfer instructions of 8086.
 3.6   Understand the Arithmetic instructions of 8086.
 3.7   Understand the Logic instructions of 8086.
 3.8   Understand the processor control instructions of 8086.
 3.9   Understand the instructions affecting flags of 8086.
 3.10 Understand the control transfer (branching) instructions of 8086.
 3.11 Understand the String manipulation instructions of 8086.

4.0 Programming with 8086
 4.1   Describe assembler directives
 4.2   Describe the use of various assembly language development tools like Editor, Assembler, Linker, Locator and Debugger.
 4.3   Explain about assembly language Programming
 4.4   Describe the procedure for executing assembly language program with an assembler
 4.5   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
 4.6   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
 4.7   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 from binary to gray on 4 bit data
 4.8   Write simple assembly language programs using string manipulation instructions
   i)   To find the length of the given string
   ii)   To reverse the given string
 4.9   Explain conditional and loop statements.
 4.10   Write simple assembly language programs using conditional and loop statements.
   i)   To find the biggest/ smallest of the given series of numbers
   ii)   To arrange the given series of numbers in ascending /descending order

4.11   State the need of Subroutine
4.12   Explain CALL, RETURN instructions
4.13   Explain Subroutine programming in 8086.
4.14   Give simple program using subroutine and parameters passing
      i)   To find the factorial of the given number

5.0 Introduction to advanced microprocessors

5.1   Give the features of 80286 microprocessor
5.2   Describe the architecture of 80286.
5.3   Explain operating modes of 80286
5.4   Describe memory management of 80286.
5.5   State the features of 80386
5.6   Describe the architecture of 80386.
5.7   Explain the operating modes of 80386
5.8   Explain memory organization in 80386
5.9   Describe pipe lining.
5.10 Describe instruction level parallelism.
5.11 Compare RISC and CISC.
5.12 State the features of 80486
5.13 Describe the architecture of 80486
5.14 State the features of Pentium microprocessor
5.15 Compare 80286,386,486 and Pentium processors

COURSE CONTENTS

1. Architecture of 8085
  Block diagram of microcomputer, Block diagram of 8085, Pin out diagram of 8085,
registers, timers, interrupts, modes of operation-address and data bus multiplexing-.
Instructions-instruction cycle-timing diagrams

2. Architecture of 8086
  Concepts of Parallel processing - memory segmentation- Features of 8086 – internal
architecture of 8086 – Pin diagram of 8086 - minimum and maximum modes - calculation
of physical address – flag register – basic 8086 system timing diagrams – interrupts.

3. Instruction set of 8086 and programming
  Instruction format - Addressing modes **-** Instruction set – data transfer – Arithmetic and
logical – branching – loop control – string – processor control instructions –

4. Programming with 8086
  Assembler directives – Assembler instruction format - program development tools –
procedure for executing assembly program – sample programs.-conditional and loop
statements-programs on conditional and loop statements- subroutine or procedure
programming-CALL and RETURN –simple progrsms

5. Architecture of 80286, 386 ,486 and Pentium
  Features of all processors- Architectures of 80286, 386 , 486 and Pentium –Operating
modes -Memory organization in 286 and 386, Comparison between all Processors

Reference Books

1.   8085-Micro Processors by Ramesh S Gaonkar
3.   Advanced Microprocessors by Ashok Roy   TMH
4.   The Intel Microprocessor by Berry B Brey Pearson
5.   X86 Microprocessor Programming by Venugopal and Rajkumar.   TMH
6.   Microcomputer systems: The 8086 Family Yu-Cheng Liu & Glenn A Gibson.   PHI
7.   Microprocessors Theory and applications Intel and Motorola by Rafiquzzaman.
        PHI
8.   Microprocessors and interfacing programming and Hardware by Douglas V. Hall
        McGraw Hill

Electronic Measurements & consumer gadgets

Subject Title	:	**Electronic Measurements & consumer gadgets**
Subject Code	:	**EC-404**
Periods/Week	:	**06**
Periods/Semester	:	**90**

TIME SCHEDULE

Sl	Major Topics	No. of periods	Weightage of Marks	Short Answer Questions	Essay Questions
1	Analog and Digital measuring Instruments	15	16	2	1
2	CRO	15	26	2	2
3	Test Instruments	15	16	2	1
4	Audio Systems	20	26	2	2
5	TV	25	26	2	2
	Total	90	110	10	8

OBJECTIVES

1.0 Analog 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 of extending the range of DC ammeter
1. 4   Explain the principle of extending the range of DC voltmeter.
1. 5   Explain the principle and working of rectifier type voltmeter
1. 6   Explain the principle and working of rectifier type ammeter
1. 7   Explain the construction and principle of series and shunt type ohmmeters.
1. 8   Explain the working of FET input voltmeter with a circuit diagram
1. 9   List the four advantages of digital instruments over Analogue instruments.
1. 10 Explain the working of Ramp type digital voltmeter with block diagram.
1. 11 Explain the working of digital frequency meter with block diagram.
1. 12 Define Accuracy and Resolution of a meter.

2.0   Cathode Ray Oscilloscope
2.1   Draw block diagram of general purpose CRO and describe the function of each block.
2.2   Explain the necessity of time base and deflection amplifiers.
2.3   Define deflection sensitivity of CRO
2.4   List the conditions for stationary waveforms.
2.5   Mention the conditions for flicker free waveforms.
2.6   Explain triggered sweep circuit with UJT
2.7   Explain the function of various controls on front panel of CRO
2.8   Explain the procedure for measurement of a) voltage (DC & AC) b) frequency c) phase angle d) time interval e) depth of modulation,
2.9   Explain the method of conversion of single trace CRO into DUAL trace CRO with block diagram
2.10   Explain how to measure frequency and phase of a signal using Lissajous figures
2.11   Give the basic principle of sampling CRO

2.12 Explain the principle of working of Digital Storage CRO using block diagram
2.13 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   Mention the 3 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 need for plotters and recorders.
3.12   Explain the working 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   Give the need for a Horn loud speaker with its construction and advantages.
4.5   Explain the principle, construction and working of magnetic and crystal headphones and their uses.
4.6   Mention the specifications of Loudspeaker and Microphones
4.7   Define speech, music and noise.
4.8   Explain frequency response and equalization.
4.9   Define the concept of Hi-Fi and Stereo.
4.10 Explain the basic principle of magnetic recording and reproduction.
4.11 List five advantages and disadvantages magnetic recording.
4.12 State the principle of optical recording.
4.13 Define the MP3 & MP4 formats..
4.14 Explain the concept of noise reduction using DOLBY system and features of Dolby Digital 5.1 Surround Sound
4.15 Explain home theatre sound system.

5.0   Television
5.1 Explain formation of picture.
5.2 State the need for horizontal and vertical scanning
5.3   Mention the frequency allocation of T.V. Channels used in India
5.4   Distinguish between progressive and interlaced scanning.
5.5   Explain the main characteristic of human eye with regard to perception of colours.
5.6   List the standards of Colour transmission system like NTSC, PAL and SECAM.
5.7   Explain how chrominance signals are transmitted on one carrier in PAL system.
5.8   Draw the block diagram of a Colour TV transmitter and state the function of each block.
5.9   Draw the block diagram of a Colour TV receiver and state the function of each block.
5.10 State the need for satellite for TV broadcasting over wide area.
5.11 List the merits of DTH system
5.12 State the need for SET TOP BOX
5.13 List the features of HDTV
5.14 List the features of SMART

COURSE CONTENT

Analog and Digital measuring instruments

characteristics of ideal Voltmeter and ideal Ammeter-principle of operation of PMMC instrument-extending the range of DC ammeter and DC voltmeter-rectifier type voltmeter and ammeter -series and shunt type ohmmeters-FET input voltmeter-Ramp type digital voltmeter-digital frequency meter-Accuracy and Resolution of a meter.

Cathode Ray Oscilloscope

block diagram of general purpose CRO -time base and deflection amplifiers-deflection sensitivity of CRO-conditions for stationary waveforms and flicker free waveforms-triggered sweep circuit with UJT-front panel of CRO-measurement of a) voltage (DC & AC) b) frequency c) phase angle d) time interval e) depth of modulation-DUAL trace CRO-Lissajous figures-sampling CRO-Digital Storage CRO-probes and connectors used in oscilloscopes.

Test instruments

AF Oscillator (sine & square)- function generator -RF signal generator- RF signal generator-digital IC tester -logic analyser- spectrum analyser- plotters and recorders- logic probe.

Audio systems.
carbon, condenser, Crystal, ribbon and dynamic microphones- PMMC Loudspeaker-woofers and tweeters- Horn loud speaker-magnetic and crystal headphones -speech, music and noise- equalization- Hi-Fi and Stereo- magnetic recording and reproduction- optical recording- MP3 & MP4 formats- DOLBY system-home theatre sound system.

Television
formation of picture- horizontal and vertical scanning-progressive and interlaced scanning-main characteristic of human eye with regard to perception of colours- Colour transmission system like NTSC, PAL and SECAM- chrominance signals are transmitted on one carrier in PAL system- block diagram of a Colour TV transmitter -block diagram of a Colour TV receiver -satellite for TV broadcasting - DTH system- SET TOP BOX- HDTV- SMART TV

REFERENCE BOOKS:
1. Modern Electronic Instrumentation and Measurement techniques - Albert D. Helfrick William David Cooper-PHI Publications
2. Electrical and Electronics Measurements and Instrumentation - A.K. Sawhney , PuneetSawhneyDhanpatRai& Company, 2010
3. **Electronic Instrumentation** - HS Kalsi ,-Tata McGraw Hill
4. Electronic communication systems by Roy Blake, Thomson Delmar.
5. Colour Television by R.R.Gulati.   TMH
6. How Electronic Things Work.& What to Do When They Don't -Robert L. Goodman, -TMH
7. Consumer electronics - SP Bali, -Pearson
8. Digital Satellite Television Handbook By Mark E. Long

Microwave & Satellite Communication systems

Subject Title	:	**Microwave & Satellite Communication systems**
Subject Code	:	**EC-405**
Periods/Week	:	**06**
Periods/Semester	:	**90**

TIME SCHEDULE

SI	Major Topics	No. of periods	Weightage of Marks	Short Answer Questions	Essay Questions
1	RADIO WAVE PROPAGATION	20	26	2	2
2	ANTENNAS	23	26	2	2
3	MICROWAVE COMPONENTS AND DEVICES	23	26	2	2
4	RADARS	14	16	2	1
5	SATELLITE COMMUNICATION SYSTEM	10	16	2	1
	Total	90	110	10	8

OBJECTIVES

1.0 **Radio wave propagation**
1.1 Explain the Ground wave propagation and ground effects on waves
1.2 List the applications of ground wave propagation
1.3 List the limitations of ground propagation
1.4 Explain Space wave (trophospheric wave) propagation and factors affecting space wave propagation
1.5 Briefly explain i) Duct propagation & ii) Tropospheric scaterring
1.6 Classify the layers of ionosphere and briefly explain them
1.7 Explain the ionosphere wave (sky wave) propagation
1.8 Explain energy absorption and wave path in the ionosphere
1.9 Define i) Refractive index ii) phase velocity and iii) reflection coefficient iv)Actual height & v) Virtual height
1.10 Define critical frequency and maximum usable frequency
1.11 Explain i) Skip distance &ii) Skip zone(dead zone)

2.0 Antennas
2.1 Understand the principle of radiation of EM waves from antennas
2.2 Briefly explain Isotropic radiator
2.3 Briefly explain Radiation mechanism of an antenna
2.4 Classify antennas based on i)Radiation ii)frequency range iii) Construction and bandwidth
2.5 State the Antenna Parameters
2.6 Define the terms i) Antenna Input Impedance
    ii. Antenna Bandwidth
    iii.Radiation pattern
    iv.Front to back Ratio
    v.Radiation Intensity

    vi.Antenna Beam efficiency,
    vii. directive gain and Directivity
   viii.Power gain
    ix.Radiation resistance
    xi.Antenna efficiency, antenna aperture
   xii.Antenna polarization

2.7   Describe the function of dipole and folded dipole antennas and give their applications
2.8   State the different microwave antennas
2.9   Briefly 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
2.12 Explain the function 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
3.2   State the microwave frequencies (different bands)
3.3   List the advantages of microwaves
3.4   State the applications of microwaves
3.5   Define TE(Transverse Electric) Wave and TM(Transverse Magnetic waves)
3.6   List different Microwave passive devices
3.7   State the function of wave guides and classify
3.8   Explain propagation of wave in waveguides
3.10 Explain i) Rectangular wave guides ii) Circular wave guides
3.11 Describe various modes of operations of wave guides
3.12 Define i) dominant mode ii) cut-off frequency iii) phase velocity and iv) group velocity related to wave guides
3.13 State the uses of i) T-junctions ii) Microwave Bends and iii) Microwave tapers
3.13 Give the list of different Microwave solid state devices
3.13 Explain i) Gunn diode ii) IMPATT DIODE iii) TRAPATT DIODE
3.14 Explain the working principle of Reflex Klystron
3.15 Explain the working principle of Magnetron and state its applications
3.16 Explain the working principle of Travelling Wave Tube and state its applications

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 different Radars
4.5   Draw the block diagram of a Pulse Radar and explain the components of a pulse Radar
4.6   State the major advantages & disadvantage of a Pulsed radar system
4.7   State the need of duplexer
4.8   List the displays of 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 Indicator(MTI) Radar
4.12 Briefly explain the concept of blind speeds
4.13 List the applications of Radars

5.0 Satellite communication System

5.1   State the use of satellite for communication

5.2   Draw and explain block diagram of a satellite communications system

5.3   Advantages of satellite communication system over terrestrial communication systems

5.4   Draw the block diagram of earth station and explain each block

5.5   Explain function of the satellite transponders

5.6   Explain the application of satellite in GPS (Global Position System)

5.7   Explain the application of satellite in Direct to Home (DTH) TV

5.8   Explain the application of satellite in satellite phone

COURSE CONTENT:

Radio wave propagation

Ground wave propagation -Space wave (trophospheric wave) propagation-Duct propagation & ii) Tropospheric scaterring - layers of ionosphere -sky wave propagation- i) Skip distance &ii) Skip zone(dead zone)

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 - Dish antenna- end-fire array and Broadside array

Microwave components and devices

microwave frequencies- TE(Transverse Electric) Wave and TM(Transverse Magnetic waves)-i) Rectangular wave guides ii) Circular wave guides - i) Gunn diode ii) IMPATT DIODE iii) TRAPATT DIODE- Reflex Klystron - Magnetron- Travelling Wave

RADARS

working principle of a RADAR- Radar Range Equation- Pulse Radar -Continuous Wave(CW) Radar- Doppler Effect - Moving Target Indicator(MTI) Radar

Satellite communication System

block diagram of a satellite communications system- active and passive satellite- satellite orbit services- block diagram of earth station- satellite transponders

Reference Books:
1.   Electronic and Radio engineering by Terman
2.   Electronic communication system by George Kenndy
3.   Radio Wave Propagation and channel modling for earth –space systems by Athanasios G.Kanatas, Athanasios D.Panagopopulos
4.   Networks and Transmission lines by Umesh Sinha
5.   Microfwave Devices, circuits and subsystems for communication engg.,by Ian A. Glover, Steve pennock
6.   Microwave devices by G.S.N. Raju
7.   Transmission and Propagation by Glazer
8.   Antenna Theory by K D Prasad
9.   Transmission line and waveguides by A.V. Bakshi
10. Communication systems by Sharadar
11. Satellite communication by Mojojit Mitra

12. Satellite communication Engineering by Michael Olorunfunmi Kolawole

Linear ICs Lab

Subject Title	:	**Linear ICs Lab**
Subject Code	:	**EC-406**
Periods/Week	:	**03**
Periods/Semester	:	**45**

TIME SCHEDULE

S. No.	Major Topics	No. of Periods
1	Operational Amplifier Circuits	27
2	555 Timer	6
3	Pspice simulation	12
	Total	45

List of Experiments

Operational Amplifier Circuits

1. Study Operational amplifier IC 741 and Quad opamp LM 324 and comparator LM 339 from data book
2. Implement and test 741 OpAmp as a) inverting amplifier, b) Non Inverting amplifier and c) Voltage follower (Buffer) – observe wave forms
3. Implement and test 741 Operation amplifier as a)summer   b) Differentiator, c) Integrator and c) Scale changer
4. Implement Monostable multi using OPAMP, observe waveforms
5. Implement Astable multi using OPAMP, observe waveforms
6. Implement Schmitt trigger using OPAMP, observe waveforms
7. Implement & test RC-phase shift oscillator Circuit using OpAmp
8. Implement & test Wien bridge oscillator Circuit using OpAmp
9. Implement D/A converter using R-2R ladder network/Binary Weighted type

555 Timer

10. Implement   Monostable multi vibrator using 555 timer and observe output waveforms on CRO
11. Implement   Astable multi vibrator using 555 timer and observe output waveforms on CRO

PSpice simulation

12. Simulate a)summer   b) Differentiator, c) Integrator and c) Scale changer using OPAMP in Pspice

13. Simulate Monostable multi using OPAMP in Pspice
14. Simulate Astable multi using OPAMP in Pspice
15. Simulate Monostable multi using 555 in Pspice
16. Simulate Astable multi using 555 in Pspice

Microprocessors lab

SUBJECT TITLE   :   **Microprocessors lab**

SUBJECT CODE   :   **EC-407**

PERIODS/WEEK   :   **03**

PERIODS/SEMESTER   :   **45**

TIME SCHEDULE

S.No	EXPERIMENT	No. of Periods
1	Familiarization of Assembler (TASM /MASM)	3
2	8086 programs to practice data transfer instructions	6
3	8086 programs to practice Arithmetic instructions	12
4	8086 programs to practice logical/bit manipulation instructions	9
5	8086 programs to practice branching instructions	15
	Total	45

LIST OF EXPERIMENTS

1. **Familiarization of Assembler (TASM /MASM)**

2. **8086 programs to practice data transfer instructions**

    i)   Program to perform block transfer of data

    ii) Program to perform block interchange

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 LCM for the given data

vi) 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) Program to arrange data in ascending/descending order

v) Write a program for generating multiplication table for a given number

vi) Write an assembly language program to count number of ones and zeros in a number.

C & MATLAB Practice Laboratory

Subject Title	:	**C & MATLAB Practice Laboratory**
Subject Code	:	**EC- 408**
Periods/Week	:	**03**
Periods/Semester	:	**45**

TIME SCHEDULE

Sl	Major Topic	No. of Periods
1	C Programming Basics	6
2	Decision & Loop Control Statements	6
3	Exercises on functions	9
4	Arrays, Strings and Pointers in C	9
5	Structures, Unions & Preprocessor Directives	6
6	MAT Lab Practice	9

LIST OF EXPERIMENTS

I. C Programming Basics

1. Familiarize with turbo Compiler features.
2. Practice formatted Input / Output (printf and scanf) functions.
3. Practice with Various Operators in C

II. Decision & Loop Control Statements

4. Practice with Decision & Control (if, if-else, nested if –else) Statements
5. Practice with Decision control (Switch –case structure) statements
6. Practice with loop control Statements

III. Exercises on functions

7. Practice the use of functions in C

IV. Arrays, Strings and Pointers in C

8. Write and run small programs using single dimensional integer arrays
9. Write and run small programs using multidimensional integer arrays .
10. Write and run small programs using string functions for string comparison, copying and concatenation
11. Write and run small programs using with pointers in 'C'

V. Structures, Unions & Preprocessor Directives

12. Write and run small programs using Structures in C
13. Write and run small programs using C preprocessor Directives.
14. Practice command line arguments in C

VI. MAT LAB PRACTICE

15 Familiarize with MATLAB Compiler environment, command line arguments, HELP and know about various tool boxes available in MATLAB

16 Write simple programs on decision making statements (if-end, if-else-end, nested if –else-end)

17 Write simple programs on loop control statements (while , for loops)

18 Write simple programs to create simple 1D & 2D arrays and perform addition & subtraction operations

19 Write simple programs to create 3X3 matrixes and perform : i) addition ;ii) subtraction; iii) multiplication; iv) transpose and v) inverse operations

20 Write simple programs to illustrate plot commands such as: i) plot(x,y) ;ii) fplot() iii) title(); ivi) xlabel(); v) ylabel(); vi) legend() in MATLAB

21 Know the procedure to convert MATLAB program to C code

Consumer Electronics & Measurements Lab

Subject Title	:	**Consumer Electronics & Measurements Lab**
Subject Code	:	**EC-409**
Periods/Week	:	**03**
Periods/Semester	:	**45**

LIST OF EXPERIMENTS

S. No.	Major Topics	No. of Periods
I.	Measurements	9
II.	CRO	21
III.	Audio and Video systems	15
		45

Measurements

1. Extend the range of voltmeter and test
2. Extend the range of ammeter and test
3. Measure L,C and R using LCR meter
4. Test some digital ICs using IC tester
5. Measure frequency of a given signal using digital frequency meter
6. Perform an experiment to verify series resonance.
7. Perform an experiment to verify parallel resonance.
8. Perform an experiment to verify Thevenin's theorem.
9. Perform an experiment to verify super position theorem.
10. Perform an experiment to verify maximum power transfer theorem.
11. Connect Four 4 ohms speakers to obtain 4 Ohms Impedance and test for maximum power output by Audio amplifier at 4 ohms output terminalsCRO
12. Use the controls of CRO to adjust intensity, Astigmatism and Focus.
13. Apply different waveforms using function generator and produce flicker free waveforms
14. Determine Vertical and Horizontal deflection sensitivity of CRO by applying standard signal provided on CRO
15. Measure signal amplitude using x10 CRO probe
16. Observe the effect of Trigger control on the waveform and display the waveform from the set point
17. Observe charging and discharging curves of a capacitor using digital CRO and determine time constant of given RC circuit
18. Measure AC and DC voltages using CRO
19. Measure AC and DC currents using CRO
20. Measure frequency of an unknown signal using Lissajous figures on CRO
21. Measure phase difference between two signals using Lissajous figures on CRO
    Audio & Video
22. Arrange PA system with different speakers of varying impedances and microphones
23. Use different features of Smart TV
24. Record and reproduce voice digitally

V Semester

DIPLOMA IN ELECTRONICS & COMMUNICATION ENGINEERING
SCHEME OF INSTRUCTIONS AND EXAMINATIONS
V 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 -501	Industrial Management & Smart Technologies	5		75	3	20	80	100
EC-502	Microcontrollers	6	-	90	3	20	80	100
EC-503	Computer Hardware & Networking	6	-	90	3	20	80	100
EC-504	Optical & Mobile Communications	6	-	90	3	20	80	100
EC-505	Industrial Electronics	6	-	90	3	20	80	100
PRACTICAL:								
EC-506	Advanced Communications & Networking Lab	-	4	60	3	40	60	100
EC-507	Microcontrollers lab	-	3	45	3	40	60	100
EC-508	Life Skills	-	3	45	3	40	60	100
EC-509	Industrial Electronics Lab	-	3	45	3	40	60	100
TOTAL		29	13	630	-	260	640	900

Industrial Management & Smart Technologies

Subject Title	:	**Industrial Management & Smart Technologies**
Subject Code	:	**EC-501**
Periods/Week	:	**5**
Period/Semester	:	**75**

TIME SCHEDULE

S. No.	Major Topics	Periods	Weightage Of Marks	Short Answer Questions	Essay Type Questions
1.	Basics of Industrial Management	06	13	1	1
2.	Organisation structure & Organisational behaviour	10	18	1	$1^{1/2}$
3.	Production Management	10	18	1	$1^{1/2}$
4.	Materials Management	08	13	1	1
5	Maintenance management & Industrial Safety	08	13	1	1
6	Entrepreneurship Development	08	13	1	1
7	Total Quality Management	05	06	2	
8	Smart technologies	20	16	2	1
	Total	**75**	**110**	**10**	**08**

1.   **Basics of Industrial Management**

On completion of the course the student will be able to

1.0   **Understand the principles of management as applied to industry.**
      1.1   Define industry, commerce (Trade) and business.
      1.2   Know the need for management.
      1.3   Understand the evolution of management
      1.4   Understand functions of Management.
      1.5   Explain the principles of scientific management.
      1.6   Explain the principles of management.
      1.7   Differentiate between management and administration.
      1.8   Understand the nature of management as a profession
      1.9   Differentiate between supervisory, middle and Top level management
      1.10   Explain the importance of managerial skills (Technical, Human, Conceptual)

2.   **Organisation Structure & organisational behaviour**

Know types of ownerships, the organisation structure of an industry and the behaviour of an

individual in an organisation.

      2.1   Understand the philosophy and need of organisation structure of an industry.
      2.2   Understand the line, staff and Functional organisations
      2.3   Understand the Authority and Responsibility Relationships
      2.4   Understand the differences between Delegation and decentralization
      2.5   Explain the factors of effective organisation.
      2.6   Outline the communication process
      2.7   State motivation theories.
      2.8   State Maslow's Hierarchy of needs.
      2.9   List out different leadership models.
      2.10   Explain the trait theory of leadership.
      2.11   Explain behavioural theory of Leadership.
      2.12   Explain the process of decision making.

2.13   Assessing Human resource requirements
2.14   Know the concept of Job analysis, Job description and specifications
2.15   Understand the process of recruitment, selection, training and development
2.16   Understand types of business ownerships
2.17   Differentiate between the business ownerships
2.18   Know the objectives of Employee participation
2.19   Understand the meaning and definition social responsibilities
2.20   Corporate social responsibility

3. **Production management**

Understand the different aspects of production management.

3.1   Identify the factors of Plant Location
3.2   Know the objectives of plant Layout
3.3   Understand the principles of plant Layouts
3.4   Explain the types of plant Layouts
3.5   Relate the production department with other departments.
3.6   State the need for planning and it's advantages.
3.7   Explain the stages of Production, planning and control.
3.8   Know the basic methods demand forecasting
3.9   Explain routing methods.
3.10   Explain scheduling methods.
3.11   Explain dispatching.
3.12   Explain Break Even Analysis
3.13   Define supply chain Management, competitive strategy, Supply chain strategy
3.14   Draw PERT/CPM networks.
3.15   Identify the critical path

4. **Materials Management**

Understand the role of materials management industries.

4.1   Explain the importance of materials management in Industry.
4.2   Know Functions of Materials Management
4.3   Derive expression for inventory control.
4.4   Explain ABC analysis.
4.5   Define safety stock.
4.6   Define reorder level.
4.7   Derive an expression for economic ordering quantity.
4.8   Know the functions of Stores Management,
4.9   Explain types of store layouts.
4.10   List out stores records.
4.11   Explain the Bin card.
4.12   Describe Cardex method.
4.13   Explain general purchasing procedures
4.14   Explain tendering, E-tendering and E-procurement procedures
4.15   List out purchase records.
4.16   Know the applications of RFID (Radio Frequency Identification Device)
4.17   Understand the applications of RFID in material management

5. **Maintenance Management & Industrial Safety**

Comprehend the Importance of Maintenance Management & Safety procedures
5.1   Explain the importance of maintenance management in Industry.
5.2   Know the Objectives of maintenance management
5.3   Know the activities of maintenance management
5.4   Understand the importance of Preventive maintenance

5.5 Understand the need for scheduled maintenance
5.6 Differentiate between scheduled and preventive maintenance
5.7 Know the principles of 5 s for good house keeping
5.8 Explain the importance of safety at Work place.
5.9 List out the important provisions related to safety.
5.10 Explain hazard and accident.
5.11 List out different hazards in the Industry.
5.12 Explain the causes of accidents.
5.13 Explain the direct and indirect cost of accidents.
5.14 Understand the types of emission from process Industries, their effects on environment and control
5.15 Understand the principles of solid waste management

6. **Entrepreneurship Development.**

   Understand the role of entrepreneur in economic development and in improving the quality of life.

   6.1 Define the word entrepreneur.
   6.2 Explain the requirements of an entrepreneur.
   6.3 Determine the role of entrepreneurs in promoting Small Scale Industries.
   6.4 Describe the details of self-employment schemes.
   6.5 Characteristic of successful entrepreneurs
   6.6 Explain the method of site selection.
   6.7 List the financial assistance programmes.
   6.8 List out the organisations that help an entrepreneur
   6.9 Know the use of EDP Programmes
   6.10 Understand the concept of make in India, Zero defect and zero effect
   6.11 Understand the importance for startups
   6.12 Explain the conduct of demand surveys
   6.13 Explain the conduct of a market survey
   6.14 Evaluate Economic and Technical factors.
   6.15 Prepare feasibility report study

7. **Total Quality Management:**

   Understand the concepts adopted in total quality management

   7.1 Explain the concept of quality.
   7.2 List the quality systems and elements of quality systems.
   7.3 State the principles of quality Assurance.
   7.4 Understand the basic concepts of TQM
   7.5 Know the Pillars of TQM
   7.6 List the evolution of ISO standards.
   7.7 Explain ISO standards and ISO 9000 series of quality systems.
   7.8 List the beneficiaries of ISO 9000.
   7.9 Explain the concepts of ISO 14000
   7.10 Know the overview of PDCA cycle

8. **Smart Technologies**
   8.1 Get an overview of IoT
      8.1.1 Define the term IoT
      8.1.2 Know how IoT work
      8.1.3 List the key features of IoT
      8.1.4 List the components of IoT : hardware, software, technology and protocols
      8.1.5 List the advantages and disadvantages of IoT
   8.2 IoT Applications
      8.2.1 Smart Cities

8.2.2 Smart Energy and the Smart Grid
8.2.3 Smart Transportation and Mobility
8.2.4 Smart Home, Smart Buildings and Infrastructure
8.2.5 Smart Factory and Smart Manufacturing
8.2.6 Smart Health
8.2.7 Food and Water Tracking and Security
8.2.8 Social Networks and IoT

Course Content

1. Basics of Industrial Management
Introduction: Industry, Commerce and Business; Definition of management; Characteristics of management; Functions of management - Planning, Organizing, Staffing, Directing, Co-ordination, Controlling, Motivating, Communication, Decision Making; Principles of scientific management: – F.W.Taylor, Principles of Management: Henry Fayol; Administration and management; Nature of management; levels of management; managerial skills;

2. Organisation Structure & organisational behaviour
Organizing - Process of Organizing; Line/Staff and functional Organizations, Decentralization and Delegation, Effective Organizing; Communication, Motivational Theories; Leadership Models; Human resources development; Forms of Business ownerships: Types – Sole proprietorship, Partnership, Joint Stock Companies, Cooperative types of Organizations; Employee participation in management; Corporate Social responsibility;

3. Production management
Definition and importance; Plant location and layout; Types of production -job, batch and mass; production Planning and Control: Demand forecasting, routing, scheduling, dispatching and follow up; Break even analysis; Supply chain Management (Definition, Competitive strategy Vs Supply chain Strategy, Supply chain drivers); Project scheduling; Application of CPM and PERT techniques; simple numerical problems;

4. Materials Management
Materials in industry, Basic inventory control model, ABC Analysis, Safety stock, re-order level, Economic ordering quantity, Stores Management: Stores layout, stores equipment, Stores records, purchasing procedures, e-tendering, e-procurement; purchase records, Bin card, Cardex RFID (Radio Frequency Identification Device)application in materials management;

5. Maintenance Management & Industrial Safety
Objectives and importance of plant maintenance, Different types of maintenance, Nature of maintenance problems, Range of maintenance activities, Schedules of preventive maintenance, Advantages of preventive maintenance, 5 S principles; Importance of Safety at work places; Causes of accidents-psychological, physiological and other industrial hazards; Domino sequence; methods of promoting safe practices; Pollution control in process industries; Introductory concepts on Solid waste management (General introduction including definitions of solid waste including municipal, hospital and industrial solid waste, Waste reduction at source – municipal and industrial wastes)

6. Entrepreneurship Development.
Definition of Entrepreneur; Role of Entrepreneur; Concept of Make In India, ZERO defect, Zero Effect, Concept of Start-up Company, Entrepreneurial Development: Role of SSI, MSME, DICs, Entrepreneurial development schemes; Institutional support, financial assistance programmes; Market survey and Demand survey; Preparation of Feasibility study reports

7. Total Quality Management:
Total Quality Management (TQM)- Concept of quality discussed by B. Crosby W. Edward, Deming, Joseph M. Juran, Kooru Ishikawa, Genichi Taguchi, Shigco Shingo. Quality systems – Definitions of the terms used in quality systems like, quality policy, quality management,

quality systems, Stages of development of ISO 9000 series , ISO-14000, Deming's PDCA Cycle (Plan, Do, Check and Action). Japanese Quality Management, culture, Kaizen Strategy (continuous improvement).

8. Smart Technologies :
Overview of IoT - Define IoT, how IoT work, key features of IoT, components of IoT : hardware, software, technology and protocols, advantages and disadvantages of IoT - IoT Applications - Smart Cities, Smart Energy and the Smart Grid, Smart Transportation and Mobility, Smart Home, Smart Buildings and Infrastructure, Smart Factory and Smart Manufacturing, Smart Health, Food and Water Tracking and Security, Participatory Sensing, Social Networks and IoT.

REFERENCE BOOKS

1.   Industrial Engineering and Management -by O.P Khanna
2.   Production Management- by Buffa.
3.   Engineering Economics and Management Science - by Banga & Sharma.
4.   Personnel Management by Flippo.
5.   Production and Operations Management –S.N. Chary
6.
      Converging_Technologies_for_Smart_Environments_and_Integrated_Ecosystems_IERC_B ook_ Open_Access_2013 pages-54-76
7.   Supply Chain Management –Sunil Chopra and Meindl, PHI publishers
8   5 S made easy by David Visco

MICRO CONTROLLERS

SUBJECT TITLE : **MICROCONTROLLERS**
SUBJECT CODE : **EC- 502**
PERIODS/WEEK : **06**
PERIODS/SEMESTER : **90**

TIME SCHEDULE

SI	Major Topics	No. of Periods	Weightage of marks	Short Answer Questions	Essay Questions
1	Architecture of Microcontroller 8051	15	16	2	1
2	Instruction set of 8051 micro controller	20	26	2	2
3	8051 Programming Concepts	20	26	2	2
4	Interfacing Simple I/O devices	15	16	2	1
5	Programming 8051 Timers, Serial port & Simple Applications	20	26	2	2
	Total	**90**	**110**	**10**	**8**

OBJECTIVES

1.0 Comprehend the architecture of Microcontroller 8051
1.1 List the features of micro controllers.
1.2 Compare Microprocessors and Microcontrollers
1.3 Draw the block diagram of a microcomputer and explain the function of each block.
1.4 Give the details of 8051 microcontroller family of chips.
1.5 Give the functional block diagram of 8051 microcontroller
1.6 Draw the register structure of 8051and explain.
1.7 Explain the function of various special function registers.
1.8 Give the pin diagram of 8051 micro controller and specify the purpose of each pin.
1.9 Describe internal memory, external memory and ports of 8051.
1.10 Explain counters & timers in 8051
1.11 Explain serial input/output of 8051
1.12 Explain interrupts in 8051

2.0 Comprehend the instruction set of 8051 micro controller
2.1 State the need for an instruction set.
2.2 Give the instruction format of 8051.
2.3 Explain fetch cycle, execution cycle and instruction cycle.
2.4 Distinguish between machine cycle and T-state.

2.5   Define the terms machine language, assembly language, and mnemonics.

2.6   Give the difference between machine level and assembly level programming.

2.7   List the major groups in the instruction set along with examples.

2.8   Explain the terms operation code, operand and illustrate these terms by writing an instruction.

2.9   Explain the data transfer, arithmetic, logical, branching and boolean instructions with examples

2.10 Classify the 8051 instructions into one byte, two byte and three byte instructions.

2.11 List the various addressing modes of 8051and Explain with examples.

2.12 Explain data transfer instructions of 8051.

2.13 Explain the arithmetic instructions and recognise the flags that are set or reset for given data conditions.

2.14 Explain the logic instructions and recognize the flags that are set or reset for given data conditions.

2.15 Illustrate the logic operations and explain their use in making, setting and resetting of individual bits.

2.16 Explain unconditional and conditional jump instructions and how flags are used to change the sequence of program.

3.0   Comprehend Programming Concepts

3.1   List the various symbols used in drawing flow charts.

3.2   Draw flow charts for some simple problems.

3.3   Write programs in mnemonics to illustrate the application of data copy instructions and translate these mnemonics into hex codes.

3.4   Write programs of instructions to perform single byte, double byte and multi byte addition and subtraction.

3.5   Illustrate the application of jump instruction in the program.

3.6   Write a program using counter techniques.

3.7   Define a subroutine and explain 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.

3.10 List and explain call and return instructions.

3.11 Use PUSH, POP instructions in programs.

3.12 Use input/output, machine related statements in writing assembly language programs.

3.13 Explain the term debugging a program.

3.14 List the important steps in writing and trouble shooting a simple program.

3.15 Explain the principles of single step and break point debugging techniques.

4   Interfacing Simple I/O devices

4.1 Describe the Interfacing of push button switches and LEDs

4.2 Write instructions to access data for the above

4.3 Describe the Seven segment display interface – static and dynamic types

4.4 List reasons for the popularity of LCDs

4.5 Describe the functions of pins of LCD

4.6 List instruction command code for programming a LCD

4.7 Explain Interfacing LCD to 8051

4.8 Program LCD in assembly language

4.9 Explain the basic operations of keyboard

4.10 Explain key press and detection mechanisms

4.11 Describe key bouncing problem and de-bouncing solutions

4.12 Explain Interfacing of a 4x4 Matrix Key Board.

4.13 Write a program to access key code from matrix key board

5.0   Programming 8051 Timers, Serial port & Simple Applications
5.1   Explain how to program 8051 timers to create time delays.
5.2   Write programs to generate a square wave of given frequency and duty cycle using timer.
5.3   Explain how to use an 8051 timer as an event counter.
5.4   Write a program to count the number of events using timer.
5.5   Explain how to program 8051 serial port to transmit and receive serial data.
5.6   Write a program to transmit a message serially using serial port.
5.7   Write a program to receive a message serially and store it in memory.
5.8   Explain RS232 standards
5.9   List RS232 pins of DB 25 and DB 9 connectors
5.10 Explain MAX 232 and 233 and interfacing
5.11 Explain the need of relays and opto-couplers for interfacing
5.12 Interface 8051 with relay to drive a lamp
5.13 Interface a solid state relay to drive a mains operated motor
5.14 Explain the working of a stepper motor.
5.15 Draw and explain a driver circuit required to run a stepper motor
5.16 Interface a stepper motor
5.17 Write a program to run stepper motor continuously
5.18 Explain pulse width modulation for controlling the speed of small DC motor.

COURSE CONTENT

1. Architecture of Microcontroller 8051
Features of micro controllers, Compare Microprocessors and Microcontrollers, block diagram of a microcomputer, block diagram of 8051 microcontroller, register structure of 8051, various special function registers, pin diagram of 8051, internal memory, external memory and ports, counters & timers in 805, serial input/output of 8051, interrupts in 8051

2.Comprehend the instruction set of 8051 micro controller
Need for an instruction set, instruction format of 8051, fetch cycle, execution cycle and instruction cycle,machine cycle and T-state,machine language, assembly language, and mnemonics, major groups in the instruction set, operation code, operand, data transfer, arithmetic, logical, branching and boolean instructions, one byte, two byte and three byte instructions, various addressing modes of 8051, unconditional and conditional jump instructions.

3.Comprehend Programming Concepts
Various symbols used in drawing flow charts, flow charts for some simple problems, 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 counter techniques, subroutine, call and return instructions, 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 LCD to 8051, Program LCD in assembly language, basic operations of keyboard, Interfacing of a 4x4 Matrix Key Board, program to access key code from matrix key board

5. Programming 8051 Timers, Serial port & Simple Applications
program 8051 timers to create time delays, program 8051 serial port to transmit and receive serial data, RS232 standards, MAX 232 and 233 and interfacing, Interface 8051 with relay to drive a lamp, Interface a solid state relay to drive a mains operated motor, working of a stepper motor, a driver circuit required to run a stepper motor, Interface a stepper motor program to run stepper motor continuously, pulse width modulation for controlling the speed of small DC motor.

REFERENCE BOOKS:

1. 8051 Micro controller by Mazidi and Mazidi.

2. 8051 Micro controller by Kenneth J.Ayala.

3. Programming customizing the 8051 Microcontroller by Myke Predko TMH

4. Microcontrollers (theory and applications) by Ajay V Deshmukh

Computer Hardware & Networking

Subject Title	:	Computer Hardware & Networking
Subject Code	:	EC-503
Periods /Week	:	06
Periods/Semester	:	90

TIME SCHEDULE

Sl.	Major Topics	No. of periods	Weightage of marks	Short Answer Questions	Essay Questions
1	Basic computer hardware	18	26	2	2
2	PC assembly and software installation	15	16	2	1
3	Basics of Data communication and OSI Reference Model	12	13	1	1
4	Physical Layer and Data Link Layer	20	26	2	2
5	Network Layer, Transport Layer and Application Layer	25	29	3	2
	Total	90	110	10	8

OBJECTIVES
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 Explain the specifications of processor
1.6 List the features of DDR2SDRAM and DDR3SDRAM
1.7 Explain accelerated graphics port.
1.8 List various SMPS power supply connectors used in PC-AT and explain their use
1.9 Give the connector details of serial port, mouse, keyboard and USB.
1.10 Give four reasons for popularity of USB ports
1.11 Explain the working of Hard Disk and data access.
1.12 List five specifications of LED monitor.
1.13 Explain the working of LED monitor.
1.14 Explain the working principle of optical mouse

2.0 Understand PC assembly and software installation
2.1 Explain the steps in assembling a PC.
2.2 Explain the editing of CMOS set up and its details.
2.3 Describe the process of formatting.
2.4 State the need for disk partitioning
2.5 Define the Power On Self Test (POST).
2.6 Explain about 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 ways of removing viruses.
2.12 List 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 explain the functions of each layer.
3.9   Draw TCP/IP reference model and explain the functions of each layer
3.10 Compare ISO :OSI 7 layer model with TCP/IP reference model

4.0   Understand 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 cable 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 and CSMA/CA.
4.10 Explain Ethernet LAN and its frame format
4.11 Explain the working of token ring network
4.12 Explain the topology of wireless LAN and explain its frame format (IEEE 802.11)
4.13 Know about CAN and SkyWAN
4.14 Explain the features of Bluetooth technology.
4.15 Explain the use of   switch, bridge in constructing networks
4.16 Differentiate between repeater, switch and bridges.

5.0   Understand Network Layer, Transport Layer and Application Layer
       a) Network Layer:
5.1   Define the terms Internet and Intranet.
5.2   Explain classful addressing and classless addressing in IPv4.
5.3   State the use of routers in networking
5.4   Explain the concept of routers and routing.
5.5   Distinguish among cut through, store-and-forward and adaptive switch mechanisms.
5.6   Explain the packet transfer mechanism using routers and IP address.
       b) Transport Layer
5.7   List the features of Transmission Control Protocol (TCP)
5.8   Explain the flow control in TCP
5.9   Explain error control in TCP
5.10 Explain the connectivity of systems using TCP (Three way hand shake)
5.11 Explain end-to-end connectivity in TCP using ports and sockets.
5.12 Describe the features of User Datagram Protocol (UDP)
5.13 Compare the features of TCP and UDP
5.14 State the use of Gateways.

c) Application Layer:

5.15 Mention the role of DNS server
5.16 Explain how email is transferred
5.17 Discuss POP server and SMTP server
5.18 Explain file transfer operation using FTP
5.19 Explain the working of Web server
5.20 Describe the web browser architecture
5.21 Explain the internal architecture of ISP
5.22 Write the purpose of proxy server
5.23 Explain remote login

COURSE CONTENTS

1.0 Understand 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, data storage on DVD, functioning of graphics card, functioning of Network card, specifications of LED monitor, working of LED monitor, working principle of optical mouse.

2.0 Understand PC assembly and software installation

Steps in assembling a PC, CMOS set up and its details, the process of formatting, use FDISK, disk manager and disk partitioning, different operating systems and their features, POST, booting procedure. usage of File Allocation Table (FAT) and NTFS, structure and uses of Windows registry, Installation procedure of WINDOWS OS, uses of Linux OS and ANDROID OS, need for installation of device drivers, blocking of damaged sectors, Defragmentation, and Removal of temporary files, types of viruses and ways of removing viruses.

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 Understand 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, FDDI and its properties, Bluetooth technology, use of switch, bridge in constructing networks

5.0 Understand 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 Gateways.

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. Network communication Technology by Ata Elahi Thomson
2. Data Communication and Networking by Godbole   TMH
3. Data and Computer Communications: William Stallings 7th edition. PHI
4. Data Communication and Networking: Behrouz Forouzan 3rd edition.TMH
5. Peter Norton's complete guide to PC upgrades 2nd edition by Peter Norton, Micheal Desmond, PHI
6. Peter Norton's new inside the PC by Peter Norton, Scott Clark, PHI
7. Microprocessors, PC Hardware and interfacing by N. Mathivanan PHI
8. Trouble shooting your PC by M. David Stone and Alfred Poor,PHI
9. Enhanced guide to managing and maintaining your PC-Third Edition,Thomson

OPTICAL & MOBILE COMMUNICATIONS

Subject Title	:	Optical & Mobile Communication
Subject Code	:	EC-504
Periods/Week	:	06
Periods/Semester	:	90

TIME SCHEDULE

SI	Major Topics	No. of periods	Weightage of marks	Short Answer Questions	Essay Questions
1	Over View of Fibre Optic Communication	12	26	2	2
2	Fibre Optic components and Devices	18	21	2	1 1/2
3	Telephony and Mobile Communication	18	21	2	1 1/2
4	Cellular system design fundamentals and Multiplexing Techniques	24	26	2	2
5	Digital Cellular mobile system	18	16	2	1
	Total	90	110	10	8

OBJECTIVES

1.0 Over View of Fibre Optic Communication
1.1 State the advantages of Light wave communication 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(SMF) and Multimode fibre (MMF)
1.6 Define Snell's law in optics and Explain light wave propagation in OFC
1.7 Define acceptance angle and Cone of acceptance.
1.8 Define numerical aperture (NA)
1.9 Explain intrinsic and extrinsic losses
1.10 Classify different types of dispersions occur in optical fibres.
1.11 Explain the need for WDM in fibre optic communication
1.12 Draw and explain the block diagram of WDM system
1.13 Draw and explain the block diagram of DWDM

2.0 Fibre Optic Components and Devices
2.1 List various fibre optic components
2.2 State the function of splice in optical fibres
2.3 State the need for optical coupler/splitter
2.4 List two types of sources used in OFC

2.5 Define salient features of an optical source
2.6 List two types of detectors used in OFC
2.7 Define salient feature 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.

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 of Electronic Telephone exchange.
3.4   In-band and out-band telephone signals.
3.5   Pulsed and DTMF dialling
3.6   List the limitations of conventional mobile phone system.
3.7   Evolution of cellular mobile communication system.
3.8   Define the terms mobile station and base station
3.9   State the functions of Mobile switching centre (MSC)
3.10 Define voice and control channels in mobile communication

4.0   Cellular system design fundamentals and Multiplexing Techniques
4.1   Draw the block diagram of a basic cellular system.
4.2   Explain the process of call progress in a cellular telephone system
4.3   State the need for hexagonal cell site.
4.4   Explain the concept of Frequency reuse.
4.5   Define the term Cell and cluster
4.6   Explain the capacity of a cellular system
4.7   Define Hand-off in mobile communication
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 Explain TDMA and its frame structure
4.12 Explain FDMA and its features
4.13 Explain the concept of spread spectrum technique
4.14 Explain CDMA and 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 Global system for mobile communication (GSM) with block diagram
5.3   List various interfaces in GSM architecture
5.4   List the service and security aspects of GSM.
5.5   List the advantages of GSM
5.6   List the draw backs of GSM system.
5.7   List the features of GPRS and EDGE
5.8   Compare the features of GSM, GPRS and EDGE systems
5.9   List the salient features of 3G system
5.10 List the advantages of 3G over earlier versions
5.11 List the basic concepts of 4G aspects
5.12 Explain IP Multimedia Subsystem (IMS)
5.13 Give the list of different IMS applications

COURSE CONTENTS

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 dispersions occur in optical fibres- WDM in fibre optic communication- block diagram of WDM system

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.

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

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

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

REFERENCE BOOKS

1. Mobile and Personal communication sytems and services by Raj Pandya, PHI
2. Wireless communications-Principles and practice by Theodore S. Rappaport, PEARSON
3. Mobile Cellular Telecommunications-Analog and Digital systems by Willium C. Y. Lee, McGrawHill
4. Mobile Communications by Jochen Schiller, PEARSON
5. Optical Fiber Communications by Gerd Keiser McGraw Hill

6.   Optical fiber and Laser- Principles and applications by Anuradha De, New Age publications
7.   Optical fiber communications-Principles and practice, John M. Senior, Pearson Publications
8.   Optical Fiber Communications and Its Applications – S.C.Gupta, 2004, PHI.

INDUSTRIAL ELECTRONICS

Subject Title : **Industrial Electronics**
Subject Code : **EC-505**
Periods/Week : **06**
Periods/Semester : **90**

TIME SCHEDULE

Sl	Major Topics	No. of periods	Weightage of marks	Short Answer Questions	Essay Questions
1	Power Electronic Devices	25	36	2	3
2	Inverters, SMPS and UPS	10	16	2	1
3	Transducers and Ultrasonics	20	26	2	2
4	Industrial Heating	15	16	2	1
5	Control Systems	20	16	2	1
	Total	90	110	10	8

OBJECTIVES

1.0 Power Electronic Devices
1.1 List different thyristor family devices.
1.2 Sketch the ISI circuit symbols SCR, SCS, SBS, SUS, DIAC, TRIAC.
1.3 Explain construction and working of SCR.
1.4 Explain 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 Distinguish between SUS, SBS, SCS & LASCR
1.11 Explain the construction and working of UJT
1.12 Give the definition of intrinsic stand-off ratio of UJT
1.13 Explain negative resistance region of UJT
1.14 Explain SCR triggering using UJT
1.15 Explain the working principle of controlled rectifier.
1.16 Explain about speed control of DC motor using SCR
1.17 List the applications of DIAC, TRIAC & SCR

2.0 Inverters, SMPS and UPS
2.1 Explain the need of inverters
2.2 Explain the principle of operation of inverter
2.3 Explain the working of MOSFET based Inverter circuit.
2.4 Explain PWM Voltage control of inverter
2.5 List the applications of inverters
2.6 Explain the working of SMPS with block diagram
2.7 List the applications of SMPS
2.8 Explain the working of Off Line UPS and Online UPS
2.9 Explain the working of MOSFET based UPS
2.10 List the applications of UPS

3.0   Transducers and Ultrasonics

3.1   Explain the term transducer, mechanical transducers and electrical/electronic transducers

3.2   Give the classification of electrical/electronic transducers on the basis of principle of operation and applications.

3.3   Give the list of 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 potentio-metric transducer.

3.6   Explain the construction and working of LVDT.

3.7   Explain 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, servomotor, and Tacho-generator.

3.11   Explain the term Ultrasonic.

3.12   Explain magnetostriction effect

3.13   Explain the construction and working of magnetostriction oscillator and how ultrasonics are generated.

3.14   Explain the construction and working of piezoelectric ultrasonic generator

3.15   Give the list of applications of ultrasonics

3.16   Explain the construction and working of pulsed-echo ultrasonic flaw detector

4.0   Industrial Heating

4.1   Give the classification of industrial heating methods.

4.2   Explain the principle of induction heating.

4.3   Give the list of applications of induction heating.

4.4   Explain about HF power source for induction heating.

4.5   Explain the principle of dielectric heating.

4.6   Explain about the electrodes used in dielectric heating & method of coupling to RF generator.

4.7   Give the list of dielectric heating applications.

4.8   Give the definition of welding.

4.9   Give the list of different types of Electrical welding

4.10   Explain the principle of resistance welding.

4.11   Explain the basic circuit of AC resistance welding and explain its working.

4.12   Explain about the electrodes used in resistance welding system

4.13   Give the list of resistance welding applications.

4.14   Draw the block diagram of a resistance welding system that uses sequence timer.

5.0   Control systems

5.1   Give the definition of system and Control system.

5.2   Give the classification of control systems

5.3   Explain an open loop control system with some examples

5.4   Give the list of merits and demerits of open loop control.

5.5   Explain closed loop system with the help of a block diagram.

5.6   Give some examples for closed loop system

5.7   Give the comparison between open loop and closed loop control systems.

5.8   Give the definition of Transfer function

5.9   State the need for industrial automation

5.10   State the need for PLC

5.11   Explain the PLC system with block diagram
5.12   Mention some applications of PLCs 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-Reverse conducting thyristor (RCT)-Asymmetrical SCR (ASCR)- Insulated gate Bipolar transistor (IGBT)

2.   Transducers & Ultrasonics
Introduction, classification of transducers, strain gauge, variable resistance transducer, capacitive, inductive, piezoelectric, LVDT. Thermocouples,Transducer applications - accelerometers, Tachogenerators, Servomotors Ultrasonic- generation –Pulsed echo ultrasonic flaw detector

3.   Inverters, SMPS and UPS
Need of inverters -MOSFET based Inverter circuit-Off Line UPS and Online UPS-PWM Voltage control of UPS-SMPS with block diagram-applications of SMPS

4.   Industrial Heating
Induction heating, Dielectric heating, Resistance welding, sequence timer.

5.   Control systems
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- industrial automation-PLC Block diagram- applications of PLC in the industry

REFERENCE BOOKS
1. Power Electronics by P.C.Sen.
2. Industrial Electronics and Control by S.K.Bhattacharya, S.Chatterjee
3. User manuals of PLCs, SCADA
4. Control Engg, by Nagarath & Gopal

Advanced Communications & Networking Lab

Subject Title : **Advanced Communications & Networking Lab**
Subject Code : **EC-506**
Periods/Week : **04**
Periods/Semester : **60**

TIME SCHEDULE

S. No.	Major Topics	No. of Periods
1.	Microwave Communications	6
2.	Mobile Communications	3
3.	Fibre Optics	12
4.	Computer Hardware	18
5.	Computer Networking	21
	Total	60

List of Experiments

1.0 Microwave Communications

Study of microwave components such as rectangular wave guide, fixed attenuators (x-5000 series), tunable probe, wave guide detectable mount (tunable),Klystron mount, circulators, slide screw tuners, multitone directional couplers, E-plane Tee, H-plane Tee, Magic Tee, Movable short, matched termination, pyramidal wave guide horn antenna, GUNN oscillator, PIN modulator, Isolators etc.

2.0 Mobile Communications

Study of mobile communications using trainer kit such as:

-Global System for Mobile Communication (GSM)

3.0 Fiber Optics

1. a)To Set up fiber optic analogue link.
    b)To Set up a fiber optic digital link

2. To verify modulation & Demodulation of light source by pulse width modulation technique.
3. To Test   Fiber optic Voice Link.
4. To Verify the NRZ & RZ modulation formats in Optical Communication

2.0 Computer Hardware

5. To Identify and note down mother board , Components and Chips
6. To Identify various Internal and External slots in the mother board and clean them with blower/ Brush.
7. To Practice Inserting and Removing RAM with care
8. To measure the Output voltages of SMPS
9. To disassemble the PC
10. To assemble the PC and test
11. To change CMOS Setup
12. To Install Operating system Windows
13. To Verify the function of control panel settings.
14. To Partition and format Hard disks.

5.0 Computer Networking

15. To identify and note down the specifications of various networking devices & Cables, Jacks , Connectors, tools etc used in local area networks
    a) To Prepare the UTP cable for cross and direct connections using crimping tool.
16. To Transfer files between systems in LAN
    b) share the printer in a network
17. To Test the Network using   ipconfig, ping / tracert and Netstat utilities and debug the network issues
18. To Install and configure Network Devices: HUB ii) Switch iii) Routers
19. To Configure Host IP, Subnet Mask and Default Gateway in a system in LAN (TCP/IP Configuration).
20. To Install and Configure Wireless NIC and transfer files between systems in LAN and Wireless LAN
21. To store the files in Cloud using Google drive and sync files using google sync.

MICROCONTROLLERS LAB

SUBJECT TITLE : **MICROCONTROLLERS LAB**

SUBJECT CODE : **EC-507**

PERIODS/WEEK : **03**

PERIODS/SEMESTER : **45**

TIME SCHEDULE

S. No.	Major Topics EXPERIMENT	No. of Periods
1.	Familiarization with Microcontroller Kit	10
2.	Instruction set	15
3.	Counters ,Timers Interrupts and Flags	10
4	Interfacing	10
	Total	45

LIST OF EXPERIMENTS

I Familiarization with Microcontroller Kit & Simulators

1. To Work with microcontroller kits and Simulators

a) Familiarize with   8051 Microcontroller Kit

b) Familiarize with   8051 simulator KEIL (similar)

II . 8051 Instruction set

2. To Practice Arithmetic instructions of 8051

a) Write an ALP to demonstrate Addition , subtraction , division and multiplication of 8 bit numbers .

b) Write an ALP to Add and Subtract 16 bit numbers

c) Write an ALP to find LCM of given 2 decimal numbers

3. To Practice Data transfer instructions

a) Write an ALP to Block move - 10bytes of data from 0X30-0X39 to 0X40-0X49

b) Write an ALP to Block exchange – 10bytes of data between 0X30-0X39 to 0X40-0X49

4. To Practice Data Manipulation

a) To find Smallest/Largest number in 10bytes of data from 0X30-0X39 (R3 – should store the smallest/largest number and R4 – should store address of the smallest/largest number)

5.To Practice Boolean & Logical instructions :

a) To Find 2's complement of a number using (CPL) instruction
b) To Convert Packed to Unpacked BCD (bit Masking) Using (ANL) Instruction
c) To convert Unpacked BCD to ASCII Using (ORL) instruction.

III. To implement Counters ,Timers

6. To implement a HEX up/down counter - (Program should check value @R0=0X30, if 0X30=0 then up counter else down counter)

7.To Implement Delays and Timers
To write a program in assembly language to produce required time delay a) by Using instructions only b) by Using Timers
IV .To practice Interfacing Techniques

8. Micro controller interfacing

a) Interfacing Switches and LEDS to 8051

i) 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

ii) To Write a Program to make an LED connected to pin P1.7 to blink at a specific rate

9. To Interface 3-digit 7SEGMENT LED DISPLAY

a) To Interface a Single DOTMATRIX DISPLAY and display the given number

10. To Interface a (4x4 matrix) Key Board to 8051

11. To control the direction of rotation of a small DC motor

12. To burn executable code into flash memory for 89C51

LIFE SKILLS

Subject Title	:	Life Skills
Subject Code	:	ECE-508
Scheme	:	C-16
Periods/ Week	:	03
Periods/Semester	:	45

TIME SCHEDULE

SI No.	UNITS	No. of periods Allotted		
		Explanation	Activities	Total
1.	ATTITUDE	1	3	4
2.	ADAPTABILITY	1	3	4
3.	GOAL SETTING	1	3	4
4.	MOTIVATION	1	3	4
5.	TIME MANAGEMENT	1	3	4
6.	CRITICAL THINKING	2	3	5
7.	CREATIVITY	1	3	4
8.	PROBLEM SOLVING	1	3	4
9.	TEAM WORK	1	3	4
10.	LEADERSHIP	1	3	4
11.	STRESS MANAGEMENT	1	3	4
	TOTAL	12	33	45

Note: No Written Examination; The total 45 hours are to be considered as Theory hours.

Marks: Internal – 40;   External – 60

OBJECTIVES:
Upon the completion of this course, the student shall be able to

1.0   Understand the concept of Attitude

   1.1   Define 'Attitude'

   1.2   Explain the importance of Attitude

    1.3   Distinguish between Positive and Negative Attitudes

    1.4   Life Response: Need for change of Attitude

    1.5   Positive Attitude: Key to success in Personal and Professional Lives

2.0   Understand the concept of Adaptability

    2.1   Define the term 'Adaptability'

    2.2   Explain the concept of Adaptability

    2.3   Advantages of Adaptability

    2.4   Disadvantages of Lack of Adaptability

    2.5   Need for positive response to change

3.0   Understand the concept of Goal setting

    3.1   Define the terms'Goal' and 'Goal Setting'

    3.2   Explain the significance of Goal setting&Long and Short term goals

    3.3   Explain the following concepts

         a) Wish   b) Dream c) Goal

    3.4   Explain the reasons for and consequences of not setting goals

    3.5   The SMART features in Goal setting

4.0   Understand the concept of Motivation

    4.1   Define 'Motivation' ; Inspiration Vs Motivation

    4.2   Importance of motivation in Goal setting

    4.3   Distinguish between Internal (Self) Motivation and External Motivation

    4.4   De-motivating Factors and how to overcome them

    4.5   Motivating oneself and others

5.0   Understand Time Management skills

    5.1   Define 'Time Management'.

    5.2   Comprehend the significance of Time Management.

    5.3   Explain the Time Quadrant

    5.4   Common Time wasters and how to overcome them.

    5.5   How to meet deadlines and targets within time

6.0 Understand Critical Thinking

  6.1 Define"Critical Thinking",

  6.2 Understand the importance of Critical Thinking

  6.3 Distinguish between facts and opinions (assumptions)

  6.4 Inculcating different perspectives

  6.5 Developing Reasoning abilities and form sound judgments

7.0 Understand Creativity

  7.1 Understand the importance of and need for creative ideas

  7.2 Distinguish between Linear Thinking and Lateral Thinking

  7.3 Distinctive qualities of creative people

  7.4 Unusual or creative use of familiar objects

  7.5 Creative ways of solving problems

8.0 Understand Problem Solving

  8.1. Define the concept of Problem solving

  8.2 Viewing the problems as challenges

  8.3 Different steps in solving a problem

  8.4 Selecting the best solution to solve a problem

  8.5 Lateral thinking in Problem solving

9.0 Understand Team Work

  9.1 Define Team work

  9.2 Develop Team skills

  9.3 Advantages of team work

  9.4 Understand responsibilities as a team player

  9.5 Problems of working in a team and possible solutions

10.0 Understand Leadership

  10.1 Define Leadership

  10.2 Identify Leadership qualities

  10.3 Analyze one's strengths and limitations as a leader

10.4 Types of Leadership: Autocratic and Democratic

10.5 Leadership by example

11.0 Understand Stress Management

11.1 Define Stress

11.2 Explain the causes of stress

11.3 Learn Stress Management skills

11.4 Need for positive thinking and self esteem

11.5 Practice Stress Management strategies

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INDUSTRIAL ELECTRONICS LAB

Subject Title : **INDUSTRIAL ELECTRONICS LAB**
Subject Code : **EC-509**
Periods/Week : **03**
Periods/Semester : **45**

S.No	Major Topics	No. of Periods
1	Power electronic devices	15
2	Inverter, Servo stabilizers and CVTs	9
3	Transducers	12
4	PLCs	9
		45

I. Power electronic devices

1. Obtain VI characteristics of SCR, TRIAC, DIAC, SUS, SBS, MOSFET
2. Implement a MOSFET switch and control a 6V lamp using NAND gate
3. Obtain the characteristics and determine the intrinsic standoff ratio of UJT
4. construct UJT Relaxation oscillator circuit and observe the output waveforms on CRO
5. Construct a circuit to trigger SCR by UJT and control output Power
6. Construct a a simple burglar alarm circuit using SCR and test it
7. Construct a circuit to vary the speed of a 1 phase 230V AC motor or to control power of any AC load, using TRIAC-DIAC phase control. Observe the waveforms on CRO.

II. Inverter , Servo Stabilizers & CVTs

8. Implement a square wave inverter circuit with centre tapped transformer ,power MOSFETS and Plot regulation characteristics.
9. Construct a circuit to vary the speed of a small DC motor using pulse width modulation
10. Understand the construction of a servo Stabilizer
11. Obtain the regulation characteristics of servo stabilizer
12. Obtain regulation characteristics of Constant Voltage Transformer.

III. Transducers

13. Obtain the performance characteristics of LVDT
14. Obtain the performance characteristics of Thermocouple
15. Obtain the performance characteristics of TDR
16. Construct a circuit to measure the temperature using IC LM 335 and test
17. Obtain the characteristics of Load cell

IV. **Programmable Logic Controllers**

18. Familiarize with PLC tutor or PSIM
19. Implement basic gates using PLC
20. Implement XOR , XNOR gates using PLC

VI SEMESTER

DIPLOMA IN ELECTRONICS AND COMMUNICATION ENGINEERING
SCHEME OF INSTRUCTIONS AND EXAMINATIONS

C-16-VI SEMESTER
EC - 601 INDUSTRIAL TRAINING

S.NO	Subject	Duration	Items	Max Marks	Remarks
1	Practical Training in the Industry	6 Months	1.First Assessment (at the end of 3rd month)	100	
			2. Second Assessment (at the end of 6th month)	100	
			3.Training Report a)Log Book b)Record	30 30	
			4. Seminar	40	
			TOTAL	300	

The industrial training shall carry **300** marks and pass marks are **50**%.A candidate failing to secure the minimum marks should complete it at his own expenses. No apprenticeship training stipend is payable in such case

During Industrial training the candidate shall put in a minimum of **90%**attendance.

C-16-VI SEMESTER
EC - 601 INDUSTRIAL TRAINING

Training Program in 5 modules

No.	Topic	No. of Periods	No. of Periods/ Module
Module 1	PCB design	50	130
	PCB manufacturing	80	
Module 2	Manual soldering	10	120
	SMT soldering	50	
	Wave soldering	60	
Module 3	Embedded systems Programming	35	140
	Embedded systems Interfacing	35	
	Embedded systems Testing	70	
Module 4	Product oriented designing, programming testing	120	120
Module 5	Product installation	80	120
	After sale servicing	40	
	Total		630

INDUSTRIAL TRAINING SCHEME

VI SEMESTER

1. A candidate shall be assessed twice in the spell of industrial training i.e. at the end of third month and finally before he/she completes the industrial training
2. The assessment shall be carried out by a committee comprising of

    (a) A representative of the Industry where the candidate is undergoing training

    (b) A staff member of the concerned section of the polytechnic.

3. The assessment at the end of the third month and the end of training shall each carry 100 marks for the progress made during the corresponding period of training.
4. The remaining 100 marks are allotted as follows:

    For the training report (Record) 30 marks,

    For maintenance of log book 30 marks

    For seminar 40 marks.

    These are to be evaluated at the institution at the end of training by a committee consisting following staff members
    (1) Head of Section.
    (2) External Examiner preferably from Industry
    (3) Staff member who assessed the student during the Industrial Training.

5.   The progress made during the end of assessment will be evaluated on the basis of the following parameters.

ASSESSMENT SCHEME

S. No.	Name of the Parameter	Max. Marks Allotted for each Parameter
1.	Attendance and punctuality	05
2.	Familiarity with Technical terms	06
3.	Familiarity with tools and material	10
4.	Attitude towards job	07
5.	Manual skills	04
6.	Application of knowledge	10
7.	Problem solving skills	10
8.	Comprehension and observation	04
9.	Safety and Environmental consciousness	03
10.	Human relations	04
11.	Ability to communicate	06
12.	Supervising ability	10
13.	General conduct during the period	06
14.	Maintenance of dairy	15
	Total	**100**