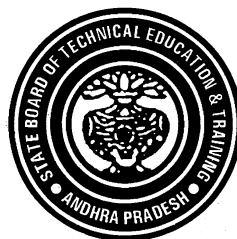


CURRICULUM C-09

DIPLOMA IN ELECTRONICS & COMMUNICATION ENGINEERING



**State Board of Technical Education & Training
Andhra Pradesh
HYDERABAD**

**DIPLOMA IN ELECTRONICS & COMMUNICATION ENGINEERING
CURRICULUM – 2009 (C – 09) SCHEME**

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CURRICULUM (C-09) 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 changing needs as stated by the user industries, the board has decided to bring forward the revision of curriculum by a year. Consequently, the Board with the assistance of the faculty made a thorough assessment of the curricular changes that have to be made. It was felt that there is an urgent need to improve hands-on experience among the students pursuing diploma courses. Further, the urgency of enhancing communication skills in English was also highlighted in the feedback and suggestions made by the user industries. Keeping these in view, a number of meetings and deliberations were held at district and state level, with experts from industry, academia and senior faculty of the department. 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. This will be implemented from the academic year 2009-10.

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.

Salient Features:

1. Duration of course is modified from 3 years of academic instruction to 2½ years of academic instruction and 6 months of industrial training
2. Every student will get the benefit of Exposure to industry, hands on training; understand the industrial environment and the behavioural pattern while working in an industry.
3. The Curriculum is prepared on Semester Pattern sandwiched with One semester of Industrial Training at 5th Semester level. However, First Year is maintained as Year-wise pattern.
4. The policy decisions taken at the State and Central level are implemented with regard to environmental science by including relevant topics in Chemistry. This is also in accordance with the Supreme Court guidelines issued in Sri Mehta's case.
5. 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 and writing skills in English. Further as emphasized in the meetings, teaching of the language has been spread over all the three years of the course and special emphasis is also on areas of employability skills.
6. Advanced topics not relevant at diploma level of education are deleted.
7. Modern topics relevant to the needs of the industry and global scenario suitable to be taught at Diploma level are incorporated in the curriculum.
8. AutoCAD specific to the branch has been given more emphasis in the curriculum. Preparing drawings using Computer has been given more importance using CAD softwares
9. Every student is exposed to the computer lab at the 1st year stage itself in order to familiarize him with skills required for keyboard/mouse operation, internet usage and e-mailing.
10. The number of teaching hours allotted to a particular topic/chapter has been rationalized keeping in view the past experience
11. Elective subjects have been introduced at the 6th semester stage to enable to study certain subjects of importance/specialization.
12. Upon reviewing the existing C-05 curriculum, it is found that the theory content is found to have more weightage than the Practical content. In the revised C-09 curriculum, more attention is given to the practical content of Laboratories and Workshops, thus strengthening the practical side. Industrial Training has been introduced for One full semester to impart Practical Experience during the course of study itself.
13. With increased emphasis for the student to acquire Practical skills, the course content in all the subjects is thoroughly reviewed. While the course content in certain subjects is reduced, in rest of the subjects the content has been enhanced as per the need of the hour.

14. All Practical subjects are independent of each other and the practice of grouping two or more practical subjects is dispensed with.
15. Curricula of Laboratory and Workshops have been thoroughly revised basing on the suggestions received from the industry, faculty, for better utilization of the equipment available at the Polytechnics. The experiments /exercises that are chosen for the practical sessions are identified to confirm to the field requirements of industry.
16. Industrial Training introduced in V semester is aimed at promoting working in groups/Team building skills through '*practice-oriented, project based activities*'. This helps the student in interacting with people in better interaction of students with Industries, R & D Institutions and other developmental/promotional agencies.
17. The Members of the working group are grateful to Sri L.Prem Chandra Reddy, I.A.S., Commissioner of Technical Education & Chairman, S.B.T.E.T. and Sri Somesh Kumar, I.A.S., for their guidance and valuable inputs in revising, modifying and updating the curriculum.
18. The Members acknowledge with thanks the cooperation and guidance provided by Sri. P.T. Prabhakar, who was Secretary, State Board of Technical Education and Training, A.P., and Sri G.V. Ranganath, Secretary, S.B.T.E.T., A.P., and other officials of Directorate of Technical Education and the State Board of Technical Education, A.P, experts from industry, academia from the universities and higher learning institutions and all teaching fraternity from the Polytechnics who are directly and indirectly involved in preparation of the curricula.

RULES AND REGULATIONS FOR DIPLOMA COURSES
UNDER THE CURRICULUM – 2009 (C-09)

1. DURATION AND PATTERN OF THE COURSES

All the Diploma programs run at various institutions are of either 3 years or 3½ years duration, with Industrial Training of 6 months / one year, sandwiched between two Semesters 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. For all conventional branches, the Industrial Training is placed in the fifth semester. For all other courses, the training will be in the fifth & sixth semesters, and seventh semester will be at the institution. In respect of few courses like Diploma in Electronics with specialization in CP/ CN/ IE/ TV/ BM/ Embedded systems, the training will be in the seventh semester.

2. PROCEDURE FOR ADMISSION IN TO THE DIPLOMA COURSES:

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

Candidates who wish to seek admission in any of the Diploma courses will have to appear for common entrance examination (CEEP) conducted by the State Board of Technical Education and Training, Andhra Pradesh, Hyderabad.

Only the candidates satisfying the following requirements will be eligible to appear for the Common Entrance Examination (CEEP).

The candidates seeking admission should have appeared for the X class examination, conducted by the Board of Secondary Examination, Andhra Pradesh or equivalent examination thereto, at the time of making application to the Common Entrance Examination for Polytechnics (CEEP). In case candidates who apply pending results of their qualifying examinations, their selection shall be subject to production of proof of their passing the qualifying examination in one attempt or compartmentally at the time of interview for admission.

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

For admission into the following Diploma Courses for which entry qualification is 10+2, candidates need not appear for CEEP. 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. **NUMBER OF WORKING DAYS PER SEMESTER / YEAR:**

The Academic year for all the Courses shall be from Fifteenth June of the year of admission to the 31st March of the succeeding year.

The Working days in a week shall be from Monday to Saturday

There shall be 7 periods of 50 minutes duration on all working days.

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 up the curriculum.

5. **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 up to 10% (65% and above and below 75%) in each semester or 1st year may be granted on medical grounds.
- c). Candidates having less than 65% attendance shall be detained.
- d). Students whose shortage of attendance is not condoned in any semester / 1st year 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.
- e). A stipulated fee shall be payable towards condonation of shortage of attendance.

6. **READMISSION**

Readmission shall be granted to eligible candidates by the respective RJD's / Principals

- 1) Within 15 days after commencement of class work in any semester
(Except industrial Training)

Within 30 days after commencement of class work in any year (including D.Pharmacy course or first year course in Engineering and Non Engineering Diploma streams)

Otherwise such cases shall not be considered for readmission for that semester / year and are advised to seek readmission in the next subsequent eligible academic year.

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

7. **SCHEME OF EXAMINATION**

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.

8. 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. Four unit tests will be conducted for I year students and two for semesters. Average marks obtained in all the tests will be considered for awarding the sessional marks.
- b) Practicals: Student's performance in Laboratories / Workshop shall be assessed during the year of study for 40% marks in each practical subject. Allotment of marks should be discrete taking into consideration 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 etc., during the course of study shall be done and sessional marks awarded by 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 the department preferably choosing a person from an Industry. Internal examiner shall be the person concerned with internal assessment as in (c) above. For drawing the end examination shall be held along with all theory papers.
- 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 Industrial Training, the training assessment shall be done and marks be awarded in the following manner. A final decision in this regard would be taken before the end of Academic Year 2009-10.

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 institute level will be done by a minimum of three faculty members including H.O.D. and be averaged.

9. 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 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.

10. 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, with the condition that the duration including betterment examination shall not exceed FIVE years from the first admission.
4. No improvement is allowed in Practical / Lab subjects or Project work or Industrial Training assessment. However, improvement is allowed in drawing subject.
5. If improvement is not achieved, the marks obtained in previous Examinations hold good.
6. Improvement is not allowed in respect to 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.

11. RULES OF PROMOTION FROM 1ST YEAR TO 3rd, 4th, 5th, 6th and 7th SEMESTERS:

For Diploma Courses of 3 years duration

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 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 Four backlog subjects of 1st year

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.

A candidate is eligible to appear for 5th semester Industrial Assessment, if he/she

- i) Puts the required percentage of attendance(90%) in 5th semester and
- ii) Should have obtained the eligibility to appear for 4th semester examination

5. A candidate shall be promoted to 6th semester provided he/she has successfully completed Industrial Training (Passed) and he / she puts the required percentage of attendance in the 5th semester and pay the industrial assessment fee. A candidate, who could not pay the 5th semester industrial assessment 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 if he/she

- i) Puts the required percentage of attendance in 6th semester and
- ii) Should not have failed in more than six backlogs subjects of 1st year, 3rd & 4th semesters put together.
- iii) Should not have failed in more than Six backlog subjects of 3rd and 4th semesters put together for IVC students.

d) For Diploma Courses of 3 ½ Years duration:

- i) MET/ CH/ CHPP/ CHPC/ CHOT/ TT/ SM

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 Four backlog subjects of 1st year.

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.

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 would be 90 % attendance and attends for the VIVA-VOCE examination at the end of training.

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

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

- (i) Puts the required percentage of attendance in the 7th semester and
- ii) Should not have failed in more than 6 backlog subjects of 1st year, 3rd and 4th semesters put together.
- iii) Should not have failed in more than Six backlog subjects of 3rd and 4th semester put together for IVC students.

ii) **DIPLOMA IN FOOTWEAR TECHNOLOGY:**

In respect of Diploma in Footwear Technology, the Industrial training is offered in two spells, the 1st spell of Industrial training after the First Year (i.e III Semester of the course) and the second spell of Industrial training after the V Semester (i.e VI Semester of the course). The promotion rules for this course are on par with the other sandwich Diploma courses except that there is no restriction on number of backlog subjects to get eligibility to appear for the 4th semester examination and

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

- 1. Puts the required percentage of attendance in the 5th semester and
- 2. Should not have failed in more than four subjects of 1st year.

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.

- d) Each Semester of Institutional study shall be a minimum of 90 working days. (With 6 working days in a week i.e. from Monday to Saturday, with 7 periods of 50 minutes, duration per day.

12. 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.

With respect to the intermediate vocational 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 levels of study shall alone be taken into consideration for determining the over all 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 three years and four subsequent examinations, from the first admission.

13. 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.

14. 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 hour's 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: $10 \times 3 = 30$.

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: $5 \times 10 = 50$.

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: $4 \times 5 = 20$. Section 'B' contains six (6) questions. Out of which four (4) questions to be answered and each question carries 10 Marks. Max. Marks $4 \times 10 = 40$.

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%

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.

15. **ISSUE OF MEMORANDUM OF MARKS**

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

16. **MAXIMUM PERIOD FOR COMPLETION OF DIPLOMA COURSES**

Maximum period for completion of the course 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.

17. **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.

18. **RECOUNTING, ISSUE OF XEROX COPY OF VALUED ANSWER SCRIPT & REVERIFICATION:**

A candidate desirous of applying for Recounting/ issue of Xerox copy of valued answer scripts/ Reverification should submit the application to the Secretary, State Board of Technical Education and Training, A.P., Hyderabad – 500 063 within 15 days from the date of receipt of Tabulated

Marks Statement by the Principal of concerned Polytechnic or the date specified.

Recounting shall be done for any TWO theory subjects per Year/Semester only, including drawing subjects. No request for recounting shall be entertained from any candidate who is reported to have resorted to Malpractice in that examination. The fee prescribed for Recounting should be paid by way of Demand Draft drawn on any Scheduled Bank payable at Hyderabad in favour of the Secretary, State Board of Technical Education and Training, A.P., Hyderabad. The verification of the totaling will be done by an Officer of the Board and will be intimated to the candidate by post only.

The following documents should be invariably be enclosed with the application failing which the application will not be considered.

Marks secured as per Tabulated Marks Sheet certified by the Principal.

Demand draft towards the payment of fee

Self – addressed and stamped envelopes of 11” X 5” size.

The applications received after the prescribed date will not be accepted and any correspondence in this regard will not be entertained.

b) FOR ISSUE OF XEROX COPIES OF VALUED ANSWER SCRIPTS

1. A candidate desirous of applying for Xerox copy of valued answer script/ scripts should submit the application to the Secretary, State Board of Technical Education and Training, A.P., Hyderabad – 500 063 along with the required fee in the form of Demand Draft within 07 days from the date of receipt of Tabulated Marks Statement by the Principal of concerned Polytechnic or the date specified in the covering letter which ever is earlier.
2. Xerox copies of valued answer scripts will be issued to all theory subjects including drawing subjects.
3. The following documents should invariably be enclosed with the application
 - (1) Marks secured as per Tabulated Marks Sheets certified by the Principal
 - (2) Self-addressed Stamped Envelope/Cloth-line cover of size 10” x 14”.
 - (3) Fee in the form of Demand Draft

c) FOR RE-VERIFICATION OF THE VALUED ANSWER SCRIPT

1. A candidate desirous of applying for Re-verification of valued answer script should submit the application to the Secretary, State Board of Technical Education and Training, A.P., Hyderabad – 500 063 along with the required fee in the form of Demand Draft, within 15 days from declaration of result.
2. Re-verification of valued answer script shall be done for all theory subjects including drawing subjects.
3. The following documents should invariably be enclosed with the application failing which the application will not be considered.
 - (i) Marks secured as per Tabulated Marks Sheets certified by the Principal.
 - (ii) Fee in the form of Demand Draft.

19. MAL PRACTICE CASES:

If any candidate resorts to any Mal Practice during examinations, he / she shall be booked and the Punishment shall be awarded as per rules and regulations framed by SBTET from time to time.

20. DISCREPANCIES/ PLEAS:

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

21. 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.

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

22. 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 candidate so as to facilitate this work and avoid errors in tabulation of results.

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

DIPLOMA IN ELECTRONICS & COMMUNICATION ENGINEERING

SCHEME OF INSTRUCTIONS AND EXAMINATION CURRICULUM-2009 (FIRST YEAR)

Sub Code	Name of the Subject	Instruction Periods/Week		Total Periods Per Year	Scheme Of Examinations			
		Theory	Practicals		Duration (hrs)	Sessional Marks	End Exam Marks	Total Marks
THEORY SUBJECTS								
EC -101*	English - I	2	-	60	3	30	70	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	Basic Electronics	5	-	150	3	20	80	100
PRACTICAL SUBJECTS								
EC -106	Basic Electronics Lab	-	6	180	3	40	60	100
EC -107*	Engineering Drawing	-	6	180	3	40	60	100
EC -108*	Physics Laboratory	-	3	90	3	20	30	50
EC -109*	Chemistry Laboratory	-			3	20	30	50
EC -110*	Information Technology Lab	-	4	120	3	40	60	100
-	Group Task / Seminar	-	3	90	-	-	-	-
	Total	20	22	1260	-	270	630	900

* Common to all branches

DIPLOMA IN ELECTRONICS & COMMUNICATION ENGINEERING
SCHEME OF INSTRUCTIONS AND EXAMINATION
CURRICULUM-2009
(III Semester)

Sub Code	Name of the Subject	Instruction Periods/Week		Total Periods Per Semester	Scheme Of Examinations			
		Theory	Practicals		Duration (hrs)	Sessional Marks	End Exam Marks	Total Marks
THEORY SUBJECTS								
EC-301*	English - II	3	-	45	3	20	80	100
EC-302*	Engineering Mathematics –II	4	-	60	3	20	80	100
EC-303	Electronic Circuits -I	6	-	90	3	20	80	100
EC-304	Communication Engineering	6	-	90	3	20	80	100
EC-305	Digital Electronics	6	-	90	3	20	80	100
EC-306	Circuit Theory	6	-	90	3	20	80	100
PRACTICAL SUBJECTS								
EC-307	Electronic Circuits –I Lab	-	3	45	3	40	60	100
EC-308	Communication Engineering Lab	-	3	45	3	40	60	100
EC-309	Digital Electronics Lab	-	3	45	3	40	60	100
	Group Task / Seminar	-	2	30	-	-	-	-
	Total	31	11	630		240	660	900

* Common to all branches

DIPLOMA IN ELECTRONICS & COMMUNICATION ENGINEERING
SCHEME OF INSTRUCTIONS AND EXAMINATION
CURRICULUM-2009
(IV Semester)

Sub Code	Name of the Subject	Instruction Periods/Week		Total Periods Per Semester	Scheme Of Examinations			
		Theory	Practicals		Duration (hrs)	Sessional Marks	End Exam Marks	Total Marks
THEORY SUBJECTS								
EC-401*	English - III	3	-	45	3	20	80	100
EC-402	Electronic Circuits- II	6	-	90	3	20	80	100
EC-403	Communication Systems	6	-	90	3	20	80	100
EC-404	Microprocessors	6	-	90	3	20	80	100
EC-405	Electronic Measurements	5	-	75	3	20	80	100
EC-406	Audio & Video Systems	5	-	75	3	20	80	100
PRACTICAL SUBJECTS								
EC-407	Electronic Circuits _ II Lab	-	3	45	3	40	60	100
EC-408	Communication Systems Lab	-	3	45	3	40	60	100
EC-409	Microprocessors Lab	-	3	45	3	40	60	100
	Group Task / Seminar	-	2	30	-	-	-	-
	Total	31	11	630	-	240	660	900

* Common to all branches

**EC-501 INDUSTRIAL TRAINING
(Practical Training)
V SEMESTER**

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

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

DIPLOMA IN ELECTRONICS & COMMUNICATION ENGINEERING
SCHEME OF INSTRUCTIONS AND EXAMINATION
CURRICULUM-2009
(VI Semester)

Sub Code	Name of the Subject	Instruction Periods/Week		Total Periods Per Semester	Scheme Of Examinations			
		Theory	Practicals		Duration (hrs)	Sessional Marks	End Exam Marks	Total Marks
THEORY SUBJECTS								
EC-601*	English - IV	2	-	30	3	20	30	50
EC-602**	Industrial Management and Entrepreneurship	5	-	75	3	20	80	100
EC-603	Micro Controllers	6	-	90	3	20	80	100
EC-604	Advanced Communication Systems	6	-	90	3	20	80	100
EC-605	Industrial Electronics	5	-	90	3	20	80	100
EC-606	ELECTIVES	6	-	90	3	20	80	100
	(A) Data Communication & Computer Networks							
	(B) Computer Hardware							
PRACTICAL SUBJECTS								
EC-607	Micro Controllers Lab	-	3	45	3	40	60	100
EC-608	Advanced Communication & Networking Lab	-	3	45	3	40	60	100
EC-609	Industrial Electronics Lab	-	3	45	3	40	60	100
EC-610	Project Work	-	3	45	-	40	60	100
	Total	30	12	630	-	280	670	950

* Common to all branches

** Common with AEIE & EEE

1ST YEAR

ENGLISH - I

Subject Title : English - I

Subject code : EC-101

Periods / Week : 2

Periods / Year : 60

TIME SCHEDULE

S.No	Major Topics	No. of Periods	Weightage of marks	No. of Short questions	No. of Essay questions
1.	FUNCTIONAL ENGLISH	10	13	1	1
2.	SITUATIONAL GRAMMAR	19	31	7	1
3.	THE ART OF READING	18	33	1	3
4.	THE CRAFT OF WRITING	13	33	1	3
TOTAL		60	110	10	8

INTRODUCTION:

Globalisation has made English language the need of the hour. Indian professionals are in great demand around the world. In this backdrop, English is felt as a bridge to make Polytechnic students employable soon after obtaining their Diploma Certificate.

In C-09 curriculum, the focus is on enhancing the students, communicative abilities as well as job-ready skills.

OBJECTIVES:

On completion of this course, the students should be able to

- Become communicatively competent
- Write and speak English confidently
- Read, listen and understand all kinds of communication
- Learn the modern methods of communication such as sending receiving emails
- Use English at social milieu or at work place

COURSE CONTENTS:

1. Functional English

- Need analysis
- Using a dictionary
- Introducing self / others
- Describing objects
- Vocabulary building
- Sounds and syllables
- Sentence structures

2. Situational Grammar

- Tense and Time
- Present, Past and Future Tenses
- Concord
- Yes/No, Wh-questions and Question Tags
- Voice
- Reported Speech
- Linkers
- Error Analysis

3. Art of Reading

- Note Taking
- Note Making and Summarising
- Preparing for Examination
- Enhancing Vocabulary through reading
- Reading for Pleasure
- Reading Strategies
- Drawing Inferences

4. Craft of Writing

- Mechanics of Writing
- Paragraph Writing
- Persuasive Writing
- Effective Correspondence
- E-mail
- Resume

ENGINEERING MATHEMATICS – I
(Common Subject)

Subject title : Engineering Mathematics -I
 Subject code : EC- 102
 Periods per week : 05
 Total periods per Year : 150

TIME SCHEDULE

S.No	Major Topics	No. of Periods	Weightage of Marks	Short Type	Essay Type
1	Unit- I - Bridging of fundamentals In mathematics	12	06	2	-
2	Unit -II-Algebra Matrices	15	10	-	1
3	Partial Fractions	05	03	1	-
4	Unit-III-Trigonometry Compound Angles	05	03	1	-
5.	Multiple and Sub-multiple angles	05	03	1	-
6.	Transformations	06	05	-	$\frac{1}{2}$
7	Inverse Trigonometric Functions	05	05	-	$\frac{1}{2}$
8	Trigonometric Equations	05	05	-	$\frac{1}{2}$
9.	Properties of Triangles and Solution of Triangles	08	05	-	$\frac{1}{2}$
10	Complex Numbers	06	03	1	-
11	Unit- IV Co- ordinate Geometry Straight Lines	02	03	1	-
12	Circles	05	03	1	-
13	Elements of Conics	01	00	-	
14	Parabola	05	05	-	$\frac{1}{2}$
15	Ellipse	05	05	-	$\frac{1}{2}$
16	Hyperbola	05	05	-	$\frac{1}{2}$
17	Three Dimensional Geometry	08	05	-	$\frac{1}{2}$
18	1.1 Unit-V: Differential Calculus Limits	05	03	1	-
19	Methods of Differentiation	20	13	1	1

20	Unit-VI Applications of the Derivative Geometrical Applications	06	05	-	$\frac{1}{2}$
21	Physical Applications	06	05	-	$\frac{1}{2}$
22	Maxima and Minima	06	05	-	$\frac{1}{2}$
23	Errors and Approximations	04	05	-	$\frac{1}{2}$
	Total	150	110	10	8

Objectives:

Unit-1. Bridging of fundamentals in Mathematics:

- 1.1 Explain the bracket operations such as $a + b + c - d$, $\frac{-1}{2}m - \left\{ -\frac{1}{2}m - \overline{m-n} \right\}$ etc.
- 1.2 Explain the ratios and properties such as componendo, dividendo, Componendo and dividendo rules such as

$$\frac{a}{b} = \frac{c}{d} \Rightarrow \frac{a+b}{b} = \frac{c+d}{d} \text{ (componendo)} \quad \frac{a}{b} = \frac{c}{d} \Rightarrow \frac{a-b}{b} = \frac{c-d}{d} \text{ (dividendo)}$$

$$\frac{a}{b} = \frac{c}{d} \Rightarrow \frac{a+b}{a-b} = \frac{c+d}{c-d} \text{ (componendo and dividendo)}$$

Also explain the variation concept (direct and inverse) such as

x varies as $y \Leftrightarrow \frac{x}{y} = \text{constant}$., x varies inversely as $y \Leftrightarrow xy = \text{constant}$. Solve simple

problems.

- 1.3. Explain Literal Values and Literal Coefficients. Solve simple problems such as $p = 2a - 3b$, $q = 3b - 4c$, $r = 5a - 2b$ find $3p + 2q - 5r$.

multiply p with q and divide p by q when $p = 2x^2 + 3x + 4$ and $q = 3x - 1$

- . Explain the procedure of Handling Vulgar fractions such as

$$\frac{x}{2x-1} + \frac{2x+4}{x-2}, \quad \frac{4}{1-\frac{1}{x}} + \frac{2}{2-\frac{3}{y}} \text{ etc.}$$

Explain the formulae for basic algebraic identities in the form of forward and backward applications like

$$a + b^2 = a^2 + b^2 + 2ab \text{ and also } a^2 + b^2 - ab = a + b^2 - 3ab \text{ or } a - b^2 + ab.$$

And also express $x^2 + 3x + 5$ in the form of $\left(x + \frac{3}{2}\right)^2 + \left(\frac{\sqrt{11}}{2}\right)^2$ etc.

- 1.6 Explain the functional notation $y = f(x)$, $z = f(x,y)$ and $u = f(x,y,z)$ with simple illustrative examples and their evaluation. Also explain the definition of a function classically as $f: \mathbf{A} \rightarrow \mathbf{B}$, Domain, Range, interval as subset of set of real numbers.
- 1.7 Explain the polynomials of Second, Third and fourth degree definitions, rational

- functions with arithmetic operations on them, Homogeneous functions, symmetric expressions and \sum notations with suitable examples in each case.
- 1.8 Explain surds and rationalizing factors with suitable simple examples.
 - 1.9 Explain logarithms with basic properties.
 - 1.10 Explain solving a quadratic equation by factorization and formula methods and solving fourth and third degree equations using remainder theorem with simple constructed examples.
 - 1.11 State the definitions of ${}^n P_r$, ${}^n C_r$.
 - 1.12 State Binomial expansions of the type $(x \pm a)^n$, $(1 \pm x)^{-1}$, $(1 \pm x)^{-2}$, $(1 \pm x)^{-3}$.
 - 1.13 Explain the exponential constant e, exponential function, exponential series, Logarithmic Series, and also define Hyperbolic and inverse Hyperbolic functions with useful identities.
 - 1.14 Define the basic Trigonometric ratios, their properties and allied angles formulae.
 - 1.15 Explain two dimensional co-ordinate system, distance and ratio formulae centroid and the meaning of the graph of a function with suitable examples.

Unit-II. Algebra

Matrices

- 2.1 Definition of a matrix, various types of matrices with examples, define the order of a matrix- define square matrix and 3rd order square matrix with examples.
- 2.2 Define sum, scalar multiplication and product of matrices, algebra of matrices (associative, distributive, commutative properties) with examples and counter examples.
- 2.3 Define the transpose of a matrix, symmetry and non-symmetry of matrices, resolving a square matrix into a sum of a symmetric and non-symmetric matrices- Examples in all cases.
- 2.4 Define minor, cofactor of an element of a 3x3 square matrix as determinant of 2x2 square matrix with examples. Define and determine the adjoint of a square matrix give examples.
- 2.5 Define determinant of a 3x3 matrix- Laplacian expansion with examples. Define singular and non singular matrices.
- 2.6 Define the multiplicative inverse of a 3x3 matrix, relation between the Adjoint and inverse leading to the formula $A^{-1} = \text{adj } A / \det A$. (proof not necessary) with examples.
- 2.7 System of 3 linear equations in 3 unknowns, matrix representation, solution by matrix inversion method and Cramer's rule-examples
- 2.8 Elementary row and column operations on a 3x3 matrix-examples, Gauss-Jordan method to solve a system of 3 linear equations in 3 unknowns with examples.
- 2.9 Row operations for evaluating the determinant of a 3x3 matrix with simple illustrative examples. Also state properties of determinants with illustrative examples.

3. Partial Fractions

- 3.1 Define rational, proper and improper fractions of functions.
- 3.2 Explain the Procedure of resolving rational fractions of the type mentioned below into partial fractions.

$$f(x)$$

$$i) \frac{\quad}{(x+a)(x+b)(x+c)}$$

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

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

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

Unit-III Trigonometry

4.0 Compound Angles

- 4.1 Define compound angles, State the formulas of $\sin(A \pm B)$, $\cos(A \pm B)$, $\tan(A \pm B)$ and $\cot(A \pm B)$, simple examples, derive the values of $\sin 15^\circ$, $\cos 15^\circ$, $\sin 75^\circ$, $\cos 75^\circ$, $\tan 15^\circ$, $\tan 75^\circ$ etc.
- 4.2 Derive identities like $\sin(A+B) \sin(A-B) = \sin^2 A - \sin^2 B$ etc. Solve simple problems on compound angles.

5.0 Multiple and Sub multiple Angles

- 5.1 Derive the formulae of multiple angles $2A$, $3A$ etc and sub multiple angle $A/2$ in terms of angle A of trigonometric functions.
- 5.2 Derive useful allied formulas like $\sin A = \sqrt{(1 - \cos 2A)}/2$ etc
- 5.3 Provide examples on the above formulae

6.0 Transformations

- 6.1 Derive the formulae on transforming sum or difference of two trigonometric ratios in to a product and vice versa- examples on these formulae.
- 6.2 Apply these formulae to sum or difference or product of three or more terms and solve problems.

7.0 Inverse Trigonometric Functions

- 7.1 Understand the concept of the inverse of a trigonometric function by selecting an appropriate domain and range. Define inverses of six trigonometric functions along with their domains and ranges.
- 7.2 To derive relations between inverse trigonometric functions so that given $A = \sin^{-1} x$, to Express angle A in terms of other inverse trigonometric functions- with examples.

- 7.3 State various properties of inverse trigonometric functions and identities like $\sin^{-1}x + \cos^{-1}x = \pi/2$ etc. Derive formulae like $\tan^{-1}x + \tan^{-1}y = \tan^{-1}((x+y)/(1-xy))$ etc., and solve simple problems.

8.0 Trigonometric Equations

- 8.1 Explain what is meant by the solution of trigonometric equations. To find the general solutions of $\sin x = k$, $\cos x = k$ and $\tan x = k$ with appropriate examples.
- 8.2 To 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.

9.0 Properties and Solutions of Triangles

- 9.1 To state sine rule, cosine rule, tangent rule and projection rule.
- 9.2 Give the formulas for $\sin A/2$, $\cos A/2$, $\tan A/2$ and $\cot A/2$ in terms of semi-perimeter and sides a, b, c and solve problems.
- 9.3 Give various formulae for the area of a triangle. Solve problems on the above formulae.
- 9.4 Explain what is meant by solving a triangle; solve a triangle given (i) three sides, (ii) two sides and an included angles, (iii) two sides and an opposite angle-angle-case of two solutions and (iv) one side and two angles.

10.0 Complex numbers:

- 10.1 Give the definition of a complex number, its modulus and Conjugate of a complex number and their properties.
- 10.2 Define the arithmetic operations on Complex numbers with examples.
- 10.3 Define amplitude of a complex number and give the modulus-amplitude (polar) form, Exponential (Euler) form of a complex number - illustrative examples on all the above.
- 10.4 State DeMoivre's Theorem (proof not necessary) and its applications to complex numbers eg. Finding the roots, powers, simplifications of a complex number with illustrative examples.

Unit-IV Coordinate Geometry

11.0 Locus, Translation of axes and Straight lines

- 11.1 Explain the concepts of locus of a point, shifting of origin (translation of axes) with illustrative examples.
- 11.2 Provide equations of a straight line in various forms, explain the slope, angle between two lines, point of intersection of lines, perpendicular distance from a point to a line, distance between two parallel lines, provide examples.

12.0 Circles

- 12.1 Define a circle, provide circle equation given (i) center and radius, (ii) given two ends of a diameter with examples.

- 12.2 State the general equation of a circle and explain the procedure to find the centre, radius from it with examples.
- 12.3 Problems on finding the equation of circle passing through three given points.
- 12.4 Define the tangent and normal at a point on the circle and problems relating to finding their equations (Derivation of general Equations not necessary.). Define the pole and polar of a circle and find the pole of a line and polar of a point w.r.t. a circle.(Derivation of general Equations not necessary)-Simple examples only.

13.0 Elements of Conics

- 13.1. Define a conic, explain the terms focus, directrix, eccentricity, axes and latus rectum of a conic.
- 13.2 Find the Equation of a Conic, given its focus, eccentricity and directrix.

14.0 Parabola

- 14.1 Derive the standard equation of a parabola with vertex at origin and one of the coordinate axes as its axis (four forms) and also the standard forms with translation of axes (shifting of origin, vertex at (h,k) and axis parallel to one of the coordinate axes).
- 14.2 Given the equation of parabola, explain how to reduce it to standard form and find its vertex, focus, directrix, axis, latus rectum etc.-illustrative examples.
- 14.3 To find the equation of a parabola given any two of focus, vertex and directrix-examples
- 14.4 To find the equation of a parabola passing through 3 given points.
- 14.5 Applications of parabola to practical problems.

15.0 Ellipse

- 15.1 Derive the standard equation of an ellipse , Types of ellipse with (i) center at origin, coordinate axes as axes and (ii) center at (h,k) and axes parallel to coordinate axes. Find the foci, centre, vertices, axes, directrices, latera recta for an ellipse in standard form and Their length and prove that sum of focal distances from any point on the ellipse is equal to length of major axis-solve problems.
- 15.3 To find the equation of an ellipse (i) given focus, eccentricity and equation of directrix and (ii) in standard form and passing through two given points.
- 15.4 Applications of ellipse to practical problems-simple cases.

16.0 Hyperbola

- 16.1 Derive the standard equation of hyperbola, explain different forms, define rectangular and conjugate hyperbola.
- 16.2 Mention the properties of hyperbola with examples.
- 16.3 To find the equation of a hyperbola given its (i) focus, directrix and eccentricity, (ii) asymptotes.
- 16.4 To find the centre, foci, vertices, axes, directrices, latera recta and the length of latus rectum given equation of a hyperbola in standard form.

17.0 Three Dimensional Geometry

- 17.1 Explain the three dimensional coordinate system.

- 17.2 Explain the distance between two points with problems.
- 17.3 Explain the ratio formula with examples.
- 17.4 State the formulae to find the centroid of a triangle and the tetrahedron with simple examples.
- 17.5 Define the direction cosines and direction ratios of a line, angle between two lines with illustrative examples.
- 17.6 State the general equation of a plane, its intercept form, plane passing through a given point and perpendicular to a line whose direction ratios are given-angle between two planes -simple illustrative examples and problems

Unit-V Differential Calculus

18.0 Limit and Continuity

- 18.1 Explain the concept of limit and meaning of $\lim_{x \rightarrow a} f(x) = l$ and State the properties of limits .
- 18.2 Mention the Standard limits $\lim_{x \rightarrow a} \frac{x^n - a^n}{x - a}$, $\frac{\sin x}{x}$, $\frac{\tan x}{x}$, $\frac{a^x - 1}{x}$, $\frac{e^x - 1}{x}$, $(1+x)^{\frac{1}{x}}$ as $x \rightarrow 0$ and also $\lim_{x \rightarrow \infty} \left(1 + \frac{1}{x}\right)^x$ (All without proofs) with illustrative examples applying the above and also evaluate the limits of the type $\lim_{x \rightarrow a} \frac{ax^2 + bx + c}{\alpha x^2 + \beta x + \gamma}$, $\lim_{x \rightarrow \infty} \frac{f(x)}{g(x)}$.
- 18.3 Explain the concept of continuity of a function at a point and in an interval. Some examples whether a given function is continuous or not can be mentioned.

19.0 Methods of differentiation

- 19.1 State the concept of derivative of a function $y = f(x)$ –definition, first principle as $\lim_{h \rightarrow 0} \frac{f(x+h) - f(x)}{h}$ and also use the appropriate standard notations to denote the derivative of a function. Mention the significance of derivative in scientific and engineering applications.
- 19.2 Find the derivatives of elementary functions like x^n , a^x , e^x , $\log x$, $\cos x$, $\sin x$, $\tan x$, $\sec x$, $\operatorname{cosec} x$ and $\cot x$ using the first principles and also find the derivatives of simple functions from the first principle .
- 19.3 State the rules of differentiation of *Sum*, *Difference* *Scalar multiplication*, *Product* and *Quotient* of functions with illustrative and simple examples .
- 19.4 Explain the method of differentiation of a function of a function (Chain rule) with illustrative examples such as
- i) $2t^2 + 3/\sqrt{t}$
 - ii) $x^2 \sin^2 x$
 - iii) $x/\sqrt{x^2+1}$
 - iv) $\log [\sin (\cos x)]$.

- 19.5 Find the derivatives of Inverse Trigonometric functions and examples using the Trigonometric transformations.
- 19.6 Explain the method of differentiation of a function with respect to another function and also Differentiation of Parametric functions with illustrative examples.
- 19.7 Explain the procedure of differentiating of hyperbolic and implicit functions with examples.
- 19.8. Explain the need of taking logarithms for differentiating some functions with illustrative examples like $[f(x)]^{g(x)}$.
- 19.9. Explain the concept of successive differentiation –derivatives of second and higher order-examples.
- 19.10 Explain the concept of functions of several variables, partial derivatives and difference between the ordinary and partial derivatives with simple illustrative examples.
- 19.11 Explain the definition of Homogenous function of degree n and Statement of Euler's Theorem for Homogeneous functions with applications to simple problems.

Unit-VI Applications of the Derivative

20.0 Geometrical Applications of Derivatives

- 20.1 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.
- 20.2. To find the tangent and normal to the curve $y=f(x)$ at any point on the curve using the slope found using the derivative.
- 20.3. Define the lengths of tangent, normal, sub-tangent and sub normal at any point on the curve $y=f(x)$ – Provide formulae and examples.
- 20.4 Explain the concept of angle between two curves and procedure for finding the angle between two given curves with illustrative examples.

21.0 Physical Applications of Derivatives

- 21.1 Explain the derivative as a rate of change in distance-time relations to find the velocity and acceleration of a moving particle with examples.
- 21.2 Explain the derivative as a rate measurer in the problems where the quantities like volumes areas vary with respect time- illustrative examples.

22.0 Derivatives to find extreme values

- 22.1 Define the concept of increasing and decreasing functions. Explain the conditions to find points where the given function is increasing or decreasing with illustrative examples.
- 22.2 Explain the procedure to find the extreme values (maxima or minima) of a function of single variable-simple problems yielding maxima and minima.
- 22.3 Solve problems on maxima and minima in applications like finding areas, volumes etc.

23.0. Derivatives to find Errors and Approximations

- 23.1 Use the definition of derivative to find the approximate values of a function of single variable and to find the errors in dependent or independent variables as the case may be-appropriate applications.
- 23.2 Provide formulae for relative error and percentage error in evaluating the dependent variable given the corresponding errors in independent variable. Provide simple examples with functions of one variable.

COURSE CONTENT

UNIT – I

1. **Bridging of fundamentals in mathematics:**

Bracket operations-examples-Ratio and Proportion, Variation-examples-Literal values-examples- Literal coefficients-examples-Identities-examples with forward and backward applications-Polynomials-examples-Rational functions-examples- Homogenous expressions-examples-Symmetrical expressions-examples-Functional notation-Exponential, logarithmic, hyperbolic functions and their series—Elementary combinatorial concepts -examples -Binomial expansion- examples -Vulgar fractions – examples- Elementary theory of equations-examples-Surds- examples- Logarithms- examples-Trigonometric ratios-examples-Basic concepts of coordinate geometry- examples.

UNIT-II

2.Matrices:

Matrices of 3rd order: Definition of a matrix-types of matrices-examples-algebra of matrices-Transpose of a matrix-Symmetric, skew symmetric matrices-Minor, cofactor of an element-Determinant of a square matrix-Laplace's expansion-singular and non singular matrices-Adjoint and multiplicative inverse of a square matrix-examples-System of linear equations in 3 variables-Solutions by Cramers's rule, Matrix inversion method-examples-Elementary row and column operations on matrices and determinants-Gauss-Jordan method to solve a system of equations. .

3. Partial Fractions : Procedure for resolving rational functions of the types mentioned below in to into partial fractions.

$$\text{i) } \frac{f(x)}{(x+a)(x+b)(x+c)}$$

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

$$f(x)$$

$$\text{iii) } \frac{\quad}{(x^2+a)(x+b)}$$

$$\text{iv) } \frac{f(x)}{(x+a)(x^2+b)^2}$$

UNIT -III

Trigonometry

- 4 Compound angles-Formulas of $\sin(A\pm B)$, $\cos(A\pm B)$, $\tan(A\pm B)$, $\cot(A\pm B)$, and related identities with problems.
- 5 Multiple and sub multiple angles-trigonometric ratios of multiple angles $2A, 3A$ and submultiple angle $A/2$ - problems.
- 6 Transformations of products into sums or differences and vice versa-simple problems
- 7 Inverse trigonometric functions-definition, domains and ranges-basic properties-problems.
- 8 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 multiple angles and usage of transformations- problems.
- 9 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.
- 10 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-IV

Coordinate geometry

- 11 Concepts of locus, change of axes- various forms of straight lines – angle between lines, perpendicular distance from a point, distance between parallel lines-examples.
- 12 Circle-definition-Circle equation given center and radius- circle equation with given diameter-general equation-finding center, radius-tangent, normal, pole and polar of a circle.
- 13 Definition of a conic- focus, directrix and eccentricity-finding the equation of a conic given focus, directrix and eccentricity
- 14 Parabola- Standard forms- finding focus, vertex, directrix etc. of a parabola-simple applications-
- 15 Ellipse- Standard forms- finding foci, vertices, directrices etc. of an ellipse-properties of ellipse- simple application problems.
- 16 Hyperbola- Standard forms- finding foci, vertices, directrices etc. of a hyperbola-properties of hyperbola- simple problems

- 17 Three dimensional geometry: Coordinate system-distance between two points-ratio formula-direction cosines and ratios of a line- angle between two lines-centroid of a triangle and tetrahedron-simple equation of a plane-general form-angle between planes.

UNIT-V

Differential Calculus

- 18 Concept of Limit- Definition- Properties of Limits and Standard Limits - Simple Problems-Continuity of a function at a point- Simple Examples only.
- 19 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 equations, Derivative of hyperbolic, Implicit functions Functions, Logarithmic Differentiation –problems in each case.Successive differentiation- examples-.Partial differentiation, Euler’s Theorem-simple problems.

UNIT-VI

Applications of the Derivative:

- 20 Geometrical meaning of the derivative, equations of Tangent and normal to a curve at any point. The lengths of Tangent, Normal, Subtangent and Subnormal to the curve at any point .Angle between the curves- problems.
- 21 Physical applications of the derivative –velocity, acceleration, derivative as a rate Measure –Problems.
- 22 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.
- 23 Applications of derivative in finding errors and approximations of functions and simple problems.

REFERENCES:

- 1) **Text book of Engineering Mathematics –I** by G.Srinagesh, and others – FALCON publishers
- 2) **Text book of Engineering Mathematics –I** by Dr.J.Sairam and others – UNI-TECH SERIES.
- 3) **A Text book of intermediate Mathematics –I & II** by Telugu Academy.
- 4) **Differential Calculus by Manicavachagom Pillai**
- 5) **Elementary Algebra by Hall & Knight.**
- 6) **Text book of Engineering Mathematics –I** by Radiant publishers.
- 7) **Trigonometry** By S.L Loney

ENGINEERING PHYSICS

Subject Title : **Engineering Physics**
Subject Code : **EC-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	10	13	1	1
3.	Kinematics	13	13	1	1
4.	Friction	08	03	1	-
5.	Work, Power and Energy	10	10	-	1
6.	Simple Harmonic Motion	11	13	1	1
7.	Heat & Thermodynamics	13	13	1	1
8.	Sound	11	13	1	1
9.	Properties of matter	14	13	1	1
10	Electricity & magnetism	14	13	1	1
11.	Modern Physics	08	03	1	
	Total:	120	110	10	8

OBJECTIVES

1.0 UNITS AND DIMENSIONS

Introduction to units

Define Physical quantity, fundamental physical quantities and derived physical quantities

Define unit

Define fundamental units and derived units

State SI units with symbols

State Multiples and submultiples in SI system

Rules of writing S.I. units

State advantages of SI units

Define Dimensions and Dimensional formulae

Derive dimensional formulae of physical quantities

List dimensional constants and dimensionless quantities

State the principle of Homogeneity of Dimensions

Explain the applications of Dimensional Analysis with examples
State the limitations of dimensional analysis
Solve problems

2.0 ELEMENTS OF VECTORS

Introduction to Vectors

Define Scalar and Vector quantities

Give examples for scalar and vector quantities

Represent vectors graphically

Types of Vectors (Proper Vector, Null Vector, Unit Vector, Equal Vectors, Negative Vector, Like Vectors, Co-Initial Vectors, Co-planar Vectors and Position Vector).

Explain addition and subtraction of vectors

Represent a vector in space using unit vectors (i, j, k)

Resolution of vectors

Resultant of the vectors by component method

State parallelogram law of vectors and illustrations

Derive formula for resultant (Magnitude and direction)

State and Explain triangle law of vectors

State and Explain polygon law of vectors

Define Dot product of two vectors with examples (Work done, Gravitational P.E)

Mention the properties of Dot product

Define Cross products of two vectors with example (Torque ,Linear velocity)

Mention the properties of Cross product.

Solve problems

3.0 KINEMATICS

3.1 Recapitulation of equations of motion in a straight line

3.2 Define acceleration due to gravity

3.3 Derive expressions for Maximum Height, time of ascent, time of descent, time of flight and velocity on reaching the point of projection

3.4 Derivation for height of a tower when a body projected vertically upwards from the top

3.5 Define projectile motion with examples

3.6 Explain Horizontal projection

3.7 Derivation for the path of a horizontal projectile

3.8 Explain oblique projection

3.9 Derivation for the path of a oblique projectile

3.10 Derive formulae for maximum height, time of flight and Horizontal Range of a projectile, maximum range in oblique projection

3.11 Derive formula for magnitude and direction of resultant velocity in oblique projection

3.12 Solve problems

4.0 FRICTION

- 4.1 Introduction to friction
- 4.2 Examples of friction in daily life
- 4.3 Definition of friction
- 4.4 Types of friction
- 4.5 Concept of Normal reaction
- 4.6 State laws of static friction
- 4.7 State laws of kinetic friction
- 4.8 Define coefficients of friction
- 4.9 Angle of friction w.r.t. rough horizontal surface
- 4.10 Derivations for displacement and time taken to come to rest over a rough horizontal surface and work done by frictional force
- 4.11 Define Angle of repose
- 4.12 Explain Motion of a body on a rough inclined planes
- 4.13 Derive expressions for acceleration of a body on a rough inclined plane (UP & DOWN)
- 4.14 Derive expressions for acceleration of a body on a smooth inclined plane (UP & DOWN)
- 4.15 List the Advantages and Disadvantages of friction
- 4.16 Mention the methods of minimizing friction
- 4.17 Solve problems

5.0. WORK, POWER AND ENERGY

- 5.1 Define work
- 5.2 State SI units, dimensional formula for work
- 5.3 Explain the concept of power
- 5.4 Define power
- 5.5 State SI units, dimensional formula for power
- 5.6 Define energy
- 5.7 State SI units, dimensional formula for energy
- 5.8 Define potential energy
- 5.9 Derive the expression for Potential energy, with examples
- 5.10 Define kinetic energy
- 5.11 Derive the expression for kinetic energy, with examples
- 5.12 Work Energy theorem
- 5.13 Relation between Kinetic energy and momentum
- 5.14 State the law of conservation of energy and verify in the case of freely falling body
- 5.15 Law of conservation of energy in the case of simple pendulum-theory only
- 5.16 Define conventional and non conventional energy sources with examples
- 5.17 Solve problems

6.0 SIMPLE HARMONIC MOTION

- 6.1 Define S. H. M
- 6.2 State the conditions of S. H. M
- 6.3 Give examples of S. H. M

- 6.4 Derive the equation for S H M as projection of particle executing uniform circular motion
- 6.5 Derive expression for displacement
- 6.6 Derive expression for velocity
- 6.7 Derive expression for acceleration
- 6.8 Derive expression for period and frequency of S H M
- 6.9 Define phase of S H M
- 6.10 Derive expression for period of simple pendulum
- 6.11 Experiment for determination of acceleration due to gravity using simple pendulum.
- 6.12 Seconds pendulum
- 6.13 Solve problems

7.0 HEAT AND THERMODYNAMICS

- 7.1 Introduction to expansion of gases
- 7.2 Explain Boyle's law
- 7.3 Experimental verification of Boyle's law
- 7.4 Explain absolute scale of temperature
- 7.5 State Charles laws
- 7.6 Derive ideal gas equation
- 7.7 Define gas constant and Universal gas constant
- 7.8 Explain why universal gas constant is same for all gases
- 7.9 State SI unit and value of universal gas constant
- 7.10 State the gas equation in terms of density
- 7.11 Differences between r and R
- 7.12 Concept of internal energy
- 7.13 Definition of external work
- 7.14 Calculate external work done by a gas
- 7.15 Explain Isothermal process and Adiabatic process
- 7.16 State laws of thermodynamics
- 7.17 Define specific heats & molar specific heats of a gas
- 7.18 Derive relation $C_p - C_v = R$
- 7.19 Solve problems

8.0 SOUND

- 8.1 Introduction to sound
- 8.2 Distinguish between musical sound and noise
- 8.3 Explain noise pollution and state SI unit for noise
- 8.4 Explain causes of noise pollution
- 8.5 Explain effects of noise pollution
- 8.6 Explain methods of minimizing noise pollution
- 8.7 Explain the phenomenon of beats
- 8.8 Explain the applications of beats
- 8.9 Explain Doppler effect
- 8.10 Derive formula for apparent frequency – (i) Source in Motion and observer at rest (ii) Observer in motion and source at rest
- 8.11 Applications of Doppler effect

- 8.12 Explain reverberation and reverberation time
- 8.13 Write Sabine's formula
- 8.14 Explain echoes
- 8.15 Solve problems

9.0 PROPERTIES OF MATTER

- 9.1 Introduction to Elasticity
- 9.2 Definitions of Stress and strain, their units and dimensional formulae
- 9.3 Statement of Hooke's law
- 9.4 Types of Stress
- 9.5 Types of strain
- 9.6 Types of moduli of elasticity
- 9.7 Definition of Surface Tension and examples
- 9.8 Explanation to Surface Tension with reference to molecular theory
- 9.9 Definitions of angle of contact and capillarity
- 9.10 State formula for Surface Tension based on capillarity
- 9.11 Experimental determination of surface tension by capillarity method
- 9.12 Concept of Viscosity, definition and examples
- 9.13 Newton's formula for Viscous force and definition of coefficient of Viscosity.
- 9.14 Effect of temperature on viscosity of liquids and gases
- 9.15 State Poiseuille's equation for coefficient of viscosity
- 9.16 Experimental determination of coefficient of viscosity
- 9.17 Solve problems

10.0 ELECTRICITY AND MAGNETISM

- 10.1 Introduction to Electricity
- 10.2 Ohm's law and explanation
- 10.3 Definitions of specific resistance, conductance and their units
- 10.4 Statements of Kichoff's laws and explanation
- 10.5 Wheatstone's bridge
- 10.6 Meter bridge
- 10.7 Experimental determination of specific resistance using Meter Bridge
- 10.8 Introduction to magnetism
- 10.9 Coulomb's inverse square law of magnetism
- 10.10 Defition of magnetic field and magnetic lines of force
- 10.11 Magnetic induction field strength-units and dimensions
- 10.12 Moment of couple on a bar magnet placed in a uniform magnetic field
- 10.13 Derivation for Magnetic induction field strength at a point on the axial line
- 10.14 Derivation for Magnetic induction field strength at a point on the equatorial line
- 10.15 Solve problems

11.0 MODERN PHYSICS

- 11.1 Explain Photo-electric effect
- 11.2 Einstein 's photoelectric equation
- 11.3 State laws of photoelectric effect
- 11.4 Working of photoelectric cell

- 11.5 Applications of photoelectric effect
- 11.6 Recapitulation of refraction of light and its laws
- 11.7 Critical angle
- 11.8 Total Internal Reflection
- 11.9 Explain the principle and working of Optical Fiber
- 11.10 Mention types of optical fibers
- 11.11 List the applications of Optical Fiber
- 11.12 Definition of super conductor and superconductivity\
- 11.13 Examples of superconducting materials
- 11.14 Properties of Superconductors
- 11.15 Applications of superconductors

COURSE CONTENTS

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- Addition of vectors- Representation of vectors- Resolution of vectors - Parallelogram, Triangle and Polygon laws 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 and resultant velocity- 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- Conservation law of energy- Conventional and Non conventional energy sources- 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- Experimental determination of acceleration due to gravity-seconds pendulum- Problems

7. HEAT AND THERMODYNAMICS:

Expansion of Gases- Boyle's law-Experiment of Boyle's law- Absolute scale of temperature- Charles laws- Ideal gas equation- Universal gas constant-Differences between r and R - Internal energy-External work done by a gas- Isothermal and adiabatic processes- Laws of thermodynamics- Two specific heats of a gas- Relation between C_p and C_v - Problems

8. SOUND:

Sound- Nature of sound- Musical sound and noise- Noise pollution – Causes & effects- Methods of reducing noise pollution- Beats- Doppler effect- Echo- Reverberation- Reverberation time-Sabine 's formula- Problems

9. PROPERTIES OF MATTER:

Introduction to Elasticity- Stress and Strain- Hooke's law- Types of Stress and Strain- Types of moduli of elasticity- Introduction to Surface Tension- Definition and examples- Molecular theory- Angle of contact and capillarity- Experimental determination of surface tension by capillary method- Effects of temperature and impurities- Introduction to Viscosity- Definition and examples- Newton's formula for viscosity- Experimental determination of viscosity by Poiseuille's method- Effect of temperature- 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-critical angle – Total internal reflection- fiber optics- -principle and working of an optical fiber-types of optical fibers - Applications of optical fibers- concepts of superconductivity - applications

Reference Books

- | | | |
|----|-------------------------------------|-----------------------------------|
| 1. | Intermediate Physics Volume 1 and 2 | Telugu academy. |
| 2. | Intermediate Physics Volume 1 and 2 | Deepthi Publications |
| 3. | Unified Physics Volume 1,2,3 and 4 | Dr. S.L. Gupta and Sanjeev Gupta. |
| 4. | Text book of Physics Volume 1 and 2 | Resnik and Halliday |
| 5. | Text book of applied physics | Dhanpath Roy |
| 6. | Fiber optics | D.A. Hill |
| 7. | Engineering Physics | M. Raghavendra |

**ENGINEERING CHEMISTRY & ENVIRONMENTAL STUDIES
(Common Subject)**

Subject Title : Engineering Chemistry & Environmental studies
Subject Code : EC-104
Periods per week : 04
Total periods per year : 120

TIME SCHEDULE

S.No	Major Topic	No. of Periods	Weightage of Marks	No. of Short Questions	No. of Essay Questions
I.	ENGINEERING CHEMISTRY				
1.	FUNDAMENTALS OF CHEMISTRY	18	16	2	1
2.	SOLUTIONS	10	08	1	1/2
3.	ACIDS AND BASES	10	08	1	1/2
4.	PRINCIPLES OF METALLURGY	10	10	-	1
5.	ELECTROCHEMISTRY	12	13	1	1
6.	CORROSION	09	10	-	1
7.	WATER TECHNOLOGY	13	13	1	1
8.	POLYMERS	12	13	1	1
9.	FUELS	08	03	1	-
II.	ENVIRONMENTAL STUDIES				
	Total	120	110	10	08

OBJECTIVES: After the completion of the study of these units the student should be able to comprehend the following

I. ENGINEERING CHEMISTRY

1.0 Fundamentals of Chemistry

Atomic Structure:

- 1.1 Fundamental particles of an atom
 - 1.2 Understand the concept of atomic number and mass number
 - 1.3 Postulates of BOHR'S atomic theory and its limitations
 - 1.4 Briefly explain Quantum numbers
 - 1.5 Define and explain Aufbau principle, Hund's rule and Pauli's exclusion principle.
 - 1.6 Define Orbital
 - 1.7 Draw the shapes of s, p and d Orbitals
 - 1.8 Distinguish between Orbit and Orbital
 - 1.9 Understand electronic configuration of elements (up to element atomic number 30)
- Periodic Table

State modern periodic law

Salient features of modern periodic Table (Periods & Groups)

Chemical bonding

- 1.12 Introduction
- 1.13 Postulates of Electronic theory of valency
- 1.14 Types of Chemical bonds
- 1.15 Define ionic bond and explain ionic bond formation in NaCl and MgO
- 1.16 Properties of Ionic compounds
- 1.17 Define covalent bond and explain Covalent bond in H₂, O₂ and N₂ using Lewis dot method.
- 1.18 Properties of Covalent compounds
- 1.19 Explain Metallic bond

Oxidation-Reduction:

- 1.20 Definition of Oxidation and Reduction
- 1.21 Definition of Oxidation Number and its calculations
- 1.22 Difference between Oxidation Number and Valency

2.0 Solutions

- 2.1 Define Solution, solute and solvent
- 2.2 Types of solutions
- 2.3 Define mole and understand Mole concept
- 2.4 Define and explain Molarity
- 2.5 Define and explain Normality
- 2.6 Define and explain equivalent weight using acids, bases and salts
- 2.7 Numerical problems on Mole, Molarity and Normality

3.0 Acids and bases

- 3.1 Explain Arrhenius theory of Acids and Bases and its limitations
- 3.1 Explain Bronsted – Lowry theory of acids bases and its limitations
- 3.2 Explain Lewis theory of acids and bases and its limitations
- 3.3 Explain ionic product of water
- 3.4 Define pH and explain Sorenson scale
- 3.5 Numerical problems on pH (Strong Acids and Bases)
- 3.6 Define buffer solution with examples
- 3.7 Applications of buffer solutions

4.0 Principles of Metallurgy

- 4.1 Characteristics of Metals
- 4.2 Distinction between Metals and Non Metals
- 4.3 Definitions of Metallurgy, Mineral, Ore, Gangue, Flux and Slag
- 4.4 Methods of concentration of ore – Hand picking, Levigation, Froth Floatation
- 4.5 Extraction of crude metal – Roasting, Calcination, Smelting
- 4.6 Purification of Metals – Electrolytic Refining
- 4.7 Define an Alloy
- 4.8 Composition and uses of following Alloys: Brass, German silver, Nichrome

5.0 Electrochemistry

- 5.1 Define conductor Insulator, Electrolyte and Non – electrolyte
- 5.2 Explain Arrhenius theory of electrolytic dissociation
- 5.3 Define and explain electrolysis by taking example fused NaCl
- 5.4 Explain Faraday's laws of electrolysis
- 5.5 Define chemical equivalent and electrochemical equivalent
- 5.6 Numerical problems based on Faraday's laws of electrolysis
- 5.7 Define Galvanic cell and explain its construction
- 5.8 Distinguish between electrolytic cell and galvanic cell
- 5.9 Understand the standard electrode potentials
- 5.10 Understand electrochemical series and its significance
- 5.11 Understand emf of a cell
- 5.12 Numerical problems on emf of cell

6.1 Corrosion

- 6.1 Define corrosion
- 6.2 Factors influencing the rate of corrosion
- 6.3 Understand the concept of electrochemical theory of corrosion
- 6.4 Describe the formation of a) composition cells b) stress cells c) concentration cells
- 6.5 Understand rusting of iron
- 6.6 Explain the mechanism of rusting of iron
- 6.7 Explain the methods of prevention of corrosion a) protective coatings b) cathodic protection (Sacrificial anode process and Impressed – voltage process)

7.0 Water Technology

- 7.1 Sources of water
- 7.2 Define soft and hard water
- 7.3 Understand temporary and permanent hardness and the compounds causing hardness (with Formulae)
- 7.4 State the disadvantages of using hard water in industries
- 7.5 Define Degree of hardness, units of hardness (ppm)
- 7.6 Explain the methods of softening of hard water: a) permutit process b) ion-Exchange process
- 7.7 Know the essential qualities of drinking water
- 7.8 Describe the method of municipal treatment of water for drinking purpose.
- 7.9 Explain Osmosis and Reverse Osmosis. Advantages of Reverse Osmosis

8.0 Polymers

- Basic concepts of polymerisation
- Describe the methods of polymerisation a) addition polymerisation of Ethylene b) condensation polymerisation of phenol and formaldehyde
(Only flow chart i.e. without chemical equations)
- Define the term plastic
- Classification of plastics with examples
- Distinguish between thermo and thermosetting plastics
- Characteristics of plastics
- Advantages of plastics over traditional materials
- Disadvantages of using plastics.

Methods of preparation and uses of the following plastics: 1. Polythene 2. PVC 3. Teflon
4. Polystyrene 5. Urea formaldehyde

Know the term natural rubber

- 8.11 State the structural formula of Natural rubber
- 8.12 Explain the processing of Natural rubber from Latex
- 8.13 Characteristics of natural rubber
- 8.14 Explain the process of Vulcanization
- 8.15 Characteristics of Vulcanized rubber
- 8.16 State the term Elastomer
- 8.17 Describe the preparation and uses of the following synthetic rubbers
a) Buna-s b) Neoprene rubber

Fuels

Define the term fuel

Classification of fuels based on physical state – solid , liquid and gaseous fuels, and based on occurrence- primary and secondary fuels

Understand characteristics of good fuel

- 9.4 Extraction and Refining of Petroleum
- 9.5 State the composition and uses of gaseous fuels: a) water gas b) producer gas c) natural gas d) coal gas e) Bio gas f) acetylene

II. ENVIRONMENTAL STUDIES

- 1.1 Define terms environment and environmental studies. explain the scope and importance of environmental studies
- 1.2 Understand the terms – lithosphere, hydrosphere, atmosphere, biosphere, biotic component, energy component, pollutant, pollution, contaminant receptor - sink, particulates, dissolved oxygen, Threshold limit value, BOD, COD
- 1.3 Define air pollution
- 1.4 Classification of air pollutants- based on origin and state of matter
- 1.5 State and explain the causes of air pollution
- 1.6 Explain the use and over exploitation of forest resources and deforestation
- 1.7 Explain the effects of air pollution on human beings, plants and animals
- 1.8 Explain the green house effect- ozone layer depletion and acid rain
- 1.9 Understand the methods of control of air pollution
- 1.10 Define water pollution
- 1.11 Explain the causes of water pollution
- 1.12 Explain the effects of water pollution on living and non living things
- 1.13 Understand the methods of control of water pollution
- 1.14 know growing energy needs renewable and non-renewable energy sources. Understand the use of alternate energy sources
- 1.15 Define an Ecosystem
- 1.16 Define producers, consumers and decomposers with examples.
- 1.17 Define biodiversity and threats to biodiversity

COURSE CONTENTS

I ENGINEERING CHEMISTRY

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

Periodic Table: Modern Periodic Law, salient features of Modern Periodic Table

Chemical Bonding: Introduction – types of chemical bonds – Ionic and covalent bond with examples – Properties of Ionic and Covalent compounds – Metallic bond

Oxidation-Reduction: Concepts of Oxidation-Reduction, 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 - P^H and related numerical problems – buffer solutions –Applications.

4. Principles of Metallurgy

Characteristics of Metals and distinctions between Metals and Non Metals, Metallurgy, ore, Gangue, Flux, Slag - Concentration of Ore –Hand picking, Levigation, Froth floatation – Extraction of crude Metal – Roasting, Calcination, Smelting – Alloys – Composition and uses of Brass, German silver and Nichrome

5. Electrochemistry

Conductors, insulators, electrolytes - Arrhenius theory of electrolytic dissociation – electrolysis – Faraday's laws of electrolysis- numerical problems – Galvanic cell – standard electrode potential – electro chemical series –emf and numerical problems on emf of a cell

6. Water technology

Introduction –soft and hard water – causes of hardness – types of hardness – disadvantages of hard water – degree of hardness (ppm) – softening methods – permutit process – ion exchange process – numerical problems related to degree of hardness – drinking water – municipal treatment of water for drinking purpose – Osmosis, Reverse Osmosis - advantages of Reverse osmosis

7. Corrosion

Introduction - factors influencing corrosion - electrochemical theory of 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 – preparation and uses of the following plastics: 1. Polyethylene 2. PVC 3. Teflon 4. Polystyrene 5. Urea formaldehyde – Rubber – Natural rubber – processing from latex –Vulcanization – Elastomers – Buna-s, Neoprene rubber and their uses.

2.0 Fuels

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

II. ENVIRONMENTAL STUDIES

Introduction – environment –scope and importance of environmental studies important terms – air pollution - causes-Effects – forest resources : uses and over exploitation, deforestation, acid rain, green house effect –ozone depletion – control of air pollution – Water pollution – causes – effects – control measures, renewable and non renewable energy sources – Concept of ecosystem, producers, consumers and decomposers – Biodiversity, definition and threats to Biodiversity.

Reference books

- | | |
|-------------------------------------|--|
| 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 and Jain |
| 5. Engineering Chemistry | O.P.Agarwal, Hi-Tech. |
| 6. Engineering Chemistry | M.S.N.Raju, etc, Hi-Tech. |
| 7. Applied Chemistry | V.Subrahmanyam |
| 8. Engineering Chemistry | Sharma |
| 9. Environmental chemistry | A.K. De |
| 10.Engg. Chemistry & Env. Studies | Dr. G. Venkatanarayana |

BASIC ELECTRONICS

Subject Title : **Basic Electronics**
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	Resistors	25	16	2	1
2	Capacitors and Inductors	20	13	1	1
3	Switches, Relays and PCBs	20	13	1	1
4	Microphones and Loudspeakers	15	13	1	1
5	Semiconductor Diode	20	16	2	1
6	Transistors	20	13	1	1
7	Transformers and Batteries	15	13	1	1
8	Principles of Generators and Motors	15	13	1	1
Total		150	110	10	8

OBJECTIVES

On completion of the study the student will be able to:

1.0 Understand fundamentals of electrostatics, resistors and their uses

- 1.1 Define electric charge and electrostatic field
- 1.2 State Coulomb's law of electrostatics and define unit charge
- 1.3 Define absolute permittivity and relative permittivity
- 1.4 Define electric potential and potential difference
- 1.5 Define electric current, electric power and electric field intensity
- 1.6 Define cycle, frequency, time period, maximum value, average value, r.m.s. value, peak factor and form factor for sinusoidal ac quantity
- 1.7 State and explain Ohm's law
- 1.8 Define the property of resistance
- 1.9 Classify types of resistors
- 1.10 List the specifications of a resistor, and state their importance.
- 1.11 Explain the necessity of preferred values in resistor.
- 1.12 Identify Resistance Value by using Colour Code
- 1.13 Compare the features of carbon and wire wound resistors with respect to size, power rating, tolerance and applications
- 1.14 Compare the features of carbon and wire wound potentiometers
- 1.15 Mention the need for tapering in potentiometers.

- 1.16 Describe the working of rheostat and mention its application
- 1.17 Explain the effects of temperature on resistance and define temperature coefficient of resistance
- 1.18 Understand the formula for resistance at any temperature

$$R_t = R_0 (1 + \alpha_0 t)$$
- 1.19 Solve problems based on the above formula
- 1.20 Calculate equivalent resistance of resistors connected in series and parallel
- 1.21 Describe the working of thermistor and sensistor and mention their applications.

2.0 Familiarise with different types of capacitors and inductors used in electronic circuits and their applications

- 2.1 Define the term capacitance
- 2.2 Classify the types of capacitors
- 2.3 List the specifications of a capacitor and state their importance
- 2.4 Identify the capacitor value by using colour code
- 2.5 State the factors affecting the capacitance of a capacitor
- 2.6 Define Di-electric constant and Di-electric strength of a material
- 2.7 Compare the properties, range of values and applications of paper, mica, glass, polyester, polystyrene, ceramic and electrolytic capacitors.
- 2.8 State different types of variable capacitors and mention their applications.
- 2.9 State losses in capacitors.
- 2.10 Find equivalent capacitance of Capacitors connected in series, Capacitors connected in parallel
- 2.11 State the expression for energy stored in a capacitor
- 2.12 Define self-inductance, mutual inductance and coefficient of coupling
- 2.13 Classify inductors
- 2.14 List the specifications of inductors
- 2.15 Find equivalent inductance when they are connected in series aiding and opposing, parallel aiding and opposing.
- 2.16 List the type of core materials used at different frequency ranges
- 2.17 Compare the features of different types of inductors with respect to value of inductance, size and type of core used.

3.0 Familiarise with different types of switches, Connectors, Relays and PCBs

- 3.1 Define a switch.
- 3.2 Classify switches according to poles and throws (SPST, SPDT, DPST, DPDT, Multi-pole multi-throw)
- 3.3 Explain the working of toggle and push button switches
- 3.4 List the ratings and applications of different types of switches
- 3.5 Sketch the I.S.I symbols of various switches
- 3.6 State the need of fuse in electronic equipment
- 3.7 Mention different types of fuses
- 3.8 Mention significance of ratings of fuse
- 3.9 Explain the necessity of connectors in electronic circuits
- 3.10 List different types of connectors
- 3.11 Mention the use of MCB
- 3.12 Define a relay

- 3.13 Classify different relays based on principle of operation, polarization and application
- 3.14 Mention specifications and applications of relays
- 3.15 Explain the construction & working of general-purpose electromagnetic relay
- 3.16 Explain the performance characteristics of relay
- 3.17 List the contact materials used in relays and list their characteristics
- 3.18 Explain the need of PCB in electronic equipment.
- 3.19 Classify PCBs.
- 3.20 List types of laminates used in PCBs.
- 3.21 List various steps involved in PCB preparation
- 3.22 List the materials used in soldering
- 3.23 State the standard PCB specification

4.0 Familiarise with different types of microphones and loud speakers

- 4.1 List the different types of microphones based on impedance, polar characteristics and principle of working.
- 4.2 Explain the working of carbon, condenser and Crystal microphones.
- 4.3 Compare the parameters like sensitivity, noise, frequency response, directivity, output impedance, bias necessity, size, cost and applications of above microphones.
- 4.4 List the ratings of condenser, crystal, carbon, ribbon and dynamic microphones.
- 4.5 Explain the constructional features and principle of operation of PMMC Loudspeaker and its ratings.
- 4.6 Mention the necessity of Baffle for a Loudspeaker and types of Baffles (like open, infinite, bass reflex, acoustic labyrinth)
- 4.7 Mention the use of woofers and tweeters.
- 4.8 Give the need for a Horn loud speaker with its construction and advantages. Mention different types of horns.
- 4.9 Compare the performance characteristics of cone type and horn type loud speakers
- 4.10 Explain the principle, construction and working of crystal headphones and their uses.
- 4.11 Mention the specifications of Loudspeaker and Microphones.

5.0 Understand Semiconductor Materials and Devices

- 5.1 State the electrical properties of solid Semiconductor materials.
- 5.2 Sketch energy level diagrams for conductors, Semiconductors, Insulators.
- 5.3 Distinguish between Intrinsic and extrinsic Semiconductors.
- 5.4 Describe the formation of P type and N type materials and sketch the energy band diagrams.
- 5.5 Identify Majority and Minority carriers in P and N Type materials.
- 5.6 Distinguish between Drift and Diffusion current.
- 5.7 Explain the formation of PN junction diode.
- 5.8 Describe the working of PN junction Diode with various biasing voltages.
- 5.9 Sketch the forward/Reverse Bias Voltage characteristics of diode
- 5.10 Interpret the manufacturer specifications of a given diode from data sheet
- 5.11 Distinguish between Zener breakdown and Avalanche breakdown

- 5.12 Describe the formation and working of Zener diode
- 5.13 Sketch the characteristics of Zener diode

6.0 Understand the working of Transistor

- 6.1 Know the formation of transistor.
- 6.2 Draw the symbol of transistor.
- 6.3 Explain the working of PNP and NPN Transistors.
- 6.4 Describe working of transistor as an amplifier (CB configuration)
- 6.5 Draw the different transistor configurations.
- 6.6 Know cut off, saturation and active regions.
- 6.7 Sketch the input/output characteristics of CB, CC and CE configurations.
- 6.8 Define alpha, beta and gamma Factors.
- 6.9 Relate alpha, beta and gamma Factors.
- 6.10 Write collector current expression in CB and CE modes of transistors in terms of α, β, I_B, I_C and I_{CBO}, I_{CEO} .
- 6.11 Compare the performance characteristics of transistor in CB, CE and CC configurations

7.0 Understand the working of transformers and know about different types of batteries

- 7.1 Explain the working principle of transformer
- 7.2 Derive the emf equation of transformer
- 7.3 State the relationship between voltage ratio, current ratio and turns ratio
- 7.4 List different types of transformers
- 7.5 List the specifications and applications of transformers
- 7.6 Mention the losses in transformers
- 7.7 Explain the working principle of auto transformer and E.H.T. transformer
- 7.8 State the advantages of secondary cells over primary cells
- 7.9 List the types of storage batteries
- 7.10 Mention the specifications and applications of storage batteries
- 7.11 Compare lead acid cell with nickel iron cell
- 7.12 Explain about maintenance free batteries
- 7.13 Mention the ratings and applications of miniature button cells

8.0 Understand the working principle of Generators and Motors

- 8.1 Explain dynamically and statically induced emf
- 8.2 Explain the working principle of DC generator
- 8.3 State emf equation of DC generator
- 8.4 Classify DC machines with reference to excitation
- 8.5 Explain different losses in DC machines
- 8.6 Define efficiency
- 8.7 Explain principle of working of DC motor
- 8.8 Explain the necessity of a starter for starting the motor
- 8.9 Explain the working principle of alternator
- 8.10 Explain the working principle of single phase induction motor
- 8.11 Explain the principle of operation of a stepper motor
- 8.12 State the applications of dc generator, dc motor, alternator, induction motor and stepper motor.

COURSE CONTENTS

1.Resistors:

Definition of charge, electric potential, electric field, voltage, current. Coulombs law
Classification of resistors, colour code, Specifications, preferred values of resistors, properties and uses of Carbon and wire wound resistors, characteristics and applications of carbon and wire wound resistors . Tapering in potentiometers. Effect of temperature on resistance. Thermistors, sensistors

2.Capacitors and Inductors:

Classification, specifications of capacitors, colour code, dielectric constant, dielectric strength, properties and applications of paper, mica, ceramic polyester, polystyrene, glass and electrolytic capacitors. Variable capacitors and applications, capacitor connected in series and parallel. Energy stored in capacitors. Self Inductance, mutual inductance, coefficient of coupling. Classification of inductors, specifications, different core materials. Inductors in series and parallel.

3. Switches, connectors and Relays and PCBs:

Different types of switches and connectors used in Electronic circuits, their specifications, constructional details and ratings. Fuses. Types of relays-Relay contacts, constructional features of relays. Need, classification and types of PCBs. Types of laminates, steps involved in preparation of PCB. Materials used in soldering.

4. Microphones and Loudspeakers:

Types of microphones – carbon, condenser, ribbon, moving coil, and crystal.
Constructional features, principle of working, characteristics, ratings and uses, construction of PMMC Loudspeakers, Baffles, horns and head phones.

5. Semiconductor diode:

Electrical properties of semiconductor materials, energy level diagrams of conductor, semi conductor and Insulator. Formation of P-Type and N-Type materials and their properties. Drift and diffusion current. Formation and behaviour of PN junction diode. Zener diode, Zener breakdown & Avalanche Breakdown.

6. Transistor:

Formation and properties of PNP and NPN Transistor, Transistor configurations, input and output characteristics. α , β , and γ factors. Comparison of CB, CE, and CC configurations. Transistor as an amplifier.

7. Transformers and Batteries:

Principle of transformer, emf equation, types, specifications, losses and applications of transformers. Auto transformer and EHT transformer. Types, specifications and applications of batteries. Maintenance free batteries and miniature button cells.

8. Generators and Motors:

Generation of emf. Working principle of DC generator, Losses and efficiency of generator. Working principle of DC motor. Need for starter to DC motor. Working principle of alternator and induction motor. Applications of motors and generators.

REFERENCE BOOKS

- | | | |
|--|--|-----|
| 1. Electronic devices and applications | by B. Somanathan Nair, PHI. | |
| 2. Basic Electronics
Publishing house Pvt., Ltd., | by B. Somanathan Nair I.K. International | |
| 3. Principles of Electronic Communications
(For speakers & Microphones) | by AnokSingh | |
| 4. Electronic components | by Dr.K.Padmanabham. | |
| 5. Electronic Instruments and Systems | by B.P Gupta TMH | |
| 6. Electrical Technology Vol 1 &2 | by B.L. Theraja | |
| 7. P.C.Bs | by Boshart | TMH |
| 8. Basic Electronics | by Grob. | TMH |
| 9. Electronic devices & Circuits | by Millman & Halkias | TMH |
| 10. Fundamentals of Accoustics | by Lawrence & Frag. | |
| 11. Electronic Components | by F.J. Waters. | |
| 12. Electrical Technology | by Hughes | |

BASIC ELECTRONICS LAB

Subject Title : **Basic Electronics Lab**
Subject Code : **EC-106**
Periods/Week : **06**
Periods/Year : **180**

TIME SCHEDULE

S.No	Major Topic	No. of Periods
1	Soldering Practice & Preparation of PCB	45
2	Study and use of Electronic equipment	45
3	Testing of Electronic components & characteristics	45
4	Wiring practice	45
Total		180

OBJECTIVES

On completion of the course a student should be able to:

1.0 Soldering & Preparation of PCB

- Get familiarised to use of various soldering tools, Components & different cables.
- Assembly and disassembly components using soldering irons.
- Use different types of soldering irons.
- Use solder squeezer on electronic PCBs.
- Use instant soldering gun.
- Solder simple electronic circuit with discrete components and I.Cs.
- Solder on printed circuit boards using passive and active components.
- Solder DIP switches and fuse carriers on PCBs.
- Draw the PCB layout and a component layout for simple electronic circuits like H.W.R./F.W.R./single stage amplifier.
- Prepare a PCB for a simple circuit.
- Assembly and testing of the above circuit.

Study and use of electronic equipment

- 2.1 Familiarise with the symbols of electronic circuit components by drawing.
- Measurement of AC/DC Voltages and currents using voltmeters and current meters.
- Measurement of voltages, currents and resistance using analogue and digital multimeters and continuity test.
- Study and use of AF / RF signal generators.
- Study and use of C.R.O. (single trace & Dual trace) for measuring frequency and amplitude.
- Study and use various regulated power supply units.

Testing of electronic components

- 3.1 Measure the value of resistor using ohmmeter / multimeter and compare with the colour code value.
- Test and measure the value of capacitor using R.L.C. meter and compare with the marked / colour code value.
- Test the given transformer and measure primary and secondary D.C. resistance & Voltages by using multimeter.
- Test the given loud speaker and measure the voice coil resistance-using multimeter.
- Test the working of different types of switches, relays, connectors and cables.
- Identify leads and testing of different diodes and transistors.
- Study of data manuals/ application manuals for diodes and transistors.
- Arrange the Public Address system and test the performance.
- Study the specifications of semiconductor devices from data manuals.
- Draw forward and reverse bias characteristics of semiconductor diode and calculate forward and reverse resistance of diode.
- Draw reverse bias characteristics of Zener diode and find out the zener voltage.
- Draw input and output characteristics of transistor in CB mode and determine R_i , R_o , and α .
- Draw input and output characteristics of transistor in CE mode and determine R_i , R_o , and β .
- Experiment showing transistor acts as amplifier.

Familiarise with house wiring.

- Familiarise with various tools used in electric wiring.
- Fundamentals of house wiring. Types of wiring and types of wires used for light points and power points.
- Study of different types of switches used in electrical wiring.
- Connection of one lamp with switch.
- Simple staircase wiring – one lamp control with two switches.
- Connection of tube light with function of choke, tube and starter.
- Connection of ceiling fan and reversing the direction of ceiling fan.

Reference Lab Manual:

Electronic Devices and Circuits by David A Bell 4 Edition PHI

Hand soldering and circuit board repair by H.(Ted)Smith, Thomas Delmar.

Electronic instruments and systems – principles, maintenance and Troubleshooting. by R.G. Gupta.

ENGINEERING DRAWING

Subject Title : **Engineering Drawing**
Subject Code : **EC – 107**
Periods/Week : **06**
Periods Per Year : **180**

TIME SCHEDULE

S. N O	Major Topics	Periods	Weightage of marks	Short Answer questions	Essay type questions
1	Importance of Engineering Drawing	03	-	-	-
2	Drawing instruments				
3	Free hand lettering & Numbering	06	5	1	-
4	Dimensioning Practice	12	5	1	-
5	Geometrical construction	24	10		1
6	Projection of points, Lines, Planes and solids	30	10		1
7	Orthographic Projection	30	15	1	1
8	Sectional views	18	10		1
9	Auxiliary views	06	5	1	
10	Pictorial drawing	30	10		1
11	Development of surfaces	21	10		1
Total		180	80	04	06

OBJECTIVES

On completion of the study of this subject the student should be able to
Understand the Importance of Engineering Drawing

- 1.1 State the importance of drawing as an engineering communication medium.
- 1.2 State the necessity of I.S. Code of practice for Engineering Drawing.
- 1.3 Appreciate the linkages between Engineering drawing and other subjects of study in Diploma course.

2.0 Use Engineering Drawing Instruments

- 2.1 Select the correct instruments and draw lines of different orientation.
- 2.2 Select the correct instruments and draw small and large Circles.
- 2.3 Select the correct instruments for measuring distances on the drawing.
- 2.4 Use correct grade of pencil for different types of lines, thickness and given function.
- 2.5 Select and use appropriate scales for a given application.
- 2.6 Identify different drawing sheet sizes as per I.S. and Standard Lay-outs.

- 2.7 Prepare Title block as per I.S. Specifications.
- 2.8 Identify the steps to be taken to keep the drawing clean and tidy.

3.0 Write Free Hand Lettering and Numbers

- 3.1 Write titles using sloping lettering and numerals as per B.I.S (Bureau of Indian standards)
- 3.2 Write titles using vertical lettering and numerals as per B.I.S.
- 3.3 Select suitable sizes of lettering for different layouts and applications.
- 3.4 Make the use of lettering stencils.

4.0 Understand Dimensioning Practice

- 4.1 State the need of dimensioning the drawing according to accepted standard.
- 4.2 Define "Dimensioning".
- 4.3 Identify notations of Dimensioning used in dimensioned drawing.
- 4.4 Identify the system of placement of dimensions in the given dimensioned drawing.
- 4.5 Dimension a given drawing using standard notations and desired system of dimensioning.
- 4.6 Dimension standard features applying necessary rules.
- 4.7 Arrange dimensions in a desired method given in a drawing.
- 4.8 Identify the departures if any made in the given dimensioned drawing with reference to SP-46-1988, and dimension the same correctly.

5.0 Apply Principles Of Geometric Constructions

- 5.1 Divide a given line into desired number of equal parts internally.
- 5.2 Draw tangent lines and arcs.
- 5.3 Construct a Hexagon from the given data.
- 5.4 Define ellipse, parabola hyperbola, involute, cycloid, and helix.
- 5.5 Construct ellipse by concentric circles method and using a paper trammel.
- 5.6 Construct parabola, rectangular hyperbola involute, cycloid and helix from the given data.
- 5.7 State the applications of the above constructions in Engineering practice.

6.0 Apply Principles of Projection of points, lines & planes

- 6.1 Explain the projection of a point with respect to reference planes (HP & VP)
- 6.2 Explain the projections of straight lines with respect to two reference planes.
- 6.3 Explain the projections of perpendicular planes.

7.0 Apply principles of Orthographic Projection

- 7.1 Explain the principles of Orthographic projection with simple sketches.
- 7.2 Prepare an Engineering Drawing of a given simple Engineering part

in first angle projection.

- 7.3 Draw the orthographic view of an object, given its pictorial drawing.
- 7.4 Sketch the minimum number of views needed to represent a given object fully.
- 7.5 identify the object, from a number of orthographic views given.
- 7.6 Supply the missing view when given two other views of an object.

8.0 Appreciate the need of Sectional Views

- 8.1 Explain the need to draw sectional views.
- 8.2 Select the section plane for a given component to reveal maximum information.
- 8.3 Draw sectional view for the component in 8.2.
- 8.4 Apply conventional practices and identify the parts, which should not be shown in section while drawing sectional views.
- 8.5 Make conventional representation of Engineering materials as per latest B.I.S. Code.
- 8.6 Apply principles of hatching.
- 8.7 Draw simple sections (full, half, revolved and removed part) for a range of simple Engineering objects.
- 8.8 Draw the component from a given set of sectional views.

9.0 Understand the need for Auxiliary Views

- 9.1 State the need of Auxiliary views for a given Engineering Drawing.
- 9.2 Sketch the auxiliary views of a given Engineering component to indicate the true shape and size of component.
- 9.3 Draw the auxiliary views of a given Engineering drawing.

10.0 Prepare Pictorial Drawings

- 10.1 State the need for commonly used type of pictorial drawings.
- 10.2 Given the objects, draw their orthographic views.
- 10.3 State the need of isometric scale and isometric projection.
- 10.4 Prepare Isometric projections for the given orthographic drawings.
- 10.5 Prepare oblique drawing cavalier, cabinet of simple Engineering objects from the given data.
- 10.6 Identify the correct pictorial views from a set of Orthographic drawings.

11.0 Prepare Development Drawings

- 11.1 State the need for preparing development drawing.
- 11.2 Prepare development of simple Engineering objects using parallel line and radial line method.
- 11.3 Prepare development of Surface of Engineering components like trays, funnel, 90⁰ elbow & rectangular duct.

COURSE CONTENT:

NOTE

1. **I.S. / B.S Latest Specification should invariably be followed in all the topics.**
2. **A-3 Size Drawing Sheets are to be used for all Drawing Practice Exercises.**

Understand 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 of I.S.O and B.I.S-Role of drawing in -engineering education

Link between Engineering drawing and other subjects of study.

Engineering drawing Instruments

Classifications: Basic Tools, tools for drawing straight lines, tools for curved lines,

tools for measuring distances and special tools like mini drafter & drafting machine

Mentioning of names under each classification and their brief description -Scales:

Recommended scales reduced & enlarged

Lines: Types of lines, selection of line thickness - Selection of Pencils

Sheet Sizes: A0, A1, A2, A3, A4, A5, Layout of drawing sheets in respect of A0, A1, A3 sizes,

Sizes of the Title block and its contents - Care and maintenance of Drawing Sheet,

To draw “Lay out of sheet “ – and as per SP-46-1988 to a suitable scale.

Simple Exercises on the use of Drawing Instruments.

Importance of Title Block.

Drawing Plate 1: (Consisting of about two exercises)

To draw geometric shapes (standard) using drawing instruments -To draw layout of sheet and title block.

Free hand lettering & numbering

Importance of lettering – Types of lettering

Guide Lines for Lettering

Recommended sizes of letters & numbers –

Advantages of single stroke or simple style of lettering –

Use of lettering stencils

Drawing plate 2: (Consisting of about 5 to 6 exercises)

To print the table of Types of lines as per latest ISI Standards.

To print the table of “Recommended sizes of letters and numerals” – as per Standards.

Selection of suitable size of letters and numbers and draw the given titles, phrases using both vertical and sloping styles.

Dimensioning practice

Purpose of engineering Drawing, need of I.S.I code in dimensioning –Shape description of an Engineering object -Definition of Dimensioning size description -Location of features, surface finish, fully dimensioned Drawing - Notations or tools of dimensioning, dimension line extension line, leader line, arrows, symbols, number and notes, rules to be observed in the use of above tools -Placing dimensions: Aligned system and unidirectional system (SP-46-1988)-Arrangement of dimensions Chain, parallel, combined progressive, and dimensioning by co-ordinate methods-The rules for dimensioning standard, features “Circles (holes) arcs, angles, tapers, chamfers, and dimension of narrow spaces.

Drawing Plate 3: (Consisting of above 12 to 15 exercises)

Dimensioning a given drawing using the above tools, rules and systems of dimensioning.

Dimensioning practice in various methods of dimensioning stated above.

Dimensioning, given common features listed.

Exercise in identifying the departures made in a given dimensioned drawing from I.S.I. Code of practice.

Geometric Construction

Division of a line: to divide a straight line into given number of equal parts internally examples in Engineering application.

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.

Hexagon: Inscribing a Hexagon in a circle of given dia and circumscribing a given circle, using

- i) Set squares.
- ii) Compass – given a side to construct a Hexagon using set squares or compass.

Conical Curves: Explanation of Ellipse, Parabola, Hyperbola, as sections of a double cone and a loci of a moving point, Eccentricity of above curves – Their Engg. Application viz. Bolts and Nuts, Projectiles, reflectors P.V. Diagram of a Hyperbolic process, Construction of Ellipse using.

- i) Concentric circles method.
- ii) Paper trammel, method.
- iii) Construction of parabola by rectangular method.
- iv) Construction of Rectangular Hyperbola when given the position of a point on the curve.

General Curves: Involute, Cycloid and Helix, explanations as locus of a moving point, their Engineering application, viz, Gear tooth profile, screw threads, springs etc. Their construction:

Drawing Plate: 4 (Consisting of about 12 to 15 exercises)

Exercises mentioned above at the rate of at least one problem on each "construction".

Projection of points, lines and planes.

Projecting a point on two planes of projection

Projecting a point on three planes of projection

Projection of straight line.

- (a) Parallel to one or both the planes.
- (b) Contained by one or both the planes.
- (c) Perpendicular to one of the planes.
- (d) inclined to one plane and parallel to other planes.

Projection of perpendicular planes

- (a) Plane perpendicular to both HP and VP
- (b) Plane perpendicular to HP and parallel to VP and Vice versa.
- (c) Plane perpendicular to HP and inclined to VP and vice versa.

Projection of Regular solids in simple positions

7.0 Orthographic Projections

Meaning of Orthographic Projection -Using a viewing Box and a model – Number of views obtained on the six faces of the box, - Neat sketches of only 3 views for describing object -Concept of front view, top views, and sides view sketching these views for a number of Engg. Objects -Explanation of "First angle projection". – Positioning of three views in First angle projection - Projection of points as a means of locating the corners of the surfaces of an object – Use of miter line in drawing a third view when other two views are given -Method of representing hidden lines -Selection of minimum number of views to describe an object fully.

Drawing Plate 5: (Consisting of about 10 to 12 Number of exercises)

Given an engineering object(s) to sketch the three views.

Given the pictorial view of simple objects to sketch the three views in First and third angle projections.

Given the object (pictorial Drawing) and 3 views identifying the surface on the views with reference to the object.

Given two views and a simple object – Draw the missing of third view.

Drawing Plate 6: (Consisting of about 6 to 8 exercises)

Given the engineering objects (Pictorial views) Drawing the three views in First angle projection.

Identifying the object, when given a number of objects and the orthographic views (matching exercises).

8.0 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) -Meaning of Full, half revolved and removed, local or partial sections - Hatching – adjacent components (two or more) large areas, a part in different parallel planes-Conventional practices to represent sections of ribs, shafts, bolts, nuts, screws, rivets, spokes, webs, keys, cotters, thin sections

etc., as per B.I.S. specifications – Conventional representation of materials as per B.I.S. Standards.

Drawing Plate 7: (Consists of about 8 to 10 exercises)

Preparing conventional representation of a materials as per latest/ B.I.S. Code.

Given the object (pictorial or orthographic view), and cutting plane line to draw sectional view.

Given the object to select the correct cutting plane line and then to draw the sectional view.

To identify the object when given number of objects and number of sectional views (Matching exercise.)

9.0 Auxiliary views

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

Drawing plate No.8: (Consisting of about 8 exercises)

Given a set of objects, state whether an auxiliary view is needed – if required sketch the same.

Given the object and its auxiliary view (partial or full, to sketch the auxiliary plane on the pictorial view)

10.0 Pictorial Drawings

Brief description of different types of pictorial drawing viz., Isometric, oblique, and perspective – Use of these - 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 drawing (or view, and Isometric Projection) and orthographic drawing - Isometric and non-Isometric lines -Isometric drawing of common features like rectangles, circular - shapes, non-isometric lines, Use of box and offset construction -Oblique drawings: Their use -Cavalier and cabinet drawings – Oblique drawing of common features like rectangular, circular and inclined, surfaces -Selection of the face of the object to be included in the front view.

Draw plate 9: (Consists of about 10 to 12 exercises)

Given the Orthographic views to draw isometric views, Construction of isometric scale.

Given the Orthographic views to draw isometric Projections.

Given the Orthographic views to draw cavalier Drawings.

Given the Orthographic views to draw cabinet Drawings.

11.0 Development of Surfaces

Need for preparing development of surface with reference to sheet metal Work -Concept of true length of a line with reference to its Orthographic

projection when the line is (i) parallel to the plane of projection (ii) When it is inclined to one principal and parallel to the other -Development of simple Engineering common solids like Cubes, prisms, Cylinders, Cones, Pyramid (sketches only) - Types of Development: Parallel line and radial line development -Procedure of drawing development, drawings of trays funnels, 90⁰ elbow pipes and rectangular ducts.

Drawing plate No. 10: (Consists of about 10 exercises)

Development drawings by “ Parallel – line “ method such as prisms and Cylinders (Truncated).

Development drawing by “Radial – line “ method such as cones and pyramids (Truncated)

Development drawings of a tray: funnel 90⁰ elbow and rectangular duct.

REFERENCE BOOKS

First Year Engineering Drawing – B.R. Gupta.

Engineering Drawing by N.D.Bhatt.

“A First Year Engineering Drawing” – A.C. Parkinson (Metric Edition).

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

SP-46-1998 – Bureau of Indian Standards.

Introduction to Engineering Drawing R.C.Mouli – V.Rama Rao –
M. Venkateswarlu.

PHYSICS LABORATORY
(Common to All Courses)

Subject title : **Physics Laboratory**
Subject code : **EC -108**
Periods / week : **03**
Total periods / Year : **45**

List of Experiments	No. of Periods
1. Vernier calipers	3
2. Screw gauge	3
3. Parallelogram law of forces and Triangle law of forces (verification)	3
4. Simple pendulum	3
5. Velocity of sound in air (Resonance method)	3
6. Focal length and focal power of convex lens (separate and combination)	3
7. Refractive index of solid using traveling microscope	3
8. Surface tension of liquid using traveling microscope	3
9. Coefficient of viscosity by capillary method	3
10. Boyle's law verification	3
11. Meter bridge	3
12. Mapping of magnetic lines of force	3
Revision	6
Test	3

Total	45

SUBJECT : PHYSICS LABORATORY
SUBJECT CODE: EC-108

SPECIFIC OBJECTIVES OF PHYSICS LABORATORY

VERNIER CALIPERS - To determine the volumes of a cylinder and a sphere

SCREW GAUGE – To determine the thickness of a glass plate and area of cross section of a wire

PARALLELOGRAM LAW AND TRIANGLE LAW VERIFICATION – To verify laws and determination of unknown weight of an object

SIMPLE PENDULUM – To determine the value of acceleration due to gravity using law of length and to draw I-T and I- T^2 curves.

VELOCITY OF SOUND IN AIR – To determine velocity of sound in air at room temperature and to calculate its value at 0°C using two tuning forks.

FOCAL LENGTH AND FOCAL POWER OF CONVEX LENSES – To find focal length and focal power of a single convex lens and combination of convex lenses respectively using U-V method and draw U-V and $1/U - 1/V$ curves for single convex lens experiment only.

REFRACTIVE INDEX OF A SOLID – To determine the refractive index of material of a glass slab using traveling microscope.

SURFACE TENSION OF A LIQUID – To determine the surface tension of water using traveling microscope (Capillary method.)

VISCOSITY OF A LIQUID – To determine viscosity of water by using capillary method

BOYLE'S LAW VERIFICATION – To experimentally verify Boyle's law employing a Quill tube.

METER BRIDGE – To find specific resistance of the material of a wire

MAPPING OF MAGNETIC LINES OF FORCE – To locate the positions of neutral points using N-S and N-N method with the help of magnetic compass

**CHEMISTRY LABORATORY
(COMMON TO ALL)**

Subject Title	:	Chemistry Laboratory
Subject Code	:	EC - 109
No of periods	:	03
Total periods	:	45

List of Experiments

1. Introduction to volumetric analysis
2. Preparation of Standard Na_2CO_3 solution
3. Estimation of HCl solution using Std. Na_2CO_3 solution
4. Estimation of NaOH using Std. HCl solution
5. Estimation of Mohr's Salt using Std. KMnO_4 solution
6. Determination of acidity of water sample
7. Determination of alkalinity of water sample
8. Determination of total hardness of water using Std. EDTA solution
9. Estimation of Chlorides present in water sample
10. Estimation of Dissolved Oxygen (D.O) in water sample

DEMONSTRATION EXPERIMENTS

11. Determination of pH using pH meter
 12. Determination of conductivity of water
 13. Determination of turbidity of water
 14. High volume air sampler
 15. Estimation of total solids present in water sample
- Revision

INFORMATION TECHNOLOGY LAB

Subject Title	:	Information Technology Lab
Subject Code	:	EC-110
Periods/Week	:	04
Periods per Semester	:	120

SPECIFIC OBJECTIVES

On completion of this subject the student would be able to

- Identify the various components of a Computer system
- Differentiate between hardware and software
- State the functions of each component of a computer a system
- State the configuration of a computer system
- Identify the various peripherals
- Know how to open an application program
- Know how to create a folder in a specified location
- Open MS-word and Identify the components on the screen
- Create a document using MS-word and save it
- Create a table using MS-Word and save it
- Create mailing letters using mail merge tool of MS-word
- Open MS-Excel and identify the components on the screen
- Create a Worksheet in MS-Excel and save it
- Generate a Chart using the data in Excel-worksheet
- Automate calculations in a worksheet using formula
- Sort and filter data in a worksheet
- Create a simple Power point presentation for a small topic
- Backup required files and folders to a CD-ROM
- Introduction to the internet technology and imparting training to use searching of required sites and using e-Mails etc..

COURSE CONTENT:

1. Study of a computer system
2. Familiarise with basic MS-WINDOWS facilities like opening programs, searching, creating folders, copying and shifting data , etc.
3. Create a formatted word document using MS-Word
4. Familiarise with spell checker facility of MS-Word
5. Print the Word document using page setup and Print facilities
6. Create a soft copy of a given table using MS-Word
7. Create mailing letters for a given information using MS-Word
8. Create a soft copy of the given statistical data using MS-Excel
9. Generate Appropriate Chart for the statistical data using MS-Excel
10. Generate the soft copy of a worksheet using formula facility of MS-Excel
11. Create a soft copy of a simple database using Excel. Run sort and filter facilities for the database
12. Create a power point presentation for a simple technical topic using MS-PowerPoint
13. Create a backup CD for a data using NERO or similar CD writing software
14. Create an user account on the Internet and e-mail and sending a document to from a given e-mail address. To another e-Mail ID as attachment.
15. Using different search engines finding required sites to collect information on engineering related topics including down loading the contents.

III SEMESTER

ENGLISH – II
(Common Subject)

Subject title : English -II
Subject code : EC-301
Periods per week : 03
Periods / Semester : 45

TIME SCHEDULE

ENGINEERING MATHEMATICS – II
(Common to AEI/C/M/EE/EC/MIN/PKG)

Subject title : Engineering Mathematics -II
Subject code : EC - 302
Periods per week : 04
Periods / Semester : 60

TIME SCHEDULE

S.No.	Major Topics	Periods	Weightage of Marks	Short Type	Essay Type
1	Unit –I Integration Methods of Integration	18	35	5	2
2	Unit-II Definite Integrals and Applications	14	26	2	2
3	Numerical Integration	03	05	-	½
4	Unit-III Differential Equations	25	44	3	3½
	Total	60	110	10	8

Objectives:

On completion of the study of the subject the student should be able to comprehend the following

Unit-I

Methods of Integration:

1.0 Understand the concept of Indefinite integral:

1.1 Explain that $\frac{d}{dx} \int f(x) dx = F(x) \Rightarrow \int F(x) dx = f(x) + c$, where c is arbitrary constant.

1.2.State the indefinite integral of standard functions and properties of Integrals with examples.

1.3. Integrate simple functions using the rule for $\int (u + v) dx$ and $\int ku dx$ where k is constant and u, v are functions of x.

1.4. Evaluate arbitrary constant and determine particular integrals in problems of the following type:

Find the equation of the curve passing through (1, 1) and whose slope at any point (x, y) is $2x^2 + 1/\sqrt{x}$.

ii) If the velocity at time 't' is given by

$V = \sqrt{t} + 3$ find the displacement "S" at time $t = k$ given that S = 0 when t = 0.

1.5. Explain various methods of integration with examples.

1.6. Integrate simple functions by decomposition of the integrand

1.7 Integrate simple functions of the following type by substitution.

i) $\int f(ax + b) dx$ where $f(x) dx$ is in standard form.

ii) $\int [f(x)]^n f'(x) dx$

iii) $\int f'(x)/[f(x)] dx$

iv) $\int f\{g(x)\} g'(x) dx$

1.8. Explain finding the Integrals of $\tan x$, $\cot x$, $\sec x$ and $\operatorname{cosec} x$ using the above.

1.9. Evaluate the integrals of the form $\int \sin^m \theta \cos^n \theta \cdot d\theta$ where m and n are positive integers.

1.10. Evaluate Integrals of powers of $\tan x$ and $\sec x$.

1.11. Evaluate the integrals of the form $\int e^x [f(x) + f'(x)] dx$.

1.12 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) $\sqrt{x^2 - a^2}, \sqrt{x^2 + a^2}, \sqrt{a^2 - x^2}$

1.13. Evaluate the Integrals of the

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

1.14. Evaluate integrals using integration by parts with examples State the Bernoulli's rule for evaluating the integrals of the form $\int u \cdot v dx$.

Unit-II

2.0 Definite Integrals and its applications

2.1 Understand the concept of definite integrals and define the definite integral over an interval.

2.2 State various properties of definite integrals.

2.3 Evaluate some problems on definite integrals using the above properties.

2.4. Identify a definite integral as a limit of sum by considering an area.

2.5. State the fundamental theorem of integral calculus.

2.6. Find the areas under plane curves and area enclosed between two curves using integration.

2.7 Obtain the volumes of solids of revolution.

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

3.0 Numerical Integration

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

Unit -III

4.0 Differential Equations

4.1. Definition of a Differential equation – order, degree and solution of a differential equation – formation of differential equations - solutions of ordinary differential equations of the first order and first degree of the type:

i. Variables Separable.

ii Homogeneous Equations.

Exact Differential Equations

iv. Linear differential equation of the form $dy/dx + Py = Q$, where P and Q are functions of x or constants.

v. Bernoulli's Equation (Reducible to linear form.)

- 4.2 Solution of second order differential equation of the type $f(D)y=0$
 4.3 Solution of nth 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
 $k, e^{ax}, \text{Sin}ax, \text{Cos}ax, x^n$.

COURSE CONTENTS

Unit-I

1. Methods of Integration.

1. Integration regarded as reverse of differentiation – Indefinite integral and constant of integration – standard forms. Integration by decomposition of the integrand into simple rational, algebraic functions-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 $\tan x, \cot x, \sec x, \text{cosec} x$ and powers of $\tan x, \sec x$ by substitution.

Integrals of:

$$i) \frac{1}{a^2 + x^2}, \frac{1}{a^2 - x^2}, \frac{1}{x^2 - a^2}$$

$$ii) \frac{1}{\sqrt{a^2 + x^2}}, \frac{1}{\sqrt{a^2 - x^2}}, \frac{1}{\sqrt{x^2 - a^2}}$$

$$iii) \sqrt{x^2 - a^2}, \sqrt{x^2 + a^2}, \sqrt{a^2 - x^2}$$

Integration by parts including Bernoulli's rule.

Unit-II

2. Definite Integral and its applications:

Definite integral – 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 value and RMS value of a function in a given interval.

3. Numerical Integration:

Trapezoidal rule, Simpson's 1/3 rules for approximation of Integrals.

Unit -III

4. Differential Equations:

Definition of a differential equation-order and degree of a differential equation- formation of differential equations-solution of differential equation of the type first order, first degree, variable-separable, homogeneous, exact, linear differential equation of the form $dy/dx + Py = Q$, Bernoulli's equation, nth order linear differential equation with constant coefficients both homogeneous and non homogeneous and finding the Particular Integrals for the functions $k, e^{ax}, \text{Sin}ax, \text{Cos}ax, x^n$.

Reference books:

1 Text book of Engineering Mathematics –II by G.Srinagesh, and others – FALCON publishers

2 Text book of Engineering Mathematics –II by Dr.J.Sairam and others – UNI-TECH SERIES.

3 A Text book of intermediate Mathematics –I & II by Telugu Academy.

4 Integral Calculus by Manicavachagom Pillai

5 Text book of Engineering Mathematics –II by Radiant publishers.

ELECTRONIC CIRCUITS - I

Subject Title : **Electronic Circuits - I**
Subject Code : **EC-303**
Periods/Week : **06**
Periods/Semester : **90**

TIME SCHEDULE

Sl no.	Major topics	No of periods	Weightage of marks	Short Answer Questions	Essay Questions
1	Power supplies	25	29	3	2
2	Transistor biasing and small signal amplifiers.	25	29	3	2
3	Special semiconductor devices.	20	26	2	2
4	Fabrication of ICs and Operational amplifiers	20	26	2	2
	Total	90	110	10	8

OBJECTIVES

On completion of the study of the subject a student should be able to comprehend the following:

1.0 Understand the working of power supply circuits used in electronic circuits

- 1.1 Review of semiconductor diode and transistor.
- 1.2 Explain the necessity of DC power supply for electronic circuits.
- 1.3 Draw the block diagram of regulated DC power supply and explain the function of each block.
- 1.4 Draw and describe the working of half wave rectifier with waveforms.
- 1.5 Derive the equations for RMS value, average value, ripple factor and efficiency for the half wave rectifier.
- 1.6 Draw and describe the working of centre tapped full wave rectifier with waveforms.
- 1.7 Draw and describe the working of bridge rectifier with waveforms.
- 1.8 Derive the equations for RMS value, average value, ripple factor and efficiency for the full wave rectifier.
- 1.9 Compare the above rectifier circuits.
- 1.10 Explain the need for a filter in power supplies and list different types of filters.
- 1.11 Explain the operation of a rectifier circuit using capacitor input, series inductor and CLC filters.
- 1.12 Define voltage regulation.
- 1.13 Explain the operation of simple Zener regulator.
- 1.14 Explain the operation of transistor series voltage regulator.

- 1.15 Explain the operation of transistor shunt voltage regulator
- 1.16 List the types of IC regulators and give the advantage of IC regulators.
- 1.17 Explain the operation of fixed positive and negative voltage regulators.(using 7800 series and 7900 series)
- 1.18 Explain the operation of adjustable voltage regulator (LM317).
- 1.19 State the need for uninterrupted power supply(UPS)
- 1.20 List different types of UPS.
- 1.21 Draw and explain the block diagram of off-line UPS
- 1.22 Draw and explain the block diagram of on-line UPS
- 1.23 Compare online UPS and OFF line UPS.

2.0 Understand transistor biasing and working of small signal amplifiers

- 2.1 Explain the basic amplifier concept using BJT–CE mode.
- 2.2 Explain why CE Mode is widely used in amplifier circuits.
- 2.3 Explain the concept of DC and AC load line.
- 2.4 Explain the selection of operating point on the DC load line with wave forms.
- 2.5 Explain the need for proper biasing in amplifier circuits and List the types of biasing circuits.
- 2.6 Explain the need for stabilization.
- 2.7 Define stability factor and derive an expression for stability factor of CE configuration.
- 2.8 Explain collector to base resistor method of biasing and explain its advantages and disadvantages.
- 2.9 Explain potential divider method of biasing and explain its advantages.
- 2.10 Draw the practical transistor CE amplifier and explain the function of each component(such as C_{in} , C_C , C_e , R_1 , R_2 and R_e)
- 2.11 Define h parameters of a transistor
- 2.12 Draw the hybrid equivalent of a transistor in CE mode.
- 2.13 Classify the amplifiers based on frequency, period of conduction, and coupling.
- 2.14 Need for Multistage amplifier (Cascading of amplifiers).
- 2.15 Define gain, frequency response and bandwidth of an amplifier.
- 2.16 Explain the principle of operation of two-stage RC coupled amplifier with circuit diagram.
- 2.17 Draw and explain the frequency response of RC coupled amplifier.
- 2.18 Explain the principle of operation of two-stage transformer coupled amplifier with circuit diagram.
- 2.19 Draw and explain the frequency response of transformer-coupled amplifier.
- 2.20 Explain the principle of operation of direct coupled amplifier with circuit diagram.
- 2.21 Compare different types of couplings.
- 2.22 Draw and explain the operation of Emitter follower circuit and list its advantages.
- 2.23 Draw the circuit of Darlington pair and explain its working and application.

3.0 Understand working of special semiconductor devices

- 3.1 Classify different types of FETs
- 3.2 Describe the construction and principle of operation of n channel JFET.
- 3.3 Draw and explain the drain characteristics of JFET.
- 3.4 Draw and explain the mutual characteristics of JFET.
- 3.5 Define the parameters of JFET and obtain the relation among them.
- 3.6 List the advantages of JFET over BJT.
- 3.7 List applications of FETs.
- 3.8 Explain the construction and principle of operation of depletion type n channel MOSFET.
- 3.9 Explain the construction and principle of operation of enhancement type n channel MOSFET.
- 3.10 Compare JFET and MOSFET.
- 3.11 Explain the principle of operation of CMOSFET.
- 3.12 Draw the circuit of common source FET amplifier.
- 3.13 Describe the constructional details of UJT.
- 3.14 Explain the working of UJT with its equivalent circuit.
- 3.15 Draw and explain the characteristics of UJT.
- 3.16 List the applications of UJT.
- 3.17 Explain the working principle of Varactor diode and draw its characteristics.
- 3.18 List the applications of varactor diode.

4.0 Understand the fabrication of ICs and working of operational amplifiers.

- 4.1 State the advantages and disadvantages of ICs over discrete assembly.
- 4.2 Classify ICs based on manufacturing process (monolithic, thin film, thick film and hybrid).
- 4.3 Describe the manufacturing process of monolithic ICs.
- 4.4 Describe the fabrication of resistor, and capacitor on monolithic IC.
- 4.5 Describe the fabrication of diode and transistor on monolithic IC.
- 4.6 List different IC packages.
- 4.7 Explain various levels of integration (SSI, MSI, LSI, VLSI etc.,).
- 4.8 Give an idea of Surface Mount Technology (SMT) and know its advantages.
- 4.9 Draw and explain the differential amplifier.
- 4.10 State the function of an operational amplifier.
- 4.11 Know the operational amplifier characteristics like Input impedance, Open loop gain, Slew rate, CMRR, Input offset voltage, Input offset Current,
- 4.12 List the specifications of ideal operational amplifier.
- 4.13 Draw the block diagram and pin out diagram of IC 741 and explain each block and pin
- 4.14 Illustrate the use of operational amplifier as summer, integrator, differentiator, inverter and multiplier.

COURSE CONTENT:

1. Power Supplies

Need of DC power supply, half wave, full wave and bridge rectifiers. RMS value, ripple factor, efficiency, comparison of rectifiers, voltage regulation. Filters – capacitor input, series inductor and CLC. Regulators-Zener regulator – transistor series and shunt, IC regulators, need for UPS, types of UPS.

2. Transistor biasing and small signal amplifiers

Transistor CE amplifier, DC and A.C load lines, operating point, stabilization, stability factor, proper biasing, types of biasing- collector to base biasing, potential divider biasing, practical transistor CE amplifier, definition of h parameters of a transistor , Classification of amplifiers, need of multi stage amplifier, working and frequency response of two-stage RC coupled amplifier, transformer coupled amplifier, direct coupled amplifier, emitter follower, Darlington pair.

3. Semiconductor Devices.

Classification of FETS,N-channel JFET- construction, working principle, characteristics, applications, FET parameters, MOSFET – types, working principle, characteristics, common source FET amplifier, applications. UJT- construction, working principle, characteristics, applications. Varactor diode - principle, application.

4. Fabrication of ICs and Operational amplifiers.

Principle, Advantages and disadvantages of ICs. Types of IC constructions. Manufacturing process of monolithic IC. Fabrication of components on monolithic IC. IC Packing. Scale of integration. SMT, advantages of SMT. Differential amplifier, operational amplifier block diagram, characteristics of operational amplifier, 741 IC, applications of operational amplifier.

REFERENCE BOOKS

1. Electronic Devices and Devices Russel L Meade & Robert Diffenderfer Cengage Publishers
2. Electronic Devices and Circuits by .David A.Bell 4th edition PHI
3. Basic Electronic Principles by Malvino. TMH
4. Principles of Electronics by V.K.Mehtha
5. Linear Electronic Device & Circuits by N.N.Bhargava., TMH
6. Electronic devices and Circuits by G.S.N. Raju, I.K. International publishing house.
7. Basic Electronics by B.L.Theraja.
8. Electronic Devices & Circuits by Millman & Halkias. TMH
9. Electronic circuits – I by K. S. Sunanda

COMMUNICATION ENGINEERING

Subject Title : **Communication Engineering**
Subject Code : **EC-304**
Periods/Week : **06**
Periods/Semester : **90**

TIME SCHEDULE

Sno	Major topics	No. of periods	Weight age of marks	Short Answer Questions	Essay Questions
1	Introduction to Communication System	20	26	2	2
2	Modulation Techniques	25	29	3	2
3	Transmitters & Receivers	25	29	3	2
4	Transmission Lines & Radio Wave propagation	20	26	2	2
Total		90	110	10	8

OBJECTIVES

On completion of the study of the subject a student should be able to comprehend the following:

1.0 Understand communication systems.

- 1.1 Know basic elements of a communication system with the help of block diagram.
- 1.2 Identify the frequency spectrum used for Radio communication.
- 1.3 Applications of different frequencies in the spectrum.
- 1.4 Define bandwidth and know its significance in a communication system
- 1.5 Need for modulation in communication systems.
- 1.6 Distinguish between baseband, carrier, and modulated signals with waveforms.
- 1.7 Classify the various types of continuous-wave modulation and sketch their waveforms.
- 1.8 Explain the relationship between channel bandwidth, base band bandwidth and transmission time.
- 1.9 Explain the term distortion and types of distortion.
- 1.10 Explain the measures for distortionless transmission.
- 1.11 Explain the term Time domain with waveforms.
- 1.12 Explain the term Frequency domain.
- 1.13 Explain the term noise and its effects in communication systems.

- 1.14 Explain various types of noise.
- 1.15 Define the terms signal to noise ratio, noise figure and noise temperature.

2.0 Understand the techniques of Modulation.

- 2.1 Know Amplitude Modulation.
- 2.2 Know the time-domain equation for an AM signal.
- 2.3 Define the modulation index of AM signal
- 2.4 Calculation of modulation index.
- 2.5 Describe the effects of over modulation and measures to avoid it.
- 2.6 Calculate the bandwidth of an AM signal.
- 2.7 Know the expressions for power and voltage of an AM signal and its sideband components.
- 2.8 Problems on power and voltage equations of an AM signal.
- 2.9 Explain suppressed-carrier (DSB-SC) and single-sideband (SSB-SC) techniques in an AM signal.
- 2.10 Mention the advantages of DSB-SC & SSB-SC.
- 2.11 List applications of AM in communication systems.
- 2.12 Introduction to Angle modulation and know its types.
- 2.13 Explain the differences between Amplitude and Angle modulation techniques.
- 2.14 Derive the time-domain equation for an FM signal.
- 2.15 Calculate bandwidth, sideband frequencies of FM signal.
- 2.16 Define modulation index for FM signal.
- 2.17 Explain the noise triangle used in FM.
- 2.18 Know how bandwidth varies with frequency deviation for FM system.
- 2.19 Define pre-emphasis and de-emphasis used in FM signal.
- 2.20 Advantages of pre-emphasis and de-emphasis in FM signal.
- 2.21 Explain the merits and demerits of FM over AM.
- 2.22 Describe time-division multiplexing.
- 2.23 Describe frequency division multiplexing.

3.0 Understand transmitters and receivers.

- 3.1 Introduction to transmitters and receivers.
- 3.2 List specifications of transmitters.
- 3.3 Distinguish between high level and low level modulation.
- 3.4 Draw the block diagram of a Low level AM transmitter.
- 3.5 Draw the block diagram of a High level AM transmitter.
- 3.6 Draw the block diagram of a heterodyne AM transmitter and briefly explain its operation.
- 3.7 Draw the block diagram of FM transmitter using reactance method and explain its working.
- 3.8 Draw the block diagram of Armstrong FM transmitter and explain its working.
- 3.9 List various frequency bands used in radio receivers.
- 3.10 Basic functions of a Radio receiver.
- 3.11 Define sensitivity, selectivity, fidelity of a receiver.
- 3.12 Explain the process of heterodyning and super heterodyning in radio receiver.
- 3.13 Draw the block diagram of super heterodyne receiver and explain its operation.

- 3.14 Explain the factors to be considered for choice of IF.
- 3.15 Explain the terms Image frequency and IMRR (Image Frequency Rejection Ratio) in a radio receiver.
- 3.16 Explain the need for AVC (AGC).
- 3.17 Explain the process of demodulation in AM receivers.
- 3.18 Explain the process of demodulation in FM receivers (Foster-seely discriminator).
- 3.19 Explain the operation of a FM noise limiter circuit.
- 3.20 Compare AM and FM receivers.
- 4.0 Understand principles of Transmission Lines and Radio Wave propagation.**
 - 4.1 Introduction to transmission lines and different types.
 - 4.2 Know the electrical equivalent of transmission line.
 - 4.3 Explain the parameters of transmission lines.
 - 4.4 Define characteristic impedance of a transmission line and know its significance.
 - 4.5 Define reflection coefficient and standing wave ratio.
 - 4.6 Know the losses in transmission lines.
 - 4.7 Explain the importance of impedance matching with respect to transmission lines.
 - 4.8 Describe methods of matching lines.
 - 4.9 Know electromagnetic spectrum.
 - 4.10 Describe the nature and behaviour of radio waves.
 - 4.11 Explain the term wave polarization and know its significance.
 - 4.12 Explain different types of polarization (vertical, horizontal, circular and elliptical polarization).
 - 4.13 Know about the impedance of free space.
 - 4.14 Describe reflection, refraction and diffraction of EM waves.
 - 4.15 Describe the ground wave propagation of EM waves.
 - 4.16 Describe the space wave propagation of EM waves.
 - 4.17 Describe the sky wave propagation of EM waves.
 - 4.18 Explain the different layers of ionosphere.
 - 4.19 Define the terms skip distance, MUF (Maximum Usable Frequency), virtual height, Critical frequency.
 - 4.20 Explain the principle of tropospheric scatter of radio waves.

COURSE CONTENTS

1. Introduction to communication systems.

Elements of communication system, Frequency spectrum, Need for modulation, types of modulation, Noise, Signal to noise ratio noise figure, and noise temperature.

2. Modulation techniques.

Time domain equation of AM wave, Modulation index, effects of over modulation, bandwidth, power and voltage calculations of AM signal, Suppressed carrier and single sideband techniques, angle modulation- its types, Time domain equation of FM wave, Modulation index, bandwidth, side bands, power of side bands, frequency deviation, pre-emphasis, de-emphasis, merits and demerits of FM over AM, TDM, FDM.

3. Transmitters and Receivers.

Specifications of transmitters, low level modulation, high level modulation, heterodyne type transmitters, FM transmitter, Armstrong method of FM generation, sensitivity, selectivity, fidelity of receiver, super heterodyne AM receiver, selection of IF, AVC, IMRR, FM receiver, FM detector (Foster Seeley), Noise limiter circuit, comparison of AM & FM receivers.

4. Transmission Lines and Wave Propagation.

Electrical equivalent of transmission lines, characteristic impedance, reflection coefficient, SWR, transmission line losses, impedance matching, Electromagnetic waves, wave polarization and its types, reflection, refraction, diffraction, ground wave propagation, space wave propagation (LOS), sky wave propagation, ionosphere layers, critical frequency, MUF, virtual height, troposcatter propagation.

REFERENCE BOOKS

- 1 Electronic communications systems by Roy Blake, Thomson Delmar
- 2 Electronic Communication System by George Kennedy.
3. Communication Electronics Frenzel TMH
4. Electronic Communication Modulation and Transmission 2nd Edition-Schoenbeck
Publisher PHI
5. Electronic Communication Systems A Complete Course –4th Edi by Schweber PHI
7. Transmission and Propagation by Glazier.
8. Electronic and Radio Engineering by Terman.
9. Communication System by Umesh Sinha.
10. Analog Communication Systems – Principles and Practices by
KC RaveendraNathan University Press (India) Pvt Ltd. Hyderabad
11. Analog Communication by Manoj Duhan, I.K. International publishing house

DIGITAL ELECTRONICS

Subject Title : **Digital Electronics**
Subject Code : **EC-305**
Periods/Week : **06**
Periods/Semester : **90**

TIME SCHEDULE

Sno	Major topics	No. of periods	Weightage of marks	Short Answer Questions	Essay Questions
1	Basics of Digital Electronics	25	29	3	2
2	Combinational Logic circuits	20	26	2	2
3	Sequential Logic Circuits	25	29	3	2
4	Semiconductor Memories and A/D and D/A converters	20	26	2	2
Total		90	110	10	8

OBJECTIVES

On completion of the study of the subject a student should be able to comprehend the following:

Understand the basics of Digital Electronics

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

- 1.18 Apply De-Morgan's theorems and other postulates to simplify Boolean expressions (up to three variables).
- 1.19 Explain standard representations for logical functions(SOP and POS form)
- 1.20 Write Boolean expressions from the given truth table.
- 1.21 Use Karnaugh map to simplify Boolean Expression (up to 3 variables only).
- 1.22 List different digital logic families.
- 1.23 Explain the characteristics of digital ICs such as logic levels, propagation delay, Noise margin, Fan-in, Fan-out, and Power dissipation.
- 1.24 Compare the TTL, CMOS and ECL logic families.
- 1.25 Draw and explain TTL NAND gate with open collector.
- 1.26 Draw and explain TTL NAND gate with Totem pole output.
- 1.27 Draw CMOS NAND gate circuit and explain its operation.
- 1.28 List the numbers of Digital IC Logic gates.

Understand the working of combinational logic circuits

- 2.1 Give the idea of combinational logic circuits.
- 2.2 Draw Half adder circuit using Exclusive OR gate and an AND gate and explain its function using truth table.
- 2.3 Realise a Half-adder using NAND gates only and NOR gates only.
- 2.4 Draw the full adder circuit and explain its operation with truth table.
- 2.5 Show that two Half-adders and an OR – gate constitutes a full-adder.
- 2.6 Draw and explain a 4 Bit parallel adder using full – adders.
- 2.7 Draw and Explain 2's compliment parallel adder/ subtractor circuit.
- 2.8 Explain the working of a serial adder with a Block diagram.
- 2.9 Compare the performance of series and parallel adder.
- 2.10 Draw and explain the operation 4 X 1 MUX
- 2.11 Draw and explain the operation 1 to 4 demultiplexer.
- 2.12 Draw and explain 3 X 8 decoder.
- 2.13 Draw and explain BCD to decimal decoder.
- 2.14 List the applications of multiplexers and decoders.
- 2.15 Draw and explain Decimal to BCD encoder.
- 2.16 State the need for a tri-state buffer.
- 2.17 Draw and explain a simple tri-State Buffer.
- 2.18 Draw and explain one -bit digital comparator.
- 2.19 Draw and explain two bit digital comparator.

3.0 Understand the working of Sequential logic circuits

- 3.1 Give the idea of Sequential logic circuits.
- 3.2 Explain NAND and NOR latches with truth tables
- 3.3 State the necessity of clock and give the concept of level clocking and edge triggering,
- 3.4 Draw and explain clocked SR flip flop using NAND gates.
- 3.5 Study the need for preset and clear inputs .
- 3.6 Construct level clocked JK flip flop using S-R flip-flop and explain with truth table
- 3.7 Analyse the race around condition.
- 3.8 Draw and explain master slave JK flip flop.

- 3.9 Explain the level clocked D and T flip flops with the help of truth table and circuit diagram.
- 3.10 Give only the truth tables of edge triggered D and T flip flops with their symbols.
- 3.11 List the applications flip flops.
- 3.12 State the need for a Register and list the types of registers.
- 3.13 Draw and explain the working of 4 bit shift left and shift right registers
- 3.14 Draw and explain the working of 4-bit bi-directional shift register.
- 3.15 Draw and explain parallel in parallel out shift register
- 3.16 Explain the working of Universal shift register (74194)
- 3.17 Give the working of ring counter and its applications
- 3.18 Define modulus of a counter
- 3.19 Draw and explain 4-bit asynchronous counter and also draw its timing diagram.
- 3.20 Draw and explain asynchronous decade counter.
- 3.21 Draw and explain 4-bit synchronous counter.
- 3.22 Distinguish between synchronous and asynchronous counters.
- 3.23 Draw and explain asynchronous 3 bit up-down counter.
- 3.24 List the IC numbers of flip flops, registers and counters.

Understand working of memories ,A/D and D/A converters

- 4.1 State memory read operation, writes operation, access time, memory capacity, address lines and word length.
- 4.2 Classify various types of memories.
- 4.3 Differentiate between ROM and RAM
- 4.4 Explain basic principle of working of diode ROM
- 4.5 Distinguish between EEPROM and UVROM.
- 4.6 List different ROM and RAM ICs
- 4.7 Explain the working of basic dynamic MOS RAM cell.
- 4.8 Compare static RAM and dynamic RAM
- 4.9 Explain the working principle of NVRAM
- 4.10 State difference between Flash ROM and NV RAM
- 4.11 Give an idea of memory modules used in computers.
- 4.12 State the need for A/D and D/A converters.
- 4.13 Explain the terms resolution, Accuracy, Monotonicity and settling time of D/A converter.
- 4.14 Explain D/A conversion using binary weighted resistors.
- 4.15 Explain D/A conversion using R-2R ladder network.
- 4.16 Explain A/D conversion using counter method.
- 4.17 Explain A/D conversion using successive approximate method.

COURSE CONTENTS

1 Basics of Digital Electronics

Binary, Octal. Hexadecimal number systems. Conversion from one system to another number system. Binary codes, excess-3 and gray codes. Logic gates :AND, OR, NOT, NAND, NOR, Exclusive-OR. Logic symbols. Boolean algebra, Boolean expressions. Demorgan's Theorems. Implementation of logic expressions,SOP and POS forms, Karnaugh map application ,Logic families.

2 Combinational logic circuits

Implementation of arithmetic circuits, Half adder, Full adder, Serial and parallel Binary adder. Parallel adder/subtractor, Multiplexer, demultiplexer, decoder, encoder, tri-state buffer, Digital comparator- 1 bit and 2- bit

3 Sequential logic circuits

Principle of flip-flops operation, Concept of edge triggering, level triggering, RS, D, JK, T, JK Master Slave flip-flops., synchronous and asynchronous inputs and their use. Applications of flip flops,. Shift Registers- Types, shift left ,shift right, bidirectional,Parallel in parallel out ,universal shift registers, ring counter and its applications, Binary counter- ripple counter, synchronous counter, up-down counter.

4. Memories, A/D and D/A Converters

Memories-terminology related to memories,RAM, ROM, EEPROM,UV-EPRM, static RAM, dynamic RAM, Flash ROM, NVRAM, memory modules used in computers , Necessity of A/D and D/A converters. Weighted resistors and R- 2R ladder method of D/A converters. Counter and SAR method of A/D converters.

Reference Books

Digital Computer Electronics by Malvino and leach., TMH
Modern Digital Electronics By RP JAIN TMH
Digital Electronics Tokhem TMH
Digital Electronics Puri TMH
Digital Computer Fundamentals by Thomas Bartee

CIRCUIT THEORY

Subject Title	:	Circuit theory
Subject Code	:	EC-306
Periods/Week	:	06
Periods/Semester	:	90

TIME SCHEDULE

Sno	Major topics	No. of periods	Weightage of marks	Short Answer Questions	Essay Questions
1	Behaviour of Passive Components and resonance	25	29	3	2
2	Mesh current and Node voltage analysis	20	26	2	2
3	Network theorems	20	26	2	2
4	Coupled circuits, Circuit transients and Linear Wave Shaping	25	29	3	2
	Total	90	110	10	8

OBJECTIVES

On completion of the study of the subject a student should be able to comprehend the following:

Understand Behaviour of passive components and concept of resonance in A.C Circuits.

- 1.1 Differentiate between active and passive circuit elements. Explain addition of A.C. quantities (Real and imaginary).
- 1.2 State the basic differences between A.C & D.C.
- 1.3 Explain phase difference.
- 1.4 Understand the V-I characteristic & power calculation of a pure resistor circuit with a.c. source.
- 1.5 Understand the V-I characteristic & power calculation of a pure inductor and pure capacitor circuit with a.c. source.
- 1.6 Understand the V-I characteristics of series LC circuit and series RLC circuit and power calculations.
- 1.7 Understand the V-I characteristics of parallel RC circuit, RL circuit, and LC circuit.
- 1.8 Solve simple problems on the above.
- 1.9 Explain solving parallel Circuits by 'J' notation.
- 1.10 Define the term resonance.
- 1.11 Derive expressions for the resonant frequency of a series circuit; List the expressions for current and impedance at resonance.
- 1.12 Plot the frequency versus current and impedance variation curves.

- 1.13 Define Q factor of a coil and capacitor circuits.
- 1.14 Define bandwidth and selectivity.
- 1.15 Define half power frequencies and determine bandwidth from the frequency response characteristics.
- 1.16 Explain the effect of resistance on bandwidth.
- 1.17 Derive the expression for selectivity in terms of bandwidth and Q factor.
- 1.18 Write expression (without derivation) for resonant frequency of parallel circuits (L,C), (L,CR), (RL,C), (LC, RC)
- 1.19 List expressions (without derivations) for current and impedance at resonance for the above circuits
- 1.20 Mention the conditions for all resonance circuits.
- 1.21 Solve simple problems on series and parallel resonance circuits.
- 1.22 Distinguish between series and parallel resonance.
- 1.23 Identify the use of resonance in radio circuits.

Understand the mesh current and node voltage analysis

- 2.1 Define junction, branch and loop in circuits.
- 2.2 State limitations of Ohm's law.
- 2.3 State Kirchoff's current law and voltage law.
- 2.4 Explain star and delta circuits
- 2.5 Explain the concept of circuit transformation and equivalent circuits
- 2.6 Develop transformation formulae for star- delta transformations
- 2.7 Solve problems on the above.
- 2.8 Identify the mesh currents.
- 2.9 Determine the number of mesh equations required to solve the given network.
- 2.10 Write the mesh current equations for the given network and arrange them in matrix form.
- 2.11 Solve for mesh currents using Cramer's rule.
- 2.12 Define driving point impedance and transfer impedance of a network.
- 2.13 Compute driving point impedance and transfer impedance of a network.
- 2.14 Identify the nodes in a network.
- 2.15 Find the number of node voltage equations.
- 2.16 Write the node voltage equation for a given network and arrange them in matrix form.
- 2.17 Solve for node voltages using Cramer's rule.
- 2.18 Define the driving point admittance and transfer admittance.
- 2.19 Compute the driving point admittance and transfer admittance's.

Understand the network theorems

- 3.1 Explain ideal voltage source and ideal current source.
- 3.2 Convert ideal voltage source to ideal current source and vice versa.
- 3.3 State and use Thevenin's, Norton's, superposition, Reciprocity, and maximum power transfer theorems
- 3.4 Apply the above theorems to solve networks
- 3.5 Bring out the advantages and limitations of above theorems

Understand the coupled circuits, principle of Transients in RC, RL, RLC Circuits and concepts of linear wave shaping

- 4.1 Explain the principle of coupled circuits.
- 4.2 Define critical coupling.
- 4.3 Explain the dot convention used in coupled circuits.
- 4.4 List the expressions (without derivations) for equivalent series inductance of mutually coupled coils for series aiding and opposing conditions.
- 4.5 List the expressions for M and N in terms of L_1 , L_2 , L_{SA} , and L_{SO} .
- 4.6 Know expression for the reflected impedance of an inductively coupled circuit.
- 4.7 Explain the significance of reflected impedance in a double tuned circuit for different degrees of coupling.
- 4.8 Identify double humps.
- 4.9 Solve problems on coupled circuits
- 4.10 Know the terms initial conditions, steady state, and transient
- 4.11 Know transient analysis of RC circuits (No derivations, only expressions) with problems
- 4.12 Know transient analysis of RL circuits (No derivations, only expressions) with problems.
- 4.13 Define the term linear wave shaping
- 4.14 Derive time constant of a RC circuit
- 4.15 Draw a high pass R.C. Circuit
- 4.16 Predict the response of a high pass R.C. Circuit for a pulse voltage
- 4.17 Know the expression for lower 3dB frequency
- 4.18 Explain how a high pass R.C. Circuit works as a differentiator
- 4.19 Draw a low pass R.C. Circuit
- 4.20 Predict the response of Low pass R.C. Circuit for a pulse input, and Square wave input
- 4.21 Know the expressions for upper 3 dB frequency and rise time
- 4.22 Explain how a low pass R.C. Circuit works as an Integrator
- 4.23 Mention the use of differentiator and integrator circuits.

COURSE CONTENTS

Behaviour of Passive Components and Resonance in A.C. Circuits

Active and passive elements. Voltage current characteristic of a pure resistor, inductor, capacitor, LC, RC, RL, series and parallel circuit with a.c. source, power calculation. Series and parallel resonance. Condition for resonance, resonance curves, effect of resistance on Q factor selectivity and bandwidth, applications in radio circuits.

2. Mesh Current and Node Voltage Analysis.

Kirchoff's laws, Mesh currents, number of mesh current equations required, mesh equations by inspection, solving mesh equations by Cramer's rule, Driving point impedance. Transfer impedance. Nodal equations by inspection, solving nodal equations by Cramer's rule, Driving point admittance. Transfer admittance.

3. Network theorems.

Thevenin's theorem, Norton's theorem, superposition theorem, reciprocity theorem and Maximum power transfer theorem, applications of the above theorems to network.

4. Coupled circuits, Transient Analysis & Linear wave shaping circuits

Principles of coupling, Mutual inductance, Coefficient of coupling, analysis of coupled circuits, reflected impedance, critical coupling double humps. Transient Analysis at RC & RL circuits. Specification of a pulse and pulse wave form, differentiating and integrating circuits.

REFERENCE BOOKS

Circuits and Networks Russel L Meade & Robert Diffeenderfer Cengage Publishers
Circuit Theory – by Joseph Edminister, Tata Mc. Graw Hill co.,
Networks, lines & field – by Ryder, PHI
Networks & Lines by Umesh Sinha, Satyaprakash
Foundations of Electronic circuits and Devices by Meade
Thomson Delmar
Circuit analysis by Hayt & Kemerly.
Network analysis by Van Valkenberg.
Circuits and Networks Sudhakar & Shyam MohanTMH
Circuit Theory by K. S. Sunanda

ELECTRONIC CIRCUITS –I LAB

Subject Title	:	Electronic Circuits - I Lab
Subject Code	:	EC-307
Periods/Week	:	03
Periods/Semester	:	45

LIST OF EXPERIMENTS

1. Half-wave rectifier with and without filters.
2. Full-wave rectifier with and without filters.
3. Construct Zener voltage regulator and verify its operation.
4. Construct transistor Series voltage regulator and verify its operation.
5. IC Regulator.
6. Obtain the frequency response of RC coupled amplifier
7. Obtain the frequency response of transformer-coupled amplifier.
8. Obtain the drain and mutual characteristics of JFET and find the FET parameters from the characteristics.
9. Obtain the drain characteristics of MOSFET.
10. Obtain the V-I characteristics of UJT
11. Measurement of A_v, A_i, Z_i, Z_o of a CE transistor amplifier
12. Familiarization with electronic workbench (software package)
13. Design half wave and full wave rectifiers using electronic workbench

References :

1. Electronic Devices and Circuits By David A. Bell 4th edition PHI
2. Linear Electronic devices and circuits by NN Bhargava., TMH

COMMUNICATION ENGINEERING LAB

Subject Title	:	Communication Engineering Lab
Subject Code	:	EC-308
Periods/Week	:	03
Periods/Semester	:	45

LIST OF EXPERIMENTS

1. Simple method of generation and detection of A.M.
2. Simple method of generation and detection of F.M.
3. Study of AM super heterodyne receiver.
4. Test audio amplifier section of super heterodyne receiver.
5. Measurement of sensitivity, selectivity of a radio receiver using field strength meter.
6. Series Resonance
7. Parallel Resonance
8. Verification of Thevenin's theorem.
9. Verification of Super position theorem.
10. Verification of maximum power transfer theorem.
11. Differentiator and integrator circuits.
12. Design common emitter amplifier using electronic work bench

Note:- For Electronic workbench refer Electronic circuit design using electronic workbench by Muhammad H. Rashid, Thomson.

DIGITAL ELECTRONICS LAB

Subject Title	:	Digital Electronics Lab
Subject Code	:	EC-309
Periods/Week	:	03
Periods/Semester	:	45

LIST OF EXPERIMENTS

1. Verify the truth tables of AND, OR, NOT , NAND, NOR and Exclusive OR (using IC's).
2. Develop NOT,OR & AND operations using universal gates
3. Construct Half-adder and verify its truth table.
4. Construct Full-adder and verify its truth table
5. Construct and verify the truth tables of NAND & NOR latches
6. Verify the truth tables for RS, D, T, and JK and Master - Slave JK flip-flops.
7. Verify the function of counter (ICs like 7490, 7493, 74160).
8. Verify the function of shift register (ICs like 7495, 74194 etc.)
9. Verify the truth table of digital comparator using IC 7485.
10. Construct and verify the working of R-2R D/A converter.
11. Verify the working of Multiplexer (Using IC 74153)
12. Verify the working of Demultiplexers.
13. Study the read and write operation using IC 7489
14. Design and simulate half adder ,full adder circuits using workbench software etc.,

IV SEMESTER

ENGLISH – III
(Common Subject)

Subject title : English -III
Subject code : EC-401
Periods per week : 03
Periods / Semester : 45

TIME SCHEDULE

ELECTRONIC CIRCUITS -II

Subject Title : **Electronic Circuits - II**
Subject Code : **EC-402**
Periods/Week : **06**
Periods/Semester : **90**

Sno	Major Topics	No of Periods	Weightage of marks	Short Answer Questions	Essay Questions
1	Feedback & Power Amplifiers	25	29	3	2
2	Oscillators	20	26	2	2
3	Sweep circuits & Multivibrators	20	26	2	2
4	Opto-electronic devices Timers & Phase locked loops	25	29	3	2
Total		90	110	10	8

OBJECTIVES

On completion of the study of the subject a student should be able to comprehend the following:

1.0 Understand the working of feedback amplifiers and power amplifiers

- 1.1 Compare Negative and Positive feed back.
- 1.2 Draw the block diagram of negative feed back amplifier and explain
- 1.3 List the types of negative feedback amplifiers
- 1.4 Draw the block diagrams of voltage series ,current series, current shunt and voltage shunt feedback amplifiers
- 1.5 Derive the expression for the gain of negative feedback amplifiers
- 1.6 Explain the effect of negative feed back on gain, bandwidth, input and output impedances.
- 1.7 List the advantages of negative feed back amplifiers
- 1.8 Explain why a voltage amplifier cannot be used as a power amplifier.
- 1.9 Distinguish between voltage amplifiers and power amplifiers.
- 1.10 Classify power amplifier circuits on the basis of frequency, period of conduction, and configurations.
- 1.11 Define efficiency of a power amplifier.
- 1.12 Draw the circuit of a class-A amplifier with resistor load at the collector and explain the operation.

- 1.13 Derive an expression for efficiency of the above circuit.
- 1.14 Draw the circuit of a class-A amplifier with transformer at the collector and explain the operation.
- 1.15 Derive an expression for efficiency of the above circuit.
- 1.16 List the advantages of push pull power amplifier.
- 1.17 Explain the operation of class-B push-pull amplifier and mention its disadvantages.
- 1.18 Derive an expression for efficiency of the above circuit.
- 1.19 State the need of class-AB push-pull operation.
- 1.20 Draw the circuit of a complementary symmetry push-pull power amplifier and explain its working.
- 1.21 State the advantages and disadvantages of the above circuit.
- 1.22 List the applications of power amplifiers.
- 1.23 List different IC numbers for power amplifiers.
- 1.24 State the necessity of Heat sink for a power transistor and power I.C. device.
- 1.25 List the different types of heat sinks and mounting methods.
- 1.26 State the requirements of a tuned power amplifier used in RF circuits.
- 1.27 Draw and explain single tuned and double tuned amplifier.
- 1.28 Describe class-C tuned power amplifier circuit with waveforms and know its efficiency.

2.0 Understand the working of oscillators

- 2.1 State the condition for an amplifier to work as an oscillator.
- 2.2 State the requisites of an Oscillator
- 2.3 Explain the Barkhausen criteria in oscillators.
- 2.4 Classify oscillator circuits.
- 2.5 Draw and Explain the working of an R.C. phase shift oscillator
- 2.6 Draw and explain the working of Wein bridge oscillator.
- 2.7 Draw and Explain the working of tuned collector oscillator
- 2.8 Draw and explain the working of Hartley oscillator.
- 2.9 Draw and Explain the working of Colpitts oscillator
- 2.10 Write the expressions for frequency of oscillation and condition for sustained oscillations of the above circuits
- 2.11 Explain the disadvantages of RC and LC oscillators.
- 2.12 List the advantages of crystal oscillators over other types
- 2.13 Draw the equivalent circuit of crystal and explain.
- 2.14 Draw and explain the working of transistor crystal oscillator.
- 2.15 State the reasons for instability in oscillator circuits.
- 2.16 Suggest the remedies for instability in oscillator.
- 2.17 List the applications of oscillators.

3.0 Understand the working of Sweep circuits and multivibrators

- 3.1 Define Sweep Voltage.
- 3.2 State the fundamental consideration of sweep waveform.

- 3.3 Distinguish between voltage and current time-base generation and list their applications.
- 3.4 Draw and explain Bootstrap sweep circuit.
- 3.5 Draw and explain Miller's sweep circuit using op Amp.
- 3.6 Draw a simple current sweep circuit and explain with waveform.
- 3.7 Explain how a transistor works as a switch in CE model.
- 3.8 Classify Multi vibrators.
- 3.9 Draw and explain the working of Transistor bistable multi vibrator with waveforms.
- 3.10 Draw and explain the working of Transistor monostable multivibrator with waveforms.
- 3.11 Draw and explain the working of Transistor astable multi vibrator with waveforms.
- 3.12 List the applications of multivibrators
- 3.13 Draw and explain the working of Schmitt trigger circuit.
- 3.14 List the different types of clippers.
- 3.15 Explain the unbiased and biased clippers.
- 3.16 Explain the double ended clipper.
- 3.17 Explain the principle of clamper circuit.
- 3.18 List the applications of clippers and clampers

4.0 Understand operational amplifiers, Timers and PLL

- 4.1 Classify optoelectronic devices.
- 4.2 Explain the operation of LDR and draw its characteristics.
- 4.3 Explain the construction, working principle and characteristics of LED
- 4.4 Explain the construction and working principle of LCD.
- 4.5 Explain the applications of LED and LCD in discrete displays, dot-matrix and seven segment displays.
- 4.6 Explain the construction, operation and characteristics of photo diode.
- 4.7 Explain the construction, operation and characteristics of photo transistor.
- 4.8 List the applications of photo diode and photo transistor
- 4.9 Give an idea of opto-coupler
- 4.10 Explain the principle and working of photovoltaic cells.
- 4.11 Explain the principle and working of photo conductive cells.
- 4.12 Draw the block diagram of 555 IC and explain.
- 4.13 Explain the working of astable multi using 555 IC.
- 4.14 Explain the working of monostable Multivibrator using 555 IC.
- 4.15 Explain Astable multivibrator using op.amp.
- 4.16 Explain Monostable multivibrator using op amp.
- 4.17 State PLL
- 4.18 Draw and explain the block diagram of PLL – LM565.
- 4.19 Explain the operation VCO (LM566)
- 4.20 Define lock range of PLL
- 4.21 Define capture range of PLL.
- 4.22 List the applications of PLL.
- 4.23 Explain frequency multiplier and FM demodulator using PLL.

COURSE CONTENTS

1. Feedback & Power amplifiers

Principle of negative and positive feedback. Feedback amplifiers- block diagram ,types, expression for gain ,effects on gain,bandwidth ,input and output impedances,advantages,power amplifier - classification amplifier. class – A, push-pull, complementary push-pull amplifiers. Applications of power amplifiers. Heat sink. Tuned power amplifier.- single and double tuned, class C tuned amplifiers.

2. Oscillators

Requisites of an oscillator. Classification of oscillators. RC phase shift oscillator, Wein bridge oscillator,tuned collector oscillator, Hartley, Colpitts, Crystal oscillator,applications

3. Sweep circuits & Multivibrators

Time base generation, Boot-strap circuit, Miller sweep circuit, Current sweep circuit. Classification of multi vibrators. Astable , monostable and bistable multivibrators using transistors. Schmitt trigger,clippers and clampers,applications

4. Opto Electronic Devices, Timers & Phase Locked Loops

Classification of optoelectronic devices, LDR- working principle, characteristics. LED &LCD–construction ,working principle ,characteristics. photo diode and phototransistor – working principle characteristics ,applications.photovoltaic cell-Block diagram 555 timer. Astable and mono table multi vibrators using 555 timer and operational amplifier. Block diagram of PLL (LM565), lock range, capture range and applications of PLL.

REFERENCES BOOKS

1. Principles of Electronics by V.K.Mehtha.S.Chand
2. Operational amplifiers by Gykwad.
3. Electronic Devices and Circuits by David A Bell, PHI
4. Pulse digital and switching circuits by Millman and Taub TMH
5. Basic Electronic Principles by Malvino. TMH
6. Basic Electronics by B.L.Theraja. S.Chand
7. Integrated Electronics Millman & Halkias TMH
8. Electronic Circuits by Schilling & Belove
9. Electronic devices and circuits by Sanjeev Guptha

COMMUNICATION SYSTEMS

Subject Title : **Communication Systems**
Subject Code : **EC-403**
Periods/Week : **06**
Periods/Semester : **90**

TIME SCHEDULE

Sl. No	Topic	No. Periods	Weightage of marks	Short Answer Questions	Essay Questions
1	Digital Communication and Modulation	25	29	3	2
2	Multiplexing and multiple access techniques	20	26	2	2
3	Telephone system & Fax	20	26	2	2
4	Antennas	25	29	3	2
	Total	90	110	10	8

OBJECTIVES

On completion of the study of the subject a student should be able to comprehend the following:

1.0 Understand the principles of Digital Communication and Digital Modulation.

- 1.1 Compare analog and digital communication techniques.
- 1.2 Define information capacity of a channel.
- 1.3 State sampling theorem and explain its significance.
- 1.4 Describe the types of pulse modulation.
- 1.5 Describe pulse-code modulation
- 1.6 Define quantization, bit rate, and dynamic range for PCM systems.
- 1.7 Describe the coding and decoding of a PCM signal.
- 1.8 Describe delta modulation.
- 1.9 Explain the advantages of delta modulation over PCM.
- 1.10 Describe the operation of vocoders.
- 1.11 Describe different data compression techniques.
- 1.12 State the need of data codes.
- 1.13 Describe Baudot, ASCII, and ARQ codes.
- 1.14 Distinguish between synchronous and asynchronous communication.
- 1.15 Explain the function of start and stop bits.
- 1.16 Describe the conversion between parallel and serial data.
- 1.17 Describe the process of synchronous transmission.

- 1.18 Describe several types of error control and know how errors can be detected and corrected.
- 1.19 State the need for digital modulation.
- 1.20 Describe the basic types of digital modulation.
- 1.21 Mention maximum data for a channel.
- 1.22 Explain the difference between bit rate and baud rate.
- 1.23 Briefly explain ASK, FSK and PSK.
- 1.24 Explain Quadrature Amplitude Modulation (QAM).
- 1.25 Compare the performance of ASK and FSK.

2.0 Understand the principles of Multiplexing and Multiple access techniques.

- 2.1 Introduction to Multiplexing and Multiple accesses.
- 2.2 State the need for a modem in data communication.
- 2.3 Describe the operation of telephone modem.
- 2.4 Explain the difference between fax and data modem.
- 2.5 Know the principles of digital modulation.
- 2.6 Explain cable modems.
- 2.7 Concepts of Digital Subscriber Line (DSL).
- 2.8 Explain Asynchronous Digital Subscriber Line (ADSL) telephone communication.
- 2.9 Explain the difference between multiplexing and multiple access.
- 2.10 Compare the three major types of multiplexing and multiple access.
- 2.11 Explain FDM technique used in telephony.
- 2.12 Explain TDM technique used in telephony.
- 2.13 Describe the concepts of FDMA.
- 2.14 Describe the concepts of TDMA.
- 2.15 Describe the principles of spread-spectrum communication.
- 2.16 Explain frequency-hopping system.
- 2.17 Explain direct-sequence system.
- 2.18 Introduction to CDMA.
- 2.19 Describe code-division multiple access (CDMA) system.
- 2.20 Compare CDMA with FDMA and TDMA.

3.0 Know Telephone System.

- 3.1 Classify switched telephone systems.
- 3.2 Describe the topology of the switched telephone network.
- 3.3 Explain the operation of basic telephone equipment.
- 3.4 Explain the operation of electronic telephone equipment.
- 3.5 Mention the advantages of electronic telephony over manual telephony.
- 3.6 Describe the various signals present on a local-loop telephone line and explain the function of each.
- 3.7 Know signal and noise levels in a telephone system.
- 3.8 Describe several methods for switching telephone signals.
- 3.9 Compare in-band and out-of-band signalling systems for telephony.
- 3.10 Explain briefly the use of Signal system 7.

- 3.11 Explain the use of FDM in telephony
- 3.12 Bandwidth requirements for FDM signals.
- 3.13 Explain the use of TDM in telephony.
- 3.14 Know about ISDN.
- 3.15 Advantages of ISDN.
- 3.16 Describe the working principle of EPABX
- 3.17 Explain the concepts of digital EPABX system.
- 3.18 Concepts of FAX system.
- 3.19 Describe the working principle of FAX machine.
- 3.20 Know about Internet telephony.

4.0 Understand Antennas

- 4.1 Introduction to antenna systems.
- 4.2 Sketch the radiation pattern of isotropic and half wave dipoles.
- 4.3 Define radiation resistance.
- 4.4 Define decibel and neper.
- 4.5 Define antenna gain, directivity, beamwidth, and front to back ratio.
- 4.6 Explain the basic principles of operation of antenna systems.
- 4.7 Explain the terms antenna impedance and polarization.
- 4.8 Explain the concept of grounding.
- 4.9 Describe how the antenna's electrical length be increased with out increasing its physical size.
- 4.10 Describe the principle of Marconi (monopole) antenna.
- 4.11 Describe the operation and applications of folded dipole.
- 4.12 Describe the operation and applications of loop, helical antennas.
- 4.13 Explain antenna matching with reference to non-resonant antennas.
- 4.14 State the need of antenna array.
- 4.15 Explain the operation of broadside and end fire arrays.
- 4.16 Explain the function of parasitic elements- reflector and director.
- 4.17 Explain radiation pattern and applications of Yagi antenna.
- 4.18 Explain radiation pattern and applications of Log periodic antenna.
- 4.19 Explain radiation pattern and applications of turnstile antenna.
- 4.20 Explain the principle of parabolic reflector.
- 4.21 Explain the operation of Dish antenna system.
- 4.22 Explain the reduction in size of antenna with increase in frequency.
- 4.23 List the applications of dish in VSAT.
- 4.24 Explain briefly working of cell-site antenna and mobile portable antenna used in cellular communication.
- 4.25 Explain the use of diversity and down tilt in cellular base station antennas.

COURSE CONTENTS

1. Digital Communication and Digital Modulation.

Introduction to digital communication, Sampling theorem, pulse modulation, pulse code modulation, delta modulation, , vocoders and data compression, Data coding, asynchronous transmission, synchronous transmission, error detection and correction, digital modulation, Amplitude shift keying(ASK), frequency shift keying (FSK), phase shift keying (PSK), quadrature amplitude modulation (QAM).

2. Multiplexing and multiple access techniques.

Telephone modem, fax modem and data modem, cable modem, digital subscriber lines, ADSL, multiplexing and multiple access, FDM and TDM, FDMA and TDMA, spread-spectrum, code-division multiple access (CDMA).

3. Telephone System.

Public switched telephone network(PSTN), manual and electronic equipment, the local loop, signals and noise in telephone system, switching telephone signals, in band and out band signalling, SS-7 system,FDM and TDM in telephony, ISDN- merits, EPABX, digital EPABX, FAX, Internet telephony.

4. Antennas.

Isotropic, half wave dipole antennas, antenna characteristics – radiation resistance, efficiency, gain, directivity, beam width, front to back ratio, impedance, polarisation. Effect of ground on antennas monopole, folded dipole, non resonant antennas, Antenna arrays – broadside, end fire, Yagi Uda, log periodic, turnstile antennas, Parabolic reflectors, Dish antennas, VSAT and Cellular antennas.

REFERENCES BOOKS

1. Electronic communications systems by Roy Blake, Thomson Delmar
2. Electronic Communication System by George Kennedy.
3. Antenna Systems by K. D. Prasad.
4. Electronic Communication Systems A Complete Course –4th Edi by Schweber PHI
5. Transmission and Propagation by Glazier.
6. Electronic Communication by Roddy & Coolen. PHI
7. Communication System by Umesh Sinha.

MICROPROCESSORS

Subject Title : **Microprocessors**
Subject Code : **EC-404**
Periods/Week : **06**
Periods/Semester : **90**

TIME SCHEDULE

Sno	Major Topics	No. of periods	Marks	Short Answer Questions	Essay Questions
1	Introduction to Computer organization	20	26	2	2
2	Architecture of 8086	25	29	3	2
3	Instruction Set of 8086 and Programming	25	26	3	2
4	Architecture of 80286, 386,486 and Pentium	20	29	2	2
	Total	90	110	10	8

OBJECTIVES

On completion of the study of the subject a student should be able to comprehend the following:

Understand Computer architecture and its organization

- Draw the block diagram of digital computer and explain its functional organization
- Draw the block diagram of Accumulator based CPU
- Explain the function of each unit
- Define Micro and Macro operations
- Explain stored program concept.
- Know the representation of Fixed and Floating point numbers.
- Define Opcode and Operand.
- Explain Instruction format.
- Explain Zero address ,One address ,Two address and Three address instructions with examples
- State memory hierarchy
- Explain Cache memory organization
- Explain Associative memory
- Describe Virtual memory organization.
- Explain memory interleaving

Understand the Architecture of 8086

Give the evolution of INTEL family microprocessors
Compare 8-bit and 16-bit microprocessors
Explain the concepts of Sequential processing, Parallel processing and Pipelining
State the need of memory segmentation
State the features of Intel 8086 microprocessors
Draw the internal architecture of 8086.
State the need of bus control logic
Explain the significance and importance of functional units involved in the architecture
Explain the importance of segment registers
Explain Instruction Pointer and its importance
Explain the Instruction Queue and its storage
Describe the working of General purpose registers
State the purpose of Pointer and Index registers
Briefly explain ALU and control unit
Explain the flags of 8086
Draw the pin diagram of 8086.
Explain the significance of each pin.
Describe the maximum and minimum mode operation.
Explain the need for calculation of physical address.
Illustrate the generation of 20-bit Physical address with an example
Know the need of interrupts.
Explain the Interrupt response in 8086
Types of interrupts of 8086

Know the instruction set of 8086 and programming

Draw the generalized Instruction format of 8086
Illustrate the generation of code with few examples
Explain Addressing modes of 8086 with examples
Classify the Instruction set of 8086
Understand the data transfer instructions of 8086.
Understand the Arithmetic instructions of 8086.
Understand the Logic instructions of 8086.
Understand the processor control instructions of 8086.
Understand the instructions affecting flags of 8086.
Understand the control transfer (branching) instructions of 8086.
Understand the String manipulation instructions of 8086.
Describe assembler directives.
Describe the use of various assembly language development tools like Editor, Assembler, Linker, Locator and Debugger.
An introduction to assembly language Programming
Describe the procedure for executing assembly language program with an assembler.
Write simple assembly language programs

Illustrate examples to solve IF-THEN, IF-THEN-ELSE, multiple IF- THEN-ELSE and REPEAT-UNTIL type programs.
Explain Subroutine or Procedure programming
Illustrate Procedure CALL , RETURN and parameter passing.
Give simple program using procedure and parameters passing.

Understand the Architecture of 80286, 386 , 486 and Pentium microprocessors

State the features of 80286 microprocessor
Describe the architecture of 80286.
Explain operating modes of 80286
Describe memory management of 80286.
State the features of 80386
Describe the architecture of 80386.
Explain the operating modes of 80386
Explain memory organization in 80386
Describe pipe lining.
Describe instruction level parallelism.
Describe and compare RISC and CISC.
State the features of 80486
Describe the architecture of 80486
Explain the super scalar architecture
State the features of Pentium microprocessor
Describe the architecture of Pentium.
Compare 80286,386,486 and Pentium processors

COURSE CONTENTS

1. Introduction to Computer Organization

Basic digital computer- Organization-Accumulator based CPU-Micro and Macro operations- Stored program concept –Fixed and Floating point representation- instruction formats-memory hierarchy – Cache memory – Associative memory – Virtual memory – Memory interleaving

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– 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 – Assembler directives – Assembler instruction format - program development tools – procedure for executing assembly program – sample programs.

4. 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, Super scalar architecture, Comparison between all Processors

Reference Books

1. Computer Organization by Hayes Mc.Graw Hill
2. Computer System Architecture by Morris Mano PHI
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
7. Microcomputer systems: The 8086 Family Yu-Cheng Liu & Glenn A Gibson. PHI
8. Microprocessors Theory and applications Intel and Motorola by Rafiquzzaman. PHI
9. Microprocessors and interfacing programming and Hardware by Douglas V. Hall McGraw Hill

ELECTRONIC MEASURING INSTRUMENTS

Subject Title	:	Electronic Measuring Instruments
Subject Code	:	EC-405
Periods/Week	:	05
Periods/Semester	:	75

TIME SCHEDULE

S.no	Major Topics	No. of periods	Weightage of Marks	Short Answer Questions	Essay Questions
1	Analog instruments	20	29	3	2
2	Digital instruments	20	29	3	2
3	Cathode Ray Oscilloscope	20	26	2	2
4	Signal generators	15	26	2	2
	Total	75	110	10	8

OBJECTIVES

On completion of the study of the subject a student should be able to comprehend the following:

1.0 Understand the working Analog instruments

1. 1 Explain the construction and principle of operation of PMMC instrument.
1. 2 Explain the principle of extending the range of DC ammeter
1. 3 Explain the principle of extending the range of DC voltmeter.
1. 4 Explain the principle and working rectifier type voltmeter and ammeter.
1. 5 Explain the construction and principle of series and shunt type ohmmeters.
1. 6 Describe and calculate meter-loading with example.
1. 7 Explain the working of FET input voltmeter with necessary circuit (DC/AC) and emitter follower voltmeter.
1. 8 Explain the working of differential voltmeters.
1. 9 Explain the use of high voltage probe and clamp on current probe.
1. 10 Explain the resistance measurement using Wheat Stone Bridge.
1. 11 Explain the inductance measurement using Maxwell's Bridge
1. 12 Explain the capacitance measurement using Schering Bridge with block diagram.
1. 13 Explain the working of Q meter with diagram.
1. 14 Explain the working of Distortion Factor Meter with block diagram.

2.0. Understand working of Digital instruments

- 2.1 List the advantages of digital instruments over analog instruments.
- 2.2 Explain the working of digital voltmeters (Ramp type, dual slope integration type, successive approximation type) with block diagrams.
- 2.3 List the specifications of digital voltmeters.
- 2.4 Explain the working of Digital Multimeter with block diagram.
- 2.5 List the specifications of Digital Multimeter.
- 2.6 Explain the working of digital frequency meter with block diagram.
- 2.7 List the specifications of digital frequency meter.
- 2.8 Explain the accuracy of a frequency meter.
- 2.9 Explain the working of digital LCR meter with block diagram.
- 2.10 List the specifications of digital LCR meter.
- 2.11 Explain the working of digital IC tester with block diagram.
- 2.12 Explain the working of logic analyser with block diagram.
- 2.13 Explain the basic working principle of spectrum analyser and state its use.

3.0 Understand construction, working principle and use of CRO

- 3.1 Draw the block diagram of general purpose CRO and describe the function of each block.
- 3.2 Sketch CRT and describe the function of different parts.
- 3.3 Explain the necessity of time base, deflection amplifiers.
- 3.4 Write the expression for deflection sensitivity.
- 3.5 Solve simple problems on above.
- 3.6 List the conditions for stationary waveforms.
- 3.7 List the conditions for flicker free waveforms.
- 3.8 Explain the function of each stage in a CRO with block diagram.
- 3.9 Explain triggered sweep with necessary circuit, mention its advantages.
- 3.10 Identify the function and use of various controls and terminals of CRO and list its specifications.
- 3.11 Explain the procedure for measurement of voltage (DC & AC) frequency, phase, time interval, depth of modulation, pulse parameters, rise time, fall time, delay time with CRO.
- 3.12 Explain the method of conversion of single trace CRO into dual trace CRO with block diagram.
- 3.13 Give basic principle of sampling oscilloscope.
- 3.14 List different types of probes used in oscilloscopes.
- 3.15 Explain sensitivity, frequency response, voltage measurement and accuracy.
- 3.16 State the necessity of plotter and recorders
- 3.17 Explain the working of recorders.
- 3.18 Explain the working of XY plotter

4.0. Understand the construction, working principle of AF, RF signal generators and power meters

- 4.1 Explain the working of AF Oscillator (sine & square) with block diagram.
- 4.2 List the front panel controls and specifications of AF Oscillator.
- 4.3 Explain the working of function generator with block diagram.
- 4.4 List the applications of AF oscillators and function generators.
- 4.5 Explain the working of RF signal generator.

- 4.6 List the specifications and applications of RF signal generator.
- 4.7 Explain the importance of shielding in RF generators.
- 4.8 Explain the working of AF power meter.
- 4.9 Explain the working of bolometer type RF power meters.
- 4.10 List the applications of power meters.

COURSE CONTENTS

1. Analog instruments:

PMMC Instrument, extending the range of instruments, series and shunt type ohmmeter, FET input voltmeter, differential voltmeter, Wheatstone, Maxwell, Schering Bridge. Q meter, Distortion Factor Meter

2. Digital Instruments:

Digital voltmeter, Digital Multimeter. Digital frequency meter, Digital LCR Meter. digital IC tester, Logic analyser, spectrum analyser

3. Cathode Ray Oscilloscope:

Block diagram of general purpose CRO, study of different blocks (in detail) sweep circuits, triggered sweep circuit, controls, specifications, applications, single trace CRO, dual trace CRO, sampling CRO. XY Plotter and Recorders.

4. Signal Generators & Power meters

AF oscillator, function generator, RF signal generator and specifications, AF and RF power meters.

REFERENCES

1. Electronic instrumentation and measurements by David A Bell, PHI
2. Electronic Instrumentation by H S Khalsi, TMH
3. Electronic measurements by A K Shaurky
4. Electronic Measurements & Instruments by Cooper PHI
5. Modern Electronic Equipment by Khandpur
6. Electrical, Electronic Measurements and Instruments by Sahney
7. Electronic Measuring Instruments Gupta TMH

AUDIO & VIDEO SYSTEMS

Subject Title : **Audio and Video Systems**
Subject Code : **EC-406**
Periods/Week : **05**
Periods/Semester : **75**

TIME SCHEDULE

S.No	Major Topics	No. of periods	Weightage of marks	Short Answer Questions	Essay Questions
1	Audio Systems	20	29	3	2
2	TV Picture & composite Video Signal	15	26	2	2
3	Monochrome & Colour TV	25	29	3	2
4	Cable, Satellite and digital TV	15	26	2	2
	Total	75	110	10	8

OBJECTIVES

On completion of the study of the subject a student should be able to comprehend the following:

Understand basics of audio systems.

Define speech, music and noise.

Know the nature of sound, reflection, refraction, diffraction and absorption.

Explain frequency response and equalization.

Know the concept of Hi-Fi and Stereo.

Know the need of bass, treble, balance, and volume control in stereo amplifier.

Explain a simple circuit showing the above controls.

Briefly describe disc recording of audio signal with block diagram.

Briefly describe reproduction of audio signal recorded on disc with block diagram.

Briefly explain the principle of magnetic recording and reproduction.

List the advantages and disadvantages magnetic recording.

List the types of optical recording.

Explain the method optical recording of sound on film.

Explain the method optical recording of sound on Compact Disc.

List the advantages and disadvantages of CDs.

Explain optical pick-up system.

Explain working of compact disc player with block diagram.

Know the MP3 format and differentiate this with audio CD.

Differentiate CD and DVD.

Explain the working principle of DVD player.

Know the concept of noise reduction using DOLBY system.

Understand TV picture & composite video signal

Explain formation of picture.

State the need for horizontal and vertical scanning.

State the frame and field frequencies.

State need for vertical synchronisation, horizontal synchronisation and blanking pulses.

Mention the frequency allocation of T.V. Channels used in India.

List the standards of T.V. transmissions as per C.C.I.R.

Mention different types of scanning.

Distinguish between progressive and interlaced scanning.

Draw the standard scanning pattern in an interlaced scanning.

State the need for interlaced scanning with reference to Bandwidth.

Name the different pulses in a composite video signal.

State and compare positive and negative modulation.

Sketch composite video signal as per I.S.I. specification.

State the need for front porch and back porch in blanking pulses.

State the necessity of equalising pulses and serrated vertical blanking pulses.

Understand the working of Monochrome & Colour Television.

List different video camera tubes.

Describe the construction of Image Orthicon camera tube with a sketch.

Explain the principle of operation and working of above.

Understand the working of silicon diode array camera tube.

Draw the block diagram of a T.V. receiver and state the function of each block.

Sketch the types of signals at various input and output stages in the block diagram.

Explain the constructional features and differences between horizontal and vertical deflecting coils.

Introduction to Colour Television system.

Explain the main characteristic of human eye with regard to perception of colours.

Distinguish between additive and subtractive mixing of colours.

Explain complementary colours, hue, saturation, and Colour circle.

Explain compatibility and reverse compatibility in TV system.

Mention the different standards of Colour transmission system like NTSC, PAL and SECAM.

Explain how chrominance signals are transmitted on one carrier in PAL system.

Draw the block diagram of a Colour TV transmitter and state the function of each block.

Draw the block diagram of a Colour TV receiver and state the function of each block.

Explain the processing of Colour video signal (PAL system) in a Colour receiver.

State the different Colour receiver operating and servicing controls.
Describe constructional features of Colour picture tubes.
Explain the De-gaussing circuit in Colour TV receiver.

5.0 Understand the principles of Cable, Satellite and HDTV

- 1.1 Draw and explain the block diagram of CATV.
- 1.2 Explain the cable TV components such as amplifiers directional couplers and converters.
- 1.3 Explain the necessity of midband and superband channels
- 1.4 State the need for satellite for TV broadcasting over wide area.
- 1.5 Explain the DTH reception with block diagram.
- 1.6 List the deficiencies in the existing TV system.
- 1.7 Explain the how the existing TV system can be improved in HDTV system.
- 1.8 List HDTV standards.
- 1.9 Explain TV Remote control transmitter with block diagram.
- 1.10 Explain TV Remote control receiver with block diagram.

COURSE CONTENTS

1. Introduction to Audio Systems

properties of sound, Hi-Fi and stereo systems, disc recording and reproduction. magnetic recording and reproduction, optical recording. Working of CD player, MP3 player, DVD player.

2. TV Picture & Composite Video Signal

Picture elements. Horizontal and vertical scanning, frame and field frequencies, Horizontal and vertical synchronisation, Horizontal and vertical blanking. T.V. Channel standards. Construction of composite Video signal, Horizontal blanking time and vertical blanking time. Linear scanning, standard scanning pattern. Flicker, sync Pulses, blanking signals.

3. Monochrome and Colour Television

T.V. Camera tubes, image orthicon, silicon diode array camera tube. Block diagram of TV receiver, constructional features of deflection yoke, fundamental concepts of 3 colours systems. Additive and subtractive mixing of colours, different Colour systems like NTSC, PAL, and SECAM. Colour TV Transmitter block diagram. Colour TV receiver block diagram (PAL). Colour video signal processing, operating and service controls, colour picture tube, degaussing.

4. Satellite and Cable TV

Cable TV, DTH system, DTH receiver, HD TV, Remote Control.

REFERENCES

Colour Television by R.R.Gulati. TMH
Audio and Video system by R.G. Gupta TMH
Communication Electronics by Frenzel TMH
Television Engineering by Dhake.
Audio and Video systems by Ajay Sharma, Dhanpat Ray & sons
Satellite TC and Cable TV system by R.R.Gulati TMH
Multimedia Sound & Video by Jose'Lozans. PHI
Basic Radio And Television Sharma TMH.

ELECTRONIC CIRCUITS –II LAB

Subject Title	:	Electronic Circuits –II Lab
Subject Code	:	EC–407
Periods/Week	:	03
Periods/Semester	:	45

LIST OF EXPERIMENTS

Photo diode, Photo transistor characteristics

Negative feedback voltage amplifier.

Push-pull power amplifier class-B operation.

Positive and negative clipper with and without bias

Positive and negative Clamper circuits

Operation amplifier as inverter, summer.

Operational amplifier as differentiator and integrator.

RC-phase shift oscillator.

Wein bridge oscillator.

Hartley /Colpitts oscillator

Monostable multi vibrator using transistors.

Study of LDR and LED.

Astable multivibrator using 555 IC.

Design and setup VCO using LM566.

Design and simulate R-C phase shift and Hartley oscillators using electronic work bench.

COMMUNICATION SYSTEMS lab

Subject Title : **Communication Systems Lab**
Subject Code : **EC – 408**
Periods/Week : **03**
Periods/ Semester : **45**

LIST OF EXPERIMENTS

1. Set up an ASK/FSK/PSK modulator and observe the waveforms.
2. Set up an ASK/ FSK/PSK demodulator and observe the waveforms.
3. Set up a Pulse Code Modulator / Demodulator circuit and the waveforms.
4. Set up Time Division Multiplexing/ Demultiplexing circuit and observe waveforms.
5. DC characteristics of LED and PIN photodiode.
6. Optical transmitter using analogue modulator.
7. Data transmission through fibre optic link.
8. Setting of fibre optics voice link using AM modulation.
9. PI characteristics of LASER diode.
10. Construct and test the Yagi-Uda antenna.
11. Study the DTH antenna and connect the DTH antenna to the TV.
12. Plot and analyse the radiation pattern of following antennas using Antenna Trainer Kit
 - a) Dipole
 - b) Half wave dipole.

MICROPROCESSORS LAB

Subject Title : **Microprocessors Lab**
Subject Code : **EC-409**
Periods/Week : **03**
Periods/Semester : **45**

LIST OF EXPERIMENTS

MICRO PROCESSOR LAB

1. Familiarization of Assembler (TASM /MASM)
2. Program to perform 16-bit addition.
3. Program to perform 16-bit subtraction.
4. Program to perform 16-bit multiplication.
5. Program to perform 16-bit division.
6. Program to find biggest number in the given array.
7. Program to arrange data in ascending order.
8. Program to find LCM for the given data.
9. Program to convert binary code to gray code.
10. Program to find factorial of 8-bit data.
11. Study of performance of various processors using “bench mark comparison”
(Refer the website: www.cpubenchmark.net)

V SEMESTER

DIPLOMA IN ELECTRONICS & COMMUNICATION ENGINEERING
(CURRICULUM C-09)
V SEMESTER
(INDUSTRIAL TRAINING)
Duration: 6 months

OBJECTIVES

On completion of a spell of practical training in a industry, the student will be able to

- 1.0 Know the organizational set up from top executive to workmen level**
 - 1.1 Know the function of each department/section
 - 1.2 Know the inter relationship among various department/sections

- 2.0 Know the various raw materials used as feed stock and their source.**
 - 2.1 Understand the various intermediates produced and their further processing and / or waste disposal.
 - 2.2 Know the final products, its composition and its commercial importance's, uses and applications.

- 3.0 Understand the various stages involved in processing, sequential arrangement of different equipment.**
 - 3.1 Draw the flow diagram, detail flow diagram of each process
 - 3.2 Understand the arrangement of various equipment and machinery in systematic manner in a less possible area of site.

- 4.0 Know the various analytical methods used in the quality control department**
 - 4.1 Understand the experimental methods to find out the quality of the product
 - Understand various tools, instruments used for quality checking.

- 5.0 Know the trouble shooting in process operation**
 - 5.1 Know preventive precautions of each equipment in the plant.
 - 5.2 Startup and shut down procedures for the equipment and plant.

- 6.0 Know the importance of safety in industries**
 - 6.1 Understand the safety about personnel protection, equipment protection
 - 6.2 Know the usage of various safety devices
 - 6.3 Precautionary measures to be taken.

- 7.0 Know the various pollutants emitted from the plant.**
 - 7.1 Understand effects of pollutants.
 - 7.2 Understand treatment method and disposal.
 - 7.3 Know the effective methods pollution control.

COURSE CONTENTS:

Organizational set up

Raw materials, intermediates and end products

Process descriptions (Process flow diagrams and line tracing, detailed flow diagrams etc.)

Quality control of raw materials, intermediates and end products

Operational troubles and preventive measures

Safety aspects (personnel, equipment etc.)

Pollution control

EVALUATION METHOD:

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 completed the industrial training
The assessment shall be carried out by a committee comprising of

A representative of the Industry where the candidate is undergoing training

A staff member of the concerned section of the polytechnic.

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.

The remaining **100 marks** are allotted as follows:

For the training report 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 Dept. concerned.(2) Staff member who assessed the student in the industry (3) Any other staff member of concerned department

The progress made during the end of assessment will be evaluated on the basis of the following parameters.

SCHEME OF ASSESSMENT

S. No.	<u>Name of the Parameter</u>	Max. Marks Allotted for each Parameter
1.	Attendance and punctuality	5
2.	Familiarity with Technical terms	6
3.	Familiarity with tools and material	10
4.	Attitude towards job	7
5.	Manual skills	4
6.	Application of knowledge	10
7.	Problem solving skills	10
8.	Comprehension and observation	4
9.	Safety and Environmental consciousness	3
10.	Human relations	4
11.	Ability to communicate	6
12.	Supervising ability	10
13.	General conduct during the period	6
14.	Maintenance of dairy	15
	Total:	100

VI SEMESTER

**ENGLISH – IV
(Common Subject)**

Subject title : English -IV
Subject code : EC-601
Periods per week : 02
Periods / Semester : 30

TIME SCHEDULE

**INDUSTRIAL MANAGEMENT AND ENTREPRENEURSHIP
(Common with AEI & EEE)**

Subject Title : Industrial Management and Entrepreneurship
 Subject Code : EC –602
 Periods/Week : 05
 Periods per Semester : 75

S.No.	Major Topics	Periods	Weightage of Marks	Short Answer Questions	Essay Type Questions
1.	Principle of Management ,Organisation Structure and behaviour	15	29	03	2
2.	Production, Material and Marketing Managements	30	39	03	3
3	Introduction to ISO 9000 & TQM	15	16	02	1
4	Role of Entrepreneur and Entrepreneurial Development	15	26	02	2
	Total	75	110	10	08

OBJECTIVES

On completion of the course the student will be able to comprehend the following

1.0 Understand the principles of management , Organizational structure and behaviour

- 1.1 Define industry, commerce (Trade) and business.
- 1.2 Know the need for management.
- 1.3 Explain the principles of scientific management.
- 1.4 Understand functions of Management.
- 1.5 Differentiate between management and administration.
- 1.6 Differentiate types of ownerships.
- 1.7 Understand salient features of joint stock companies.
- 1.8 Understand the philosophy and need of organisation structure of an industry.
- 1.9 Understand the line, line & staff and Functional organisations.
- 1.10 List the advantages and limitations of line, line & staff and functional organisations.
- 1.11 List different departments in a large scale industry.
- 1.12 Explain the factors of effective organisation.
- 1.13 Understand organisational behaviour.
- 1.14 Conduct job analysis.
- 1.15 Assess the incurring applicants.
- 1.16 Outline the selection process.
- 1.17 Understand the sources of manpower.
- 1.18 State motivation theories.

1.19 List out different leadership models.

2.0 Understand the different aspects Production , Materials and Marketing managements

2.1 Differentiate and integrate production, planning and control.

2.2 Relate the production department with other departments.

2.3 State the need for planning and it's advantages.

2.4 Explain the stages of Production, planning and control.

2.5 Explain routing methods.

2.6 Explain scheduling methods.

2.7 Explain dispatching.

2.8 Draw PERT/CPM networks.

2.9 Identify the critical path.

2.10 Explain the role of the materials in Industry.

2.11 Derive expression for inventory control.

2.12 Explain ABC analysis.

2.13 Define safety stock.

2.14 Define reorder level.

2.15 Know about economic ordering quantity.

2.16 Explain stock layout.

2.17 List out stores records.

2.18 Explain the Bin card.

2.19 Describe Cardex method.

2.20 Explain purchasing procedures.

2.21 List out purchase records.

2.22 Explain marketing functions.

2.23 Explain Sales function.

2.24 List out market conditions.

2.25 Differentiate Sellers and Buyers' market.

2.26 Differentiate monopoly, oligarchy, and perfect competition.

2.27 Explain the concept of cost.

2.28 List out the elements of cost.

2.29 Explain the concept of contribution.

2.30 Explain break-even analysis.

2.31 Conduct market and demand surveys.

2.32 Differentiate product and production analysis.

3.0 Understand ISO 9000 & TQM.

3.1 Understand the concept of quality.

3.2 Know the quality systems and elements of quality systems.

3.3 Know the principles of quality Assurance.

3.4 Know the Indian Standards on quality systems.

3.5 Know the evolution of ISO standards.

3.6 Discuss ISO standards and ISO 9000 series of quality systems.

3.7 State the constituents of ISO 9000 series of standards for quality systems.

3.8 State the outstanding features and drawbacks of ISO 9000 series of standards.

3.9 List the beneficiaries of ISO 9000..

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

- 4.1 Outline the concepts of Entrepreneurship.
- 4.2 Define the word entrepreneur.
- 4.3 Determine the role of Entrepreneurship.
- 4.4 Describe the profile of an entrepreneur.
- 4.5 Explain the requirements of an entrepreneur.
- 4.6 Outline the expectations of Entrepreneurship.
- 4.7 Determine the role of entrepreneurs in promoting Small Scale Industries.
- 4.8 Describe the details of self-employment schemes.
- 4.9 Explain the method of site selection.
- 4.10 Outline the method of plant layout.
- 4.11 List the financial assistance programmes.
- 4.12 List out the organisations that help an entrepreneur.

COURSE CONTENTS

1. Principles of management, Organizational structure and behaviour

Definitions of Industry, Commerce and Business. Principles of Scientific Management, functions of management. Difference of administration and management.

Role of industry, Types of ownership – Sole proprietorship, Partnership, Private limited, Public limited company, Industrial Cooperatives, Philosophy, types of Organisations, Line and Staff and functional organisations. Advantages and limitations, departments in a large scale industry. Effective organisation. Job analysis, Assessing applicants, selection, motivation, Leadership models.

2. Production , Materials and Marketing managements

Production, planning and control, relation with other departments, need for planning and its advantages, Routing, scheduling, despatching, PERT and CPM, simple problems.

Materials in industry, inventory control model, ABC Analysis, Safety stock, re-order, level, Economic ordering quantity, Stores layout, stores equipment, Stores records, purchasing procedures, purchase records, Bin card, Cardex., Sellers and Buyers markets, Marketing, Sales, Market conditions, monopoly, oligarchy, perfect competition. Cost Elements of Cost, Contribution, Break even analysis, Market Survey, Product and production Analysis.

3. Introduction to ISO 9000 and TQM.

Concept of quality discussed by B. Crosby W. Edward, Deming, Joseph M. Jura Kooru Ishikawa, Genichi Taguchi, Shigco Shingo.

Quality systems – Definitions of the terms used in quality systems like, quality policy, quality management, quality systems, quality control and quality assurance.

Elements quality systems : Management responsibility, Quality system, contract review, design control, document control, purchasing, purchaser – supplied product, product identification and traceability, process control, Inspection and testing.

Principles of quality assurance – Definition of quality assurance.

Indian standards on quality systems – Main features of IS 13999 : 1990, IS 14000 : 1990, IS 14004 : 1990, IS 14001: 1990, IS 14002 : 1990, IS 14003: 1990.

Know the necessity of International standards – Evolution of ISO. Various standards under ISO – Outstanding features of ISO 9000 series of standards – ISO 9000 Phenomenon ISO 9000 series of quality systems – Constituents of ISO 9000 series of standards for quality systems.

Drawbacks of ISO 9000 series of standards, list the beneficiaries of ISO 9000 (Whom does ISO 9000 help).

4. Role of Entrepreneur & Entrepreneurial Development.

Concept, definition, role, expectation, entrepreneurship Vs Management, promotion of S.S.I. Self – employment schemes. site selection, plant layout, profile and requirement, Institutional support needed, financial assistance programmes.

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. S.S.I Hand Book by S.B.P. Publishers.
5. Personnel Management by Flippo.
6. Entrepreneurship – by NITTT&R, Chennai.

MICRO CONTROLLERS

SUBJECT TITLE : MICRO CONTROLLERS
SUBJECT CODE : EC- 603
PERIODS/WEEK : 06
PERIODS/SEMESTER : 90

TIME SCHEDULE

Sl. No.	Major Topics	No. of Periods	Weightage of marks	Short Answer Questions	Essay Questions
1	Architecture of 8051	20	26	2	2
2	Instruction set of 8051	25	29	3	2
3	Programming concepts	20	26	2	2
4	Peripheral ICs	25	29	3	2
	Total	90	110	10	8

OBJECTIVES

On completion of the study of the subject a student should be able to comprehend the following:

1.0 Comprehend the architecture of Microcontroller 8051

- 1.1 Know the basic digital computer and its organization
- 1.2 Draw the block diagram of a microcomputer and explain the function of each block.
- 1.3 Know the fundamental concepts of micro controllers.
- 1.4 Compare microcontroller and microprocessor
- 1.5 Know the evolution of microcontrollers
- 1.6 State the features of INTEL 8051 microcontroller
- 1.7 Give the functional block diagram of 8051 microcontroller
- 1.8 Know the register structure of 8051.
- 1.9 Explain the function of various special function registers.
- 1.10 Give the pin diagram of 8051 micro controller and specify the purpose of each pin.
- 1.11 Describe internal memory, external memory and ports of 8051.
- 1.12 Explain counters & timers in 8051
- 1.13 Explain input/output ports of 8051
- 1.14 Explain interrupts in 8051.
- 1.15 Explain fetch cycle, execution cycle and instruction cycle.
- 1.16 Distinguish between machine cycle and T-state.

2.0 Know the instruction set of 8051 micro controller

- 2.1 Give the instruction format of 8051
- 2.2 Explain the terms operation code, operand and illustrate these terms by writing an instruction
- 2.3 Know the instruction format and Classify them into one byte, two byte and three byte instructions..
- 2.4 Explain the addressing modes of 8051
- 2.5 Classify the instruction set of 8051
- 2.6 Explain data transfer instructions of 8051.
- 2.7 Explain the arithmetic instructions and recognise the flags that are set or reset for given data conditions.
- 2.8 Explain the logic instructions and recognize the flags that are set or reset for given data conditions.
- 2.9 Illustrate the logic operations and explain their use in setting and resetting of individual bits.
- 2.10 Explain branch group of instructions.
- 2.11 Illustrate unconditional and conditional jump and how flags are used to change the sequence of program.
- 2.12 Explain Boolean group of instructions
- 2.13 Illustrate the bit manipulation on various Boolean functions

3.0 Programming concepts

- 3.1 Write simple programs in mnemonics to illustrate the application of data copy instructions and arithmetic instructions
- 3.2 Write programs of instructions to perform single byte, double byte and multi byte addition and subtraction.
- 3.3 Illustrate the application of jump instruction in the program.
- 3.4 Write a program using counter techniques.
- 3.5 Define a subroutine and explain its use.
- 3.6 Explain the sequence of program when subroutine is called and executed.
- 3.7 Explain how information is exchanged between the program counter and the stack and identify the stack pointer register when a subroutine is called.
- 3.8 List and explain unconditional and conditional call and return instructions.
- 3.9 Use PUSH, POP instructions in programs.
- 3.10 Know the advanced subroutine concepts
- 3.11 Illustrate the concept of nesting, multiple ending and common ending in subroutines.
- 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.
- 3.16 Write instructions to set up time delay.

4.0 Know the interfacing of Peripherals

- 4.1 Explain the need for Interfacing
- 4.2 Classify Interfacing peripherals
- 4.3 Know the functional block diagram of 8255.
- 4.4 Understand the concept of CWR (Control Word Register).
- 4.5 Illustrate the control word with suitable examples
- 4.6 Understand interfacing of 8255 with micro controllers (8051).
- 4.7 State the features of 8257
- 4.8 Explain the functional block diagram of DMA controller 8257.
- 4.9 Understand interfacing 8257 with micro controllers
- 4.10 Explain the need for Communication interface
- 4.11 Know the functional block diagram of 8251
- 4.12 Understand interfacing 8251 with micro controllers
- 4.13 Understand RS – 232 standard.
- 4.14 Explain serial communication through 8051 using RS 232

COURSE CONTENTS

1. Architecture of 8051:

Block diagram of microcomputer, Block diagram of 8051, Pin out diagram of 8051, registers, timers, interrupts, fetch cycle, execution cycle, machine cycle, state

2. Instruction set of 8051:

Instruction set of 8051, instruction format, classification of instructions, addressing modes- Groups of instructions, data transfer, arithmetic, logical, branch ,Boolean instructions

3. Programming concepts:

Data transfer, single and multi byte addition and subtraction, subroutines, nesting, multiple ending and common ending, use of Input output and machine related statements, debugging, time delay program.

5. Peripheral ICs:

Know the function, features, pin details and interfacing of 8255, 8257, 8251, RS-232C.

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. Microprocessors and interfacing by Douglas Hall McGraw Hill.
- 5. Intel Microprocessors by Barry Brey, Prentice-Hall.
- 6. 0000 to 8085: Introduction to microprocessors for engineers and scientists by Ghosh & Sridhar, Prentice-Hall.
- 7. Micro Processors by Ramesh S Gaonkar

ADVANCED COMMUNICATION SYSTEMS

Subject Title	:	Advanced Communication Systems
Subject Code	:	EC-604
Periods/Week	:	06
Periods/Semester	:	90

TIME SCHEDULE

Sno	Major Topics	No. of periods	Weightage of marks	Short Answer Questions	Essay Questions
1	Microwave devices & RADAR	25	29	3	2
2	Satellite communication	25	29	3	2
3	Fibre optic communication	20	26	2	2
4	Mobile communication	20	26	2	2
	Total	90	110	10	8

OBJECTIVES

On completion of the study of the subject a student should be able to comprehend the following:

1.0 Understand the principle and working of Microwave devices and RADAR systems

- 1.1 State microwave frequency range.
- 1.2 Explain the propagation of waves in waveguide.
- 1.3 Know about rectangular and circular waveguides.
- 1.4 Describe various modes of operation of waveguides.
- 1.5 Define the terms dominant mode, cut off frequency, phase velocity and group velocity related to waveguides.
- 1.6 Explain the operation of a Magic tee.
- 1.7 Explain the working and applications of Magnetron.
- 1.8 Explain the working and applications of Reflex-Klystron.
- 1.9 Explain the working and applications of TWT.
- 1.10 State the basic principle of Radar with a block diagram.
- 1.11 Classify types of Radars.
- 1.12 Derive the expression for Radar range.
- 1.13 Mention the performance factors affecting radar range.
- 1.14 Draw and explain the block diagram of pulsed Radar system.
- 1.15 Explain the operation of a Duplexer with sketch.
- 1.16 List the types of indicators used in radar systems.
- 1.17 Explain A-scope, B-scope and PPI displays.
- 1.18 State the disadvantages of pulsed radar.
- 1.19 Explain the Doppler effect.
- 1.20 Explain the principle of CW radar.

- 1.21 Draw and explain the block diagram of CW radar.
- 1.22 Draw and explain the block diagram of MTI.
- 1.23 List the applications of various radar systems.
- 1.24 Explain the basic principle of Radar Beacons.
- 1.25 Explain the principle of instrument landing system.

2.0 Understand the principle of working of satellite communication

- 2.1 Introduction to microwave links.
- 2.2 Explain fixed microwave link with block diagram.
- 2.3 Introduction to Satellite communication.
- 2.4 List the advantages of satellite communication over terrestrial radio communication.
- 2.5 Classify types of satellites.
- 2.6 Explain the principle of Geo-stationary satellite.
- 2.7 Define azimuth and elevation with reference to satellites.
- 2.8 Define terms apogee and perigee.
- 2.9 Explain the transponder in satellites and list the frequency bands used.
- 2.10 Know the uplink frequency, down link frequency and bandwidth of satellite.
- 2.11 Explain the methods of increasing channel capacity. (Frequency reuse, polarization, and spatial isolation).
- 2.12 Distinguish between active and passive satellites.
- 2.13 Draw the block diagram of communication satellite.
- 2.14 Explain communication subsystem.
- 2.15 Explain the power subsystem.
- 2.16 Explain the telemetry tracking and control subsystem.
- 2.17 Explain altitude control subsystem.
- 2.18 Draw the block diagram of Earth station.
- 2.19 Explain antenna, receiver, and transmitter sections of earth station.
- 2.20 Explain ground communication equipment and power subsystems of earth station.
- 2.21 List the applications of satellites.
- 2.22 Explain the application of satellite in GPS (Global positioning system).
- 2.23 Explain the application of satellite in TV broadcasting (DTH).
- 2.24 Explain the application of satellite in telephony.
- 2.25 List the Indian communication satellites and remote sensing satellites.

3.0 Understand Fibre Optic Communication

- 3.1 Introduction to Fibre Optic communication.
- 3.2 Explain total internal reflection phenomena used in optical fibres.
- 3.3 Define numerical aperture, modes, dispersion.
- 3.4 List various losses with reference to optical fibre.
- 3.5 Explain the advantages of optical fibres in communication.
- 3.6 Explain types of fibre optic cables,
- 3.7 Mention different splices and connectors, optical couplers, switches and relays.
- 3.8 Explain the operation of LED used in optical fibre communication.
- 3.9 Explain the operation of Laser diodes used in optical fibre communication.
- 3.10 Explain the operation of PIN diode used as detector in optical fibre

- communication.
- 3.11 Explain the operation of APD used as detector in optical fibre communication
 - 3.12 Explain basic fibre optic communication system with block diagram.
 - 3.13 Explain repeaters and optical amplifiers.
 - 3.14 Explain wavelength division multiplexing.
 - 3.15 Explain the principle of DWDM.
 - 3.16 Discuss submarine cables.
 - 3.17 Explain fibre in local area network.
 - 3.18 Explain Ethernet on fibre and gigabit Ethernet.
 - 3.19 Mention the applications of optical fibres.
 - 3.20 Discuss the applications of optical fibres in local telephone and cable TV applications.

4.0 Understand principles of Mobile Communication

- 4.1 Basic concepts of Mobile Communication.
- 4.2 Intelligent network concept.
- 4.3 Discuss evolution of mobile radio communication system.
- 4.4 Explain cellular concept.
- 4.5 Describe cellular system operation.
- 4.6 Significance of frequency re-use and hand off features.
- 4.7 Explain AMPS system.
- 4.8 Concepts of digital cellular mobile system.
- 4.9 GSM standardisation and service aspects.
- 4.10 GSM reference architecture
- 4.11 Explain the function partitioning in GSM.
- 4.12 List radio characteristics of GSM.
- 4.13 Security aspects for GSM.
- 4.14 Basic concepts of CDMA systems used in mobile communication.
- 4.15 Power control in CDMA.
- 4.16 Soft hand off in CDMA.
- 4.17 Introduction to DECT (Digital Enhanced Cordless Telecommunications).
- 4.18 The concepts of EDGE (Enhanced Data Rates for GSM Evolution) technology.
- 4.19 Introduction to IRIDIUM system.
- 4.20 Introduction to Global Star system.

COURSE CONTENTS

1. Microwave devices & RADAR

Microwave frequency range – introduction to wave guides - dominant mode in Rectangular wave guide – phase velocity – Group velocity – Cut off wavelength – operation of Magic tee – working principle and applications of Magnetron, Klystron, TWT, Introduction to Radar system – Radar range equation - Pulsed Radars - Duplexer – Radar Indicators – Doppler effect - CW radar – MTI – radar Beacons – instrument landing system.

2. Satellite Communication

Microwave link, advantages of satellite communication system, classification of satellites, Geo-stationary Satellites, azimuth, elevation, apogee, perigee, transponder, up-link and down-link frequencies, enhancing channel capacity, active and passive satellites, communication satellite – its subsystems, Earth station – its subsystems, applications of satellites, GPS and DTH, Indian satellites.

3. Fibre Optic Communication

Optical fibre – Total Internal Reflection (TIR), Numerical Aperture(NA), Modes and dispersion, losses in fibres, fibre optic cables – Splices, connectors, optical couplers, switches & relays – optical emitters (LED & LASER diode) – optical detectors (PIN diode & APD) – basic fibre optic system – Repeaters and optical amplifiers – wavelength division multiplexing (WDM), Dense wavelength division multiplexing (DWDM), Submarine cables – Fibre in local area network – Cable television applications.

4. Mobile Communication

Intelligent network, Evolution of Mobile Radio Communication - Cellular concepts – Cellular systems operation – AMPS operation – Digital cellular mobile system – GSM standard and service aspects – GSM architecture – GSM function partitioning, GSM radio characteristics, security aspects, CDMA systems – power control & soft hand off in CDMA - DECT - EDGE technology – concepts of IRIDIUM and Global Star communications.

Reference Books

1. Electronic communication system by George Kennedy. TMH
2. Electronic Communication Systems by Roy Blake Thomson
3. Communication Electronics by Frenzel TMH
4. Mobile and Personal communication system and services by Raj Pandya. PHI
5. Microwave Engineering by Sanjeeva Gupta
6. Wireless digital communication by Kamilo Fehr
7. Communication systems by Shradar
8. Modern Electronic Communication by Ashok Raj.

INDUSTRIAL ELECTRONICS

Subject Title	:	Industrial Electronics
Subject Code	:	EC-605
Periods/Week	:	05
Periods/Semester	:	75

TIME SCHEDULE

S.No	Major Topics	No. of periods	Weightage of marks	Short Answer Questions	Essay Questions
1	Power Electronic Devices	20	29	3	2
2	Converters, AC Regulators & Choppers	20	29	3	2
3	Inverters and Speed control OF AC/DC motors	20	29	3	2
4	Transducers and Ultrasonics	15	23	1	2
	Total	75	110	10	8

OBJECTIVES

On completion of the study of the subject a student should be able to comprehend the following:

1.0 Understand the construction and working of Power Electronic Devices

- 1.1 List different thyristor family devices.
- 1.2 Sketch the ISI circuit symbols for each device.
- 1.3 Describe constructional details of SCR.
- 1.4 Draw & Explain the Volt – Ampere characteristics of SCR.
- 1.5 Mention the ratings of SCR.
- 1.6 Explain the construction of GTO SCR
- 1.7 Compare the characteristics of GTO SCR and SCR.
- 1.8 Give constructional details of Diac & Triac.
- 1.9 Draw & Explain the Volt-ampere characteristics of Diac & Triac under forward / Reverse bias.
- 1.10 State the different modes of Triac triggering.
- 1.11 Distinguish between SUS, SBS, SCS & LASCR
- 1.12 Draw & Explain SCR circuit triggered by UJT.
- 1.13 Explain power control circuits Diacs, Triacs & SCR's.

- 1.14 Briefly explain the working of Reverse conducting thyristor (RCT), Asymmetrical SCR (ASCR), Power BJT, Insulated gate Bipolar transistor (IGBT), MOS-controlled thyristors (MCT) with characteristics.
- 1.15 Describe the mechanism in protecting power devices.
- 1.16 Study of Manufacturer's data sheet of power electronic devices.
- 1.17 List the applications of all power electronic devices.
- 1.18 Illustrate SMPS with block diagram.

2.0 Understand the working of converters, AC regulators and Choppers.

- 2.1 Classify converters.
- 2.2 Explain the working of single-phase half wave fully controlled converter with Resistive and R-L loads.
- 2.3 Understand need of free wheeling diode.
- 2.4 Explain the working of single phase fully controlled converter with resistive and R- L loads.
- 2.5 Explain the working of three-phase half wave controlled converter with Resistive and R-L loads.
- 2.6 Explain the working of three phase fully controlled converter with resistive load.
- 2.7 Explain the working of controlled bridge rectifiers for Battery charging application.
- 2.8 Explain the working of single phase AC regulator.
- 2.9 Explain the applications of Converters and AC regulators
- 2.10 Explain the working principle of chopper.
- 2.11 Describe the control modes of chopper
- 2.12 Explain the operation of chopper in all four quadrants.
- 2.13 List the applications of choppers

3.0 Understand the Inverters and Speed control of DC/AC motors

- 3.1 Classify inverters.
- 3.2 Explain the working of single-phase bridge inverter using MOSFET.
- 3.3 Explain the working of voltage source inverter.
- 3.4 Explain the working of PWM inverter.
- 3.5 Explain the working of three-phase inverter.
- 3.6 List out the applications of Inverters.
- 3.7 Explain the principle of AC voltage control using Phase control with simple circuits and draw waveforms.
- 3.8 Mention factors affecting the speed of DC Motors.
- 3.9 Describe speed control for DC Shunt motor using converter.
- 3.10 Describe speed control for DC Shunt motor using chopper.
- 3.11 List the factors affecting speed of AC Motors.
- 3.12 Explain the speed control of Induction Motor by using AC voltage controller.
- 3.13 Explain the speed control of induction motor by using converters and inverters (V/F control)

4.0 Understand the working of transducers and basics of Ultrasonics

- 4.1 Classify transducers on the basis of principle of operation and applications.
- 4.2 Explain the working principle, construction and applications of strain gauge.
- 4.3 Explain the working principle, construction and applications of potentiometric transducer.
- 4.4 Explain the working principle, construction and applications of capacitive and inductive transducers.
- 4.5 Explain the working principle, construction and applications of LVDT.
- 4.6 Explain the working principle, construction and applications of Piezo electric transducer.
- 4.7 Explain the working principle and applications of thermocouple transducer.
- 4.8 Explain the application of transducer in Accelerometer, servomotors, and Tachogenerators.
- 4.9 Explain the term Ultrasonic.
- 4.10 Mention methods of generating ultrasonic waves.
- 4.11 Draw and explain pulsed-echo ultrasonic flaw detector

COURSE CONTENTS

1. Power Electronic Devices

Types of power semiconductor devices – SCR, Triac, Power BJT, IGBT- Construction, Working principle of all devices, symbol. Two transistor analogy for SCR – V-I characteristics, Forward break over voltage, latching current, holding current, turn on triggering time, turn off time - triggering of SCR using UJT – protection of power devices-Applications.

2. Converters AC Regulators & Choppers

Classification of converters, single phase half wave fully controlled converter, free wheeling diode, single phase fully controlled converter, three phase half wave, three phase full wave controlled converter, battery charger, single phase ac regulator, choppers- modes, operation - Applications.

3. Inverters & Speed control AC / DC of motors

Classification of invertors-basic series inverter- parallel inverter- single-phase bridge inverter using MOSFET- voltage source inverter- PWM inverter- single, multiple and Sinusoidal – Three phase bridge inverter- Applications. DC motor control- Introduction-Speed control of DC shunt motor by using converters and choppers- speed control of induction motor by using AC voltage controllers – V / F control (Converters and invertors control).

4. 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

REFERENCE BOOKS

1. Power Electronics by Jamil Asghar – PHI, New Delhi.
2. Power Electronics – Devices, Circuits and applications PHI, New Delhi
3. Industrial Electronics by Kissell PHI
4. Industrial Electronics by Mithal
5. Industrial Electronics by P.C.Sen.
6. Industrial Electronics by Berde
7. Advanced Power Electronics by P.C.Sen.
8. Industrial & Power Electronics by Harish Rai.

DATA COMMUNICATIONS AND COMPUTER NETWORKS

Subject Title : Data Communications and Computer Networks
Subject Code : EC-606 A
Periods/Week : 06
Periods/Semester : 90

TIME SCHEDULE

Sn o	Major Topics	No. of periods	Marks	Short Answer Questions	Essay Questions
1	Basics of Data communication	18	26	2	2
2	Networking & LAN	25	29	3	2
3	WAN & Protocols	26	29	3	2
4	Web Applications	21	26	2	2
	Total	90	110	10	8

OBJECTIVES

On completion of the study of the subject a student should be able to comprehend the following:

1.0 Understand Basics of Data communication

- 1.1 Define data communications
- 1.2 Need for data communication networking
- 1.3 Distinguish between analog and digital transmission
- 1.4 Explain serial and parallel communication
- 1.5 Define baud rate, simplex, half duplex and full duplex communication
- 1.6 Define channel capacity
- 1.7 List different transmission Media
- 1.8 Explain the cross section and applications of twisted pair cable, UTP, STP, co-axial cable, optical fibre
- 1.9 Know about infrared and light wave transmission
- 1.10 Explain about data and signals (digital data digital signals, digital data analog signals, analog data digital signals, analog data analog signals)
- 1.11 Compare characteristics of transmission media
- 1.12 Explain Shannon capacity

2.0 Understand the concepts of Networking and LAN

- 2.1 Define computer network and state its use
- 2.2 Describe different network topologies (Bus, Star, Ring)
- 2.3 State the need of protocols in computer networks
- 2.4 Draw the OSI 7 layer model
- 2.5 Explain the functions of each OSI layer
- 2.6 Describe circuit switching and packet switching
- 2.7 Distinguish between circuit switching and packet switching
- 2.8 Explain the concepts of router and routing
- 2.9 Categorise the computer networks
- 2.10 Describe CSMA
- 2.11 Explain the working of LAN
- 2.12 Explain the Ethernet frame format (802.3)
- 2.13 Discuss cut through, store and forward and adaptive switch mechanism
- 2.14 Write advantages of star configuration
- 2.15 Explain the working of token ring network
- 2.16 Explain the concept of WLAN
- 2.17 Understand Bluetooth technology
- 2.18 Write the applications of WAP

3.0 Understand Basics of WAN & WAN Protocols

- 3.1. Explain WAN architecture
- 3.2. Describe packet forwarding in WAN
- 3.3. Define intranet
- 3.4. Explain the working of point to point and point to multipoint networks
- 3.5. Describe the concepts of internetworking.
- 3.6. Discuss the history of Internet.
- 3.7. Explain the operation of repeaters and bridges.
- 3.8. Explain the role of gateways.
- 3.9. Describe the ARPA NET and WWW.
- 3.10. Explain the internal architecture of ISP
- 3.11. Describe the high level architecture of IS
- 3.12. Explain PSTN Internet connectivity
- 3.13. Explain Dial up access for an individual user
- 3.14. Explain the ISDN architecture.
- 3.15. Explain point-to-point protocol.
- 3.16. Discuss leased line, DSL and cable modems.
- 3.17. Explain the IP addressing concepts
- 3.18. Write the packet transfer mechanism using routers and IP address
- 3.19. Describe different layers of TCP/IP
- 3.20. Explain the features of TCP
- 3.21. Write the functions of port and sockets.

4.0 Understand Web Applications.

- 4.1. Write the role of DNS server.

- 4.2. Explain how email is transferred.
- 4.3. Explain file transfer operation (FTP) in web applications
- 4.4. Explain the working of Web server.
- 4.5. Explain the working of Web browser.
- 4.6. List HTTP commands.
- 4.7. Write the purpose of proxy server.
- 4.8. Discuss about hyperlinks.
- 4.9. Describe the web browser architecture.
- 4.10. Know the concept of remote login.

COURSE CONTENTS

1. Basics of Data Communication

Introduction – concepts of data communication – analogue signal, analogue transmission – digital signal, digital transmission – simplex, duplex, full duplex – transmission media – guided media – twisted pair, UTP, STP, Coaxial cable, optical fibre – comparison of transmission media characteristics – Shannon capacity.

2. Networking & LAN

Network topologies – bus, star, ring – switching basics – circuit switching – packet switching – message switching – router – routing. – OSI Model – OSI functions – physical layer, data link layer, network layer, transport layer, session layer, presentation layer and application layer.

Categories of computer network – LAN – Ethernet – introduction – properties – CSMA/CDMA – addresses – Ethernet frame 802.3 format – MAC – star configuration – switch – cut through, store and forward and adaptive – token ring – introduction – properties - operation. Concepts of WLAN characteristics of WLAN – Bluetooth – overview – application – WAP applications

3. Basics of WAN and WAN Protocols

WAN – basics – architecture – transmission mechanism – addressing – packet forwarding – intranet – point-to-point and point to multi point networks.

Internet – introduction – internet working devices – repeaters – bridges – routers – gateways – brief history of internet – ARPA net – www – internal architecture of ISP – high level architecture of an ISP

Ways of accessing the internet – introduction – Dial up access – PSTN

ISDN – background of ISDN– ISDN architecture – Leased lines – DSL – cable modems.

TCP/IP basics – Use of IP address – TCP/IP examples – IP datagrams – IP is unreliable – IP is connectionless.

Communication using TCP/IP – concept of IP address – classes of IP addresses – dotted decimal notation – routers & IP addresses - TCP basics – features of TCP – relation between TCP & IP – ports and sockets – Connection.

4. Web Applications

Domain name system (DNS) – DNS Name space – Electronic mail – Mail box – sending and receiving an email – email anatomy – POP – SMTP server – complete journey of an email message – browser based emails – file transfer using FTP – FTP connections – Data transfer connection – trivial file transfer protocol – TELNET.

Introduction and brief history of WWW – basics of WWW – example of HTTP interaction – proxy server – hyper links – web browser architecture – invoking email client from within a browser – invoking the FTP application from within a browser – remote login.

Reference Books:

1. Data Communication and Networking by Godbole TMH
2. Computer Networks by Andrew S. Tanenbaum 4th Ed. PHI.
3. Data and Computer Communications: William Stallings 7th edition. PHI.
4. Data Communication and Networking: Behrouz Forouzan 3rd edition.TMH.
5. Computer Communications and Network Technologies by Michael A.Gallo & William Hancock Thomson

COMPUTER HARDWARE

Subject Title	:	Computer Hardware
Subject Code	:	EC-606 B
Periods /Week	:	06
Periods/Semester	:	90

TIME SCHEDULE

S no	Major Topics	No. of periods	Weight age of marks	Short Answer Questions	Essay Questions
1	Mother Board	25	29	3	2
2	Peripherals	25	29	3	2
3	Windows OS	20	26	2	2
4	PC assembly & Software Installation	20	26	2	2
	Total	90	110	10	8

OBJECTIVES

On completion of the study of the subject a student should be able to comprehend the following:

1.0 Understand mother board and its features

- 1.1 Study the layout of components in the motherboard.
- 1.2 List different expansion slots available on the motherboard.
- 1.3 Describe the functions of chip set.
- 1.4 Know the details of different chipset in use.
- 1.5 Know the processor interface and specifications of processor.
- 1.6 Know different types of RAMs in use.
- 1.7 Know about cache memory.
- 1.8 Know about accelerated graphics port.
- 1.9 Study about power supply connectors and external devices.
- 1.10 Know about Serial, parallel and USB ports.
- 1.11 Know the connector details for printer, serial port, mouse, keyboard and USB.
- 1.12 Know different voltages in SMPS and connector details.
- 1.13 Describe working of Hard Disk and data access.
- 1.14 Know about SCSI Hard Disk controller.
- 1.15 Describe the storage of data on floppy disk.
- 1.16 Describe the functioning of sound card.
- 1.17 Describe the functioning of video grabber card.
- 1.18 Describe the functioning of Network card and list its specifications.

2.0 Know various computer peripherals

- 2.1 List the specifications of monitor.

- 2.2 Describe the working of LCD monitor.
- 2.3 List the types of keyboards.
- 2.4 Describe the working principle of membrane switch, and capacitance switches.
- 2.5 Describe the working principle and optical mouse.
- 2.6 Describe the working principle of infrared keyboard and infrared mouse
- 2.7 List different types of printers.
- 2.8 Describe the working of dot matrix printer.
- 2.9 Describe the working of Laser printer.
- 2.10 Describe the working of inkjet printer.
- 2.11 List the specifications of various printers.
- 2.12 Describe the working of scanners.
- 2.13 Describe OCR (optical character recognition).
- 2.14 Describe the JPEG and MPEG formats.
- 2.15 Describe the working of digital camera.
- 2.16 Describe the working of CD drive and writer.
- 2.17 Describe the principle of DVD.
- 2.18 Describe the use of Flash drive.

3.0 Understand windows operating systems.

- 3.1 List the Power On Self Test (POST).
- 3.2 Explain the need for BIOS settings.
- 3.3 Know about the booting procedure.
- 3.4 Mention the content of BOOT sector.
- 3.5 Understand the usage of File Allocation Table (FAT).
- 3.6 Know the content of AUTOEXEC.BAT file
- 3.7 Mention the content of CONFIG.SYS
- 3.8 State the structure and uses of Windows registry
- 3.9 Know the purpose of INI and INF files
- 3.10 List the device classes in the device manager.
- 3.11 Explain the purpose of control panel icons
- 3.12 List the types of common viruses and ways of removing viruses.

4.0 Understand PC assembly and software installation

- 4.1 Describe the steps in assembling a PC.
- 4.2 Know the editing of CMOS set up and its details.
- 4.3 Understand the process of formatting.
- 4.4 Know the use FDISK.
- 4.5 Know about disk manager and disk partitioning.
- 4.6 Installation OS (windows and Linux).
- 4.7 Mention the need for installation of device drivers.
- 4.8 Know about surface scanning, blocking damaged sectors, defragmentation, and removal of temporary files.

COURSE CONTENTS

1. Motherboard.

Motherboard – component layout, chip set, slots, serial port, parallel port, USB port, connectors. RAM, cache memory, AGP. HDD, FDD, sound card, Video grabber card, network card.

2. Peripherals

Monitor, Keyboard, and mouse. Working and specifications of dot matrix, Laser and inkjet printers – Scanner – JPEG, MPEG – digital camera – CD writer – DVD player. Flash Drive.

3. Windows Operating System

Power On Self Test, BIOS, Booting, autoexecutable batch file, config.sys file, windows registry, Device manager, control panel, viruses.

4. PC assembly and Software Installation

Assembling PC, CMOS set up, Installation OS, Installation of device drivers, system tools.

REFERENCES Books:

1. Peter Norton's complete guide to PC upgrades 2nd edition by Peter Norton, Michael Desmond PHI
2. Peter Norton's new inside the PC by Peter Norton, Scott Clark PHI.
3. Microprocessors, PC Hardware and interfacing by N. Mathivanan, PHI
4. Trouble shooting your PC by M. David Stone and Alfred Poor PHI
5. Enhanced guide to managing and maintaining your PC-Third Edition, Thomson

MICROCONTROLLERS LAB

SUBJECT TITLE : MICRO-CONTROLLERS LAB
SUBJECT CODE : EC-607
PERIODS/WEEK : 03
PERIODS/SEMESTER : 45

LIST OF EXPERIMENTS

Assembly language programming on 8051 to perform

1. 8 – bit addition and subtraction
2. Multi byte addition
3. Block transfer of data.
4. Sum of given n numbers
5. Sum of first n natural numbers
6. Arithmetic programming
7. 8 bit x 8 bit multiplication using MUL instruction
8. Biggest data in given array
9. Hex to BCD conversion
10. Hex to ASCII conversion
11. BCD to Hex conversion

Micro controller interfacing

12. Simple interface of USART 8251
13. Testing the interfacing of 8255, PPI
14. Use of RS-232 in Interfacing.

ADVANCED COMMUNICATION & NETWORKING LAB

Subject Title : **Advanced Communication & Networking Lab**
Subject Code : **EC- 608**
Periods/Week : **03**
Periods/Semester : **45**

LIST OF EXPERIMENTS

1. Familiarize with computer networking Line diagrams.
2. Installation of network card.
3. Connecting systems in a network switch.
4. Connecting systems in peer-to-peer network.
5. Installing of internal modem and connecting to Internet.
6. Installing wireless node
7. Installing multiple network cards.
8. Installing switch (Hub).
9. Preparing the UTP cable for cross and direct connections using crimping tool.
10. Installing and configuring E-mail client Microsoft Outlook Express.
11. Installing and configuring proxy server using Winproxy or Wingate.
12. Configuring Browser for Internet access using Proxy server.
13. Installing windows 2000 server as domain controller.

INDUSTRIAL ELECTRONICS LAB

Subject Title : **Industrial Electronics Lab**
Subject Code : **EC-609**
Periods/Week : **03**
Periods/ Semester : **45**

LIST OF EXPERIMENTS

1. SCR Characteristics.
2. Diac Characteristics.
3. Triac Characteristics.
4. UJT relaxation oscillator.
5. Study of simple inverter circuit.
6. SCR circuit to drive small loads (DC and AC)
7. Triac power control circuit (AC load)
8. Study of different transducers, like LVDT, Piezo electric and thermocouple.
9. SCS, SBS, SUS characteristics.
10. Study of a simple servomotor and system.

PROJECT WORK

Subject Title	:	PROJECT WORK
Subject Code	:	EC-610
Periods/Week	:	03
Periods per semester	:	45

In the project work, the student should prepare a report based on their observations of a nearby industry / industries which should be **Entrepreneurship oriented**. They should also prepare a product and achieve at the costs for setting up an enterprise as per the norms required by the financial / industrial promotion agencies utilizing techno entrepreneurship programmes in the manufacture or service industries. If the above suggested project is not possible, they may choose a project, which is of practical utility involving theoretical and practical skills and to execute the same.