CMR COLLEGE OF ENGINEERING & TECHNOLOGY
(Autonomous)
Kandlakoya, Hyderabad – 501 401

ACADEMIC REGULATIONS R 15
FOR CBCS & OUTCOME BASED B.TECH. REGULAR PROGRAMMES

(Effective for the students admitted into I year from the Academic Year 2015-16 and onwards)

1.0 Under-Graduate Degree Programme in Engineering & Technology

CMR College of Engineering & Technology Hyderabad offers 4 Years (8 Semesters) Bachelor of Technology (B.Tech.) degree Programme, under Choice Based Credit System (CBCS), with effect from the Academic Year 2015 - 16 and onwards, in the following Branches of Engineering …

S.No.	Branch
I.	Civil Engineering
II.	Electrical & Electronics Engineering
III.	Mechanical Engineering
IV.	Electronics & Communication Engineering
V.	Computer Science & Engineering

1.1. The B. Tech. degree of Jawaharlal Nehru Technological University Hyderabad shall be conferred on candidates who are admitted to the program and who fulfil all the requirements for the award of the degree

2.0 Admission Procedure

2.1. Admissions will be done as per the norms prescribed by the Government of Telangana. The Government orders in vogue shall prevail.

2.2. The candidate should have passed the qualifying examination, intermediate or equivalent.

2.3. Seats in each programme in the college are classified into Category–A (70% of intake), and Category-B (30% of intake) besides Lateral Entry. Category -A seats in each programme will be filled by the Convener, EAMCET Admissions. Category - B seats in each programme will be filled by the College as per the guidelines of the Competent Authority.

2.4. Lateral Entry seats for 20% of the candidates from the approved strength of the course shall be admitted into the II Year I Semester (III Semester) directly based on the rank secured by the candidate in Engineering Common Entrance Test (ECET) in accordance with the instructions received from the Convener, ECET / Competent Authority.

3.0 B.Tech. Programme (UG PROGRAMME) Structure

3.1 The B.Tech. Programme of CMR College of Engineering & Technology are of Semester Pattern, with 8 Semesters constituting 4 Academic Years, each Academic Year having two Semesters (First/Odd and Second/Even Semesters). Each Semester shall be of 22 Weeks duration (inclusive of examinations), with a minimum of 90 Instructional Days per Semester.

3.2 UGC/ AICTE specified Definitions/ Descriptions are adopted appropriately for various terms and abbreviations used in these Academic Regulations/ Norms, which are as listed below.

3.2.1 Semester Scheme

Each UG Programme is of 4 Academic Years (8 Semesters), with the year being divided into two Semesters of 22 weeks (≥ 90 Instructional days), each Semester having 'Continuous Internal Evaluation (CIE)' and 'Semester End Examination (SEE)'. Choice Based Credit System (CBCS) and Credit Based Semester System (CBSS) as denoted by UGC, and Curriculum/ Course Structure as suggested by AICTE are followed.

3.2.2 Credit Courses

All Courses are to be registered by the student in a Semester to earn Credits. Credits shall be assigned to each Course in a L: T: P: C (Lecture Periods: Tutorial Periods: Practicals Periods : Credits) Structure, based on the following general pattern.

- One Credit - for One hour/ Week for Theory/ Lecture (L) Courses; and,
- One Credit - for Two hours/ Week for Laboratory/ Practical (P) Courses or Tutorials (T).

Other student activities like NCC, NSS, NSO, Study Tour, Guest Lecture etc., and identified Mandatory Courses will not carry Credits.

3.2.3 Course Classification

All Courses offered for the UG Programme are broadly classified as

(a) Foundation Courses (Fn C),
(b) Core Courses (Co C), and
(c) Elective Courses (Eℓ C).

- **Foundation Courses** (Fn C) are further categorized as
  - (i) HS (Humanities and Social Sciences)
  - (ii) BS (Basic Sciences)
  - (iii) ES (Engineering Sciences)
- **Core Courses** (Co C) and **Elective Courses** (Eℓ C) are categorized as PS (Professional Courses), which are further subdivided as –
  - (i) PC (Professional Core) Courses
  - (ii) PE (Professional Electives)
  - (iii) OE (Open Electives)
  - (iv) Project Works (PW)
- **Minor Courses** (1 or 2 Credit Courses, belonging to HS/ BS/ ES/ PC as per relevance); and
- **Mandatory Courses** (MC - Non-credit oriented).

3.2.4 Course Nomenclature:

The Curriculum Nomenclature or Course-Structure Grouping for the each of the UG PROGRAMME E&T (B.Tech. Degree Programmes), is as listed below:

Broad Course Classification	*Course Group/ Category*	*Course Description*	*Range of Credits*
Foundation Courses (Fn C)	**BS – Basic Sciences**	Includes - Mathematics, Physics and Chemistry Courses	**15% to 20%**
	HS – Humanities and Social Sciences	Includes Courses related to Humanities, Social Sciences and Management	**5% to 10%**
	ES - Engineering Sciences	Includes fundamental engineering Courses	**15% to 20%**
Core Courses (Co C)	**PC – Professional Core**	Includes core Courses related to the Parent Discipline/ Department/ Branch of Engg.	**30% - 40%**
Elective Courses (Eℓ C)	**PE – Professional Electives**	Includes Elective Courses related to the Parent Discipline/ Department/ Branch of Engg.	**10% to 15%**
	OE – Open Electives	Elective Courses which include inter-disciplinary Courses or Courses in an area outside the Parent Discipline/ Department/ Branch of Engg.	**5% to 10%**
Project	**Project Work**	B.Tech. Project or UG Project or UG Major Project	
	Industrial Training/	Industrial Training/	

Work	**Mini- Project**	Internship/ UG Mini-Project/ Mini-Project	**10% to 15%**
	Seminar	Seminar/ Colloquium based on core contents related to Parent Discipline/ Department/ Branch of Engg.	
	Comprehensive Viva-Voce	Comprehensive Viva-Voce	
	Minor Courses	1 or 2 Credit Courses (subset of HS)	-
	Mandatory Courses (MC)	Mandatory Courses (non-credit)	**included**
	Total Credits for B. Tech. Programme		**192 (100%)**

4.0 Course Work

4.1 A student, after securing admission, shall pursue the B.Tech. UG Programme in a minimum period of 4 Academic Years, and a maximum period of 8 Academic Years (starting from the Date of Commencement of I Year).

4.2 Each student shall Register for and Secure the specified number of Credits required for the completion of the UG Programme and for Award of the B.Tech. degree in the respective Branch of Engineering.

4.3 Each Semester is structured to provide 24 Credits, totaling to 192 Credits for the entire B.Tech. Programme.

5.0 Course Registration

5.1 A 'Faculty Advisor or Counselor' shall be assigned to each student, who will advise the student about the UG Programme, its Course Structure and Curriculum, Choice/Option for Courses, based on his competence, progress, pre-requisites and interest.

5.2 Academic Section of the College invites 'Registration Forms' from students apriori (before the beginning of the Semester), through 'on-line submissions', ensuring 'DATE and TIME Stamping'. The On-line Registration Requests for any 'Current Semester' shall be completed before the commencement of SEEs (Semester End Examinations) of the 'Preceding Semester'.

5.3 A Student can apply for On-Line Registration, only after obtaining the 'Written Approval' from his Faculty Advisor, which should be submitted to the College Academic Section through the Head of Department (a copy of the same being retained with Head of Department, Faculty Advisor and the Student).

5.4 A Student may be permitted to Register for his Course(s) of choice with a typical total of 24 Credits per Semester (Minimum being 20 Credits and Maximum being 28 Credits) based on his progress and SGPA/ CGPA, and completion of the 'Pre-Requisites' as indicated for various Courses, in the Department Course Structure and Syllabus contents. However, a minimum of 20 Credits per Semester must be registered to ensure the 'studentship' in any Semester.

5.5 Choice for 'additional Courses' to reach the Maximum Permissible Limit of 28 Credits (above the typical 24 Credit norm) must be clearly indicated, which needs the specific approval of the Faculty Advisor/ Counselor.

5.6 If the Student submits ambiguous choices or multiple options or erroneous entries - during On-Line Registration for the Course(s) under a given/ specified Course Group/ Category as listed in the Course Structure, such discrepancy if any will be considered and disposed by the Head of the Department.

5.7 Course Options exercised through On-Line Registration are final and cannot be changed/ inter-changed; further, alternate choices will also not be considered. However, if the Course that has already been listed for Registration (by the Head of Department) in a Semester could not be offered due to any unforeseen or unexpected reasons, then the Student shall be

allowed to have alternate choice - either for a new Course (Course to offering of such a Course), or for another existing Course (Course to availability of seats), which may be considered. Such alternate arrangements will be made by the Head of Department, with due notification and time-framed schedule, within the first week from the commencement of Class-work for that Semester.

Dropping of Courses may be permitted, only after obtaining prior approval from the Faculty Advisor (Course to retaining a minimum of 20 Credits), 'within one week of time' from the beginning of the current Semester.

5.8 For Mandatory Courses like NCC/ NSS/ NSO etc., a 'Satisfactory Participation Certificate' from the concerned authorities for the relevant Semester is essential. No Marks or Grades or Credits shall be awarded for these activities.

6.0 Courses to be offered

6.1 A typical Section (or Class) Strength for each Semester shall be 60.

6.2 An elective Course may be offered to the Students, ONLY IF a Minimum of 20 Students (1/3 of the Section Strength) opt for the same. The Maximum Strength of a Section is limited to 80 (60 + 1/3 of the Section Strength).

6.3 More than one teacher may offer the same Course (Lab./ Practicals may be included with the corresponding Theory Course in the same Semester) in any Semester.

6.4 If more entries for Registration of a Course come into picture, then the concerned Head of Department shall take necessary action, whether to offer such a Course for TWO (or multiple) sections or NOT .

6.5 In case of options coming from Students of other Departments/ Branches/ Disciplines (not considering open electives), priority shall be given to the student of the 'Parent Department' first.

7.0 Attendance Requirements

7.1 A student shall be eligible to appear for the Semester End Examinations, if he acquires a minimum of 75% of attendance in aggregate of all the Courses (excluding Non-Credit Courses) for that Semester.

7.2 Condoning of shortage of attendance in aggregate up to 10% (65% and above, and below 75%) in each Semester may be granted by the College Academic Committee on genuine and valid grounds, based on the student's representation with supporting evidence.

7.3 A stipulated fee shall be payable towards condoning of shortage of attendance.

7.4 Shortage of Attendance below 65% in aggregate shall in NO case be condoned.

7.5 Students, whose shortage of attendance is not condoned in any Semester, are not eligible to take their End Examinations of that Semester, they get detained and their registration for that Semester shall stand cancelled. They will not be promoted to the next Semester. They may seek re-registration for all those Courses registered in that Semester in which he got detained, by seeking re-admission for that Semester as and when offered; in case if there are any Professional Electives and/ or Open Electives, the same may also be re-registered if offered, however, if those Electives are not offered in later Semesters, then alternate Electives may be chosen from the same set of Elective Courses offered under that category.

8.0 Academic Requirements

The following Academic Requirements have to be satisfied, in addition to the Attendance Requirements mentioned in Item No.**7.**

8.1 A student shall be deemed to have satisfied the Academic Requirements and earned the Credits allotted to each Course, if he secures not less than 35% marks (25 out of 70 marks) in the Semester End Examination, and a minimum of 40% of marks in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together; in terms of Letter Grades, this implies securing P Grade or above in that Course. A student shall be deemed to have satisfied the Academic Requirements and earned the Credits allotted to main

project, if he secures not less than 40% marks in internal evaluation as well as external evaluation. This implies securing P Grade or above in the main project.

8.2 A student shall be deemed to have satisfied the Academic Requirements and earned the Credits allotted to - Mini-Project/ Seminar/ Comprehensive Viva, if he secures not less than 40% of the total marks to be awarded for each. The student would be treated as failed, if he -

(i) does not submit a report on his Mini-Project, or does not make a presentation of the same before the Evaluation Committee as per schedule, or Does not appear for Comprehensive Viva

(ii) does not present the Seminar as required in the VII Semester, or

(iii) secures less than 40% of total marks in Mini-Project/ Seminar evaluations/Comprehensive Viva.

He may reappear once for each of the above evaluations, when they are scheduled again; if he fails in such 'one reappearance' evaluation also, he has to reappear for the same in the next subsequent Semester, as and when it is scheduled.

8.3 A Student will not be promoted from I Year to II Year, unless he fulfils the Attendance and Academic Requirements and secures a minimum of total 24 Credits of I Year, from all the relevant regular and supplementary examinations, whether he takes those examinations or not.

8.4 A Student will not be promoted from II Year to III Year, unless he fulfils the Attendance and Academic Requirements and secures a minimum of total 57 Credits up to IV Semester, from all the relevant regular and supplementary examinations, whether he takes those examinations or not.

8.5 A Student will not be promoted from III Year to IV Year, unless he fulfils the Attendance and Academic Requirements and secures a minimum of total 86 Credits up to VI Semester, from all the relevant regular and supplementary examinations, whether he takes those examinations or not.

8.6 A Student shall - register for all Courses covering 192 Credits as specified and listed (with the relevant Course/ Course Classifications as mentioned) in the Course Structure, put up all the Attendance and Academic requirements for 192 Credits securing a minimum of P Grade (Pass Grade) or above in each Course, and 'earn All 192 Credits securing SGPA ≥ 5.0 (in each Semester), and CGPA (at the end of each successive Semester) ≥ 5.0, to successfully complete the UG Programme.

8.7 After securing the necessary 192 Credits as specified for the successful completion of the entire UG Programme, an exemption up to 8 secured Credits (in terms of two of their corresponding Courses) may be permitted for optional drop out from these 192 Credits earned; resulting in 184 Credits for UG Programme performance evaluation, i.e., the performance of the Student in these 184 Credits shall alone be taken into account for the calculation of 'the final CGPA (at the end of UG Programme, which takes the SGPA of the VIII Semester into account), and shall be indicated in the Grade Card of VIII Semester; however, the Student's Performances in the earlier individual Semesters, with the corresponding SGPA and CGPA for which already Grade Cards are given, will not be altered. Further, optional drop out for such 8 secured Credits shall not be allowed for Courses listed Table-1 below.

Table-1

S. No.	Course Particulars
1	All practical Courses
2	Industry Oriented mini project
3	Comprehensive Viva-Voce
4	Seminar
5	Project Work

8.8 If a Student registers for additional courses (in the parent Department or other Departments/Branches of Engineering)

other than those listed Courses totaling to 192 Credits as specified in the Course Structure of his Department. A student having the CGPA of ≥ 7.0 and having passed all previously registered courses are only allowed to register such additional course from the offered open electives. The performances in those additional Courses (although evaluated and graded using the same procedure as that of the required 192 Credits) will not be taken into account while calculating the SGPA and CGPA. For such 'additional courses' registered, % marks and Letter Grade alone will be indicated in the Grade Card, as a performance measure, Course to completion of the Attendance and Academic Requirements as stated in Items 7 and 8.1 – 8.7 above.

8.9 Students who fail to earn 192 Credits as per the Course Structure, and as indicated above, within 8 Academic Years from the Date of Commencement of their I Year shall forfeit their seats in B.Tech. Programme and their admissions shall stand cancelled.

8.10 When a Student is detained due to shortage of attendance in any Semester, he may re-register for that Semester, as and when offered, with the Academic Regulations of the Batch into which he re-registers. However, no Grade Allotments or SGPA/ CGPA calculations will be done for that entire Semester in which he got detained.

8.11 When a Student is detained due to lack of Credits in any year, he may be re-register for the next year, after fulfilment of the Academic Requirements, with the Academic Regulations of the Batch into which he re-registers.

8.12 A student eligible to appear in the Semester End Examination in any Course, but absent at it or failed (thereby failing to secure P Grade or above), may reappear for that Course at the supplementary examination as and when conducted. In such cases, his Internal Marks (CIE) secured earlier for that Course will be carried over, and added to the Marks to be obtained

in the SEE supplementary examination, for evaluating his performance in that Course.

9.0 Evaluation - Distribution and Weightage of Marks

9.1 The performance of a student in each Semester shall be evaluated Course-wise (irrespective of Credits assigned) with a maximum of 100 marks for Theory or Practicals or Seminar or Drawing/Design or Mini-Project or Minor Course, etc; however, the B.Tech. Project Work (Major Project) will be evaluated for 200 Marks. These evaluations shall be based on CIE (Continuous Internal Evaluation) and SEE (Semester End Examination), and a Letter Grade corresponding to the percentage marks obtained shall be given.

9.2 For Theory Courses 30 marks are allocated for Continuous Internal Evaluation. Continuous Internal Evaluation during a semester is based on two internal examinations conducted during the semester and attendance put in by the student in that semester. 70 marks are allocated for the Semester End Examination (SEE).

(a) Internal evaluation for 30 marks in each course consists of two internal examinations (for 20 marks), two assignments (for 5 marks) and attendance in that course (for 5 marks).

(b) Internal examination question paper consists of Part-A and Part-B. Part-A consists of 5 short answer questions of 1 mark each, Part-B consists of 5 descriptive questions out of which 3 are to be answered, each question carrying 5 marks. The duration of internal examination is 1 hour 30 minutes.

(c) Out of the two Assignments, the first Assignment should be submitted before the conduct of the first internal examination and second Assignment should be submitted before the conduct of the second internal examination. Each Assignment consists of 5 questions, each question carries 1 mark.

(d) The final marks (for total of 25) secured by the student in 'Internal Examination and the Assignment' for the semester are

arrived at by giving a weightage of 70% to the best secured 'internal examination and Assignment' and 30% weightage to the least secured 'internal examination and Assignment'. A student who is absent from any assignment/ internal examination for any reason what so ever shall be deemed to have secured 'zero' marks in the test/ examination and no makeup test/ examination shall be conducted.

(e) Five marks in each course are allocated for the attendance of the student during the semester in that course. The allocation of the marks for attendance is as follows.

% of Attendance	Marks allocated
Below 75%	Nil
75% to 85%	2
85% to 95%	4
>95%	5

9.3 For Practical Courses, there shall be a Continuous Internal Evaluation (CIE) during the Semester for 40 internal marks, and 60 marks are assigned for Lab./Practical Semester End Examination (SEE). Out of the 40 marks for internals, day-to-day work in the laboratory shall be evaluated for 30 marks; and for the remaining 10 marks - internal practical test shall be conducted by the concerned laboratory teacher. The end semester examination SEE for practicals shall be conducted with an external examiner and the laboratory teacher.

9.4 For the Courses of design and / or drawing, (such as Engineering Graphics, AutoCAD, Engineering Drawing, Machine Drawing, Estimation etc.,) the internal evaluation carries 40 marks (the distribution is 15 marks for day-to-day work, 20 marks for internal examination and 5 marks for end semester attendance). There shall be 60 marks for semester end examination. Internal exam marks will be awarded from two internal examinations conducted in a semester, with a weightage of 70% of the best secured internal examination and 30% of the least secured internal examination.

Question paper pattern

Internal Exam- Maximum Marks: 20

Part- A of internal exam contains short answer questions for five marks.

Part-B contains three questions with internal choice, following judicious distribution of questions, unit wise. Each question carries five marks.

Semester End Examination (SEE) – Maximum Marks: 60

Part-A of SEE contains 10 short answer questions of 1 mark each.

Part-B contains five questions with internal choice, following judicious distribution among five units. Each question carries 10 marks.

9.5 **Open Electives:** Students are to choose One Open Elective (OE-I) during VII Semester, one (OE-II) and one (OE-III) in VIII Semester from the list of Courses offered under Open Electives.

9.6 There shall be a Mini-Project, to be taken up in the college or industry during the summer vacation after VI Semester End Examination. The mini project shall be evaluated during the VII Semester. The mini project shall be submitted in a report form along with the project model if any and should be presented before a committee, which shall evaluate for 100 marks. The committee consists of Head of the Department, the supervisor of mini project, a senior faculty member of the department and an external examiner. There shall be no internal marks for Mini-project. The external examiner shall be appointed by the Controller of Examinations from a panel of three members submitted by the Head of the Department.

9.7 There shall be a Seminar presentation in VIII Semester. For the

Seminar, the student shall collect the information on a specialized topic related to his branch other than the project topic and prepare a technical report and submit to the department. The presentation demonstrating understanding of the topic and technical report shall be evaluated by a Departmental committee consisting of the Head of the department, Seminar supervisor and a senior faculty member from the department. The seminar will be evaluated for 100 marks. There shall be no internal marks for the seminar.

9.8 There shall be a Comprehensive Viva-Voce in VIII Semester. The Comprehensive Viva-Voce will be conducted by a Committee consisting of the Head of the Department and three Senior Faculty members of the Department. The Comprehensive Viva-Voce is intended to assess the student's understanding in various Courses he studied during the B.Tech. course of study. The Comprehensive Viva-Voce is evaluated for 100 marks by the Committee. There shall be no internal marks for the Comprehensive Viva-Voce.

9.9 The **main project** shall be evaluated for 200 marks out of which 80 marks are for internal evaluation and 120 marks are for Semester End Evaluation. The project work shall be taken up in the beginning of VIII semester and shall be completed by the end of VIII semester. Internal evaluation shall be conducted by Head of the Department and the project supervisor for 80 marks. The Semester End Examination shall be based on the report submitted and a viva-voce exam for 120 marks by committee comprising of the Head of the Department, project supervisor and an external examiner. The external examiner shall be appointed by the Controller of Examinations from a panel of three members submitted by the Head of the Department.

10. 0. Semester End Examination

10.1. Theory Courses

The Semester End Examination will be conducted for 70 marks

which consist of Part-A and Part-B. The examination is of 3 hours duration. Question paper pattern is as follows.

Part-A: 20 Marks

There shall be 10 questions each carrying 2 Marks. (Two questions from each Unit)

Part-B: 50 Marks

There shall be 5 questions with internal choice, each question carrying 10 marks. One question from each unit of the syllabus should be framed.

10.2. Practical Courses

Each lab course is evaluated for 60 marks. The examination shall be conducted by the laboratory teacher and an external examiner. External examiner will be appointed by the Controller of Examinations from other institutions or industry.

10.3. Supplementary Examinations

The schedule for supplementary examinations shall be as notified by the institute from time to time.

10.4 For NCC/ NSS/ NSO types of Courses, and/or any other Mandatory Non-Credit Course offered in a Semester, a 'Satisfactory Participation Certificate' shall be issued to the Student from the concerned authorities, only after securing ≥ 65% attendance in such a Course. No marks or Letter Grade shall be allotted for these activities and it will not be part of calculation of CGPA.

11.0. Grading Procedure

11.1.Marks will be awarded to indicate the performance of each student in each Theory Course, or Lab/Practicals, or Seminar, or Project, or Mini-Project, etc., based on the % marks obtained in CIE + SEE

(Continuous Internal Evaluation + Semester End Examination). As a measure of the student's performance, a 10-point Absolute Grading System using the following Letter Grades (UGC Guidelines) and corresponding percentage of marks shall be followed.

% of Marks Secured (Class Intervals)	*Letter Grade (UGC Guidelines)*	*Grade Points*
100% or below but not less than 85% (≥ 85% , <= 100%)	**O (Excellent)**	**10**
Below 85% but not less than 70% (≥ 70% , < 85%)	**A (Very Good)**	**9**
Below 70% but not less than 60% (≥ 60% , < 70%)	**B (Good)**	**8**
Below 60% but not less than 55% (≥ 55% , < 60%)	**C (above Average)**	**7**
Below 55% but not less than 50% (≥ 50% , < 55%)	**D (Average)**	**6**
Below 50% but not less than 40% (≥ 40% , < 50%)	**P (Pass)**	**5**
Below 40% (< 40%)	**F (FAIL)**	**0**

11.2 A student obtaining F Grade in any Course shall be considered 'failed' and will be required to reappear as 'Supplementary Candidate' in the End Semester Examination (SEE), as and when offered. In such cases, his Internal Marks (CIE Marks) in those Course(s) will remain same as those he obtained earlier.

11.3. A Letter Grade does not imply any specific % of Marks.

11.4. In general, a student shall not be permitted to repeat any Course/ Course (s) only for the sake of 'Grade Improvement' or 'SGPA/ CGPA Improvement'. However, he has to repeat all the Courses pertaining to that Semester, when he is detained (as listed in Items 8.10- 8.11).

11.5. A student earns Grade Point (GP) in each Course/ Course, on the basis of the Letter Grade obtained by him in that Course/ Course (excluding Mandatory non-credit Courses). Then the corresponding 'Credit Points' (CP) are computed by multiplying the Grade Point with Credits for that particular Course/ Course.

Credit Points (CP) = Grade Point (GP) x Credits …. For a Course

11.6. The Student passes the Course/ Course only when he gets GP ≥ 5 (P Grade or above).

11.7. The Semester Grade Point Average (SGPA) is calculated by dividing the Sum of Credit Points (ΣCP) secured from all Courses registered in a Semester, by the Total Number of Credits registered during that Semester. SGPA is rounded off to TWO Decimal Places. SGPA is thus computed as

SGPA $= \{ \sum_{i=1}^{N} C_i G_i \} / \{ \sum_{i=1}^{N} C_i \}$ **…. For each Semester**,

where **'i'** is the Course indicator index (takes into account all Courses in a Semester), 'N' is the no. of Courses 'REGISTERED' for the Semester (as specifically required and listed under the Course Structure of the parent Department), C_i is the no. of Credits allotted to the $\mathbf{i}^{th}$ Course, and G_i represents the Grade Points (GP) corresponding to the Letter Grade awarded for that $\mathbf{i}^{th}$ Course.

11.8. The Cumulative Grade Point Average (CGPA) is a measure of the overall cumulative performance of a student over all Semesters considered for registration. The CGPA is the ratio of the Total Credit Points secured by a student in ALL registered Courses in ALL Semesters, and the Total Number of Credits registered in ALL the Semesters. CGPA is rounded off to TWO Decimal Places. CGPA is thus computed from the I Year Second Semester onwards, at the end of each Semester, as per the formula

CGPA = $\{\sum_{j=1}^{M} C_j G_j\} / \{\sum_{j=1}^{M} C_j\}$ … for all S Semesters registered

(ie., upto and inclusive of S Semesters, $S \geq 2$),

where 'M' is the TOTAL no. of Courses (as specifically required and listed under the Course Structure of the parent Department) the Student has 'REGISTERED' from the 1st Semester onwards up to and inclusive of the Semester S (obviously M > N), '**j**' is the Course indicator index (takes into account all Courses from 1 to S Semesters), C_j is the no. of Credits allotted to the **j**th Course, and G_j represents the Grade Points (GP) corresponding to the Letter Grade awarded for that **j**th Course. After registration and completion of I Year I Semester however, the SGPA of that Semester itself may be taken as the CGPA, as there are no cumulative effects.

11.9. For Merit Ranking or Comparison Purposes or any other listing, ONLY the 'ROUNDED OFF' values of the CGPAs will be used.

11.10. For Calculations listed in Item 11.5– 11.8, performance in failed Courses (securing F Grade) will also be taken into account, and the Credits of such Courses will also be included in the multiplications and summations. However, Non-Credit Courses will not be taken into consideration.

12.0. Pass Criterion

12.1. A student shall be declared successful or 'passed' in a Semester, only when he gets a SGPA ≥ 5.00 (at the end of that particular Semester); and a student shall be declared successful or 'passed' in the entire UG PROGRAMME, only when he gets a CGPA ≥ 5.00; Course to the condition that he secures a GP ≥ 5 (P Grade or above) in every registered

Course/ Course in each Semester (during the entire UG programme) for the Degree Award, as required.

12.2. A Student shall be declared successful or 'passed' in any Non-Credit Course/ Course, if he secures a 'Satisfactory Participation Certificate' for that Mandatory Course.

12.3. After the completion of each Semester, a Grade Card or Grade Sheet (or Transcript) shall be issued to all the Registered Students of that Semester, indicating the Letter Grades and Credits earned. It will show the details of the Courses Registered (Course Code, Title, No. of Credits, Grade Earned etc.), Credits earned, SGPA, and CGPA.

13.0. Declaration of Results

13.1 Computation of SGPA and CGPA are done using the procedure listed in 11.5 – 11.9.

13.2. For Final % of Marks equivalent to the computed final CGPA, the following formula may be used …

% of Marks = (final CGPA – 0.5) x 10

14.0. Award of Degree

14.1 A Student who registers for all the specified Courses as listed in the Course Structure, satisfies all the Course Requirements, and passes all the examinations prescribed in the entire UG E&T Programme (UG PROGRAMME), and secures the required number of 192 Credits (with CGPA ≥ 5.0), within 8 Academic Years from the Date of Commencement of the First Academic Year, shall be declared to have 'QUALIFIED' for the Award of the B.Tech. Degree in the chosen Branch of Engineering as selected at the time of Admission.

14.2. A Student who qualifies for the Award of the Degree as listed in Item 14.1, shall be placed in the following Classes …

14.3. Students with final CGPA (at the end of the UG PROGRAMME) ≥ 8.00, and fulfilling the following conditions

(i) should have passed all the Courses/Courses in 'FIRST APPEARANCE' within the first 4 Academic Years (or 8 Sequential Semesters) from the Date of Commencement of his First Academic Year,

(ii) should have secured a CGPA ≥ 8.00, at the end of each of the 8 Sequential Semesters, starting from the I Year I Semester onwards,

(iii) should not have been detained or prevented from writing the End Semester Examinations in any Semester due to shortage of attendance or any other reason,

Shall be placed in 'FIRST **CLASS with DISTINCTION'**.

14.4 (a) Students having final CGPA (at the end of UG PROGRAMME) ≥ 8.00 , but not fulfilling the conditions of 14.3 (i), (ii) and (iii) shall be placed in 'FIRST CLASS'.

(b) Students with final CGPA (at the end of the UG PROGRAMME) ≥ 6.50 but < 8.00, shall be placed in 'FIRST CLASS'.

14.5 Students with final CGPA (at the end of the UG PROGRAMME) ≥ 5.50 but < 6.50, shall be placed in 'SECOND CLASS'.

14.6 All other Students who qualify for the Award of the Degree (as per Item 14.1), with final CGPA (at the end of the UG PROGRAMME) ≥ 5.00 but < 5.50, shall be placed in 'PASS CLASS'.

14.7 A student with final CGPA (at the end of the UG PROGRAMME) < 5.00 will not be eligible for the Award of the Degree.

15.0. Withholding of Results

15.1 If the student has not paid fees to College at any stage, or has pending dues against his name due to any reason whatsoever, or if any case of indiscipline is pending against him, the

result of the student may be withheld, and he will not be allowed to go into the next higher Semester. The Award or issue of the Degree may also be withheld in such cases.

16.0 Transitory Regulations

16.1 The Student who has discontinued for any reason, or has been detained for want of attendance may be considered eligible for re-admission to the same course in next academic year or subsequent academic years. The student who has been detained for lack of credits can be readmitted to the next semester only on obtaining minimum required credits.

16.2. After re-admission the student is required to study the course as prescribed in the new regulations for the re-admitted programme at that level and thereafter.

16.3. In case the courses offered in subsequent semesters are repetitive, equivalent courses for replacement of completed courses by the students will be established /identified by the BOS comparing the earlier course in which he studied as per the new regulation in which he has taken re-admission into the course. The students will be suggested the course and to register the said substitute subjects in the new regulation.

16.4. The marks /credits are transferred for all such cleared equivalent subjects and treated as successfully cleared in the new prescribed program course structure.

16.5. For not cleared subjects in the previous course also equivalent course will be identified by the BOS for pursuing the course. The students will be suggested to purse the course and to register the said substitute subjects in the new regulation and to qualify in examinations.

16.5. Marks obtained in the courses completed in previous regulations (in case of change in regulation) are to be converted in to grades and CGPA and memos may be re-issued with the CGPA.

17.0 Student Transfers

17.1 There shall be no Branch transfers after the completion of Admission Process.

17.2 Transfer of candidates from other Institutions will be governed by the regulations of Telangana State Government issued from time to time.

18.0 Scope

i) Where the words "he", "him", "his", occur in the write-up of regulations, they include "she", "her", "hers".
ii) Where the words "Course" or "Courses", occur in these regulations, they also imply "Course" or "Courses".
iii) The Academic Regulations should be read as a whole, for the purpose of any interpretation.
iv) In case of any doubt or ambiguity in the interpretation of the above rules, the decision of the Vice-Chancellor/ Principal is final.
v) The College may change or amend the Academic Regulations, Course Structure or Syllabi at any time, and the changes or amendments made shall be applicable to all Students with effect from the dates notified by the College Authorities.

ACADEMIC REGULATIONS R02 FOR B. TECH.

(LATERAL ENTRY SCHEME)

\(Applicable for the students admitted into II year B. Tech. (Lateral Entry Scheme) from the Academic Year 2016-17 and onwards)

1. **Eligibility for award of B. Tech. Degree (LES)**

1.1. The LES candidates shall pursue a course of study for not less than three academic years and for not more than six academic years.

1.2. The candidate shall register for 144 credits and secure 144 credits from II to IV year B.Tech. Programme (LES) for the award of B.Tech. degree. They are exempted from the courses of I year offered to regular entry students.

1.3. The students, who fail to fulfill the requirement for the award of the degree in 6 consecutive academic years from the year of admission, shall forfeit their seats.

1.4. The attendance regulations of B. Tech. (Regular) shall be applicable to B.Tech. (LES) also.

2. **Promotion Rule**

A student shall be eligible for promotion in B.Tech programme, if he/she acquires the minimum number of credits as given below:

2.1. A student shall be promoted from II Year to III Year only if he/she fulfills the academic requirements of 24 credits up to IV Semester, from all the examinations, whether or not the candidate takes the examinations.

2.2. A student shall be promoted from III year to IV year only if he/she fulfills the academic requirements of 48 credits up to VI Semester from all the examinations, whether or not the

candidate takes the examinations.

2.3. Students who fail to earn 144 credits as indicated in the course structure within six academic years from the year of their admission shall forfeit their seat in B.Tech. Course and their admission stands cancelled.

3. **Award of Class**

After a student has satisfied the requirement prescribed for the completion of the program and is eligible for the award of B. Tech. Degree, he shall be placed in one of the following four classes:

CGPA	Class Awarded	From the CGPA secured from 144 credits
≥7.5	First Class with Distinction	
≥6.5 - <7.5	First Class	
≥5.5 - <6.5	Second Class	
≥5.0 - <5.5	Pass Class	

4. All the other regulations as applicable to B. Tech. 4-year degree course (Regular) will hold good for B.Tech. (Lateral Entry Scheme).

MALPRACTICE RULES

Disciplinary Action for Malpractices/Improper Conduct in Examinations

	Nature of Malpractices/ Improper conduct	Punishment
1.(a)	Possesses or keeps accessible in examination hall, any paper, note book, programmable calculators, Cell phones, pager, palm computers or any other form of material concerned with or related to the Course of the examination (theory or practical) in which he is appearing but has not made use of (material shall include any marks on the body of the candidate which can be used as an aid in the Course of the examination)	Expulsion from the examination hall and cancellation of the performance in that Course only.
(b)	Gives assistance or guidance or receives it from any other candidate orally or by any other body language methods or communicates through cell phones with any candidate or persons in or outside the exam hall in respect of any matter.	Expulsion from the examination hall and cancellation of the performance in that Course only of all the candidates involved. In case of an outsider, he will be handed over to the police and a case is registered against him.
2.	Has copied in the examination hall from any paper, book, programmable calculators, palm computers or any other form of material relevant to the Course of the examination (theory or practical) in which the candidate is appearing.	Expulsion from the examination hall and cancellation of the performance in that Course and all other Courses the candidate has already appeared including practical examinations and project work and shall not be permitted to appear for the remaining examinations of the Courses of that Semester/year. The Hall Ticket of the candidate is to be cancelled.

3.	Impersonates any other candidate in connection with the examination.	The candidate who has impersonated shall be expelled from examination hall. The candidate is also debarred and forfeits the seat. The performance of the original candidate Who has been impersonated, shall be cancelled in all the Courses of the examination (including practicals and project work) already appeared and shall not be allowed to appear for examinations of the Remaining Courses of that semester/year. The candidate is also debarred for two consecutive semesters from class work and all end semester examinations. The continuation of the course by the candidate is Course to the academic regulations in connection with forfeiture of seat. If the imposter is an outsider, he will be handed over to the police and a case is registered against him.
4.	Smuggles the answer book or additional sheet or takes out or arranges to send out the question paper during the examination or answer book or additional sheet, during or after the examination	Expulsion from the examination hall and cancellation of performance in that Course and all the other Courses the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the Courses of that semester/year. The candidate is also debarred for two consecutive semesters from class work and all end semester Examinations. The continuation of the course by the candidate is Course to the academic regulations in connection with forfeiture of seat.
5.	Uses objectionable, abusive or offensive language in the answer paper or in letters to the examiners or writes to the examiner requesting him to award pass marks	Cancellation of the performance in that Course
6.	Refuses to obey the orders of the Chief Superintendent/Assistant–	In case of students of the college, they shall be expelled from examination

	Superintendent / any officer on duty or misbehaves or creates disturbance of any kind in and around the or organizes a walk out or instigates others **to** examination hall walk out, or threatens the officer- in-charge or any person on duty in or outside the examination hall of any injury**,** to his person or to any of his relations whether by words, either spoken or written or by signs or by visible representation, assaults the officer- in-charge, or any person on duty in or outside the examination hall or any of his relations, or indulges in any other act of misconduct or mischief which result in damage to or destruction of property in the examination hall or any part of the College campus or engages in any other act which in the opinion of the officer on duty amounts to use of unfair means or misconduct or has the tendency to disrupt the orderly conduct of the examination.	halls and cancellation of their performance in that Course and all other Courses the candidate(s) has (have) already appeared and shall not be permitted to appear for the remaining examinations of the Courses of that semester/year. The candidates are also debarred and forfeit their seats. In case of outsiders, they will be handed over to the police and a police case is registered against them.
7.	Leaves the exam hall taking away answer script or intentionally tears of the script or any part thereof inside or outside the examination hall.	Expulsion from the examination hall and cancellation of performance in that Course and all the other Courses the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the Courses of that semester/year. The candidate is also debarred for two consecutive semesters from class work and all University examinations. The continuation of the course by the candidate is Course to the academic regulations in connection with forfeiture of seat.
8.	Possess any lethal weapon or firearm in the examination hall.	Expulsion from the examination hall and cancellation of the performance in that

		Course and all other Courses the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the Courses of That semester/year. The candidate is also debarred and forfeits the seat.
9.	If student of the college, who is not a candidate for the particular examination or any person not connected with the college indulges in any malpractice or improper conduct mentioned in clause 6 to 8.	If the student belongs to the college, expulsion from the examination performance in that Course and all other Courses shall and cancellation of the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the Courses of that semester/year. The candidate is also debarred and forfeits the seat. Person(s) who do not belong to the College will be handed over to police and, a police case will be registered against them.
10.	Comes in a drunken condition to the examination hall.	Expulsion from the examination hall and cancellation of the performance in that Course and all other Courses the candidate has already appeared including practical examinations and project work and shall not be permitted for other remaining examinations of the Courses of that semester/year.
11.	Copying detected on the basis of internal evidence, such as, during valuation or during special scrutiny.	Cancellation of the performance in that Course and all other Courses the candidate has appeared including practical examinations and project work of that semester/year.
12.	If any malpractice is detected which is not covered in the above clauses 1 to 11 shall be reported to the College Academic Committee for further action to award suitable punishment.	

Malpractices identified by squad or special invigilators

Punishments to the candidates as per the above guidelines.

Malpractice identified at Spot center during valuation

The following procedure is to be followed in the case of malpractice cases detected during valuation, scrutiny etc. at spot center.

1) Malpractice is detected at the spot valuation. The case is to be referred to the malpractice committee. Malpractice committee will meet and discuss/question the candidate and based on the evidences, the committee will recommend suitable action on the candidate.
2) A notice is to be served to the candidate(s) involved through the Principal to his address and to the candidate(s) permanent address regarding the malpractice and seek explanations.

3) The involvement of staff who are in charge of conducting examinations, invigilators valuing examination papers and preparing / keeping records of documents relating to the examinations in such acts (inclusive of providing in correct or misleading information) that infringe upon the course of natural justice to one and all concerned at the examinations shall be viewed seriously and recommended for award of appropriate punishment after thorough enquire.

4) Based on the explanation and recommendation of the committee action may be initiated.

5) **Malpractice committee:**

i.	Controller of Examinations	Chairman
ii.	Assistant Controller of Evaluation	Member
iii.	Chief Examiner of the Course/ Course expert	Member
iv.	Concerned Head of the Department	Member
v	Concerned Invigilator	Member

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CMR COLLEGE OF ENGINEERING & TECHNOLOGY
(Autonomous)
DEPARTMENT OF ECE

Institute Vision:

To be a premier academic institution striving continuously for excellence in technical education, research and technological service to the nation.

Institute Mission:

- Create and sustain a community of learning in which students acquire knowledge and learn to apply it professionally with a concern for the society.
- Pursue and disseminate research findings and offer knowledge-based technological services to satisfy the needs of society and the industry.
- Promote professional ethics, leadership qualities and social responsibilities.

Department Vision:

To produce globally competitive engineering graduates with social awareness and become centre of excellence through research in the areas of Electronics & Communication Engineering.

Department Mission:

- To impart quality education to the students in the domain of Electronics & Communication Engineering and related fields to make them globally competitive.
- To pursue research in Electronics & Communication Engineering and related disciplines in order to serve the needs of the society.
- Develop self-learning abilities and professional ethics to enable them to serve the society

Program Educational Objectives:

PEO 1: Excel in their professional career and higher education in & Electronics & Communication Engineering and related fields.
PEO 2: Exhibit leadership through professional ability and team work
PEO 3: Adapt to emerging trends for sustained growth in their relevant areas of Interest and exhibit social responsibility

Program Outcomes:

1. Ability to apply the knowledge of mathematics, science, engineering fundamentals for solution of complex engineering problems.
2. Ability to identify, formulate, research literature, and analyse complex engineering problems with appropriate considerations
3. Ability to design solution for complex engineering problems with appropriate consideration for society.
4. Ability to use research –based knowledge and research methods including design of experiments to provide valid conclusions.
5. Ability to learn and apply appropriate modern tools for engineering solutions
6. Ability to assess societal, health, safety, legal and cultural issues and the consequent responsibilities and follow them in professional practice
7. Ability to understand the impact of the professional practices on environment, society and its sustainable development
8. Ability to apply ethical principles and commit to professional ethics in engineering practice
9. Ability to function on an inter- disciplinary team
10. Ability to communicate effectively
11. Ability to understand engineering and management principles and apply them to one's own work, as a member and leader in a team, to manage projects
12. Ability to engage in lifelong learning.

CMR COLLEGE OF ENGINEERING & TECHNOLOGY,
(AUTONOMOUS)

B.Tech (ECE)
CBCS & OUTCOME BASED COURSE STRUCTURE

I Semester

Course Code	Group	Course	L	T	P	C
A2007	BS	Engineering Mathematics-I	3	1	0	3
A2012	BS	Engineering Physics-I	3	0	0	3
A2015	BS	Engineering Chemistry	3	0	0	3
A2501	ES	Computer Programming Through 'C'	3	1	0	3
A2309	ES	Engineering Drawing Practice	2	0	4	4
A2014	BS	Engineering Physics Lab	0	0	3	2
A2018	BS	Engineering Chemistry Lab	0	0	3	2
A2305	ES	Engineering Workshop	0	0	3	2
A2549	ES	Computer Programming Lab	0	0	3	2
Total:			14	2	16	**24**

II Semester

Course Code	Group	Course	L	T	P	C
A2001	HS	English	3	0	0	3
A2008	BS	Engineering Mathematics-II	3	1	0	3
A2009	BS	Engineering Mathematics-III	3	1	0	3
A2013	BS	Engineering Physics-II	3	0	0	3
A2251	ES	Network Theory	3	1	0	3
A2502	ES	Data Structures Through 'C'	3	1	0	3
A2002	HS	English Language Communication Skills Lab	0	0	3	2
A2550	ES	Data Structures Lab	0	0	3	2
A2551	ES	IT Workshop	0	0	3	2
Total:			18	4	9	**24**

III Semester

Course Code	Group	Course	L	T	P	C
A2010	BS	Special Functions & Complex Analysis	3	1	0	3
A2252	ES	Electrical Technology	3	0	0	3
A2401	PC	Electronic Devices & Circuits	4	1	0	4
A2021	HS	Managerial Economics and Financial Analysis	3	0	0	3
A2402	PC	Probability Theory & Random Process	4	0	0	4
A2403	PC	Switching Theory & Logic Design	3	1	0	3
A2404	PC	Electronic Devices & Circuits Lab	0	0	3	2
A2405	PC	Basic Simulation Lab	0	0	3	2
A2023	HS	Gender Sensitization	0	0	3	2
Total:			20	3	9	**26**

IV Semester

Course Code	Group	Course	L	T	P	C
A2019	HS	Environmental Studies	3	0	0	3
A2406	PC	Signals & Systems	3	1	0	3
A2407	PC	Electronic, Pulse & Digital Circuits	3	0	0	3
A2207	ES	Control Systems	4	0	0	4
A2408	PC	Electromagnetic Theory & Transmission Lines	4	1	0	4
A2409	PC	Analog Communications	3	0	0	3
A2253	ES	Electrical Technology Lab	0	0	3	2
A2410	PC	Electronic, Pulse & Digital Circuits Lab	0	0	3	2
A2004	HS	Soft Skills and Professional Ethics	2	0	0	0
Total:			22	2	6	24

V Semester

Course Code	Group	Course	L	T	P	C
A2411	PC	Microprocessors & Microcontrollers	4	1	0	4
A2412	PC	Antennas & Wave Propagation	4	0	0	4
A2413	PC	Digital Communications	3	0	0	3
A2414	PC	Linear & Digital IC Applications	3	0	0	3
A2415	PC	Digital Design Using Verilog HDL	4	0	0	4
A2416	PC	IC Applications & HDL Simulation Lab	0	0	3	2
A2417	PC	Micro Processors & Micro Controllers Lab	0	0	3	2
A2418	PC	Analog Communications Lab	0	0	3	2
A2005	HS	Analytical Skills-I	2	0	0	0
Total:			20	1	9	24

VI Semester

Course Code	Group	Course	L	T	P	C
A2419	PC	Digital Signal Processing	3	1	0	3
A2420	PC	Microwave Engineering	3	0	0	3
A2421	PC	VLSI Design	3	0	0	3
A2422	PC	Electronic Measurements & Instrumentation	3	0	0	3
	PE	**Professional Elective –I**	4	0	0	4
A2423		Digital Image Processing				
A2511		Computer Networks				
A2424		Telecommunication Switching Systems & Networks				
	PE	**Professional Elective –II**	4	0	0	4
A2425		Cellular & Mobile Communications				
A2433		Satellite Communications				
A2427		Optical Communications				
A2428	PC	Microwave & Digital	0	0	3	2

		Communications Lab				
A2003	HS	Advanced English Communication Skills Lab	0	0	3	2
A2006	HS	Analytical Skills-II	2	0	0	0
Total:			22	1	6	24

VII Semester

Course Code	Group	Course	L	T	P	C
	OE	**Open Elective - I**	3	0	0	3
A2508	PC	Computer Organization	3	0	0	3
	PE	**Professional Elective –III**	4	0	0	4
A2429		Radar Systems				
A2512		Operating Systems				
A2430		Wireless Communications & Networks				
	PE	**Professional Elective –IV**	4	0	0	4
A2431		Data Communications				
A2426		Embedded Systems Design				
A2541		Cloud Computing				
	PE	**Professional Elective –V**	4	0	0	4
A2506		Design & Analysis of Algorithms				
A2434		Digital Signal Processors and Architectures				
A2435		Real Time Operating Systems				
A2436		Digital Signal Processing Lab	0	0	3	2
A2437	PC	VLSI Lab	0	0	3	2
A2438	P	Mini Project	0	0	0	2
Total:			18	0	6	24

VIII Semester

Course Code	Group	Course	L	T	P	C
A2022	HS	Management Science	4	0	0	4
	OE	Open Elective - II	3	0	0	3
	OE	Open Elective - III	3	0	0	3

A2439	P	Seminar	0	0	0	2
A2440	P	Comprehensive Viva-Voce	0	0	0	2
A2441	P	Main Project	0	12	6	10
Total:			10	12	6	24

Total Credits of Programme(Excluding Gender Sensitization): 192

T – Tutorial L – Theory P – Practical C – Credits

Group: HS: Humanities & Social Sciences, BS: Basic Sciences, ES: Engineering Sciences
PC: Professional Core, PE: Professional Elective, OE: Open Elective, MC: Mandatory Non-credit Course, PW: Project Work

OPEN ELECTIVES

Open Elective-I

Subject Code	Open electives	Dept offering	Pre-requisite	L	T	P	C
A2256	Modern Control Theory	EEE	Control Systems	3	0	0	3
A2362	Material Science	ME	Nil	3	0	0	3
C2161	Logistics and supply chain management	MBA	Nil	3	0	0	3
A2509	Java Programming	CSE	Nil	3	0	0	3

Open Elective-II

Subject Code	Open electives	Dept offering	Prerequisite	L	T	P	C
A2363	Elements of Mechanical Engineering	ME	Nil	3	0	0	3
A2517	Information Security	CSE	Nil	3	0	0	3
C2164	Entrepreneurship	MBA	Nil	3	0	0	3
A2246	Power Systems Engineering	EEE	BEE	3	0	0	3

Open Elective-III

Subject Code	Open electives	Dept offering	Prerequisite	L	T	P	C
A2241	Renewable Energy Sources	EEE	BEE	3	0	0	3
A2156	Remote Sensing & GIS	CE	Nil	3	0	0	3
A2562	Fundamentals of Web Technologies	CSE	Java Programming	3	0	0	3
C2165	Basics of Insurance & Taxation	MBA	Nil	3	0	0	3

DETAILED SYLLABUS
B.TECH(ECE)

I SEMESTER

(A2007) ENGINEERING MATHEMATICS-I

L	T	P	C
3	1	0	3

B. Tech. (ECE) I-Semester

Course Objectives:

1. Obtain and understand formation and solution of matrices. Solutions of linear systems through matrices.
2. Learn to find Eigen values, Eigen vectors and usage of Cayley-Hamilton Theorem. Understanding real & complex matrices and reduction to Canonical form.
3. Develop the skills pertinent to the practice of mathematics and to formulate problems on continuous and differentiable functions.
4. The areas of bounded regions can be found using methods of integrations.
5. In the diverse fields like electrical circuits, electronic communication, mechanical vibration and structural engineering, periodic functions naturally occur and hence their properties are very much required.

Unit-I: Linear Algebra-I

Matrices and Linear Systems of Equations: Real Matrices: Symmetric, Skew-symmetric, Orthogonal. Complex matrices: Hermitian, Skew- Hermitian and Unitary. Elementary row transformations- Rank – Echelon form, Normal form- Solution of Linear Systems – Direct Methods (Gauss Elimination, Gauss Jordan)-LU-Decomposition.

Unit-II: Linear Algebra-II

Eigen Values, Eigen Vectors- Properties, Cayley –Hamilton Theorem (without proof) – Inverse and Powers of a matrix by Cayley-Hamilton theorem- Linear Transformation- Orthogonal Transformation- Diagonalization of matrix. Calculation of Powers of matrix-Modal and spectral matrices. Quadratic forms- Reduction of quadratic form to canonical form-rank- positive, Negative definite-semi definite-Index-Signature.

Unit- III: Functions of Single & Several Variables

Rolle's Theorem –Lagrange's Mean value Theorem – Cauchy's Mean value theorem- Generalized Mean value theorem (all theorems without proof)
Functions of Several Variables- Functional dependence –Jacobian- Maxima and Minima of functions of two variables with constraints and without constraints.

Unit IV: Multiple Integrals

Double integrals – Change of variables – Change of order of integration and Triple integrals.

Unit-V: Fourier Series

Determination of Fourier coefficients – Fourier Series – even and odd function – Fourier Series in an arbitrary interval – even and odd periodic continuation – Half-range Fourier sine and cosine expansions.

Text Books

1. Kreyszig's Engineering Mathematics – I by Dr. A. Ramakrishna Prasad, 2014 yr Edition John Wiley Publications.
2. Advanced Engineering Mathematics by R.K. Jain & S.R.K. Iyengar, 3rd edition, Narosa Publishing House, Delhi.

References

1. Advanced Engineering Mathematics by Kreyszig, 8th Edition, John Wiley & Sons Publishers
2. Higher Engineering Mathematics by B.S. Grewal, 36th Edition, Khanna Publishers.
3. Advanced Engineering Mathematics with MATLAB, Dean G. Duffy, 3rd Edi, CRC Press Taylor & Francis Group.
4. Mathematics for Engineering and Scientists. Alan Jeffrey, 6th Edi, 2013, Chapman & Hall / CRC
5. Engineering Mathematics – I by T.K.V. Iyengar, B. Krishna Gandhi & Others, 2013 Yr. Edition S.Chand.
6. Engineering Mathematics – I by D.S. Chandrasekhar, Prison Books Pvt. Ltd.
7. Engineering Mathematics – I by G. Shanker Rao & Others I.K. International Publications.

Course Outcomes

On completion of the course students will be able to

1. Solve linear system of equations by using various methods of matrices.
2. Find eigenvalues, eigenvectors and diagonalization of a square matrix. Finds the nature of real and complex matrices by reducing to canonical form.
3. Verify mean value theorems and they can find maximum and minimum for multiple variable functions.
4. Calculate the length of arcs, surface area and the volumes of solid objects. Perform polar-to-cartesian and cartesian-to-polar conversions.
5. Expand the function by Fourier series and Fourier transforms.

(A2012) ENGINEERING PHYSICS-I

L	T	P	C
3	0	0	3

B. Tech. (ECE) I-Semester

Course Objectives:

- To understand the phenomenon of interference, diffraction and polarization of light.
- To understand the bonding and structural properties of the crystals and their study using X-ray diffraction techniques.
- To understand the origin of different crystal defects and the basics of statistical mechanics.
- To understand the classical, quantum approach to explain the electrical properties of solids and also band theory of solids.
- To understand the properties of semi-conductors materials.

Unit -I

Optics: Interference: Principle of super position waves (qualitative), Interference, Conditions required for interference- Coherence- Interference due to Division of Wave front & Division of Amplitude – Stokes Principle- Interference in thin films (reflected light)& Conditions for interference maxima and minima, Newton rings – Formation of rings- Diameter of n^{th} bright & dark rings- Derivation of equation for wavelength of a monochromatic light- Calculation of refractive index of a liquid.

Diffraction: Diffraction (definition), Distinctions between Fraunhofer & Fresnel diffraction- Fraunhofer diffraction due to single slit, Conditions for Principle maxima, Secondary maxima and minima – Fraunhofer diffraction due to single slit, Double slitand N Parallel slits -Conditions for Principle maxima, Secondary maxima and minima -Construction of diffraction grating - Rayleigh criterion of resolving power-Resolving power of a grating.

Polarisation: Introduction, Representation of various polarized lights- Optic axis- Principle section- Malus law- Brewster's law-Double refraction, Construction and working of Nicol's prism, Polaroids, Quarter wave plate &Half wave plate. Circular & Elliptical polarization (qualitative)

Unit -II

Crystallography: Ionic bond, covalent bond, metallic bond, hydrogen bond, Vander-Waal's bond, cohesive energy of diatomic molecule, cohesive energy of ionic crystal, space lattice, basis, unit cell, lattice parameters, seven crystal system, Bravais lattice, atomic radius, co-ordination number and packing factors of SC, BCC, FCC structures, Structures of NaCland CsCl.

Crystal planes and directions: Crystal directions- Crystal planes-Miller indices- Evaluation of Miller indices- Inter planar spacing of orthogonal crystal.
X-ray Diffraction: Introduction of X –rays, Bragg's law, Powder X- ray diffraction method, applications of X- ray diffraction.

Unit -III
Defects in Solids: Point defects; Vacancies, Schottky and Frenkel defects, Substitutional Impurities, Interstitial impurities -Line Defects; Edge and Screw dislocations, Burger's vector -Surface defects.
Statistical Mechanics: Micro state & Macro state – Phase Space -Maxwell-Boltzman, Bose-Einstein and Fermi-Dirac statistics (qualitative treatment), Concept of electron gas, Derivation of density of Energy States, Fermi distribution function, Concept of Fermi level - Effect of temperature on the Fermi distribution.

Unit -IV
Principles of Quantum Mechanics: Waves and particles- de-Broglie hypothesis-Matter waves- Wavelength of Matter Waves, Davisson and Germer's Experiment, G.P. Thomson Experiment, Heisenberg's Uncertainty Principle, Schrödinger's Time Independent Wave Equation - Physical Significance of the Wave Function – Particle in a one dimensional potential box- Equation for energy and wave function of the particle . Extension for three dimensions (qualitative)
Band Theory of Solids: Assumptions of classical and quantum free electron theory of metals and their limitations, Origin of energy band formation in solids-Electron in a periodic potential: Bloch theorem, Kronig- Penny model (qualitative treatment), E-K curve, concept of effective mass of an electron, classification of materials into conductors, Semiconductors &Insulators.

Unit -V
Semiconductor Physics: Introduction, Intrinsic semiconductor – Concentration of electrons in the conduction band- concentration of holes in the valance band -Fermi level in intrinsic semiconductor- Law of mass action- Extrinsic semiconductors, N-Type semiconductor -Carrier concentration in N-Type semiconductor- P-Type semiconductor -Carrier concentration in P-Type semiconductors, Drift and diffusion current ,Hall effect
Physics of Semiconductor Devices: Formation of PN junction, Open circuit PN junction-I-V Characteristics of PN junction diode- Energy diagram of PN diode-Diode equation- Direct &Indirect band gap semiconductors, LED ,

working principle & Applications - Photo diode, working principle & Applications - Solar cells, working principle& Applications.

Text Books

1. Engineering Physics by PK Palani Samy, SciTech Publications.
2. Applied Physics for Engineers by Dr P. Madhusudana Rao, Academic Publishing Company.
3. Solid State Physics by S. O. Pillai (Main edition) – New Age Publishers.

References

1. Fundamentals of Physics, David Halliday, Robert Resnick, Jearl Walker by John Wiley & Sons
2. Introduction to Solid State Physics – C. Kittel (Wiley Eastern).
3. Engineering Physics by R.K.Gaur and S.L. Gupta; DhanpatRai and Sons.
4. Modern Physics by K. Vijaya Kumar, S. Chandralingam, S. Chand & Co.

Course Outcomes:

On completion of the course students will be able to

1. Explain the properties of light propagation and interaction of light with matter, such as interference, diffraction and polarization of light.
2. State the different types of bonds in solids and classify the solids into different crystal groups.
3. Explain how the X rays were employed to determine the structure of crystals.
4. Differentiate the crystal defects on the basis of their geometry.
5. Summarize different statistical distribution methods.
6. Analyse why the classical theory and quantum free electron theory failed to explain the electrical properties of solids and how the band theory overcomes these failures.
7. Distinguish various properties of semi-conductor materials, devices and their applications.

(A2015) ENGINEERING CHEMISTRY

B. Tech. (ECE) I-Semester

L	T	P	C
3	0	0	3

Course Objectives:

- Knowledge of purification techniques and various applications of soft water in industries.
- Understand electrochemistry which deals with the utilization of electrical energy of an external source for bringing about a physical or chemical change.
- To give the students a basic understanding on polymers. The peculiar properties of the macromolecules are emphasized.
- A sustainable energy supply, is needed for promoting economic development as well as protecting the environment
- To provide an overview of Industrial applications of various fuels.

Unit I

Water Technology

Sources of water – Impurities in water – Hardness of water – Temporary and Permanent Hardness – Units. Estimation of temporary and permanent hardness of water – EDTA method; Numerical problems; Potable Water treatment – Specifications; Steps involved in treatment - Sedimentation – Coagulation – Filtration – Sterilisation – Desalination of Brackish Water – Reverse Osmosis and Electro dialysis.

Industrial water treatment – Boiler Troubles – Scales and Sludges ; Caustic Embrittlement; Boiler Corrosion; Priming and Foaming. Hot lime and Cold lime soda process ; Numerical Problems; Zeolite Process and Ion Exchange Process. Internal conditioning methods like –,Calgon, Colloidal and Sodium aluminate conditioning

Unit II

Electrochemistry & Batteries

Electrochemistry- Conductance- Specific, Equivalent and Molar conductance and their units. Applications of Conductance (conductometric titration). Galvanic cells, Types of Electrodes (Calomel, Quinhydrone and Glass Electrode); Nernst Equation and its applications; Concept of concentration cells; Electro chemical series, Potentiometric titrations, Determination of P^H using glass electrode – Numerical problems

Batteries

Electrode Potential – Determination of Single Electrode Potential; Primary Cell – Dry or Leclanche Cell, Secondary Cell – Lead acid storage Cell ; Ni – Cd batteries, , Fuel Cell – Hydrogen Oxygen Fuel Cell. Methanol – Oxygen fuel cell.

Unit III

Corrosion and its Control

Causes and effects of corrosion. Theories of Corrosion – Chemical & Electrochemical corrosion; Types of corrosion (Galvanic, Waterline, Pitting and Inter granular); Pilling bed-worth Rule. Factors affecting rate of corrosion – Nature of metal and Nature of Environment – Corrosion control methods – Cathodic protection (sacrificial anodic and Impressed current).

Surface coatings: Metallic coatings & methods of application of metallic coating – Hot dipping (Galvanization & Tinning); Cementation, Metal Cladding; Electroplating (copper plating); Electroless plating (Ni Plating); Organic coatings – Paints – Constituents and their functions. V

Unit IV

Material Chemistry - High Polymers

polymers: Types of polymerization (addition, condensation and copolymerization) .

Plastics: Thermoplastic and Thermosetting resins, Compounding and fabrication of plastics (compression and injection moulding). Preparation, properties, Engineering applications of PVC, Teflon and Bakelite.

Fibers: Characteristics of fibers – preparation, properties and uses of Nylon – 6,6 and Dacron – Fibre Reinforced Plastics (FRP) – applications.

Rubbers: Natural rubber and its vulcanization. Elastomers : Buna – s, Butyl rubber and Thiokol rubber

Bio-degradable Preparation and applications of Polyvinyl acetate and Polylactic acid.

Nano materials: Introduction, preparation by sol-gel and chemical vapour deposition methods. Applications of nano-materials.

Unit V

Energy Sources

Fuels – Classification. Solid fuels; Coal – analysis of coal – proximate and ultimate analysis and their significance.

Liquid fuels – Petroleum and its refining, Cracking, Types- fixed bed catalytic cracking; Knocking – octane and cetane rating; Synthetic petrol, Bergius and Fischer Tropsch process;

Gaseous fuels- constituents, characteristics and applications of natural gas, LPG and CNG. Analysis of flue gas by Orsat's apparatus – Numerical problems.

Combustion – Definition, calorific value of fuel – HCV, LCV, Determination of calorific value by Junker's gas calorimeter – theoretical calculation of calorific value by Dulong's formula – Numerical problems on combustion.

Text Books

1. Engineering chemistry by B. Rama Devi & Ch. Venkata Ramana Reddy; Cengage Learning, 2012
2. Engineering Chemistry P. C. Jain and M .Jain, Dhanapat Rai& Sons
3. Engineering chemistry by Dr. Bharathikumari, Dr. Jyotsna
4. Engineering chemistry by Thirumala chary, E. Laxminyarana, SCITECH Publications(India) Pvt. Ltd

References

1. A Textbook of Engineering Chemistry, S.S. Dara, S. Chand & Co.
2. A Textbook of Engineering Chemistry, Sashi Chawla, Dhanapath Rai & Sons

Course Outcomes

At the end of the course student will be able to

1. Explain the benefits of treated water as source in steam generation and other fields like production of steel, paper, textiles, atomic energy etc.
2. Analyze and apply the concepts in electrochemistry and corrosion science.
3. Predict the different engineering applications by preparing various polymers.
4. Summarize the manufacturing process of various fuels and their applications in day today life.
5. Illustrate the importance and applications of surface chemistry in various industries.

(A2501) COMPUTER PROGRAMMING THROUGH 'C'

B. Tech. (ECE) I-Semester

L	T	P	C
3	1	0	3

Course Objectives

1. Understand computer basic's, algorithms, flowcharts and write simple 'C' programs, data types and operators and Console I/O functions.
2. Understand Decision making statements and loops.
3. Understand the concepts of functions and pointers.
4. Understand the concepts of strings and various string handling functions and Arrays.
5. Understand the concepts related to structures and able to differentiate between structure and union, Storing of large data using files.

Unit – I

Algorithm, flowchart, Structure of a C program, Simple C Program, Compiler, Linker, Pre-processor, Compilation process (program development).Identifiers, Data Types, Variables, Constants, Console I/O (printf, scanf), Operators(arithmetic, Relational, Logical, Conditional, Increment/decrement, Bitwise, Assignment, Conditional, Special), Expressions, Precedence and Associativity, Expression Evaluation, Type conversions, Simple C Programming examples.

Unit-II

Decision Statements and loops- IF statement- (Simple IF Statement, the IF ELSE Statement, Nesting of IF ELSE Statement, The ELSE IF Ladder), Switch Statement, Repetition (Iteration) statements – (for, While, do-while), Jump statements-(break, continue, goto), Simple C Programming examples.

Arrays – Concepts, declaration, definition, accessing elements, storing elements, two– dimensional arrays, multidimensional arrays, array applications, Example C programs.

Unit-III

Functions: Defining functions, user defined functions, categories of Function, Standard functions, Passing arguments to functions, arrays and functions, Returning values from functions, function calls, storage classes-auto, static, extern, register, scope rules, recursion- recursive functions, Limitations of recursion, Comparison of Iteration and Recursion, header files, C pre-processor directives, Example C programs.

Unit-IV

Pointers – Introduction, declaration, definition, Accessing variable through pointer, Storing variable, Arrays and Pointers, Pointer Arithmetic and arrays, Passing an array to a function, array of pointers, pointers to pointers, compatibility, pointers to void, pointers to functions, Dynamic Memory Allocation, programming applications, Command line arguments.

Strings – Concepts, C Strings, String Input / Output functions, arrays of strings, string manipulation functions-(stringlenth, stringcopy, stringreverse, stringcompare, stringconcatenate, searching for a sub-sting), string / data conversion-(sting to data, data to string), Example C programs.

Unit-V

Structures and Union: Declaring and initializing a structure, Accessing the members of a structure, Nested structures, self referential structures, Array of structures, Using structures in functions, Pointers to structures, Declaring and initializing a union, Enumerated types, typedef, bit fields, Example C programs.

Files- Concept of a file, stream, text files and binary files, Differences between text and binary files, Modes of a file, Opening and Closing files, file input / output functions (standard library input / output functions for files), file status functions (error handling), Positioning functions(ftell,fseek,rewind), Example C programs.

Text Books:

1. C programming A Problem-Solving Approach by Behrouz A.Forouzan, E.V.Prasad, Richard F. Gilberg C How to Program Paul Deitel and Harvey Deitel, PH.
2. Kanetkar Yashavant, Let Us C, BPB.

Reference Books

1. Computer Programming and Data Structures by E Balagurusamy, Tata McGraw Hill.
2. The C Programming Language by Brain W.Kernighan, Dennis M.Ritchie.
3. Programming in C, 2/e By Ashok Kamthane.
4. Absolute beginner's guide to C, Greg M. Perry, Edition 2, Publisher: Sams Pub., 1994.
5. Schaum's Outline of Programming with C by Byron S. Gottfried,1996

Electronic Materials, Websites

- http://en.wikiversity.org/wiki/Topic:C
- www.cprogramming.com

Course Outcomes:
On completion of the course students will be able to

1. Explain the algorithms, flowcharts implementation of simple 'C' programs, data types and operators and Console I/O functions.
2. Implement the decision control statements, loop control statements and case control statements.
3. Declare and implement the pointers and functions.
4. Declare and implement the arrays and strings.
5. Describe the structures declaration, initialization and implementation.
6. Explain the file operations, Character I/O, String I/O, File pointers and importance of pre-processor directives.

(A2309) ENGINEERING DRAWING PRACTICE

B. Tech. (ECE) I-Semester

L	T	P	C
2	0	4	4

Pre-requisites: Nil

Objective: The objective of this subject is to provide the basic concepts about Engineering Drawing. Detailed concepts are given in projections, technical drawing, dimensioning and specifications.
Codes / Tables: Nil

Unit – I
Introduction To Engineering Drawing :
Principles of Engineering Graphics and their Significance, Conic Sections (Eccentricity method only), Cycloid, Epicycloid and Hypocycloid. Involutes.

Unit- II
Scales – Plain, Diagonal and Vernier Scales.

Unit – III
Orthographic Projections:
Principles of Orthographic Projections – Conventions – Projections of Points and Lines (Excluding traces of lines) Projections of Plane regular geometric figures (Excluding Auxiliary Planes and traces of planes)

Unit – IV
Projections of Solids: Projection of regular solids- cube, Cylinder, prisms, pyramids, cone (Excluding Auxiliary Planes).

Unit-V
Isometric Projections
Principles of Isometric Projection, Isometric Scale, Isometric Views, Conventions, Isometric Views of Lines, Plane Figures, Solids and Compound Solids, Isometric Projection of objects having non- isometric lines. Isometric Projection of Spherical Parts.
Transformation of Projections: Conversion of Isometric Views to Orthographic Views and Vice-versa.

Text Books

1. Engineering Drawing N.D. Bhatt / Charotar
2. Engineering Drawing and Graphics Rane and Shah/ Pearson Edu.

Reference Books

1. A Text Book of Engineering Drawing / Dhawan R K / S. Chand
2. Engineering Graphics With Auto CAD / James D Bethune / Pearson Edu.
3. Engineering Graphics / K R Mohan / Dhanpat Rai.
4. Text book on Engineering Drawing / KL Narayana / P Kannaih / Scitech

Course Outcomes

On Completion of the course, students will be able to

1. Explain the conventions and the methods of engineering drawing.
2. Draw the projections of points, lines, planes and solids in different types of projections.

(A2014) ENGINEERING PHYSICS LAB

L	T	P	C
0	0	3	2

B. Tech. (ECE) I-Semester

Course Objectives:

- This course on Physics lab is designed with 15 experiments in a semester. It is common to all branches of engineering.
- The objective of the course is that the student will have exposure to various experimental skills which is very essential for an engineering student.
- The experiments are selected from various area of Physics like Physical Optics, Lasers, Fiber Optics, Sound, Mechanics, Electricity & Magnetism and Basic Electronics.
- Also the student is exposed to various tools like Screw gauge, Vernier Callipers, Physical Balance, Spectrometer and Microscope.

(Any ten experiments compulsory)

1. Determination of wavelength of a source – Diffraction Grating.
2. Newton's Rings - Radius of curvature of plano convex lens.
3. Melde's experiment – Transverse and longitudinal modes.
4. Time constant of an R-C circuit.
5. L-C-R circuit.
6. Magnetic field along the axis of current carrying coil – Stewart and Gees method.
7. Bending losses of fibres & Evaluation of numerical aperture of a given fibre.
8. Energy gap of a material of p-n junction.
9. Torsional pendulum.
10. Wavelength of light –Diffraction grating using laser.
11. Sonometer-AC power supply.
12. Characteristics of a LED.
13. Characteristics of a photodiode.
14. Characteristics of a solar cell.
15. Determination of velocity of ultrasonic waves.

Laboratory Manual:

1. Laboratory Manual of Engineering Physics by Dr. Y. Aparna & Dr. K. Venkateswara Rao (V.G.S Publishers).

(A2018) ENGINEERING CHEMISTRY LAB

B. Tech. (ECE) I-Semester

L	T	P	C
0	0	3	2

Course objectives

- Estimation of hardness of water is essential for drinking water and in industries to avoid boiler troubles.
- Knowledge of instrumentation in conducto-meter, potentiometer, calorimeter and p^H meter.
- Knowledge of preparation of aspirin and Thiokol rubber
- Knowledge of physical properties of chemical compounds
- To gain the knowledge on existing devices, materials.

Experiments

I Inorganic chemistry experiments by Analytical methods.

Water Analysis:

1. Estimation of Hardness of water by EDTA method
2. Estimation of Alkalinity of water.

II. Instrumentation.

3. Estimation of Copper by colorimetric Method.
4. Conductometric Titration of a strong acid vs a strong base
5. Potentiometric Titration of a strong acid vs a strong base

III. Identification and preparation of organic compounds

6. Preparation of ASPIRIN
7. Preparation of Thiokol Rubber

IV. Physical chemistry experiments

8. Determination of Viscosity of a Liquid.
9. Determination of Surface Tension of a liquid.
10. Adsorption of acetic acid on activated charcoal
11. Determination of melting point and Boiling point of given solids and liquids

V. Cement Analysis

12. Determination of Ferric iron in cement by Colorimetry

References

1. Engineering chemistry by B. Rama Devi & Ch. Venkata Ramana Reddy; Cengage Learning, 2012
2. A Textbook of Engineering Chemistry, Sashi Chawla, Dhanapath Rai& Sons
3. A Text book .Engineering Chemistry, B. K. Sharma Et al

Course outcomes:

On Completion of the course, students will be able to

1. Predict the extent of hardness range present in water sample and its consequences if used for various industrial operations
2. Prepare drugs like Aspirin and polymers like Thiokol rubber
3. Estimate the strength of solutions ,p^H of various solutions
4. Evaluate the viscosity and surface tension of liquids
5. Employ the conductometric and potentiometric titrations
6. Describe the principles of adsorption phenomenon.

(A2305) ENGINEERING WORKSHOP

	L	T	P	C
B. Tech. (ECE) I-Semester	**0**	**0**	**3**	**2**

Course Objectives

To provide the students with hands on experience on different trades of Engineering like fitting, carpentry, foundry, smithy, house wiring and soldering**.**

I Trade for Exercise:

(Two experiments each from any six trades of the following)

1. Carpentry
2. Fitting
3. Tin-smithy
4. House-wiring
5. Foundry
6. Plumbing
7. Welding
8. Black smithy

II Trades for Demonstration and Exposure:

1. Power tools
2. Machine tools

Text book:

1. Workshop Manual, Second edition/ P Kannaiah and K L Narayana / Scitech publishers

Course Outcomes:

On completion of the course, students will be able to

1. Use tools and equipments in fitting, carpentry, house wiring, soldering, foundry and smithy.
2. Produce simple models in the above trades

(A2549) COMPUTER PROGRAMMING LAB

B. Tech. (ECE) I-Semester

L	T	P	C
0	0	3	2

Course Objectives:

1. To understand the various steps in program development.
2. To understand the basic concepts in C Programming Language.
3. To understand different modules that includes conditional and looping expressions.
4. To understand how to write modular and readable C Programs.
5. To write programs in C to solve problems using arrays, structures and files.

Week	Week Wise Programs
Week1	(a)Write a simple C program to Print "Hello World" (b) Write a simple C program Declaring Variable and Printing its Value (c) Write a simple C Program to Calculate Area and Circumference of Circle (d)Write a simple C program to implement basic arithmetic operations - sum, difference, product, quotient and remainder of given numbers.
Week 2	Write C programs to demonstrate the following operators (a) Assignment Operator. (b) Relational and Logical Operator. (c) Increment and decrement operator. (d) Bitwise operators. (e) Ternary operator.
Week3	(a) Write a C programs - to find the largest and smallest of 2 numbers(if – else), to find the largest and smallest of 3 numbers(Nested if – else), roots of quadratic equation(else – if ladder). (b)The total distance travelled by vehicle in't' seconds is given by distance=ut+1/2at^2 where 'u' and 'a' are the initial velocity and acceleration. Write a c program to find the distance travelled at regular intervals of time given the Values of 'u' and 'a'. The program should provide the

	flexibility to the user to select his own time intervals and repeat the calculations for different values of 'u' and 'a'. (c)Write a c program, which takes two integer operands and one operator from the user, performs the operation and the prints the result. (consider the operators +,-,*,/,% and use switch statement).
Week4	(a)Write a C program to find the sum of individual digits of a positive integer (b) A Fibonacci Sequence is defined as follows: the first and second terms in the sequence are 0 and 1.Subsequent terms are found by adding the preceding two terms in the sequence .Write a c program to generate the first n terms of the sequence. (c) Write a c program to generate all the prime numbers between 1 and n, where n is a value supplied by the user.
Week5	(a)Write a C program to read in two numbers, x and n, and then compute the sum of this geometric progression: $1+x+x^2+x^3+\ldots\ldots\ldots\ldots+x^n$ (b) Write a C program to generate Pascal's triangle. (c) Write a C program to construct a pyramid of numbers
Week6	(a)Write a programs that use both recursive and non-recursive functions (i)To find the factorial of a given integer. (ii)To find the GCD of two given integers.
Week7	(a)Write a c program to find both the largest and smallest number in a list of integers. (b)write a c program that uses functions to perform the following: (i)Addition of Two Matrices. (ii)Multiplication of Two Matrices.
Week8	(a) Write a c program that uses functions to perform the following operations: (i)To insert a sub-string in given main string from a given position. (ii) To delete n Characters from a given position in a given string. (b)Write a C program to determine if the given string is a palindrome or not
Week9	(a) Write a C program that displays the position or index in the string S Where the string T begins, or - 1 if S doesn't contain T.

	(b) Write a C program to count the lines, words and characters in a given text .
week10	(a) Write a program to print the details of a student like(Name, Roll No, Marks) using nested structures. (b) Write a C Program to Calculate Difference Between Two Time Period.
week11	(a)Write a C program that uses functions to perform the following operations: i) Reading a complex number ii) Writing a complex number iii) Addition of two complex numbers iv) Multiplication of two complex numbers (Note: represent complex number using a structure.)
week12	(a)Write a C program which copies one file to another and display the contents of a file (b) Write a C program to reverse the first n characters in a file. (Note: The file name and n are specified on the command line). (c) Write a C programme to merge two files into a third file (i.e., the contents of the first file followed by those of the second are put in the third file)

Course Outcomes

On completion of the course, students will be able to

1. Explain basics of C programming, Usage of various operators.
2. Write programs on strings and usage of functions.
3. Write programs on files.

(A2001) ENGLISH

B. Tech. (ECE) II-Semester

L T P C
3 0 0 3

Course objectives:

- To improve the language proficiency of the students in English with an emphasis on **LSRW** skills.
- To equip the students with skills to study academic subjects more effectively.
- To develop communication skills in formal and informal situations.

Skills-wise objectives:

Listening Skills:

- To equip them to identify the main ideas and the supporting details.
- To be able to identify different organizational patterns and use these ideas while speaking and writing.

Speaking Skills:

- To make students aware of the role of speaking in English and its contribution to their success.
- To enable students to express themselves fluently and appropriately in social and professional contexts.

Reading Skills:

- To develop a global understanding of the text by paying adequate attention to the details. To identify the main idea of the text.
- To identify their note – making skills through reading for specific speaking and writing purposes.

Writing Skills:

To enable them to write coherent paragraphs of different forms that include…..

- Problem – Solution
- Extended definition
- Compare and Contrast
- General description/discussion
- Cause and effect

- To enable them to write from notes made.

Unit –I

Chapter entitled '**Advances in Science and Technology'** from **'Skills Annexe'** Published by Orient Black Swan, Hyderabad.

- L-Conversations – Listening for the theme.
- S- Apologizing and interrupting.
- R- Read a Report on Seminar on pure science at the Pravasi Bharathiya Divas Event in Kochi - Why pure Science in India lags behind.
- W- Descriptions of Objects and Events
- G- Types of Verbs; Transitive, Intransitive and Linking.
- V- Adjective and Adverb Suffixes.

Unit –II

Chapter entitled **'Mokshagundam Visvesvaraya'** from "**Epitome of Wisdom**", Published by Maruthi Publications, Hyderabad.

- L-Conversations – Introducing each other, Talking about a course.
- S- Opinion based questions
- R- Reading for Subject/ Theme - The Palm island
- W- Writing Paragraphs
- G- Joining ideas by conjunctions, Adverbs
- V- Prefixes and suffixes

Unit –III

A. Chapter entitled '**Risk Management'** from "**Skills Annexe** -Functional English for Success" Published by Orient Black Swan, Hyderabad

- L – for main points and sub-points for note taking
- S – giving instructions and directions; Speaking of hypothetical situations
- R – reading for details
- W – note-making, information transfer, punctuation
- G – present tense
- V – synonyms and antonyms
- Report writing
- Information Transfer

B. Chapter entitled '**Leela's Friend'** by R.K. Narayan from "**Epitome of Wisdom**", Published by Maruthi Publications, Hyderabad

- L – for main points and sub-points for note taking

- S – Presentations
- R – reading for details
- W – note-making, information transfer, punctuation
- V – Guessing the words, using an appropriate word, Phrasal verbs

Unit –IV

Chapter entitled '**Sports and Health'** from "**Skills Annexe** -Functional English for Success" Published by Orient Black Swan, Hyderabad

- L- Critical Listening and Listening for speaker's tone/ attitude
- S- Group discussion and Making presentations
- R- Critical reading, reading for reference
- W-Project proposals; Technical reports, Project Reports and Research Papers
- G- Adjectives, prepositions and concord
- V- Collocations and Technical vocabulary Using words appropriately

Unit –V

Chapter entitled '**The Convocation Speech**' by N. R. Narayana Murthy' from "**Epitome of Wisdom"**, Published by Maruthi Publications, Hyderabad

- L- Speech on 'How do you make a teacher great?'
- S- Role play – Interviewing famous personalities
- R- Critical reading, reading for reference – 'What is meant by Entrepreneurship?'
- W-Essay writing
- G- Focusing with passive voice
- V- One word substitutes

Textbooks

In order to improve the proficiency of the student in the acquisition of the four skills mentioned above, the following text books and course content, are prescribed:

1. A Text book entitled **"Skills Annexe", -Functional English to Success** Published by Orient Black Swan, Hyderabad
2. A text book entitled, **"Epitome of Wisdom",** Published by Maruthi Publications, Hyderabad.

References

1. Contemporary English Grammar Structures and Composition by David Green, MacMillan Publishers, New Delhi. 2010.
2. English Grammar Practice, Raj N Bakshi, Orient Longman.
3. Technical Communication by Daniel Riordan. 2011. Cengage Publications. New Delhi.
4. Handbook of English Grammar& Usage, Mark Lester and Larry Beason, Tata McGraw –Hill.
5. Technical Communication, Meenakshi Raman, Oxford University Press
6. Objective English. Edgar Thorpe & Showick Thorpe, Pearson Education
7. Grammar Games, Renuvolcuri Mario, Cambridge University Press.
8. Murphy's English Grammar with CD, Murphy, Cambridge University Press.
9. Everyday Dialogues in English, Robert J. Dixson, Prentice Hall India Pvt Ltd.,
10. Basic Vocabulary Edgar Thorpe & Showick Thorpe, Pearson Education
11. Effective Technical Communication, M Ashraf Rizvi, Tata McGraw – Hill.
12. Basic Vocabulary in Use, Michael McCarthy

Course Outcomes

On completion of the course, students will be able to:

1. Use the marvels of science and technology
2. Discuss the role of Visvesvaraya as a true patriot and as an excellent engineer in solving complex, social problems.
3. Recognize the risk factors that are characteristic of factories in the South Asian region and explain safety measures to be taken to prevent them.
4. Explain extraordinary narrative techniques of R.K. Narayan with simple expressions
5. Deliver the speech effectually to inspire the gathering.
6. Explain how undaunted spirit turns the ordinary into the extraordinary and how sports contribute to sound health.

(A2008) ENGINEERING MATHEMATICS-II

L	T	P	C
3	1	0	3

B. Tech. (ECE) II-Semester

Course Objectives

1. Solve Differential Equations of first order using various methods and their applications.
2. Solve Differential Equations of multiple orders using various methods and their applications.
3. Possible to transform from one form another form by using Laplace Transforms (Used in Signals and systems).
4. Evaluate Gradient – Divergence – Curl, Directional derivatives.
5. Evaluate multiple integrals (line, surface, volume integrals) and convert line integrals to area integrals and surface integrals to volume integrals.

Unit-I: Differential equations of first order and their applications

Over view of Differential equations – exact, Linear and Bernoulli's. Applications to Newton's Law of cooling, Law of Natural growth and decay, orthogonal trajectories.

Unit-II: Higher order linear differential equations and their applications

Linear differential equations of second and higher order with constant coefficients. RHS term of the type $f(x) = e^{ax}, \sin ax, \cos axandx^n, e^{ax}V(x), x^nV(x)$,method of variation of parameters. Applications to bending of beams, Electrical circuits.

Unit-III: Laplace Transform and its applications to Ordinary Differential Equations

Laplace transform of standard functions – Inverse transform- First Shifting theorem, Transforms of derivatives and integrals – Unit step function – Second Shifting theorem – Dirac's delta function- Convolution theorem – Periodic function – Differentiation and integration of transforms.Application of Laplace transforms to ordinary differential equations.

Unit- IV: Vector Differential Calculus

Vector Differential Calculus: Scalar & vector point functions, Gradient – Divergence – Curl with geometrical & Physical interpretation. Directional derivatives, Vector differential operators &their related properties.

Unit-V: Vector Integral Calculus & Vector integral theorems

Vector Integral Calculus: Line integral – Work done – scalar potential function, surface integrals – Flux of Vector valued function, Volume integrals.

Vector integral theorems: Gauss's Divergence theorem, Green's theorem, Stoke's Theorem (Statement and their verification).

Text Books

1. Kreyszig's Engineering Mathematics – I by Dr. A. Ramakrishna Prasad, 2014yr Edition John Wiley Publications.
2. Advanced Engineering Mathematics by R.K. Jain & S.R.K. Iyengar, 3rd edition, Narosa Publishing House, Delhi.

References

1. Differential Equations with Applications & Historical Notes by George F Simmons, 2ndEdi ,Tata Mc.graw Hill Publishing Co Ltd.
2. Kreyszig's Mathematical Methods by Dr. A. Ramakrishna Prasad, 1st Edition John Wiley Publications.
3. Advanced Engineering Mathematics by Kreyszig, 8th Edition, John Wiley & Sons Publishers
4. Higher Engineering Mathematics by B.S. Grewal, 36th Edition, Khanna Publishers.
5. Advanced Engineering Mathematics with MATLAB, Dean G. Duffy, 3rd Edi, CRC Press Taylor & Francis Group.
6. Mathematics for Engineering and Scientists. Alan Jeffrey, 6th Edi, 2013, Chapman & Hall / CRC
7. Engineering Mathematics – I by T.K.V. Iyengar, B. Krishna Gandhi & Others, 2012 Yr. Edition S. Chand.
8. Engineering Mathematics – I by D.S. Chandrasekhar, Prison Books Pvt. Ltd.
9. Engineering Mathematics – I by G. Shanker Rao & Others I.K. International Publications.

Course Outcomes

On completion of the course, students will be able to

1. Form and evaluate differential equations by various methods.
2. Analyse certain physical problems (tank flow, mechanical and electrical vibration), set up their determining differential equations and solve them to answer questions about the physical system.
3. Solve linear, simultaneous equations to analyze voltages and currents in AC to DC (phase) circuits. Determine the average power dissipated in a circuit. Calculate voltages and currents in single phase circuit.
4. Evaluate Gradient – Divergence – Curl and Directional derivatives.
5. Evaluate multiple integrals (line, surface, volume integrals) and convert line integrals to area integrals and surface integrals to volume integrals.

(A2009) ENGINEERING MATHEMATICS-III

B. Tech. (ECE) II-Semester

L	T	P	C
3	1	0	3

Course Objectives

1. Obtain an intuitive and working understanding of some Mathematical Methods for the basic problems of numerical analysis.
2. Develop some experience in the implementation of numerical methods in engineering applications by using a computer.
3. Solutions of Ordinary Differential Equations using numerical methods.
4. The aim at forming a partial differential equation (PDE) for a function with many variables and their solution methods. Two important methods for first order PDE's are learnt. While separation of variables technique is learnt for typical second order PDE's such as Wave, Heat and Laplace equations.
5. Evaluate the Fourier transform of a continuous function, and be familiar with its basic properties.

Unit – I: Solutions of Linear & Non-Linear equations

Introduction to Algebraic and Transcendental Equations, Bisection Method, Method of False Position (Regular – False Method), Iteration Method, Newton – Raphson's Method, Errors in Polynomial. Gauss Jacobi's iterative method, Gauss-Seidel Method.

Unit – II: Interpolation& Curve fitting

Forward, Backward & Central Differences, Symbolic Relations, Newton's Forward & Backward Interpolation, Gauss's Forward & Backward Interpolation, Lagrange's Interpolation & Problems.

Fitting straight line, Fitting Non-Linear curve, Curve fitting by sum of Exponentials, Non-Linear Weighted least squares approximation.

Unit –III: Numerical Differentiation, Integrations & Solutions of ODE

Numerical Differentiation & Integrations: Numerical Differentiation, Derivatives using forward & backward difference formula, Derivatives using central difference formula, Trapezoidal Rule, Simpson's 1/3 Rule,3/8 Rule.

Solutions of ODE: Introduction to Numerical solutions of ODE, Taylor's series method, Picard's method of Successive Approximations, Euler's method, Euler's Modified method, Runga-Kutta method , Predictor and Corrector method, Milne's Predictor and Corrector method, Adams-Moulton method.

Unit – IV: Partial differential equations

Introduction and Formation of partial differential equation by elimination of arbitrary constants and arbitrary functions solutions of first order linear (Lagrange) equation and non-linear equations (Charpit's method).Method of separation of variables for second order equations – applications of Partial differential equations – Two dimensional wave equation, Heat equation.

Unit – V: Fourier transforms

Fourier integral theorem – Fourier sine and cosine integrals. Fourier transforms – Fourier sine and cosine transforms – properties – Inverse transforms – Finite Fourier transforms.

Text Books

1. Kreyszig's Mathematical Methods by Dr. A. Ramakrishna Prasad, 2014 yr Edition John Wiley Publications.
2. Advanced Engineering Mathematics by R.K. Jain & S.R.K. Iyengar, 3rd edition, Narosa Publishing House, Delhi.

References

1. Advanced Engineering Mathematics by Kreyszig, 8th Edition, John Wiley & Sons Publishers
2. Higher Engineering Mathematics by B.S. Grewal, 36th Edition, Khanna Publishers.
3. Advanced Engineering Mathematics with MATLAB, Dean G. Duffy, 3rd Edi, CRC Press Taylor & Francis Group.
4. Mathematics for Engineering and Scientists. Alan Jeffrey, 6th Edi, 2013, Chapman & Hall / CRC
5. Introductory Methods of Numerical Analysis , S.S.Sastry, 4h Edition, Prentice Hall of India Pvt. Ltd.
6. Mathematical Methods by T.K.V. Iyengar, B. Krishna Gandhi & Others, 2013 Yr. Edition S. Chand.
7. Mathematical Methods by D.S. Chandrasekhar, Prison Books Pvt. Ltd.
8. Mathematical Methods by G. Shanker Rao & Others I.K. International Publications.

Course Outcomes

On Completion of the course, students will be able to

1. Compute root of nonlinear equations by using different types of numerical methods.
2. Explain different kinds of techniques for interpolating data

3. Solve ODE initial value problems using Euler's, Taylor's, Picard's & R-K methods,
4. Form the partial differential equation from the given function. Solve partial differential equation for an unknown function with many independent variables and find their solution.
5. Evaluate the Fourier transform of a function and list its basic properties.

(A2013) ENGINEERING PHYSICS-II

	L	T	P	C
B. Tech. (ECE) II-Semester	**3**	**0**	**0**	**3**

Course Objectives

1. To understand the introductory level concept of optical coherence, lasers and optical fiber characteristics.
2. To understand the basic principles of dielectric properties of solids.
3. To understand the physical principles underlying the magnetic and super conducting properties of solids.
4. To understand the fundamental concepts of electromagnetic fields and laws governing them.
5. To understand the basic principles of nanotechnology, ultrasonic and acoustics of buildings.

Unit -I

Lasers: Characteristics of Lasers, Spontaneous and Stimulated Emission of Radiation, Einstein's Coefficients and relation between them, Population inversion, Lasing action in Ruby Laser, Helium-Neon Laser, Semiconductor Diode Laser, Applications of Lasers.

Fiber Optics: Principle of Optical Fiber, Construction of optical Fiber, Acceptance Angle and Acceptance Cone, Numerical Aperture, Types of Optical Fibers: Step Index Optical Fibers& Pulse Dispersion - Graded index Optical fibers& Pulse Dispersion, Attenuation in Optical Fibers, Optical Fiber Communication, Optical Fiber Sensors.

Unit -II

Dielectric Properties: Electric dipole, Dipole Moment, Relative Permittivity, Polarization and Polarizability, Electric Susceptibility, Displacement Vector, Electronic, Ionic, and Orientation, Polarization and derivation of their polarizabilities, Internal fields in Solids, Clausius - Mossotti Equation, Ferro electric, Piezo electric and pyro-electric materials.

Unit -III

Magnetic Properties & Superconducting Properties: Permeability, Field intensity, Magnetic field induction, Magnetization, Magnetic Permeability & Susceptibility, Origin of Magnetic Moment, Bohr Magneton, Classification of Dia, Para Ferro, Ferri and Anti-Ferro magnetic materials on the basis of magnetic moment (qualitative), Domain theory of Ferro magnetism on the basis of Hysteresis curve, Soft and Hard Magnetic Materials.

Superconductivity: Introduction, Critical Field, Meissner effect, Effect of Magnetic field, Type-I and Type-II Superconductors, BCS Theory (qualitative), Applications of Superconductors.

Unit -IV

Electromagnetic Theory: Review of Gauss Law, Amperes law and Faraday's law, Steady and Varying Fields, Conduction and Displacement Current, Maxwell's Equations in Integral and Differential forms, Electromagnetic Wave Equations in free space, dielectric and conducting media, Poynting Theorem.

Unit -V

Nanotechnology: Origin of nanotechnology, Nano Scale, Surface to Volume Ratio, Quantum Confinement, Properties that changes on Nano Scale, Physical Properties, Electrical Properties, Chemical Properties, Optical Properties.; Bottom-up Fabrication: Sol-Gel and combustion methods; Top-Down Fabrication: Physical Vapour Deposition, Pulsed Laser Vapour Deposition Methods, Characterization by XRD & TEM, Applications.

Acoustics: Basic Requirements of Acoustically Good Hall, Reverberation and Time of Reverberation, Sabine's Formula for Reverberation Time, Measurement of Absorption Coefficient of a Material, Factors Affecting the Architectural Acoustics and their Remedies.

Ultrasonic: Introduction, Production of Ultrasonic using Piezoelectric Method –Magnetostriction Method- applications.

Text Books

1. Engineering Physics by P K PalaniSamy, ScitechPublications.
2. Applied Physics for Engineers by Dr. P. Madhusudana Rao, Academic Publishing Company.
3. Solid State Physics by S.O. Pillai (Main edition) – New Age Publishers.

References

1. Fundamentals of Physics, David Halliday, Robert Resnick, Jearl Walker by John Wiley & Sons
2. Introduction to Solid State Physics – C. Kittel (Wiley Eastern).
3. Engineering Physics by R. K. Gaur and S. L. Gupta; DhanpatRai and Sons.
4. Modern Physics by K. Vijaya Kumar, S. Chandralingam: S. Chand & Co.

Course Outcomes

On Completion of the course, students will be able to

1. Explain the principle, construction, characteristics of laser and their applications in optical fiber communication
2. Describe various polarization processes in solids and classify different dielectric materials.
3. Classify the magnetic materials in to various classes depending upon their magnetic moment. They are also able to understand the basics principles of superconductivity.
4. Apply Maxwell's equations to solve EM problems.
5. Explain how the properties of the material changes on nano scale. He will also understand the characteristics and generation of ultrasonic.

(A2251) NETWORK THEORY

B. Tech. (ECE) II-Semester

L	T	P	C
3	1	0	3

Course Objective

This course introduces the basic concepts of circuit analysis which is the foundation for all the subjects of the Electrical Engineering discipline. The emphasis of this course is laid on the basic analysis of circuits which includes single phase circuits, magnetic circuits, theorems and network topology, concepts of transient analysis of the circuits and basic two port network parameters

Unit – I Introduction to Electrical Circuits

Circuit Concept – R-L-C parameters – Voltage and Current sources – Independent and dependent sources-Source transformation – Voltage – Current relationship for passive elements – Kirchhoff's laws – Network reduction techniques – Series, Parallel, Series Parallel, Star-to-Delta or Delta-to-Star transformation, Mesh analysis, Nodal analysis.

Unit – II A.C Circuits

R.M.S and Average values and Form factor for different periodic wave forms, Steady state analysis of R, L and C (in series, parallel and series parallel combinations) with sinusoidal excitation-

Three phase circuits: Phase sequence –Star and delta connection – Relation between line and phase voltages and currents in balanced systems – Calculations of active and reactive power.

Concept of self and mutual inductances- co-efficient of coupling series circuit analysis with mutual inductance. Resonance – Series, parallel circuits, concept of band width and Q factor.

Unit –III Network Theorems

Tellegens, Superposition, Reciprocity, Thevenin's, Norton's, Max Power Transfer theorem. Milliman's Theorem-Statement and proofs problem solving using dependent and independent sources for d.c and a.c excitation.

Unit –IV Two Port Networks

Z,Y, ABCD, h-parameters – Conversion of one parameter to another parameter –Condition for reciprocity and symmetry -2 port network connections in series ,parallel and cascaded –Problem solving.

Unit –V Transient Analysis

Transient response of R-L, R-C, R-L-C circuits (Series combination only) for d.c. and sinusoidal excitations- initial conditions- Solution using differential equation approach and Laplace transform methods of solutions.

Text Books

1. Electrical Circuits by A. Chakarborthy, Dhanpath Rai & Co.,
2. Network Analysis – N.C. Jagan and C. Lakshminarayana, B.S Publications, 2006.

References

1. Engineering Circuit Analysis – William Hayt and Jack E Kemmerly, McGraw Hill, 5th Edition, 1993.
2. Electric Circuits – J. Edminister and M.Nahvi – Schaum's Outlines, TMH, 1999.
3. Electric Circuits- – ME Van Valkenburg, Prentice Hall of India, 3rd Edition, 2000
4. Networks, Lines and Fields – JD Ryder, PHI, 2nd Edition, 2009.

Course Outcomes

On Completion of the course, students will be able to

1. Apply Kirchoff's Laws & network reduction techniques.
2. Explain AC fundamentals of single & three phase circuits, principles of magnetic circuits
3. Identify when and how to use network reduction techniques with the help of theorems for AC & DC excitations
4. Describe parameters of two port networks.
5. Analyze the transient response for different series circuits with DC & sinusoidal excitations and its solutions with Laplace transforms.

(A2502) DATA STRUCTURES THROUGH 'C'

B. Tech. (ECE) II-Semester

L	T	P	C
3	1	0	3

Objectives:

- To understand the basic concepts such as Abstract Data Types, Linear and Non Linear Data structures.
- To understand the behavior of data structures such as stacks, queues, trees, hash tables, search trees, Graphs and their representations.
- To choose the appropriate data structure for a specified application.
- To write programs in C to solve problems using data structures such as arrays, linked lists, stacks, queues, trees, graphs, hash tables, search trees.

Unit-I

Linear Data Structures: Introduction to Data Structures, Abstract data types, Strategies for choosing the appropriate data structure, Introduction to Linear and Non-Linear Data Structures. Singly linked list- Operations, insertion, deletion, Concatenating singly linked lists, circular linked list-operations for Circular Linked lists. Doubly linked list- Operations-insertion, deletion.

Unit-II

Stack: Definition, operations, array and linked representations of stacks, Applications: Infix to postfix conversion, postfix expression evaluation, Recursion implementation, Towers of Hanoi problem.

Unit-III

Queue: Definition & Operations, Array and linked implementation in C , Circular Queues-Insertion and deletion operations. Deque (Double ended queue) Array and linked implementation in C , Applications of Queues-Priority queues.

Unit-IV

Non-Linear Data Structures

Trees- Terminology, Representation of Trees **,** Binary Tree , Properties of Binary Trees ,Binary Tree Representations-Array and Linked

Representation. Binary Search Tree, Binary Tree Traversals.

Graphs: Introduction, Definitions, Terminology Graph, Graph Representations, Adjacency Matrix, Adjacency Lists. Graph traversals-DFS and BFS.

Unit-V

Searching and Sorting: Linear Search, Binary Search, Bubble Sort, Selection Sort, Insertion Sort, Quick Sort, Merge Sort, Performance analysis of Searching and Sorting techniques using Asymptotic notations. Comparison of sorting methods.

Text Books:

1. Yedidyah Langsam, Moshe J. Augenstein and Aaron M. Tenenbaum, Data Structures using C and C++. 2 ed, Pearson Education.
2. C Programming& Data Structures, B.A.Forouzan and R.F. Gilberg, Third Edition, Cengage Learning.
3. Fundamentals of Data Structures in C,2nd Edition, E.Horowitz, S. Sahani and Susan.

Reference Books:

1. C Programming & Data Structures, E. Balagurusamy, TMH.
2. C& Data structures – P. Padmanabham, Third Edition, B.S. Publications.
3. Mark Allen Weiss, Data structures and Algorithm Analysis in C. Addison Wesley Publication.

Electronic Materials, Websites:

1. **https://www.youtube.com/user/mycodeschool**
2. **http://freevideolectures.com/Course/2279/Data-Structures- And-Algorithms**

Course Outcomes:

On Completion of the course, students will be able to

1. Use data structure concepts for realistic problems.
2. Identify appropriate data structure for solving computing problems in respective language.
3. Solve problems independently and analyze critically.

(A2002)ENGLISH LANGUAGE COMMUNICATION SKILLS LAB

B. Tech. (ECE) II-Semester

L	T	P	C
0	0	3	2

Introduction:
The Language Lab focuses on the production and practice of sounds of language and familiarizes the students with the use of English in everyday situations and contexts.

Course Objectives:

- To facilitate computer-aided multi-media instruction enabling individualized and independent language learning
- To sensitize the students to the nuances of English speech sounds, word accent, intonation and rhythm
- To bring about a consistent accent and intelligibility in their pronunciation of English by providing an opportunity for practice in speaking
- To improve the fluency in spoken English and neutralize mother tongue influence
- To train students to use language appropriately for public speaking

Syllabus:
English Language Communication Skills Lab shall have two parts:

a. **Computer Assisted Language Learning (CALL) Lab**
b. **Interactive Communication Skills (ICS) Lab**

The following course content is prescribed for the English Language Communication Skills Lab

Exercise – I

- **CALL Lab**: Introduction to Phonetics – Speech Sounds – Vowels and Consonants
- **ICS Lab**: Ice-Breaking activity and JAM session

Exercise – II

- **CALL Lab:** Structure of Syllables - Past Tense Marker and Plural Marker – Weak Forms and Strong Forms - Consonant Clusters.
- **ICS Lab:** Situational Dialogues – Role-Play- Expressions in Various Situations – Self-introduction and Introducing Others – Greetings – Apologies – Requests – Social and Professional Etiquette - Telephone Etiquette.

Exercise – III

- **CALL Lab**: Minimal Pairs- Word accent and Stress Shifts-
- **ICS Lab**: Descriptions – Place , Person, Object

Exercise – IV

- **CALL Lab**: Intonation and Common errors in Pronunciation.
- **ICS Lab**: Extempore- Public Speaking

Exercise – V

- **CALL Lab**: Neutralization of Mother Tongue Influence and Conversation Practice
- **ICS Lab**:. **Giving Directions**

Minimum Requirement of infra structural facilities for ELCS Lab:

1. Computer Assisted Language Learning (CALL) Lab: The Computer aided Language Lab for 40 students with 40 systems, one master console, LAN facility and English language software for self- study by learners. R13 B.Tech I year syllabus System Requirement (Hardware component): Computer network with LAN with minimum 60 multimedia systems with the following specifications: i) P – IV Processor a) Speed – 2.8 GHZ b) RAM – 512 MB Minimum c) Hard Disk – 80 GB ii) Headphones of High quality
2. Interactive Communication Skills (ICS) Lab: The Interactive Communication Skills Lab: A Spacious room with movable chairs and audio-visual aids with a Public Address System, a T. V., a digital stereo –audio & video system and camcorder etc.

Course Outcomes

On Completion of the course, students will be able to

1. Explain nuances of language through audio- visual experience and group activities
2. Neutralization of accent for intelligibility
3. Exhibit speaking ability with clarity and confidence to enhance their employability skills.

(A2550) DATA STRUCTURES LAB

B. Tech. (ECE) II-Semester

L	T	P	C
0	0	3	2

Objectives:

1. To understand the basic concepts such as Abstract Data Types, Linear and Non Linear Data Structures.
2. To understand the behaviour of data structures such as stacks, queues.
3. To write and execute programs in C to solve problems using Data Structures such as arrays, Linked Lists, Trees and Graphs.
4. To write and execute programs in C to implement various Sorting and Searching methods.

Week	Week Wise Programs
Week1	Write a C program to perform the following operations on the given array: (i)Insert element in specific position in to the array. (ii)Delete random element from the array.
Week2	Write a C program that uses functions to perform the following (i)Creating a Singly linked list of integers (ii)Delete a given integer from above linked list. (iii)Display the contents of the above list after deletion.
Week 3	Write a C program that uses functions to perform the following (i)Creating a Doubly linked list of integers (ii)Delete a given integer from above linked list. (iii)Display the contents of the above list after deletion.
Week4	Write C programs to implement Stack using (i)Array (ii)Linked List
Week5	Write C programs to implement Queue using (i)Array (ii)Linked List
Week6	(a)Write a C program that uses stack operations to convert a given infix expression in to its postfix equivalent.(Implement the Stack using Array) (b)Write a C program to implement the towers of Hanoi problem.

Week7	Write a C program to implement double ended queue using (i)Array and (ii) Doubly linked list respectively.
Week8	Write a C program that uses functions to perform the following (i)Create a Binary Search Tree of Integers (ii)Traverse above binary search tree recursively in In-Order, Pre- Order, Post –Order.
Week9	Write C programs for implementing the following Sorting methods for sorting a given list of integers in ascending order. (i)Bubble Sort (ii)Quick Sort(iii) Insertion Sort
Week10	Write C programs for implementing the following Sorting methods for sorting a given list of integers in ascending order. (i) Selection Sort (ii) Merge Sort
Week 11	(a)Write a C program for implementing the Depth First Search graph traversal algorithm using (i) recursion (ii) without recursion. (b) Write a C program for implementing the Breadth First Search graph traversal algorithm using queues.
Week12	Write C programs for implementing the following Search methods (i)Linear Search (ii) Binary Search(recursive, non-recursive)

Course Outcomes

On Completion of the course, students will be able to

1. Explain the importance of structure and abstract data type, and their basic usability in different applications through different programming languages.
2. Analyze and differentiate different algorithms based on their time complexity.
3. Explain the linked implementation, and its uses both in linear and non - linear data structure.
4. Use various data structure such as stacks, queues, trees, graphs, etc. to solve various computing problems.
5. Implement various kinds of searching and sorting techniques, and know when to choose which technique.
6. Decide a suitable data structure and algorithm to solve a real world problem

(A2551) IT WORKSHOP

B. Tech. (ECE) II-Semester

L	T	P	C
0	0	3	2

Objectives

- The IT Workshop for engineers is a training lab course spread over 42 hours. The modules include training on PC Hardware, Internet & World Wide Web and Productivity tools including Word, Excel and Power Point.

PC Hardware

Week 1 – Task 1 : Identify the peripherals of a computer, components in a CPU and its functions. Draw the block diagram of the CPU along with the configuration of each peripheral and submit to your instructor.

Week 2 – Task 2 : Every student should dissemble and assemble the PC back to working condition. Lab instructors should verify the work and follow it up with a Viva. Also students need to go through the video which shows the process of assembling a PC. A video would be given as part of the course content.

Week 3 – Task 3 : Every student should individually install MS windows-XP on the personal computer. Lab instructor should verify the installation and follow it up with a Viva.

Week 4 – Task 4 : Every student should install Linux on the computer. This computer should have windows installed. The system should be configured as dual boot with both windows and Linux. Lab instructors should verify the installation and follow it up with a Viva

Week 5 – Task 5: Hardware Troubleshooting: Students have to be given a PC which does not boot due to improper assembly or defective peripherals. They should identify the problem and fix it to get the computer back to working condition. The work done should be verified by the instructor and followed up with a Viva

Internet & World Wide Web:

Week 6 - Task 1 : **Orientation & Connectivity Boot Camp :** Students should get connected to their Local Area Network and access the Internet. In the process they configure the TCP/IP setting. Finally students should demonstrate, to the instructor, how to access the websites and email. If there

is no internet connectivity preparations need to be made by the instructors to simulate the WWW on the LAN.

Task 2 : Web Browsers, Surfing the Web : Students customize their web browsers with the LAN proxy settings, bookmarks, search toolbars and pop up blockers. Also, plug-ins like Macromedia Flash and JRE for applets should be configured.

Week 7 -Task 3: Cyber Hygiene: Students would be exposed to the various threats on the internet and would be asked to configure their computer to be safe on the internet. They need to first install antivirus software, configure their personal firewall and windows update on their computer. Then they need to customize their browsers to block pop ups, block active x downloads to avoid viruses and/or worms.

Productivity tools

Word

Week 8 – Word Orientation: The mentor needs to give an overview of Microsoft (MS) office 2007/ equivalent (FOSS) tool word: MS office 2007/ equivalent (FOSS) tool Word as word Processors, Details of the three tasks and features that would be covered in each, using and word – Accessing, overview of toolbars, saving files, Using help and resources, rulers, format painter.

Task 1: Using Word to create project certificate. Features to be covered:- Formatting Fonts in word, Drop Cap in word, Applying Text effects, Using Character Spacing, Borders and Colours, Inserting Header and Footer, Using Date and Time option in Word.

Week 9 - Task 2: Creating project abstract Features to be covered:- Formatting Styles, Inserting table, Bullets and Numbering, Changing Text Direction, Cell alignment, Footnote, Hyperlink, Symbols, Spell Check, Track Changes.

Week 10 - Task 3 : Creating a Newsletter : Features to be covered:- Table of Content, Newspaper columns, Images from files and clipart, Drawing toolbar and Word Art, Formatting Images, Textboxes, Paragraphs and Mail Merge in word.

Excel

Week 11 - Excel Orientation: The mentor needs to tell the importance of MS office 2007/ equivalent (FOSS) tool Excel as a Spreadsheet tool, give the

details of the two tasks and features that would be covered in each. Using Excel – Accessing, overview of toolbars, saving excel files, Using help and resources.

Task 1: Creating a Scheduler - Features to be covered:- Gridlines, Format Cells, Summation, auto fill, Formatting Text

Week 12 - Task 2 : Calculating GPA - .Features to be covered:- Cell Referencing, Formulae in excel – average, std. deviation, Charts, Renaming and Inserting worksheets, Hyper linking, Count function, LOOKUP/VLOOKUP, Sorting, Conditional formatting

MS/equivalent (FOSS) tool Power Point:

Week 13 - Task1: Students will be working on basic power point utilities and tools which help them create basic power point presentation. Topic covered during this week includes :- PPT Orientation, Slide Layouts, Inserting Text, Word Art, Formatting Text, Bullets and Numbering, Auto Shapes, Lines and Arrows in Power point. Students will be given model power point presentation which needs to be replicated (exactly how it's asked).

Week 14 - Task 2: Second week helps students in making their presentations interactive. Topic covered during this week includes: Hyperlinks, Inserting – Images, Clip Art, Audio, Video, Objects, Tables and Charts

Task 3: Concentrating on the in and out of Microsoft power point presentations. Helps them learn best practices in designing and preparing power point presentation. Topic covered during this week includes: - Master Layouts (slide, template, and notes), Types of views (basic, presentation, slide slotter, notes etc), Inserting – Background, textures, Design Templates, Hidden slides.

Outcomes

PC Hardware introduces the students to a personal computer and its basic peripherals, the process of assembling a personal computer, installation of system software like MS Windows-XP, Linux and the required device drivers. In addition hardware level troubleshooting process, tips and tricks would be covered. **The students should work on working PC to dissemble and assemble to working condition and install Windows and Linux on the same PC. Students are suggested to work similar tasks in the Laptop scenario wherever possible.**

Internet & World Wide Web module introduces the different ways of hooking the PC on to the internet from home and workplace and effectively usage of the internet. Usage of web browsers, email, newsgroups and discussion forums would be covered. In addition, awareness of cyber hygiene, i.e., protecting the personal computer from getting infected with the viruses, worms and other cyber attacks would be introduced.

Productivity tools module would enable the students in crafting professional word documents, excel spread sheets and power point presentations using the Microsoft suite of office tools.

(**Recommended to use Microsoft office 2007 in place of MS Office 2003).**

Reference Books

1. Introduction to Information Technology, ITL Education Solutions limited, Pearson Education.
2. Introduction to Computers, Peter Norton, 6/e McGraw Hill Publishers.
3. Upgrading and Repairing, PC's 18th e, Scott Muller QUE, Pearson Education
4. Comdex Information Technology course tool kit Vikas Gupta, WILEY Dreamtech.
5. IT Essentials PC Hardware and Software Companion Guide Third Edition by David Anfinson and Ken Quamme. – CISCO Press, Pearson Education.
6. PC Hardware and A+Handbook – Kate J. Chase PHI (Microsoft)

(A2010) SPECIAL FUNCTIONS & COMPLEX ANALYSIS

B. Tech. (ECE) III-Semester

L	T	P	C
3	1	0	3

Course Objectives

- Evaluation of improper integrals using Beta , Gamma functions
- Series solutions for Bessel differential equations, analyzing the properties of Bessel polynomials**.**
- Differentiation and Integration of Complex valued functions
- Evaluation of integrals using Cauchy's integral formula.
- Taylor's series, Maclaurin's series and Laurent's series expansions of complex functions.
- Evaluation of integrals using residue theorem.
- Transform a given function from z-plane to w-plane.
- Identify the transformations like translation magnification, rotation and reflection and inversion.
- Properties of bilinear transformations

Unit – I: Special Functions

Gamma and Beta Functions – Their properties – evaluation of improper integrals. Bessel's functions, Properties, Recurrence relations, Orthogonality.

Unit – II: Functions Of Complex Variables

Continuity – Differentiability – Analyticity – Properties – Cauchy- Riemann conditions, Maxima – Minima Principle, Harmonic and conjugate harmonic functions – Milne – Thompson method. Elementary functions, general power of Z principal value Logarithmic function.

Unit – III: Complex Integration & Complex Power Series

Line integral – evaluation along a path and by indefinite integration – Cauchy's integral theorem – Cauchy's integral formula – Generalized integral formula.

Radius of convergence – Expansion in Taylor's series, Maclaurin's series and Laurent series. Singular point – Isolated singular point – pole of order m – essential singularity. (Distinction between and real analyticity and complex analyticity)

Unit – IV: Contour Integration

Residue – Evaluation of residue by formula and by Laurent series – Residue theorem. Evaluation of integrals of the type

(a) Improper real integrals $\int_{-\infty}^{\infty} f(x)\,dx$

(b) $\int_{0}^{2\pi} f(\cos\theta, \sin\theta)\,d\theta$

Unit – V: Conformal Mapping

Transformation by $e^z, \text{Im}\, z, z^2, z^n, \sin z, \cos z, z + a/z$. Translation, Rotation, inversion and bilinear transformation – fixed point – cross ratio – properties – invariance of circle and cross ratio – determination of bilinear transformation mapping 3 given points.

Text Books

1. Advanced Engineering Mathematics by R.K. Jain &S.R.K. Iyengar, 3rd edition, Narosa Publishing House, Delhi.
2. Complex variables and applications by James Ward Brown, Ruel V Churchill – 8th Edition McGraw Hill.

References

1. Higher Engineering Mathematics by B.S. Grewal, 36th Edition, Khanna Publishers.
2. Engineering Mathematics – III by T. K. V. Iyengar, B.Krishna Gandhi and others, 2014 YrEdition S. Chand.
3. Engineering Mathematics – III by P.B. BhaskaraRao, S.K.V.S. Rama Chary, M. BhujangaRao& others.
4. Engineering Mathematics – III by C. Shankaraiah, V.G. S. Book Links.
5. Advanced Engineering Mathematics by Allen Jaffrey. 1st Edition, Academic Press.

Course Outcomes

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

1. Solve Bessel equation under special conditions by using series solutions method. List recurrence relations and orthogonality properties of Bessel polynomials. Evaluate improper integrals using Beta and Gamma functions.
2. Analyse the complex functions with reference to their analyticity.
3. Evaluate integration by using Cauchy's integral theorem

4. Find the Taylor's and Laurent series expansion of complex functions
5. Transform the complex functions into conformal mapping. Discuss the properties of bilinear transformations

(A2252) ELECTRICAL TECHNOLOGY

B. Tech. (ECE) III-Semester

L	T	P	C
3	0	0	3

Course Objective

The emphasis of this course is laid on the basic operation of the DC machines and the transformers which includes DC generators and motors, single phase transformers, constructional features, operational principle of three phase induction motor, alternators and single phase motors.

Unit I: DC Machines

Principle and operation of DC Machines-EMF equation-Types of Generators-Magnetization and load characteristics of DC generators.

DC Motors

DC Motors-Types of DC motors- Characteristics of DC motors-3 point starters for DC shunt motor-losses and efficiency-Swinburne's test-speed control of DC shunt motor-Flux and Armature voltage control methods.

Unit II: Transformers

Principle of operation of single phase transformer-Types-Constructional features-Phasor diagram on No load and Load-Equivalent circuit. Losses and efficiency of transformer and regulation - OC and SC tests-predetermination of efficiency and regulation (simple problems)

Unit III: Three Phase Induction Motors

Principle of operation of three phase induction motors-Slip ring and squirrel cage motors-Slip torque characteristics-Efficiency calculation-Starting methods.

Unit IV: Alternators

Alternators-Constructional features-Principle of operation-Types-EMF equation-Distribution and coil span factors-Predetermination of regulation by synchronous impedance method-OC and SC tests

Unit V: Single Phase Motors

Principle of operation-Shaded pole motors-Capacitor motors, AC servomotors, stepper motors-Characteristics.

Text Books

1. Introduction to Electrical Engineering: M.S.Naidu and S.Kamakshaiah, TMH Publ.
2. Basic Electrical Engineering-T.K. Nagasarkar and M.S.Sukhaija. Oxford Univ.press

References

1. Principles of Electrical Engineering-V.K. Mehta, S. Chand Publications
2. Electrical Technology Volume 2-A.K.Theraja,B.L.Theraja, S. Chand Publications.
3. Electrical Machines, Ashfaq Hussain
4. Theory and Problems of Basic Electrical Engineering-I.J Nagarath and D.P. Kothari, PHI Publications

Course Outcomes

On completion of the course, students will be able to

1. Categorize DC machines, operation and its characteristics, with the help of tests and speed control methods.
2. Acquire the knowledge of operation and performance Analysis of transformers
3. Analyze three phase induction motor operation with their characteristics & its applications.
4. Illustrate the operation and constructional features of alternators and its regulation.
5. Evaluate the operational performance of different single phase motors

(A2401) ELECTRONIC DEVICES & CIRCUITS

B. Tech. (ECE) III-Semester

L	T	P	C
4	1	0	4

Course Objectives

This is a fundamental course, basic knowledge of which is required by all the circuit branch engineers. This course focuses:

- To familiarize the student with the principle of operation, analysis and design of junction diode, BJT and FET transistors and amplifier circuits.
- To understand diode as rectifier.
- To study basic principle of filter circuits and various types.

Unit-I:

P-N Junction Diode: Qualitative Theory of P-N junction, P-N junction as a Diode, Diode Equation, Volt-Ampere Characteristics, Temperature dependence of V-I characteristics, Ideal versus Practical- Resistance levels (Static and Dynamic). Transition and Diffusion Capacitances, Diode Equivalent Circuits, Load Line Analysis, Breakdown Mechanisms in Semiconductor Diodes, Zenar Diode Characteristics.

Special Purpose Electronic Devices: Principle of Operation and Characteristics of Tunnel Diode (with the help of Energy Band Diagram) , Varactor Diode, SCR and Semiconductor Photo Diode.

Unit- II:

Rectifiers and Filters: The P-N junction as a Rectifier, Half wave Rectifier, Full wave Rectifier, Bridge Rectifier, Harmonic components in a Rectifier Circuit, Inductor Filters, Capacitor Filters, L- Section Filters, Pi- Section Filters, Comparison of Filters, Voltage Regulation using Zener diode.

Unit –III:

Bipolar Junction Transistor and UJT : The Junction Transistor, , Transistor Current Components, , Transistor as an Amplifier, transistor Construction, BJT Operation, symbol, Common base, Common Emitter and Common Collector Configurations, Limits of operation, BJT Specifications, BJT Hybrid model , Determination of H parameters from Transistor characteristics, Comparison of CB, CE, and CC amplifiers configurations, UJT and Characteristics.

Unit- IV:

Transistor Biasing and Stabilization: Operating Point, The DC and AC Load lines, Need for Biasing, Fixed Bias, Collector to base bias Feedback, Voltage Divider Bias, Bias Stability, Stabilization Factors, Stabilization against variations in V_{BE} and β, Bias Compensation using Diodes and Transistors, Thermal Runaway, Thermal Stability, Analysis of a transistor amplifier circuit using h- parameters.

Unit- V:

Field Effect Transistor and FET Amplifiers

Field Effect Transistor: The Junction Field Effect Transistor (Construction, principle of operation, Symbol)- Pinch-off Voltage-Volt-Ampere characteristics, The JFET small signal model, MOSFET (Construction, principle of operation, Symbol), MOSFET Characteristics in Enhancement and Depletion modes.

FET Amplifiers: FET Common Source Amplifier, Common Drain Amplifier, Generalized FET Amplifier, Biasing of FET, FET as Voltage Variable Resistor, Comparison of BJT and FET.

Text Books

1. Millman's Electronic Devices & Circuits-J. Millman, C.C. Halkais & Satyabrata Jit, 2 Ed., 1998, TMH.
2. Electronic Devices & Circuits- Mohammad Rashid, Cengage Learning, 2013
3. Electronic Devices & Circuits- David A. Bell, 5 Ed, Oxford

Reference Books

1. Integrated Electronics- J. Millman and Christos C. Halkais, 1991 Ed., 2008, TMH.
2. Electronic Devices and Circuits- R.L. Boylstad and Louis Nashelsky, 9 Ed., 2006, PEI/PHI
3. Electronic Devices and Circuits- B. P. Singh, Rekha Singh, Pearson, 2 Ed, 2013.
4. Electronic Devices and Circuits- K. Lal Kishore, 2 Ed., 2005, BSP.
5. Electronic Devices and Circuits- Anil K. Maini, Varsha Agarwal, 1 Ed., 2009, Wiley India Pvt Ltd.
6. Electronic Devices and Circuits- S. Salivahanan, N. Suresh Kumar, A. Vallavaraj, 2 ed., 2008, TMH.

Course Outcomes

At the end of the course the student will be able to:

1. Distinguish characteristics of different diodes and special purpose electronic devices
2. Analyze the characteristics of BJT and FET
3. Design and analyze the DC bias circuitry of BJT and FET.
4. Able to design different Amplifier circuits using BJT and FET.

(A2021) MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS

B. Tech. (ECE) III-Semester

L	T	P	C
3	0	0	3

Course Objectives

- The students should be able to apply the principles of economics in business decision making process, Demand analysis, Elasticity of Demand and Demand forecasting.
- Study cost concepts and Break Even Analysis.
- Describe "Business" and new economic environment and also the capital and its significance and capital budgeting techniques.
- Describe the accounting concepts and conventions and financial statements to be prepared for any business.
- Describe the accounting concepts and financial analysis through ratios.

Unit I Introduction & Demand Analysis:
Definition, Nature and Scope of Managerial Economics Demand Analysis: Demand Determinants, Law of Demand and its exceptions. Elasticity of Demand: Definition, Types, Measurement and Significance of Elasticity of Demand. Demand Forecasting, Factors governing demand forecasting, methods of demand forecasting (survey methods, statistical methods, expert opinion method, test marketing, controlled experiments, judgmental approach to demand forecasting)

Unit II Theory of Production and Cost Analysis:
Production Function Isoquants and Is costs, MRTS, Least Cost Combination of Inputs, Cobb-Douglas Production function, Laws of Returns, Internal and External Economies of Scale.
Cost Analysis: Cost concepts, Opportunity cost, fixed vs. Variable costs, explicit costs Vs. Implicit costs, Out of pocket costs vs. Imputed costs. Break-even Analysis (BEA)-Determination of Break-Even Point (simple problems)- Managerial Significance and limitations of BEA.

Unit III Introduction to Markets & New Economic Environment:
Market structures: Types of competition and Markets, Features of Perfect competition, Monopoly and Monopolistic Competition. Price-Output Determination in case of Perfect Competition and Monopoly. Pricing:

Objectives and Policies of Pricing- Methods of Pricing, Business: Features and evaluation of different forms of Business Organisation: Sole Proprietorship, Partnership, Joint Stock Company, Public Enterprises and their types, New Economic Environment in Post-liberalization scenario.

Unit IV Capital and Capital Budgeting:
Capital Budgeting: Capital and its significance, Types of Capital, Estimation of Fixed and Working capital requirements, Methods and sources of raising finance. Capital Budgeting: Nature and scope of capital budgeting, features of capital budgeting proposals, Methods of Capital Budgeting: Payback Method, Accounting Rate of Return (ARR) and Net Present Value Method (simple problems)

Unit V Introduction to Financial Accounting& Financial Analysis:
Accounting concepts and conventions-Introduction IFRS-Double-Entry Book Keeping, Journal, Ledger, Trial Balance- Final Accounts (Trading Account, Profit and Loss Account and Balance Sheet with simple adjustments). Financial Analysis: Analysis and Interpretation of Liquidity Ratios, Activity Ratios, and Capital structure Ratios and Profitability ratios. Conversion of Ratios into preparation of Financial Statements.

Text books

1) S.A Siddiqui& A.S Siddiqui Managerial Economics& Financial Analysis, New Age International Publishers, Hyderabad 2013 .
2) Varshney&Maheswari: Managerial Economics, Sultan Chand, 2009.

References

1. Ambrish Gupta, Financial Accounting for Management, Pearson Education, New Delhi.
2. H. Craig Peterson & W. CrisLewis, Managerial Economics, Person, 2012.
3. Lipsey&Chrystel, Economies, Oxford University Press,2012.
4. Dwivedi: Managerial Economics,Vikas2012.
5. Shailaja&Usha: MEFA, University Press,2012.
6. Aryasri: Managerial Economics & Financial Analysis, TMH,2012.

Course Outcomes

On Completion of the course, students will be able to

1. Explain basic concepts of managerial economics, Nature/Scope of Business Economics and Demand Analysis issues.

2. Describe concepts of Production and Cost Analysis and Determine of Break-Even Point with simple problem.
3. Explain market, its structures, competition, Perfect competition, and Monopoly and Pricing strategies with performance measurement.
4. Explain features of capital budgeting techniques and apply Methods of Capital Budgeting
5. Apply Concepts and conventions of book keeping, Ledger, Trial Balance, Final Accounts and prepare Profit and Loss Account and prepare Balance Sheet with simple adjustments.

(A2402) PROBABILITY THEORY & RANDOM PROCESSES

B. Tech. (ECE) III-Semester

L	T	P	C
4	0	0	4

Course Objectives

The primary objective of this course is

- To provide mathematical background and sufficient experience so that the student can read, write and understand sentences in the language of probability theory, as well as solve probabilistic problems in signal processing and communication engineering
- To introduce students to the basic methodology of probabilistic thinking and to apply it to problems
- To understand basic concepts of probability theory and random variables, how to deal with multiple random variables, conditional probability and conditional expectation, joint distribution and independence, mean square estimation
- To understand the difference between time averages and statistical averages
- Analysis of random process and application to the signal processing in the communication system
- To teach students how to apply sums and integrals to compute probabilities, means and expectations

Unit I: Probability and Random Variables

Probability: Probability introduced through Sets and Relative Frequency: Experiments and Sample Spaces, Discrete and Continuous Sample Spaces, Events, Probability Definitions and Axioms, Mathematical Model of Experiments, Probability as a Relative Frequency, Joint Probability, Conditional Probability, Total Probability, Bayes Theorem, Independent Events

The Random Variable: Definition of a Random Variable, Conditions for a Function to be a Random Variable, Discrete and Continuous and Mixed Random Variables.

Unit-II: Distribution and Density Functions and Operation on one Random Variable-Expectations.

Distribution and Density Functions: Distribution and Density functions and their Properties, Binomial, Poisson, Uniform, Gaussian, Exponential,

Rayleigh and Conditional Distribution, Methods of defining Conditioning Event, Conditional Density, Properties.

Operation on one Random Variable Expectations : Introduction, Expected Value of a Random Variable, Function of a Random Variable, Moments about the Origin, Central Moments, Variance and Skew, Characteristic Function, Moment Generating Function, Transformations of a Random Variable: Monotonic Transformations for a Continuous Random Variable, Non-monotonic Transformations of Continuous Random Variable, Transformation of a Discrete Random Variable.

Unit-III: Multiple Random Variables and Operations

Multiple Random Variables: Vector Random Variables, Joint Distribution Function, Properties of Joint Distribution, Marginal Distribution Functions, Conditional Distribution and Density Point Conditioning, Conditional Distribution and Density, Statistical Independence, Sum of Two Random Variables, Sum of Several Random Variables.

Operations on Multiple Random Variables: Expected Value of a Function of Random Variables: Joint Moments about the Origin, Joint Central Moments, Joint Characteristic Functions, Jointly Gaussian Random Variables: Two Random Variables case, N Random Variable case, Properties, Transformations of Multiple Random Variables, Linear Transformations of Gaussian Random Variables.

Unit-IV: Stochastic Processes-Temporal Characteristics

The Stochastic process, concept, Classification of Processes, Deterministic and Nondeterministic Processes, Distribution and Density Functions, concept of Stationary and Statistical Independence. First-Order Stationary Processes, Second- order and Wide-Sense Stationarity, (N-Order) and Strict-Sense Stationary, Time Averages and Ergodicity, Mean-Ergodic Processes, Correlation-Ergodic Processes, Autocorrelation Function and its Properties, Cross-Correlation Function and Its Properties, Covariance and its properties, Linear system response of mean and mean-squared value, Autocorrelation function, Cross-correlation functions, Gaussian Random Processes, Poisson Random Process.

Unit-V: Stochastic Processes-Spectral Characteristics

The Power Spectrum: Properties, Relationship between Power Spectrum and Autocorrelation Function, the Cross-Power Density Spectrum, Properties, Relationship between Cross-Power Spectrum and Cross-Correlation Function.

Spectral Characteristics of System Response: Power Density spectrum of response, Cross-Power Spectral Density of Input and Output of a linear system.

Text Books

1. Probability, Random Variables & Random Signal Principles - Peyton Z. Peebles, TMH, 4th Edition, 2001.
2. Principles of communication systems H Taub, Donald L Schilling, Goutham Saha 2007 TMH

References

1. Probability, Random Variables and Stochastic Processes - Athanasios Papoulis and S. Unnikrishna Pillai, PHI, 4th Edition, 2002.
2. Theory of probability and stochastic Processes- Pradeep kumar Ghosh
3. Probability and Random Processes with application to signal processing - Henry stark and john w woods 3rd PE
4. Probability Methods of signal and system analysis - George r cooper clave d mc giflem 3ed 1999 oxford.
5. Statistical theory of communication - sp Eugene Xavier 1997 new age publications.

Course Outcomes

On Completion of the course, students will be able to

1. Describe the axiomatic formulation of modern Probability Theory and random variables.
2. Summarise probability models and function of random variables based on single & multiples random variables.
3. Evaluate the moments & characteristic functions of random variables.
4. Explain the concept of the random processes and spectral density of stationary random processes with examples.
5. List the specific applications to Poisson and Gaussian processes

(A2403) SWITCHING THEORY & LOGIC DESIGN

B. Tech. (ECE) III-Semester

L	T	P	C
3	1	0	3

Course Objectives

This course provides in-depth knowledge of switching theory and the design techniques of Digital Circuits, which is the basis for design of any digital circuit. The main objectives are:

- To learn basic techniques for the design of digital circuits and fundamental concepts used in the design of digital systems.
- To understand common forms of number representation in digital electronic circuits and to be able to convert between different representations.
- To implement simple logical operation using combinational logic circuits.
- To design combinational logic circuits, sequential logic circuits.
- To impart to student the concepts of sequential circuits, enabling them to analyze sequential systems in terms of state machines.
- To implement synchronous state machines using Flip-Flops.

Unit I: Number System and Boolean Algebra and Switching Functions

Number Systems, Base Conversion Methods, Complements of numbers, Codes – binary codes, Binary Coded Decimal code and its properties, UNIT Distance Codes, Alpha Numeric Codes, Error Detecting and Correcting Codes.

Boolean Algebra: Basic theorems and properties - Switching Functions, Canonical and Standard forms-Algebraic simplification Digital Logic Gates, Properties of XOR gates &Universal gates-Multilevel NAND/NOR realizations.

Unit-II: Minimization and Design of Combinational Circuits:

Introduction, The Minimization with Theorem, The Karnaugh Map Method, Five and Six Variable Maps , Prime and Essential Implications, Don't Care Map Entries, Using Map for simplifying tabular method, Partially Specified Expressions Multi Output minimization and combinational design, Arithmetic Circuits, Comparator, Multiplexer, Code-converters.

Unit-III: Sequential Machines Fundamentals

Introduction, Basic Architectural Distinctions between combinational and sequential circuits. The Binary Cell, Fundamentals of Sequential Machine Operations, The Flip-flop, D-Latch Flip-flop, The clocked T-flip-flop, the clocked J-K flip-flop, Design of a clocked flip-flop, Conversion from one type of Flip-Flop to another, Timing and Triggering Consideration.

Unit-IV: Sequential Circuit Design and Analysis

Introduction, State Diagram, Analysis of synchronous Sequential Circuits, Approaches to the Design of Synchronous Sequential Finite State Machines, Design Aspects, State Reduction , Design Steps, Realization using Flip-Flops.

Counters –Design of single mode counter, ripple counter, ring counter, shift register, shift register sequences, ring counter using shift register.

Unit-V: Sequential Circuits

Finite state machine-capabilities and limitations, Mealy and Moore models-minimization of completely specified and incompletely specified sequential machines, Partition techniques and Merger chart methods-concept of minimal cover table.

Algorithmic State Machines: salient features of the ASM chart-Simple examples-System design using data path and control subsystems-control implementations-examples of Weighing machine and Binary multiplier.

Text Books

1. Switching & Finite Automata theory - ZviKohavi, & Niraj K. Jha ,,3rd Edition, Cambridge.
2. Digital Design -Morris Mano, PHI, 3rd Edition, 2006.

Reference Books

1 Introduction to switching design and logic design - Fredriac J. Hill, Gerald R. Peterson, 3rd ED, John Wiley & Sons Inc
2. Digital fundamentals – A Systems approach-Thomas L. Floyd, Pearson, 2013.
3. Digital logic design- Ye Brian and Holds Worth, Elsevier.
4. Fundamentals of Logic Design - Charles H. Roth, Thomson Publications, 5th Edition, 2004.
5. Digital Logic Applications and Design - John M. Yarbrough, Thomson Publications, 2006.

6. Digital Logic and state machine design – Comer, 3rd, oxford, 2013.

Course Outcomes

Upon completion of the course, students will be able to

1. Identify the numeric information in different forms eg. Different bases, signed & unsigned integers, variable codes with ASCII, gray & BCD.
2. Summarize the Boolean functions using theorems and postulates
3. Ability to solve & design of combinational circuits
4. Subdivide the combinational and sequential circuits

(A2404) ELECTRONIC DEVICES & CIRCUITS LAB

B. Tech. (ECE) III-Semester

L	T	P	C
0	0	3	2

Course Objectives

This is a fundamental course, basic knowledge of which is required by all the circuit branch engineers. This course focuses:

- To familiarize the student with the principle of operation, analysis and design of junction diode, BJT and FET transistors and amplifier circuits.
- To understand diode as rectifier.
- To study basic principle of filter circuits and various types.

PART A: (Only for viva voce Examination)

Electronic Workshop Practice (in 3 lab sessions):

1. Identification and Specifications, testing of R, L, C Components (Color Codes), Potentiometers, Switches (SPDT, DPDT, and DIP), Coils, Gang Condensers, Relays, Bread Boards. PCBs

2. Identification, and Specifications, testing of Active Devices, Diodes, BJTs, Low power JFETs, MOSFETs, Power Transistors, LEDs, LCDs, Optoelectronic Devices, SCR, UJT.

3. Study and operation of

- Multi meters (Analog and Digital)
- Function Generator
- Regulated Power Supplies
- CRO.

PART B: (For Laboratory examination - Minimum of 10 experiments)

1. Forward & Reverse Bias Characteristics of PN Junction diode characteristics.
2. Zener diode characteristics and Zener as Voltage regulator.
3. Input & Output characteristics of Transistor in CB configurations and h-parameter calculations.
4. Input & Output characteristics of Transistor in CE configurations and h-parameter calculations
5. Half wave Rectifiers with & without filters.

6. Full wave Rectifiers with & without filters.
7. FET characteristics
8. Design of self - bias circuit
9. Frequency response of CC Amplifier
10. Frequency response of CE Amplifier (Emitter Follower).
11. Frequency response of Common Source FET amplifier.
12. SCR characteristics.
13. UJT characteristics.

PART C: Equipment required for Laboratories:

1. Regulated Power supplies (RPS) - 0-30v
2. CROs: 0-20 MHz
3. Function Generators: 0-1 MHz
4. Multi meters
5. Decade Resistance Boxes/Rheostats
6. Decade Capacitance Boxes
7. Ammeters (Analog or Digital): 0-20μ A, 0-50 μA, 0-100 μA, 0-200 μA, 0 – 10mA
8. Voltmeters (Analog or Digital): 0-50V, 0-100V, 0-250V
9. Electronic Components: Resistors, Capacitors, BJTs, LCDs, SCRs, UJTs, FETs, LEDs, MOSFETs, Diodes (Ge & Si type), transistors (NPN & PNP type)

Course Outcomes

On Completion of the course, students will be able to

1. Distinguish characteristics of different diodes and special purpose electronic devices
2. Analyze the characteristics of BJT and FET
3. Design and analyze the DC bias circuitry of BJT and FET.
4. Design different amplifier circuits using BJT and FET.

(A2405) BASIC SIMULATION LAB

B. Tech. (ECE) III-Semester

L	T	P	C
0	0	3	2

Course Objective:
To get an in depth knowledge about signals, systems and analysis of the same using various transforms

Note: Minimum of 12 experiments to be conducted from the following.

List of Experiments:

1. Basic Operations on Matrices.
2. Generation of Various Signals and Sequences (Periodic and Aperiodic), such as UNIT impulse, UNIT step, square, saw tooth, triangular, sinusoidal, ramp, sinc.
3. Observations on signals and sequences such as addition, multiplication, scaling , shifting, folding, computation of energy and average power.
4. Finding the even and odd parts of signal/ sequence and real and imaginary parts of signal.
5. Convolution between signals and sequences.
6. Autocorrelation and cross correlation between signals and sequences.
7. Verification of linearity and time invariance properties of a given continuous/discrete system.
8. Computation of UNIT sample, UNIT step and sinusoidal responses of the given LTI system and verifying its physical realizability and stability properties.
9. Gibbs phenomenon.
10. Finding the Fourier transform of a given signal and plotting its magnitude and phase spectrum.
11. Waveform synthesis using Laplace Transform
12. Locating the zeros and poles and plotting the pole-zero maps in S plane and Z-plane for the given transfer function.
13. Generation of Gaussian noise (real and complex), computation of its mean, M.S. Value and its Skew, Kurtosis, and PSD, Probability Distribution Function.
14. Sampling theorem verification.
15. Removal of noise by autocorrelation / cross correlation.

16. Extraction of periodic signal masked by noise using correlation.
17. Verification of Weiner-Khinchine Relations
18. Checking a random process for stationarity in wide sense

Course Outcomes

Upon completing this course the student will be able to

1. Classify basics of MATLAB syntax, functions and programming
2. Generate various signal and sequences in MATLAB and perform operations on signals and sequences
3. Determine the convolution and correlation signals and sequences.
4. Verify the linearity and time invariance properties of a given system
5. Analyze the Fourier transform of a given signal and plotting its magnitude and phase spectrum
6. Describe the wave form synthesis using Laplace transforms, locate poles and zeros and plotting pole-zero maps in S-plane and Z-plane

(A2023) GENDER SENSITIZATION

(An Activity-based Course)

B.Tech (ECE) III Semester

L	T	P	C
0	0	3	2

Objectives of the Course:

- To develop students' sensibility with regard to issues of gender in contemporary India.
- To provide a critical perspective on the socialization of men and women.
- To introduce students to information about some key biological aspects of genders.
- To expose the students to debates on the politics and economics of work.
- To help students reflect critically on gender violence.
- To expose students to more egalitarian interactions between men and women.

Learning Outcomes:

- Students will have developed a better understanding of important issues related to gender in contemporary India.
- Students will be sensitized to basic dimensions of the biological, sociological, psychological and legal aspects of gender. This will be achieved through discussion of materials derived from research. Facts .everyday life, literature and film.
- Students will attain a finer grasp of how gender discrimination works in our society and how to counter it.
- Students will acquire insight in to the gendered division of labour and its relation to politics and economics.
- Men and women students and professionals will be better equipped to work and live together as equals.
- Students will develop a sense of appreciation of women in all walks of life.
- Through providing accounts of studies and movements as well as the new laws that provide protection and relief to women, the textbook will empower students to understand and respond to gender violence.

Unit-I:
UNDERSTANDING GENDER:
Gender: Why Should We Study It? (Towards a World of Equals: Unit-1)
Socialization: Making Women, Making Men (?(Towards a World of Equals: Unit-2)
Introduction. Preparing for Womanhood. Growing up Male. First lessons in Caste. Different Masculinities.
Just Relationships: Being Together as equals(Towards a World of Equals: Unit-12)
Mary Kom and Onler. Love and Acid just do not Mix Love Letters. Mothers and fathers. Further Reading: Rosa Parks -The Brave Heart.

UNIT-II:
GENDER AND BIOLOGY:
Missing Women: Sex Selection and its Consequences (Towards a World of Equals: Unit-4)
Declining Sex Ratio. Demographic Consequences.
Gender Spectrum: Beyond the Binary(Towards a World of Equals: Unit-10)
Two or Many? Struggles with Discrimination.
Additional Reading: Our Bodies, Our Health(Towards a World of Equals: Unit-13)

Unit-III:
GENDER AND LABOUR:
Housework: the Invisible Labour (Towards a World of Equals: Unit-3)
"My Mother doesn't Work" "Share the Load"
Women's Work: Its Politics and Economics (Towards a World of Equals: Unit-7)
Fact and Fiction. Unrecognized Unaccounted work. Further Reading: Wages and Conditions of Work.

Unit-IV:
ISSUES OF VIOLENCE:
Sexual Harassment: Say No! (Towards a World of Equals: Unit-6)
Sexual Harassment, not Eve- teasing-Coping with Everyday Harassment - Further Reading."Chupulu"
Domestic Violence: Speaking Out (Towards a World of Equals: Unit-8)
Is Home a Safe Place?-When Women Unite Film]. Rebuilding Lives. Further Reading: New Forums for Justice.
Thinking About Sexual Violence (Towards a World of Equals: Unit-11)

Blaming the Victim- "I Fought for my Life....." - Further Reading: The Face of Violence.

Unit-V:
GENDER STUDIES:
Knowledge: Through the Lens of gender! (Towards a World of Equals: Unit-5)
Point of view. Gender and the Structure of Knowledge. Further Reading: Unacknowledge Women Artists of Telangana.
Whose History? Questions for Historians and Other! (Towards a World of Equals: Unit-9)
Reclaiming a Past. Writing other Histories. Further Reading: Missing Pages from Modern Telangana History.

Essential Reading: All the Units in the Textbook, "Towards a World of Equals: A Bilingual Textbook on "Gender" written by A. Suneetha, Uma Bhrugubanda, Duggirala Vasanta, Rama Melkote, Vasudha Nagaraj, Asma Rasheed, Gogu Shyamala, Deepa Sreenivas and Susie Tharu.

Note: Since it is Interdisciplinary Course, Resource persons can be drawn from the fields of English Literature or Sociology or Political Science or any other qualified faculty who has expertise in this field.

Reference Books:

1. Sen., Amartya."More Than One Million Women Are Missing" New York Review of Books 37.20(20December 1990). Print. 'we Were Making History.....'Life Stories of Women in the Telangana People's Struggle. New Delhi: Kali for Women,1989.
2. Tripti Lahiri."By the Numbers :Where Indian Women Work" Women's Studies Journals(14Novenber2012)Available Online at: http//blogs.wsj.com/India real time/2012/11/14/by-the numbers-Where-Indan-Women work/
3. K. Satyanarayana and Susie Tharu (Ed) Steel Nibs Are Sprouting: New Dalit Writing From South India, Dossier2: Telugu And Kannada http//harpercollins.co.in/BookDetail.asp?book code=3732
4. Vimala." Vantillu(The Kitchen)". Women Writing in India: 600 BC to the present Volume II: The 20thCentury.Ed Susie Thuru and K. Lalita.Delhi" Oxford University press, 1995. 599-601.
5. Shatrughna. Veena et al. Women's Work and its Impact on Child Health and Nutrition, Hyderabad, National Institute of Nutrition, Indian Council of Medical Research,1993

6. Stree Shakti Sanghatana "We Were Making History..... Life Stories of Women in the Telangana people's Struggle New Delhi : Kali for Women,1989
7. Menon, Nivedita. Seeing like a FEMINIST. New Delhi: Zubaan-Penguin books, 2012.
8. Jayaprabha, A "Chupulu (Stares).Women Writing in India: 600BC to the present. Volume II: The 20th Century Ed Susie Tharu and K. Lalita. Delhi: Oxford University press,1995.596-597
9. Javeed, Shayan and Anupam Manuhaar."Women and Wage Discrimination in India: A Critical Analysis" International Journal of Humanities and Social Science invention2.4(2013).
10. Gautam, Liela And Gita Ramaswamy "A Conversation Between A Daughter And A Mother" Broadsheet On Contermporary Politics. Special Issue On Sexuality And Harassment:Gender Politics On Campus Today .Ed Madhumeeta Sinha And Asma Rasheed Hyderabad; Anveshi Research Center For Women's Studies,2014
11. Abdulali Sohaila "I Fought For My Life ...And Won" Available Online At:Http/Www.Theaiternative.In/Lifestyle/I-Fought-For-My-Lifeand-Won-Sohaila-Abdulal/
12. Jeganathan Pradeep, Partha Chatterjee(Ed) "Community, Gender And Violence Subattern Studies Xi Permanent Black And Ravi Dayal Publishers, New Delhi,2000.

(A2019) ENVIRONMENTAL STUDIES

B. Tech. (ECE) IV-Semester

L	T	P	C
3	0	0	3

Course Objectives:

- Develop an understanding of the necessity of protection of environment
- Develop an understanding of Natural resources
- Develop an understanding of Biodiversity
- Develop an understanding of Global Environmental problems
- Develop an understanding of Environmental pollution

Unit-I

Environmental Studies:

Introduction, Definition, scope and importance, Ecosystems: Introduction, types, characteristic features, structure and functions of ecosystems. Bio geo chemical cycle, Classification of Eco system.

Unit-II

Natural Resources: classification of Resources, Land resources, Land as resource, Common property resources, Land degradation, Soil erosion and desertification, Effects of modern agriculture, fertilizer –pesticide problems, Forest resources, Use and over-exploitation.

Mining and dams – their effects on forest and tribal people, Water resources, Use and over- utilization of surface and groundwater, Floods, droughts, Water logging and salinity, Dams –benefits and costs, Conflicts over Water, Energy resources.

Unit-III

Bio-diversity and its conservation, Value of bio-diversity -consumptive and productive use, social, ethical, aesthetic and option values, Bio-geographical classification of India – India as a mega diversity habitat, Threats to bio-diversity –Hot-spots, habitat loss, poaching of wild life, loss of species, seeds, etc. Conservation of bio-diversity – Insitu and Ex-situ conservation.

Unit-IV

Environmental Pollution –Local and Global Issues, Nature of thermal pollution and nuclear hazards, Global warming, Acid rain, Ozone depletion., Environmental case studies.

Unit-V

Environmental Problems in India, Drinking water, sanitation and public health, Effects of the activities on the quality of environment, Water scarcity and groundwater depletion, Controversies on major dams – resettlement and rehabilitation of people: problems and concerns, Rain water harvesting, cloud seeding and watershed management. Economy and Environment, The economy and environment interaction, Economics of development, preservation and conservation, Sustainability: theory and practices, Limits to growth, Equitable use of resources for sustainable life styles, Environmental Impact Assessment.

Text Books

1. Environmental Science - Y.Anjaneyulu, B S Publications.
2. Environmental studies-Deeksha dave, Cengage learning India Pvt. Ltd.,
3. Environmental sciences and Engineering - P. Venugopal Rao, PHI learning Pvt. Ltd.,
4. Environmental Science and Technology by M. Anji Reddy, B S Publications.

Reference Books

1. Clark, R.S., Marine Pollution, Clanderson Press, Oxford, 2002.
2. Cunningham, W.P., et al. , Environmental Encyclopedia, Jaico Publishing House, Mumbai, 2003.

Course Outcomes:

On Completion of the course, students will be able to

1. Explain various factors affecting the environment
2. Describe various types of natural resources
3. Exhibit skills in solving various environmental problems
4. Explain means to protect the environment

(A2406) SIGNALS AND SYSTEMS

B. Tech. (ECE) IV-Semester

L	T	P	C
3	1	0	3

Course Objectives

This is a core subject, basic knowledge of which is required by all the engineers.

This course focuses on:

To get an in depth knowledge about signals, systems and analysis of the same using various transforms

Unit-I: Signal Analysis and Fourier Series

Signal Analysis: Introduction, classification of signals, elementary signals, basic operation of signals. Analogy between vectors and signals, Orthogonal signal space, Signal approximation using orthogonal functions, Mean square error, Closed or complete set of orthogonal functions, Orthogonality in complex functions,

Fourier Series: Representation of Fourier series, Continuous time periodic signals, properties of Fourier series, Dirichlet's conditions, Trigonometric Fourier series and Exponential Fourier series, Complex Fourier spectrum

Unit-II: Fourier Transforms and Sampling

Fourier Transforms: Deriving Fourier transform from Fourier series, Fourier transform of arbitrary signal, Fourier transform of standard signals, Fourier transform of periodic signals, properties of Fourier transforms, Fourier transforms involving impulse function and Signum function. Introduction to Hilbert Transform.

Sampling: Sampling theorem – Graphical and analytical proof for Band Limited Signals, Types of sampling- impulse sampling, Natural and Flat top Sampling, Reconstruction of signal from its samples, effect of under sampling – Aliasing, Introduction to Band Pass sampling.

Unit-III: Signal Transmission Through Linear Systems

Linear system, impulse response, Response of a linear system, Linear time invariant (LTI) system, Linear time variant (LTV) system, Transfer function of a LTI system. Filter characteristics of linear systems. Distortion less transmission through a system, Signal bandwidth, system bandwidth, Ideal

LPF, HPF and BPF characteristics, Causality and Paley-Wiener criterion for physical realization, relationship between bandwidth and rise time.

Unit-IV: Convolution and Correlation Of Signals

Concept of convolution in time domain and frequency domain, Graphical representation of convolution, Convolution property of Fourier transforms. Cross correlation and auto correlation of functions, properties of correlation function, Energy density spectrum, Parseval's theorem, Power density spectrum, Relation between auto correlation function and energy/power spectral density function. Relation between convolution and correlation, Detection of periodic signals in the presence of noise by correlation, Extraction of signal from noise by filtering.

Unit-V: Laplace Transforms and Z-Transforms

Laplace Transforms : Review of Laplace transforms, Partial fraction expansion, Inverse Laplace transform, Concept of region of convergence (ROC) for Laplace transforms, constraints on ROC for various classes of signals, Properties of L.T's relation between L.T's, and F.T. of a signal. Laplace transform of certain signals using waveform synthesis.

Z–Transforms : Fundamental difference between continuous and discrete time signals, Concept of Z- Transform of a discrete sequence. Distinction between Laplace, Fourier and Z transforms. Region of convergence in Z-Transform, constraints on ROC for various classes of signals, Inverse Z-transform, properties of Z-transforms.

Text Books

1. Signals, Systems & Communications - B.P. Lathi, BS Publications, 2003.
2. Signals and Systems - A.V. Oppenheim, A.S. Willsky and S.H. Nawab, PHI, 2nd Edn.

References

1. Signals & Systems - Simon Haykin and Van Veen,Wiley, 2nd Edition.
2. Fundamentals of Signals and Systems Michel J. Robert, MGH International Edition, 2008.
3. Signals, Systems and Transforms - C. L. Philips, J.M.Parr and Eve A.Riskin, Pearson education.3rd Edition, 2004.
4. Signals and signals- Iyer and K.Satya Prasad, Cengage Learning.
5. Signals and Systems – A. Rama Krishna Rao-2008,TMH

6. Introduction to Signal and System Analysis-K .Gopalan 2009, Cengage Learning.

Course Outcomes

Upon completing this course the student will be able to

1. Describe any arbitrary signals in terms of complete sets of orthogonal functions and understand the principles of impulse functions, step function and signum function
2. Express periodic signals in terms of Fourier series and analyze the spectrum and analyze the arbitrary signals(discrete) in Fourier transform to draw the spectrum
3. Explain the principle of linear system, filter characteristics of a system and its bandwidth, the concepts of auto correlation and cross correlation and power density spectrum
4. Can design a system for sampling a signal
5. For a given system, response can be obtained using Laplace transform, properties and ROC of LT
6. Estimate the response of a system using Laplace transform properties and RoC of LT.

(A2407) ELECTRONIC PULSE & DIGITAL CIRCUITS

B. Tech. (ECE) IV-Semester

L	T	P	C
3	0	0	3

Course Objectives

The main objectives are:

- To explain the complete response of R-C and R-L-C transient circuits.
- To explain clippers, clampers, switching characteristics of transistors and sampling gates
- To construct various multivibrators using transistors, design of sweep circuits and sampling gates.
- To discuss and realize logic gates using diodes and transistors

Unit I:

Multi Stage Amplifiers: Analysis of Cascaded RC Coupled BJT amplifiers ,Cascade Amplifier, Darlington Pair, Different Coupling Schemes used in Amplifiers - RC Coupled Amplifier, Transformer Coupled Amplifier, Direct Coupled Amplifier.

Feedback Amplifiers: Concepts of Feedback, Classification of Feedback Amplifiers, General characteristics of Negative Feedback Amplifiers, Effect of Feedback on Amplifier Characteristics, Voltage Series, Voltage Shunt, Current Series and Current Shunt Feedback Configurations, Illustrative Problems

Unit II:

BJT amplifiers – Frequency response: Logarithms, Decibels, General frequency considerations, Frequency response of BJT amplifier, Analysis at Low and High frequencies, Effect of coupling and bypass Capacitors, The Hybrid- pi (p) - Common Emitter Transistor Model, CE Short Circuit Current Gain, Current Gain with Resistive Load, Single Stage CE Transistor Amplifier Response, Gain-Bandwidth Product, Emitter follower at higher frequencies

Tuned Amplifiers: Single tuned amplifier operation, Q-factor, bandwidth and applications

UNIT -III: Large Signal Amplifiers

Classification, Class A Large Signal Amplifiers, Transformer Coupled Class

A Audio Power Amplifier, Efficiency of Class A Amplifier, Class B Amplifier, Efficiency of Class B Amplifier, Class-B Push- Pull Amplifier, Complementary Symmetry Class B Push-Pull Amplifier, Distortion in Power Amplifiers, Thermal Stability and Heat Sinks.

UNIT -IV: **Linear Wave Shaping**

High pass and low pass RC circuits and their response for sinusoidal, step, pulse, square& Ramp inputs, High pass RC network as Differentiator, low pass RC circuit as an integrator

Non- Linear Wave Shaping

Diode clippers, transistor clippers, clipping at two independent levels, comparators applications of voltage comparators. Clamping operation, clamping circuit taking source and diode resistances into account, clamping circuit theorem, practical clamping circuits, effect of diode characteristics on clamping voltage

UNIT-V: Multivibrators

Analysis of Bistable, Monostable, Astable Multivibrators and Schmitt trigger using Transistors, Time Base Generators: General features of a Time base Signal, Methods of generating Time Base Waveform, Operation of Miller and Bootstrap Time Base Generators

Text books

1. Millman's Pulse, Digital and Switching Waveforms- J.Millman, H.Taub and Mothaiki S.Prakash Rao, 2 Ed, 2008,TMH
2. Solid State Pulse Circuits- David A. Bell, 4 Ed,2002 PHI
3. Integrated Electronics-Jacob Millman and Christos C Halkias, 1991 Ed., 2008, TMH.
4. Electronic Devices and Circuits, B. P. Singh, Rekha Singh, Pearson, 2013.

Reference books

1. Pulse and Digital Circuits- A. Anand Kumar, 2005,PHI
2. Fundamentals of Pulse and Digital Circuits- Ronald J. Tocci, 3 Ed,2008
3. Pulse and Digital Circuits- Motheki S.Prakash Rao,2006,TMH
4. Wave Generation and Shaping- L. Strauss
1. Electronic Circuit Analysis - Rashid, Cengage Learning, 2013
2. Electronic Devices and Circuit Theory - Robert L.Boylestad, Louis Nashelsky, 9 Ed., 2008 PE.

3. Micro electric Circuits-Sedra and Smith-5Ed., 2009, Oxford University Press.
4. Electronic Circuit Analysis - K. Lal Kishore, 2004, BSP.
5. Electronic Devices and Circuits - S. Salivahanan, N.Suresh Kumar, A. Vallavaraj, 2 Ed., 2009, TMH.

Course Outcomes

At the end of the course, The student will be able to:

1. Design and analyze different multirange amplifiers and feed back amplifier
2. Design different large signal amplifiers
3. Design different Linear and Non linear wave shaping circuits
4. Design various multi vibrator circuits

(A2207) CONTROL SYSTEMS

B. Tech. (ECE) IV-Semester

L	T	P	C
4	0	0	4

Course Objective

This course it is aimed to introduce the principles and applications of control systems in everyday life. This course deals with the basic concepts of block diagram reduction, time domain analysis, solutions of time invariant systems and concepts related to stability analysis of systems in frequency domain and time domain.

Unit – I: Introduction

Concepts of Control Systems- Open Loop and closed loop control systems and their differences- Different examples of control systems- Classification of control systems, Feed-Back Characteristics, Effects of feedback.
Mathematical models – Differential equations, Impulse Response and transfer functions - Translational and Rotational mechanical systems

Unit -II: Transfer Function Representation

Transfer Function of DC Servo motor - AC Servo motor- Synchro transmitter and Receiver, Block diagram representation of systems considering electrical systems as examples -Block diagram algebra – Representation by Signal flow graph - Reduction using Mason's gain formula.

Unit-III: Time Response Analysis

Standard test signals - Time response of first order systems – Characteristic Equation of Feedback control systems, Transient response of second order systems - Time domain specifications – Steady state response - Steady state errors and error constants – Effects of proportional derivative, proportional integral systems.

Stability Analysis in S-Domain

The concept of stability – Routh's stability criterion – qualitative stability and conditional stability – limitations of Routh's stability

Root Locus Technique: The root locus concept - construction of root loci-effects of adding poles and zeros to G(s)H(s) on the root loci. Basics of PID Controllers.

Unit –IV: Frequency Response Analysis

Introduction, Frequency domain specifications-Bode diagrams-Determination of Frequency domain specifications and transfer function from the Bode Diagram-Phase margin and Gain margin-Stability Analysis from Bode Plots. Polar Plots-Nyquist Plots-Stability Analysis-Applications of Nyquist criterion to find the stability.

Unit – V: State Space Analysis of Continuous Systems

Concepts of state, state variables and state model, derivation of state models from block diagrams, Diagonalization- Solving the Time invariant state Equations- State Transition Matrix and it's Properties – Concepts of Controllability and Observability

Text Books

1. Automatic Control Systems 8th edition– by B. C. Kuo 2003– John wiley and son's.,
2. Control Systems Engineering – by I. J. Nagrath and M. Gopal, New Age International (P) Limited, Publishers, 2nd edition.

Reference Books

1. Modern Control Engineering – by Katsuhiko Ogata – Prentice Hall of India Pvt. Ltd., 3rd edition, 1998
2. Control Systems by N.K.Sinha, New Age International (P) Limited Publishers, 3rd Edition, 1998.
3. Control Systems Engg. by NISE 3rd Edition – John wiley
4. "Modeling & Control Of Dynamic Systems" by Narciso F. Macia George J. Thaler, Thomson Publishers.

Course Outcomes

On completion of the course, students will be able to

1. Explain the need for feedback control systems.
2. Obtain mathematical models of simple Electrical and mechanical systems
3. Evaluate the performance of a linear system in frequency and time domains.
4. Determine the stability of a linear control system. Design classical controllers for given system response.
5. Analyze linear systems in state space domain.

(A2408) ELECTROMAGNETIC THEORY & TRANSMISSION LINES

B. Tech. (ECE) IV-Semester

L	T	P	C
4	1	0	4

Course Objectives:

The course objectives are:

- To introduce the student to the fundamental theory and concepts of electromagnetic waves and transmission lines, and their practical applications
- To study the propagation, reflection, and transmission of plane waves in bounded and unbounded media

Unit-I: Electrostatics

Coulomb's Law, Electric Field Intensity- Fields due to Different charge Distributions, Electric Flux Density, Gauss Law and Applications, Electric Potential, Relations Between E and V, Maxwell's Two Equations for Electrostatic fields, Energy Density, Illustrative Problems. Convection and conduction Currents, Dielectric constant, Isotropic and Homogeneous Dielectrics, Continuity Equation, Relaxation Time, Poisson's and Laplace Equations; Illustrative Problems.

Unit-II: Magnetostatics

Biot-Savart's Law, Ampere's Circuital Law and Applications, Magnetic Flux Density, Maxwell's Two Equations for Magnetostatic Fields, Magnetic Scalar and Vector Potentials, Forces due to Magnetic Fields, Ampere's Force Law, Inductances and Magnetic Energy, Illustrative Problems.

Maxwell's Equations(Time Varying Fields): Faraday's Law and Transformer EMF, Inconsistency of Ampere's Law and Displacement Current Density, Maxwell's Equations in different Final Forms and Word Statements, Conditions at a Boundary Surface: Dielectric-Dielectric and Dielectric-Conductor Interfaces, Illustrative Problems

Unit-III: EM Wave Characteristics

Wave Equations for Conducting and perfect Dielectric Media, Uniform Plane waves- Definition, All Relations Between E& H, Sinusoidal variations, Wave Propagation in lossless and conducting Media, Conductors & Dielectrics- Characterization, Wave Propagation in Good Conductors and good Dielectrics, Polarization, Illustrative Problems.

Reflection and Refraction of plane waves- Normal and Oblique incidences for both perfect Conductor and perfect Dielectrics, Brewster Angle, Critical Angle and Total internal Reflection Surface Impedance, Poynting Vector and Poynting Theorem-Applications, Illustrative problems.

Unit-IV: Transmission Lines-I

Types, Parameters, Transmission Line Equations, Primary & Secondary Constants, Expressions for characteristic impedence, Propagation Constant, Phase and Group Velocities, infinite line Concepts, Losslessness/Low Loss Characterization, Distortion – Condition for Distortionlessness and minimum Attenuation, Loading- Types of Loading, Illustrative problems.

Unit-V: Transmission Lines-II

Input impedence Relations, SC and OC Lines, Reflection Coefficient, VSWR, UHF Lines as Circuit Elements; **λ/4, λ /2. λ /8** Lines- Impendence Transformations, Smith Chart – Construction and Applications, Single and Double Stub Matching, Illustrative Problems.

Text Books

1. Elements of Electromagnetics-Mattew N.O. Sadiku, 4thEd, OxfordUniv.Press.
2. Electromagnetic Waves and Radiating Systems – E.C. Jordan andK.G. Balmain, 2nd, 2000, PHI.
3. Transmission Lines and Networks- Umesh Sinha, Satya Prakashan, 2001, (Tech India Publications), New Delhi.

Reference Books

1. Engineering Electromagnetic- Nathan Ida, 2nd Ed, 2005, Springer(India) Pvt Ltd., New Delhi.
2. Engineering Electromagnetic – William H.Hayt Jr. and John A.Buck, 7th Ed., 2006, TMH.
3. Electromagnetic Field Theory and Transmission Lines – G. Sashibhushana Rao, Wiley Inia, 2013.
4. Networks, Lines and fields – John D. Ryder, 2nd Ed, 1999, PHI

Course Outcomes

Upon successful completion of the course, students will be able to:

1. Describe various Coordinate Systems, Vector Calculus, Field Concept
2. Explain the importance of Maxwell equations in electromagnetic theory
3. Analyze the behavior of electric fields and magnetic fields in the presence of dielectric and magnetic materials.

4. Demonstrate the ability to compute various parameters for loaded transmission lines using either Smith chart or classical theory
5. Design matching networks for loaded transmission lines

(A2409) ANALOG COMMUNICATIONS

B. Tech. (ECE) IV-Semester

L	T	P	C
3	0	0	3

Course Objectives:
This Course aims at:

- Developing and understanding of the design of analogy communication system.
- Study of Analog Modulation Techniques.
- Subject will develop analytical abilities related to Circuit members.
- Establishing a firm foundation for the understanding of telecommunication systems, and the relationship among various technical factors when such systems are designed and operated.

Unit I: Amplitude Modulation
Introduction to communication system, Need for modulation, Frequency Division Multiplexing , Amplitude Modulation, Definition, Time domain and frequency domain description, single tone modulation, power relations in AM waves, Generation of AM waves: square law Modulator, Switching modulator, Detection of AM Waves: Square law detector, Envelope detector.
DSB Modulation: Double side band suppressed carrier modulators, time domain and frequency domain description, Generation of DSBSC Waves: Balanced Modulators, Ring Modulator, Coherent detection of DSB – SC modulated waves, COSTAS Loop.

Unit II: SSB Modulation
Frequency domain description, Frequency discrimination method for generation of AM-SSB Modulated Wave, Time domain description, Phase discrimination method for generating AM-SSB Modulated waves. Demodulation of SSB Waves, Vestigial Side Band Modulation: Frequency description, Generation of VSB Modulated wave, Time domain description, Envelope detection of a VSB Wave pulse Carrier, Comparison of AM Techniques, Applications of different AM Systems.

Unit III: Angle Modulation
Basic concepts, Frequency Modulation: Single tone frequency modulation, Spectrum Analysis of Sinusoidal FM Wave, Narrow band FM, Wide band FM, Constant Average Power, Transmission bandwidth of FM Wave-Generation of FM Waves, Direct FM, Detection of FM Waves: Balanced

Frequency discriminator, Zero crossing detector, Phase locked loop, Comparison of FM and AM.

Unit IV: Noise in Analog Communication System

Types of noise: Resistive (Thermal) Noise source, Shot Noise, Extraterrestrial Noise, Arbitrary Noise Sources, White Noise, Narrow Band Noise- In phase and quadrature phase components and its properties, Modeling of Noise sources, Average Noise bandwidth, Effective noise temperature, Average Noise Figures, Average Noise Figure of cascaded networks.

Noise in DSB & SSB System, Noise in AM System, Noise in Angle Modulation System, Noise Triangle in Angle Modulation System, Pre-emphasis and de-emphasis.

Unit V: Receivers

Radio Receiver - Receiver Types - Tuned radio frequency receiver, Super hetrodyne receiver, RF section and Characteristics - Frequency changing and tracking, Intermediate frequency, AGC, FM Receiver, Comparison with AM Receiver, Amplitude limiting.

Pulse Modulation: Types of Pulse modulation, PAM (Single polarity, double polarity) PWM: Generation & demodulation of PWM, PPM, Generation and demodulation of PPM, Time Division Multiplexing.

Textbooks

1. Communication Systems - Simon Haykin, 2nd Ed., Wiley publications.
2. Communication Systems – B.P. Lathi, BS Publication, 2004.

References

1. Electronic Communications – Dennis Roddy and John Coolean, 4th Edition, PEA, 2004.
2. Electronic Communication Systems – Modulation and transmission – Robert J.Schoenbeck, 2nd Edition, PHI.
3. Analog and Digital Communication – K. Sam Shanmugam, Willey, 2005.
4. Electronics & Communication System – George Kennedy and Bernard Davis, TMH 2004.
5. Principles of Communication Systems – H Taub & D. Schilling, Gautam Sahe, TMH, 3rd Edition, 2007.

Course Outcomes

Upon completion of the subject, students will be able to:

1. Define baseband signal & systems and describe various elements, processes, noise and parameters in telecommunication systems.
2. Design procedure of AM transmission and Reception, analyze, measure, and evaluate the performance of a telecommunication system against given criteria.
3. Discuss the basics of SSB, DSB and VSB transmission and Reception.
4. Describe about FM transmission and Reception differential analog pulse modulation techniques.
5. Design typical telecommunication systems that consist of basic and essential building blocks.

(A2253) ELECTRICAL TECHNOLOGY LAB

B. Tech. (ECE) IV-Semester

L	T	P	C
0	0	3	2

Objective

This course provides the in-depth knowledge of theorems , resonance phenomena two port network parameters time response of electrical networks by verifying practically. It also introduces different tests on DC machines and transformer to know the performance.

PART - A

1. Verification of KCL and KVL.
2. Verification of Superposition and Reciprocity theorems
3. Verification of Maximum power transfer theorem.
4. Verification of Thevenin's and Norton's theorems.
5. Series and Parallel resonance in RLC Network
6. Two port network parameters- Z and Y parameters
7. Two port network parameters- ABDC and Hybrid Parameters.
8. Time Response of First Order RC/RL Network for periodic, non-sinusoidal inputs- time constant and steady state error determination

PART - B

1. Magnetization characteristics of D.C. Shunt generator.
2. Swinburne's Test on DC shunt machine.
3. Brake test on DC shunt motor
4. OC and SC tests on Single-phase transformer.
5. Load Test on Transformer

Note: Any 12 of the above experiments are to be conducted

Course Outcomes

On Completion of the course, students will be able to

1. Verify KCL & KVL.
2. Verify different theorems.
3. Calculate different two port network parameters.
4. Explain resonance phenomena for RLC networks.
5. Analyze time response of RC/RL networks.
6. Acquire the knowledge of different tests conducted on DC machines and single phase transformers

(A2410) ELECTRONICS CIRCUITS & PULSE CIRCUITS LAB

B. Tech. (ECE) IV-Semester

L	T	P	C
0	0	3	2

Course Objectives

The main objectives are:

- Familiarize the student with the analysis and design of basic transistor amplifier circuits and their frequency response characteristics, Feedback amplifiers, Oscillators, Large signal amplifiers and Tuned amplifiers.
- To explain the complete response of R-C and R-L-C transient circuits.
- To explain clippers, clampers, switching characteristics of transistors and sampling gates
- To construct various multivibrators using transistors, design of sweep circuits and sampling gates.
- To discuss and realize logic gates using diodes and transistors

List of Experiments (16 experiments to be done):

PART – 1: Electronic Circuits

Minimum eight experiments to be conducted:

I) Design and Simulation in Simulation Laboratory using any Simulation Software(Minimum 6 Experiments):

1. Common Emitter Amplifier
2. Common Source Amplifier
3. Two Stage RC Coupled Amplifier
4. Current Shunt and Voltage Series Feedback Amplifier
5. Cascade Amplifier
6. Wien Bridge Oscillator using Transistors
7. RC Phase Shift Oscillator using Transistors
8. Class A Power Amplifier (Transformer less)
9. Class B Complementary Symmetry Amplifier
10. Common Base(BJT) / Common Gate (JFET) Amplifier

II) Testing in Hardware Laboratory
1. Class A power Amplifier (With transformer load)
2. Class C Power Amplifier
3. Single Tuned Voltage Amplifier
4. Hartley & Colpitts Oscillator
5. Darlington Pair
6. MOS Common Source Amplifier

Experiments Required for the Laboratory:

1. For Software Simulation of Electronic Circuits
   i) Computer Systems with Latest Specifications
   ii) Connected in LAN (Optional)
   iii) Operating System (Windows XP)
   iv) Suitable Simulation Software
2. For Hardware Simulation of Electronic Circuits
   i) Regulated Power Supply (0 – 30 V)
   ii) CRO's
   iii) Function Generators
   iv) Multi meters
   v) Components
3. Win XP/ Linux etc.

PART – II: Pulse Circuits

1. Linear Wave Shaping
   a. RC Low Pass Circuit for different time constants
   b. RC High Pass Circuit for Different time constants
2. Non – linear wave shaping
   a. Transfer characteristics and response of clippers:
      i) Positive and Negative Clippers
      ii) Clipping at two independent levels
   b. The Steady State Output Waveform of Clampers for a Square wave input
      i) Positive and Negative Clampers
      ii) Clamping at Reference Voltage
3. Switching characteristics of a transistor
4. Design a Bistable Multivibrator and draw its waveforms
5. Design an Astable Multivibrator and draw its wave forms
6. Design a Monostable Multivibrator and draw its waveforms

Equipment Required for Laboratories:
Regulated Power Supply – 0-30 V

CRO – 0 – 20 M Hz
Function Generators – 0 – 1 M Hz
Components
Multi meters

Course Outcomes

At the end of the course, the student will be able to:

1. Design and analyze different amplifiers circuits using BJT and FET
2. Analyze different negative feedback amplifiers
3. Analye different power amplifiers
4. Design different linear and non linear circuits
5. Analyze different multivibrator circuits

(A2004) SOFT SKILLS & PROFESSIONAL ETHICS

B. Tech. (ECE) IV-Semester

L	T	P	C
2	0	0	0

Module 1. Business Communication Skills

- English Language Enhancement
- The Art of Communication

objective

- The student will gain a functional understanding of basic English Grammar
- Practice language skills to eliminate errors in pronunciation and sentence construction
- Understand and enhance interpersonal communication process

Module 2. Intrapersonal & Interpersonal Relationship Skills

- Intrapersonal Relationships
- Interpersonal Relationships – To be an Effective Team Player

Objective

- The student will understand the importance of and the various skills involved in developing enriching interpersonal relationships
- Be more aware of his/her own self – confidence, values
- Understand and handle emotions of self and others.
- Understand the necessity and importance of working together as a team
- Learn how to go about being a good team player and form an effective team
- Have put their team building skills to test in the various activities to understand where they stand and improve themselves with each succeeding activity.

Module 3. Campus to Company

- Corporate Dressing
- Corporate Grooming
- Business Etiquette

- Communication Media Etiquette

Objective

- The student will understand what constitutes proper grooming and etiquette in a professional environment.
- Have some practical tips to handle him/her in a given professional setting.
- Have practiced the skills necessary to demonstrate a comfort level in executing the same.

Module 4. Group Discussions, Interviews and Presentations

- Group Discussions
- Interviews
- Presentations

Objective

- The student will be able to appreciate the nuances of the Group Decision-making process.
- Understand the skills tested and participate effectively in Group Discussions.
- Learn the basics of how to make an effective presentation and have numerous practice presentations in small groups and larger audiences.
- Attend any type of interview with the confidence borne out of knowledge gained and practice sessions.

Module 5. Entrepreneurial Skills Development

- Goal Setting
- Entrepreneurial Skills – Awareness and Development

Objective

- The student will be able to set specific measurable goals for themselves in their personal and/or professional life.
- Understand the skills and the intricacies involved in starting an entrepreneurial venture.

References

1. UNLEASH the power within….Soft Skills – Training Manual (Infosys Campus Connect)

V SEMESTER

(A2411) MICROPROCESSORS & MICROCONTROLLERS

L	T	P	C
4	1	0	4

B. Tech. (ECE) V-Semester

Course Objective:
To develop an in-depth understanding of the operation of Microprocessors and Microcontrollers, Machine language programming & Interfacing techniques.

Unit- I: 8086 Architecture
8086 Architecture-Functional diagram, Register organization, Memory segmentation, programming model, Memory addresses, physical memory organization, Architecture of 8086, signal descriptions of 8086-Common Function Signals, Timing diagrams, Interrupts of 8086.

Unit- II: Instruction set and assembly language programming of 8086
Instruction formats, Addressing modes, Instruction Set, Assembler Directives, Macros, simple Programs involving Logical, Branch and Call Instructions, Sorting, Evaluating Arithmetic Expressions, String Manipulations.

Unit- III: I/O interface
8255 PPI, Various Modes of Operation and Interfacing to 8086, Interfacing keyboard, Display, D/A and A/D Converter.

Interfacing with advanced devices: Memory interfacing to 8086, Interrupt Structure of 8086, Vector interrupt table, Interrupt service routine.
Communication Interface: Serial Communication Standards, Serial Data Transfer Schemes, 8251 USART Architecture and Interfacing.

Unit – IV: Introduction to Microcontrollers
Overview of 8051 Microcontroller, Architecture, I/O Ports, Memory Organization, Addressing Modes and Instruction set of 8051, Simple Programs.

Unit – V: 8051 Real Time Control

Programming Timer Interrupts, Programming External Hardware Interrupts, Programming the Serial Communication Interrupts, Programming 8051 Timers and Counters.

Text Books:

1. D.V. Hall, Micro Processors and Interfacing, TMGH, 2nd edition 2006.
2. Kenneth.J.Ayala,The 8051 Microcontroller, 3rd Ed, Cengage Learning.
3. The 8051 microcontroller and Embedded Systems, Muhammad Ali Mazidi and Janice GillispieMazidi, Second Edition, Pearson Education India

Reference Books:

1. Advanced microprocessor and Peripherals - A.K.Ray and K.M. Bhurchandi, TMH, 2nd edition 2006.
2. The 8051 Microcontrollers, Architecture and programming and Applications- K. Uma Rao, Andhe Pallavi, Pearson, 2009.
3. Micro Computer System 8086/8088 Family Architecture, Programming and Design - By Liu and GA Gibson, PHI, 2nd Ed.
4. Microcontrollers and Application, Aijay.V. Deshmukh, TMGH, 2005.
5. The 8085 Microprocessor: Architecture, Programming and interfacing- K. Uday Kumar, B.S. Umashankar, 2008, Pearson.

Course Outcomes:

Upon completion of this course, the student will be able to

1. Describe the architecture of 8086 microprocessor.
2. Define various addressing modes, assembler directives and assembly level instructions of 8086 microprocessor.
3. Write assembly language programs for interfacing various I/O devices and 8251 USART with 8086 microprocessor.
4. Describe the architecture of 8051 microcontroller.
5. Write assembly language programs for various 8051 interrupts.

(A2412) ANTENNAS & WAVE PROPAGATION

B. Tech. (ECE) V-Semester

L	T	P	C
4	0	0	4

Course objectives:
The main objective are

- To attain knowledge on basic terminology and concepts of antennas.
- To attain knowledge on the basic parameters those are considered in the antenna design process and the analysis while designing that.
- Analyse the electric and magnetic field emission from various basic antennas and mathematical formulation of the analysis.
- To have knowledge on antenna operation and types as well as their usage in real time field.
- Aware of the wave spectrum and prorogation of the waves at different frequencies through different layers.

Unit-I: Antenna basics
Introduction, basic antenna parameters- patterns, beam area, radiation intensity, beam efficiency , directivity- gain- resolution, antenna apertures, effective height, illustrative problems. Fields from oscillating dipole, field zones, front-to-back ratio, antenna theorems, Retardedpotentials-Helmholtz theorem.
Thin linear wire antennas-Radiation from small electric dipole, quarter wave monopole and half wave dipole-current distributions, field components, radiated power, radiation resistance, beam width, directivity, effective area and effective height, natural current distributions, far fields and patterns of thin linear centre fed antennas of different lengths, illustrative problems. Loop antennas - introduction, small loop, comparison of far fields of small loop and short dipole, radiation resistances and directivities of small and large loops (qualitative treatment).

Unit-II: VHF, UHF and Microwave Antennas-I
Arrays with parasitic elements- Yagi-Uda array, folded dipoles and their characteristics, helical antennas-helical geometry, helix modes, practical design considerations for monofilar helical antenna in axial and normal

modes, horn antennas - types, fermat's principle, optimum horns, design considerations of pyramidal horns, illustrative problems.

Unit-III: VHF, UHF and Microwave Antennas-II

Micro strip antennas- introduction, features, advantages and limitations, rectangular patch antennas-geometry and parameters, characteristics of micro strip antennas. Impact of different parameters on characteristics,

Reflector antennas-Introduction, flat sheet and corner reflectors, paraboloidal reflectors-geometry, pattern characteristics, feed methods. Illustrative problems.

Lens antennas- Introduction, geometry of non metallic dielectric lenses, zoning, tolerances and applications.

Unit-IV: Antenna Arrays

Point sources-definition, patterns, arrays of 2 isotropic sources-different cases, principle of pattern multiplication, uniform linear arrays-Broadside arrays, Endfire arrays, EFA with increased directivity, derivation of their characteristics and comparison, BSA with non-uniform amplitude distributions-general considerations and binomial arrays, illustrative problems.

Antenna measurements: Introduction, concepts – Reciprocity, near and far fields, coordinate system, sources of errors. Patterns to be measured, pattern measurement arrangement, directivity measurement, gain measurements (by comparison, absolute and 3 –antenna methods).

Unit-V: Wave Propagation-I

Introduction, definitions, categorizations and general classifications, different modes of wave propagation. Ground wave propagation (qualitative treatment) for flat earth reflections, space and surface waves, wave tilt, curved earth reflections.

Space wave propagation - Introduction, field strength variation with distance and height, effect of earth's curvature, absorption, super refraction, M-curves and duct propagation, scattering phenomena, tropospheric propagation.

Wave Propagation– II: sky wave propagation- Introduction, structure of ionosphere, refraction and reflection of sky waves by ionosphere, Ray path, critical frequency, MUF, LUF, virtual height and skip distance. Relation between MUF and skip distance, multi-hoppropagation.

Text books:

1. Antennas and Wave Propagation – J. D. Kraus, R. J. Marhefka And Ahmad S.Khan, TMH, New Delhi, 4th Ed., (Special Indian Edition), 2010.
2. Electromagnetic Waves and Radiating Systems – E.C. Jordan And K.G. Balmain, Phi, 2nd Ed., 2000.

Reference books:

1. Antenna Theory-C.A Balanis, John Wiley &Sons, 3rd Ed., 2005.
2. Antennas and Wave Propagation-K.D.Prasad, Satyaprakashan, Tech India Publications, New Delhi, 2001.
3. Transmission and Propagation-E.V.D.GlazierAnd.R.L.Lamont, The Services Text Book Of Radio, Vol.5, Standard Publishers Distributors, Delhi.
4. Electronic and Radio Engineering-F.E.Terman, Mcgraw-Hill, 4th Edition, 1955.
5. Antennas-John D.Kraus, Mcgraw-Hill (International Edition), 2nd Ed.1988.

Course Outcomes:

Upon completion of this course, the student will be able to

1. Explain the basic concept of radiation mechanism, can define basic antenna Parameters and can derive relation between them.
2. Explain constructional details, principle of operation and characteristics of different linear antennas, VHF, UHF and Microwave Antennas and will be able to identify proper type of antenna for specified application.
3. Discuss the constructional details, principle of operation and characteristics of different antennas arrays and apply this knowledge to design array antenna.
4. Demonstrate techniques of measuring different antenna parameters and can interpret the results.
5. Explain different modes of propagation, their characteristics and applications.

(A2413) DIGITAL COMMUNICATIONS

B.Tech (ECE): V - Semester

L	T	P	C
3	0	0	3

Course Objectives:

The objectives are:

- To attain the knowledge on different digital modulation techniques such as PCM, DM and various shift keying techniques.
- To give the student an understanding the concepts of different digital modulation techniques.
- To distinguish different error detecting and error correcting codes like block codes, cyclic codes and convolution codes
- To study the advantages of spread spectrum techniques and performance of spread spectrum, PN codes in jamming, noise etc.

Unit- I: Elements of Digital Communication Systems

Advantages of Digital Communication Systems, Bandwidth – S/N trade off, Hartley Shannon Law and Sampling Theorem.

Pulse Code Modulation: PCM Generation and Reconstruction, Quantization noise, Non uniform Quantization and Companding, DPCM, Adaptive DPCM, DM and Adaptive DM, Noise in PCM and DM.

Unit-II: Digital Modulation Techniques

Introduction, ASK Modulator, Coherent ASK Detector, Non – Coherent ASK Detector, FSK, Bandwidth and Frequency Spectrum FSK, Non coherent FSK Detector, Coherent FSK Detector, FSK Detection Using PLL,BPSK, Coherent PSK Detection, QPSK, Differential PSK.

Unit-III: Baseband Transmission and Optimal Reception of Digital Signal

Pulse shaping for optimum transmissions, A Baseband Signal Receiver, Probability of Error, Optimum Receiver, Optimal of Coherent Reception, Signal Space Representation and Probability of Error and eye diagrams for ASK, PSK, FSK, Cross talk.

Information Theory: Information and entropy, conditional entropy and redundancy, Shannon Fano coding, Mutual Information, Information loss due to noise, source coding– Huffman Code, variable length coding, Source coding to Increase average Information per bit, Lossy source coding.

Unit-IV: Error Control Codes

Linear Block Codes: Matrix description of Linear block Codes, Error detection and error Correction capabilities of linear block codes.

Cyclic Codes: Algebraic structure, encoding, syndrome calculation, Decoding.

Convolution Codes: Encoding, Decoding using State, tree and trellis diagrams, Decoding using Viterbi algorithm, Comparison of Error Rates in Coded and Uncoded Transmission.

Unit-V: Spread Spectrum Modulation

Use of spread Spectrum, Direct Sequence Spread Spectrum (DSSS), Code Division Multiple Access, Ranging using DSSS, Frequency Hopping Spread Spectrum, PN – Sequences: Generation and Characteristics, Synchronization in Spread Spectrum Systems.

Textbooks:

1. Principles of Communication Systems – Herbert Taub , Donald L Schilling, Goutam Saha, 3rd Edition, McGraw Hill Education, 2008.
2. Digital and Analog Communication Systems – Sam Shanmugam, John Wiley, 2005.
3. Digital Communications- John G. Proakis, Masoud Salehi- 5th Edition, McGraw Hill Education, 2008.

Reference books:

1. Digital Communications – Simon Haykin, Jon Wiley, 2005.
2. Digital Communications- Ian A. Glover, Peter M Grant, 2nd Edition, Pearson EDU, 2008.
3. Communications Systems – B.P. Lathi, BS Publications, 2006.
4. A First course in Digital Communications- Nguyen, Shewedyh, Cambridge.
5. Digital Communications- Theory, Techniques, and Applications- R. N. Mutagi - 2nd Edition, 2013.

Course Outcomes:

At the end of the course, the student will be able to:

1. Explain basic concepts of digital communication systems.
2. Design optimum receivers for digital modulation techniques.
3. Analyse the error performance of digital modulation techniques.
4. Describe different error detecting and correcting codes like block codes, cyclic codes and convolution codes.

5. Summarize the advantages of spread spectrum techniques and performance of spread spectrum, PN codes in jamming, noise etc.

(A2414) LINEAR & DIGITAL IC APPLICATIONS
(Common for ECE and EEE)

B.Tech (ECE): V - Semester

L	T	P	C
3	0	0	3

Course Objectives

- To introduce the basic building blocks of linear integrated circuits.
- To teach the linear and non-linear applications of Op amplifiers.
- To teach the theory & applications of analog multipliers & PLL.
- To teach the theory of ADC and DAC.
- To introduce the concepts of waveform generation and introduce some special function ICs.
- To understand and implement the working of basic digital circuits.

Unit-I: Operational Amplifier

Ideal and Practical Op-Amp, Op-Amp characteristics, DC and AC characteristics, Features of 741 Op-Amp, Modes of Operation- Inverting, Non-inverting, Differential, Instrumentation Amplifier, AC Amplifier, Differentiators and Integrators, Comparators, Schmitt trigger, Introduction to Voltage Regulators, Features of 723 Regulator, Three Terminal Voltage Regulators.

Unit-II: OP-AMP, IC 555 & IC 565 Applications

Introduction to Active Filters, Characteristics of Band Pass, Band Reject and All Pass Filters, Analysis of 1^{st} Order LPF & HPF Butterworth Filters, Waveform Generators- Triangular, Sawtooth, Square wave, IC 555 Timer-Functional Diagram, Monostable and Astable Operations, Applications, IC565 PLL- Block Schematic, Description of Individual Blocks, Applications.

Unit-III: Data Converters

Introduction, Basic DAC techniques, Different types of DACs-Weighted resistor DAC, R-2R ladder DAC, Inverted R-2R DAC, Different types of ADCs-Parallel Comparator Type ADC, Counter Type ADC, Successive Approximation ADC and Dual Slope ADC, DAC and ADC Specifications.

Unit-IV: Digital Integrated Circuits

Classification of Integrated Circuits, Comparison of Various Logic Families, CMOS Transmission Gate, IC interfacing-TTL driving CMOS & CMOS Driving TTL, Combinational Logic ICs- Specifications and Applications of TTL-74XX & CMOS 40XX Series ICs- Code Converters, Decoders, Demultiplexers, LED & LCD Decoders with Drivers, Encoders, Priority Encoders, Multiplexers, Demultiplexers, Priority Generators/Checkers, Parallel Binary Adders/Subtractor, Magnitude Comparators.

Unit-V: Sequential Logic ICs and Memories

Familiarity with Commonly Available 74XX & CMOS 40XX Series ICs - All Types of Flip-Flops, Synchronous Counters. Decade counters, Shift Registers.

Memories- ROM Architecture, Types of ROMs & Applications, RAM Architecture, Static & Dynamic RAMs.

Text Books

1. Op-Amps & Linear ICs - Ramakanth A. Gayakwad, PHI, 2003.
2. Linear Integrated Circuits -D. Roy Chowdhury, New Age International (p)Ltd, 2nd Ed., 2003.
3. Digital Fundamentals - Floyd and Jain, Pearson Education,8th Edition, 2005.

Reference Books

1. Op-Amps and Linear Integrated Circuits - Concepts and Applications - James M.Fiore, Cengage Learning/Jaico, 2009.
2. Operational Amplifiers and Liner Integrated Circuits by K.Lal Kishore - Pearson, 2009
3. Linear Integrated Circuits and Applications – Salivahana, TMH.
4. Modern Digital Electronics - RP Jain - 4/e - TMH, 2010.
5. Digital Design Principles and Practices – John F. Wakerly 3/e, 2005.
6. Operational Amplifiers with Liner Integrated Circuits, 4/e William D. Stanley, Pearson Education India, 2009.

Course Outcomes:

On completion of this course, the students will have:

1. Explain the basic characteristics of operational amplifiers.
2. List different families of digital integrated circuits and their characteristics.
3. Design simple circuits using operational amplifiers

(A2415) DIGITAL DESIGN USING VERILOG HDL

B. Tech. (ECE) V-Semester

L	T	P	C
4	0	0	4

Course Objectives:

This course teaches:

- Designing Digital Circuits, behavioural and RTL modelling of digital circuits using Verilog HDL, verifying these models, and synthesizing RTL models to standard cell libraries and FPGAs.
- Students gain practical experience by designing, modelling, implementing and verifying several digital circuits.
- This course aims to provide students with the understanding of the different technologies related to HDLs, construct, compile and execute Verilog HDL programs using provided software tools. Design digital components and circuits that are testable, reusable and synthesizable.

Unit I: Introduction to Verilog HDL

Verilog As HDL, Levels Of Design Description, Concurrency, Simulation and Synthesis, Function Verification, System Tasks, Programming Language Interface, Module, Simulation and Synthesis Tools.

Language Constructs and Conventions: Introduction, Keywords, Identifiers, White Space Characters, Comments, Numbers, Strings, Logic Values, Strengths, Data Types, Scalars and Vectors, Parameters, Operators.

Unit II: Gate Level Modelling

Introduction, AND Gate Primitive, Module Structure, Other Gate Primitives, Illustrative Examples, Tristate Gates, Array of Instances of Primitives, Design of Flip-Flops with Gate Primitives, Delays, Strengths and Construction Resolution, Net Types, Design of Basic Circuit.

Modelling at Dataflow Level: Introduction, Continuous Assignment Structure, Delays and Continuous Assignments, Assignment to Vectors, Operators.

Unit III: Behavioural Modelling

Introduction, Operation and Assignments, Functional Bifurcation. 'Initial' Construct, 'Always' Construct, Assignments With Delays, 'Wait' Construct, Multiple Always Block, Design at Behavioural Level, Blocking And Non-Blocking Assignments, The 'Case' Statement, Simulation Flow, 'If' and 'If-Else 'Constructs. 'Assign-De-Assign' Construct, 'Repeat' Construct, For

Loop, 'The Disable' Construct, 'While Loop', For Ever Loop, Parallel Blocks. 'Force-Release' Construct, Event.

Unit IV: Switch Level Modelling

Basic Transistor Switches, CMOS Switches, Bidirectional Gates, Time Delays with Switch Primitives, Instantiation with 'Strengths' and 'Delays'. Strength Contention with Trireg Nets.

System Tasks, Functions and Compiler Directives: Parameters, Path Delays, Module Parameters, System Tasks and Functions, File Based Tasks and Functions, Computer Directives, Hierarchical Access, User Defined Primitives.

Unit V: Sequential Circuit Description

Sequential Models-Feedback Model, Capacitive Model, Implicit Model, Basic Memory Components, Functional Register, Static Machine Coding, Sequential Synthesis.

Component Test and Verification: Test Bench-Combinational Circuit Testing, Sequential Circuit Testing, Test Bench Techniques, Design Verification, Assertion Verification.

Text Books:

1. Fundamentals of Digital Logic withVeilog Design - Stephen Brown, ZvonkocVranesic, TMH, 2nd Edition, 2010.
2. Verilog Digital System Design –ZainalabdienNavabi, TMH, 2nd Edition.

Reference Books:

1. Design through Verilog HDL -T R. Padmanabhan, B. Bala Tripura Sundari, Wiley, 2009.
2. Advanced Digital Logic Design Using Verilog, State Machine & Synthesis For FPGA- Sunggu Lee, Cengage Learning, 2012.
3. Verilog HDL-Samir Palnitkar,2nd Edition, Pearson Education, 2009.
4. Advanced Digital Design with The Verilog HDL- Michel D.Ciletti, PHI, 2009.

Course Outcomes:

By the end of this course, the students should be able to:

1. Describe Verilog Hardware Description Language (HDL).
2. Design Digital Circuits.
3. Write Behavioural models of digital circuits.
4. Write Register Transfer Level (RTL) models of digital circuits.

5. Verify Behavioural and RTL models.
6. Describe standard cell libraries and FPGAs.
7. Synthesize RTL models to standard cell libraries and FPGAs.
8. Implement RTL models on FPGAs and testing & verification.

(A2416) IC APPLICATIONS & HDL SIMULATION LAB

B. Tech. (ECE) V-Semester

L	T	P	C
0	0	3	2

Course Objectives:

The main objectives of the course are:

- To describe the basic building blocks of linear integrated circuits.
- To identify the linear and non-linear applications of operational amplifiers.
- To interpret and summarize the theory and applications of analog multipliers and PLL.
- To distinguish the applications of ADC and DAC.
- To describe the concepts of waveform generation and list some special function ICs.
- To identify and summarize the working of basic digital circuits

Note: Minimum of 12 experiments have to be conducted (Six from each part):

List of Experiments:

Part-1: Verify the following functions.

1. Adder, Subtractor & Comparator operation using IC 741 Op-Amp.
2. Integrator and Differentiator using IC741 Op-Amp.
3. Active Low Pass & High Pass Butterworth (second Order)
4. RC Phase Shift and Wein Bridge Oscillators using IC 741 OP-Amp.
5. IC 555 timer in Monostable operation.
6. Voltage regulators IC 723, three terminal voltage regulators -7805, 7809, 7912.
7. 3-8 decoder – 74LS138
8. 4 bit comparator 74LS85.
9. D Flip-Flop (74LS74) and JK Master –Slave Flip-Flop (74LS73).
10. Universal Shift registers-74LS194/195.

Part-2: Simulate the following functionalities using HDL.

1. HDL code to simulate basic gates
2. Full adder using 3 modelling Styles
3. Design of 4 bit Binary to Gray&Gray to Binary Converter
4. Design of 3x8 Decoder and 8x3 Encoder

5. Design of 8x1 Mux using 4x1 Mux and 8x1 Demux
6. Design of SR & D Flip flop
7. Design of JK & T Flip flop
8. Decade counter &Updown counter
9. Universal Shift register
10. Binary Multiplier

Course Outcomes:

On completion of this course, the students will be able to:

1. Explain the working of operational amplifiers with linear integrated circuits.
2. Interpret the working of the different families of digital integrated circuits and their characteristics.
3. Design circuits using operational amplifiers for various applications

(A2417) MICROPROCESSORS & MICROCONTROLLERS LAB
(Common for ECE and EEE)

B. Tech. (ECE) V-Semester

L	T	P	C
0	0	3	2

Course Objective:

The Course Objectives are:

- To develop an in-depth understanding of the operation of Microprocessors and Microcontrollers, Machine language programming & Interfacing techniques.

Note: Minimum of 12 experiments are to be conducted.

List of Experiments

The following programs /experiments are to be executed in Microsoft assembler and also in 8086 and 8051 kits.

List of Experiments:

1. Program for 16 bit arithmetic operations for 8086 (using Various Addressing Modes).
2. Program for sorting an array for 8086.
3. Program for searching a number or character in a string for 8086.
4. Program for string manipulations in 8086.
5. Program for digital clock design using 8086.
6. Interfacing ADC and DAC to 8086
7. Parallel communication between two microprocessors using 8255.
8. Serial communication between two microprocessors using 8251.
9. Interfacing to 8086 and Programming to control stepper motor.
10. Program using arithmetic, logical and bit manipulation instructions of 8051.
11. Program and verify Timer/Counter in 8051.
12. Program and verify interrupt handling in 8051.
13. UART Operation in 8051.
14. *Communication between 8051 kit and PC.*
15. Interfacing LCD to 8051.
16. Interfacing matrix/keyboard to 8051.
17. Data transfer from Peripheral to memory through DMA controller 8237/8257.

Course Outcomes:

Upon completion of this course, the students will be able to

1. Describe about the internal organization of popular 8086 Microprocessor and 8051 Microcontroller.
2. Analyse hardware and software interaction and integration.
3. Design Microprocessor / Microcontrollers based systems

(A2418) ANALOG COMMUNICATIONS LAB

B. Tech. (ECE) V-Semester

L	T	P	C
0	0	3	2

Course Objective:
The Course Objectives are:

- To develop an in-depth understanding of the operation of modulation and demodulation techniques, AM&FM transmitters and receivers.
- To teach the detail concept of spectrum analyzer.

Note: Minimum of 12 Experiments should be conducted

1. Amplitude modulation and demodulation
2. Balanced modulator
3. SSB-SC Modulator and Detector (Phase Shift Method)
4. Frequency modulation and demodulation
5. Study of spectrum analyzer and analysis of AM and FM Signals
6. Pre-emphasis and De-emphasis
7. Time Division Multiplexing & De multiplexing
8. Frequency Division Multiplexing
9. Sampling Theorem – verification
10. Pulse Amplitude Modulation and demodulation
11. Pulse Width Modulation and demodulation
12. Pulse Position Modulation& Demodulation
13. Phase locked loop
14. AGC Characteristics

Equipment required

1. RPS - 0-30V
2. CRO - 0-20 M Hz
3. Function Generators - 0-1M Hz
4. RF generators - 0-1000 M Hz/0-100M Hz
5. Multimeters
6. Lab Experimental kits
7. Spectrum Analyser -60 M Hz

Course Outcomes:
On Completion of the course, students will be able to

1. Explain the concepts of various modulation and demodulation methods in practice.
2. Design and test AM & FM transmitter for designed frequency.
3. Demonstrate the study of spectrum analyzer.
4. Conduct experiments on various pulse modulation techniques.
5. Design and test AM & FM receivers.

(A2005) ANALYTICAL SKILLS-I

L	T	P	C
2	0	0	0

B. Tech. (ECE) V-Semester

Course Objectives:

1. Preparing for Competitive exams with Quantitative Aptitude
2. Different short cut methods are introduced for problem solving.
3. Holistic approach is introduced for critical skills.
4. To enhance analytical skills

Quantitative Aptitude

- Number System
- LCM and HCF
- Averages
- Simple Equations
- Ratios & Proportions
- Partnerships
- Percentages
- Profit & Loss
- Time & Work
- Time & Distance
- Simple and compound interest
- Permutations & Combinations
- Probability

Reference books:

1. Quantative Aptitude by R.S. Agarwal.

Course Outcomes:

On Completion of the course, students will be able to

1. Perform well in the competitive examinations.
2. Master different quantitative methods.
3. Develop holistic skills and right critical skills.
4. Develop analytical skills for problem solving

VI SEMESTER

(A2419) DIGITAL SIGNAL PROCESSING
(Common for ECE and EEE)

L	T	P	C
3	1	0	3

B. Tech. (ECE) VI-Semester

Course Objectives:
This course is an essential course that provides design techniques for processing all type of signals in various fields. The main objectives are:

- To provide background and fundamental material for the analysis and processing of digital signals.
- To familiarize the relationships between continuous – time and discrete – time signals and systems.
- To study fundamentals of time, frequency and Z – plane analysis and to discuss the inter - relationships of these analytic method.
- To study the designs and structures of digital (IIR and FIR) filters from analysis to synthesis for a given specifications.
- The impetus is to introduce a few real – world signal processing applications.
- To acquaint in FFT algorithms, Multi – rate signal processing techniques and finite world length effects.

Unit- I: Introduction: Introduction to Digital Signal Processing
Discrete time signals & sequences, linear shift invariant systems, stability and causality, linear constant coefficient difference equations, Frequency domain representation of discrete time signals and systems.
Realization of Digital Filters: Applications of Z-transforms, solution of difference equations of digital filters, System function, Stability criterion, Frequency response of stable systems, Realization of digital filters – Direct, Canonic, Cascade and Parallel forms.

Unit –II: Discrete Fourier Series
DFS representation of periodic Sequences, Properties of Discrete Fourier Series, Discrete Fourier Transforms: Properties of DFT, linear convolution of sequences using DFT, Computation of DFT: Over – lap Add method, over – lap Save method, Relation between DTFT, DFS, DFT and Z-Transform.
Fast Fourier Transforms: Fast Fourier Transforms (FFT) - Radix-2 decimation-in-time and decimation – in-frequency FFT Algorithms, Inverse FFT, and FFT with general Radix-N.

Unit- III: IIR Digital Filters

Analog filer approximations- Butterworth and Chebyshev, Design of IIR Digital filters from analog filters, Step and Impulse invariant techniques, bilinear transformation method, spectral transformations.

Unit- IV: FIR Digital Filters

Characteristics of FIR Digital Filters, Frequency response, Design of FIR Filters: Fourier Method, Digital Filters using Window techniques, Frequency Sampling technique, Comparison of IIR & FIR filters.

Unit- V:Multi Rate Digital Signal Processing

Introduction, down sampling, Decimation, Up sampling, interpolation, sampling rate conversion.

Finite word Length effects: Limit Cycles, Overflow oscillations, round-off noise in IIR digital filters, Computational output round off Noise, Methods to prevent overflow, Tradeoff between Round off and overflow noise, Dead band effects.

Text Books:

1. Digital Signal Processing, Principles, Algorithms, and Applications, John G. Proakis, Dimitris G. Manolakis, Pearson Education /PHI, 2007.
2. Discrete Time Signal Processing - A.V. Oppenheim and R.W.Schaffer, PHI, 2009.
3. Fundamental of Digital Signal Processing- Loney Ludeman, John Wiley, 2009.

References:

1. Digital Signal Processing – Fundamentals and Applications – Li Tan, Elsevier, 2008.
2. Fundamentals of Digital Signal Processing Using MATLAB – Robert J.Schilling, Sandra L.Harris, Thomson, 2007.
3. Digital Signal Processing - S. Salivahanan, A.Vallavaraj and C. Gnanapriya, TMH, 2009.
4. Discrete Systems and Digital Signal Processing with MATLAB – TaanS. EIAli, CRC press, 2009.
5. Digital Signal Processing – A practical approach, Emmanuel C.I. feachor and Barrie W.Jervis, 2nd Edition Pearson Education, 2009.
6. Digital Signal Processing - Nagoorkani, TMG, 2012.

Course Outcomes:

On completion of this subject, the students should be able to:

1. Perform Time, Frequency and Z- transform analysis on signals and systems.
2. Compare the inter – relationship between DFT and various transforms.
3. Explain the significance of various filter structures and effects of round off errors.
4. Design a digital filter for a given specification.
5. Explain the fast computation of DFT and appreciate the FFT processing.
6. Compare the tradeoffs between normal and multi rate DSP techniques and finite length word effects.

(A2420) MICROWAVE ENGINEERING

B. Tech. (ECE) VI-Semester

L	T	P	C
3	0	0	3

Course Objectives:

The objectives of the course are

- To develop knowledge on various applications of Microwave frequencies and difficulties in handling the signals at Microwave frequencies.
- To enable the students to understand and analyse various transmission lines used at Microwave frequencies.
- To enable the students to understand and analyse construction and operation of Microwave Tubes.
- To understand Scattering matrix parameters and their application to Microwave components.
- To enable the students to understand construction and operation of Microwave solid state devices.
- To introduce the student the microwave test bench for measurement of different important parameters.

Unit- I

Microwave Transmission Lines

Introduction to Microwaves, Microwave Spectrum and Bands, Applications of Microwaves, Types of Microwave Transmission lines.

Rectangular Waveguides- Solution of Wave Equations in Rectangular Coordinates, TE and TM mode analysis, Expressions for Fields, Cut-off Frequencies, Dominant and Degenerate Modes, - Phase and Group Velocities, Wavelengths and Impedance Relations, Power Losses and Maximum Power transmission, Impossibility of TEM Mode.

Micro Strip Lines- Introduction, Z_o Relations, Effective Dielectric Constant, Losses and Q factor.

Rectangular Waveguide Cavity Resonators-Introduction, Wave equations, Dominant Mode and Resonant Frequency, Q-factor and Illustrative Problems.

Unit- II

Waveguide Components and Applications: Coupling Mechanisms - Probe, Loop, - Waveguide Windows, Tuning Screws and Posts, Matched Loads. Waveguide Attenuators -Different Types, Resistive Card

and Rotary Vane Attenuators; Waveguide Phase Shifters - Types, Dielectric and Rotary Vane Phase Shifters, Waveguide Multiport Junctions –'E' plane and 'H' plane Tees, Magic Tee. Directional Couplers-2Hole, Bethe Hole types. Illustrative Problems.

Ferrites- Composition and Characteristics, Faraday rotation; Ferrite Components- Gyrator, Isolator, Circulator.

Scattering Matrix- Significance, S Matrix Properties, Calculation of S Matrix for- Gyrator, Isolator, E plane Tee and H plane Tee, Magic Tee, Circulator.

Unit- III

Microwave Tubes: Limitations and Losses of conventional tubes at microwave frequencies, Classification of O-type and M type Microwave tubes.

2-Cavity Klystrons- Structure, Re-entrant Cavities, Velocity Modulation Process, Applegate Diagram, Bunching Process and Small Signal Theory-Expressions for Output Power, efficiency and illustrated problems.

Reflex Klystrons-Structure, Velocity Modulation and Applegate Diagram, Mathematical Theory of Bunching, Power Output, Efficiency, Oscillating Modes and output Characteristics, Effect of Repeller Voltage on Power output. Illustrative Problems.

Unit- IV

Helix TWTS: Significance, Types and Characteristics of Slow Wave Structures; Structure of TWT and Amplification Process (qualitative treatment), Suppression of Oscillations, Gain Considerations, Applications.

M-Type Tubes: Introduction, Cross-field effects, Magnetrons-Different Types, Cylindrical Travelling Wave Magnetron -Hull Cut-off and Hartree Conditions, Modes of Resonance and π Mode Operation, Separation of π - Mode, Frequency Pulling, Frequency pushing, output characteristics. Illustrative Problems.

UNIT-V:

Microwave Solid State Devices: Introduction, Classification, Applications. TEDs-Introduction, Gunn Diodes-Principle, RWH Theory, Characteristics, Basic Modes of Operation - Gunn Oscillation Modes, LSA Mode, Introduction to Avalanche Transit Time Devices.

Microwave Measurements: Description of Microwave Bench-Different Blocks and their Features, Errors and Precautions; Microwave Power Measurement - Bolometers. Measurement of Attenuation, Frequency and Standing Wave Measurements- Measurement of Low and High VSWR, Cavity Q and Impedance Measurements.

Text Books:

1. Microwave Devices and Circuits- Samuel Y. Liao, Pearson, 3rd Edition, 2003.
2. Microwave Engineering- Dr. M. Sudhakar, Vandana Khare, S Chand Publications,1st Edition, 2016

Reference Books:

1. Foundations for Microwave Engineering – R.E. Collin, IEEE Press, John Wiley, 2nd Edition, 2002.
2. Microwave Principles - Herbert J. Reich, J.G. Skalnik, PF. Ordung and H.L.Krauss, CBS Publishers and Distributors, New Delhi, 2004.
3. Microwave Circuits and Passive Devices – M.L. Sisodia and G.S. Raghuvanshi, Wiley Eastern Ltd., New Age International Publishers Ltd., 1995.
4. Microwave Engineering Passive Circuits – Peter A. Rizzi, PHI, 1999.
5. Electronic and Radio Engineering – F.E. Terman, McGraw-Hill, 4th ed., 1955.
6. Micro Wave and Radar Engineering – M. Kulkarni, Umesh Publications, 1998

Course Outcomes:

On completion of the course, students will be able to

1. Explain the applications and technical difficulties involved in using microwave frequencies.
2. Analyze functioning of wave guide transmission lines, different modes of propagation, and parameters of transmission lines.
3. Describe the use and operation of various wave guide accessories
4. Analyze mathematically various microwave junctions using S-parameters.
5. Explain the functioning, usage and limitations of various microwave tubes and solid state devices.
6. Describe the methodology of measurement of important microwave parameters.

(A2421) VLSI DESIGN
(Common for ECE and EEE)

B. Tech. (ECE) VI-Semester

L	T	P	C
3	0	0	3

Course objective

The objective of the course is to

- Give exposure to different steps involved in the fabrication of ICs using MOS CMOS/BICMOS transistors and passive components.
- Explain electrical properties of MOS and BICMOS devices to analyse the behaviour of inverters designed with various loads.
- Define the concept to design different types of logic gates using CMOS inverter and analyse their transfer characteristics.
- Illustrate the concepts to design building blocks of data path of any system using gates.
- Describe basic programmable logic devices and testing of CMOS circuits.

Unit- I:

Introduction: Review of Semiconductors, Introduction to IC Technology, PMOS, NMOS, CMOS &BiCMOS technologies, Steps involved in Fabrication Process.

Basic Electrical Properties: Basic Electrical Properties of MOS and Bi CMOS Circuits: Ids-Vds relationships, MOS transistor threshold Voltage, Trans-conductance, figure of merit, NMOS Inverter, Various pull ups, CMOS Inverter analysis and design, Bi-CMOS Inverters.

Unit- II:

VLSI Circuit Design Processes :VLSI Design Flow, Design Constraints, MOS Layers, Stick Diagrams, Design Rules and Layout, 2 um CMOS Design rules for wires, Contacts and Transistors Layout Diagrams for NMOS and CMOS Inverters and Gates, Scaling of MOS circuits, Limitations of Scaling, CAD tools

Unit- III:

Gate Level Design: Logic Gates and Other complex gates, Switch logic, Alternate gate circuits, Basic circuit concepts, Concept of Sheet Resistance and Area Capacitance, Delays, Driving large Capacitive Loads, Wiring Capacitances, Fan-in and fan-out, Choice of layers.

Unit- IV:

System Level Design Considerations: ALU unit, Multipliers, Parity generators, Comparators, Zero/One Detectors, Counters, High Density Memory Elements. SRAM, DRAM, ROM, Serial access memories, Content Addressable Memory.

Unit- V:

Programmable logic Devices: PLD's, CPLD's, FPGAs, Standard Cells, sea of gates, Design Approach, Parameters influencing low power design.

CMOS Testing: Need and importance of testing, CMOS Testing, Test Principles, Design Strategies for test, Chip level Test Techniques.

Textbooks:

1. Essentials of VLSI circuits and systems – Kamran Eshraghian, Eshraghian Dougles and A. Pucknell, PHI, Edition.
2. CMOS VLSI Design – A Circuits and Systems Perspective, Neil. H.E. Westea, David Harris, Ayan Banerjee, 3rd Ed, Pearson Education, 2009.

References:

1. Introduction to VLSI Systems: A Logic, Circuit and System Perspective - Ming-BO Lin, CRC Press, 2011
2. VLSI Technology SM SZE.
3. CMOS logic circuit Design - John .P. Uyemura, Springer, 2007.
4. Modern VLSI Design - Wayne Wolf, Pearson Education, 3rd Edition, 1997.
5. VLSI Design- K. Lal Kishore, V. S. V. Prabhakar, I.K International, 2009.
6. Introduction to VLSI - Mead & Convey, BS Publications, 2010.

Course Outcomes:

Upon successfully completing the course, the student should be able to:

1. Acquire qualitative knowledge about the fabrication process of integrated circuits using MOS transistors.
2. Choose an appropriate inverter required for a circuit based on its specifications.
3. Design the layout of any logic circuit which helps to understand and estimate parasitic of any logic circuit
4. Compare the performance of different types of logic gates using CMOS inverter and analyze their transfer characteristics.
5. Explain the concepts required to design building blocks of data path using gates.

6. Employ the design simple memories using MOS transistors and can interpret the design of large memories.
7. Design simple logic circuits using PLA, PAL, FPGA and CPLD
8. Identify different types of faults that can occur in a system and define the concept of testing and adding extra hardware to improve testability of system.

(A2422) ELECTRONIC MEASUREMENTS & INSTRUMENTATION

L	T	P	C
3	0	0	3

B. Tech. (ECE) VI-Semester

Course Objectives:
This course provides:

- An introduction to measurement techniques and instrumentation design and operation.
- The basic concept of units, Measurement error and Accuracy, the construction and design of measuring devices and circuits, measuring instruments and their proper applications.
- To use different measuring techniques and the measurement of different physical parameters using different transducers.

Unit- I: Block Schematic of Measuring Systems
Performance characteristics, Static characteristics, Accuracy, Resolution, Precision, Types of Errors, Gaussian Error, Root Sum Squares formula, Dynamic Characteristics, Repeatability, Reproducibility, Fidelity, Lag; Measuring Instruments: DC Volt meters, D'Arsonval Movement, DC Current Meters, AC voltmeters and Current Meters, Ohmmeters, Multi meters, Meter Protection, Extension of Range, True RMS Responding Voltmeters, Specifications of Instruments.

Unit –II: Signal Analysers
AF, HF Wave Analysers, Harmonic Distortion, Heterodyne Wave Analysers, Spectrum Analysers, Power Analysers, Capacitance-Voltage Meters, Oscillators. Signal Generator-
AF and RF signal generators, Sweep frequency Generators, pulse and Square wave Generators, Function Generators, Arbitrary waveform Generator, Video signal Generators, Specifications

Unit- III: Oscilloscopes
CRT, Block Schematic of CRO, Time base circuits, Lissajous Figures, CRO Probes, High Frequency CRO Considerations, Delay Lines, Applications: Measurement of time, Period and Frequency specifications.
Special Purpose oscilloscopes: Dual trace, Dual Beam CROs, sampling oscilloscopes, storage oscilloscopes, digital storage CROs.

Unit- IV: Transducers

Classification, Strain gauges, Bounded, Un bounded; force and displacement transducers, Resistance Thermometers ,hotwire anemometers, LVDT, Thermocouples, Synchros, Special Resistance Thermometers ,Digital temperature sensing system. Piezo Electric transducers, variable capacitance transducers, Magneto Strictive Transducers.

Unit- V: Bridges

Wheat stone bridge, Kelvin Bridge and Maxwell's bridge

Measurement of Physical Parameters: Flow Measurement, displacement meters, Liquid level Measurements , Measurement of Humidity and Moisture, Velocity, Force, Pressure – High Pressure , Vacuum level , Temperature – Measurements, Data Acquisition Systems.

Text Books:

1. Electronic instrumentation, second edition - H.S.Kalsi, Tata McGraw Hill, 2004.
2. Modern Electronic Instrumentation and Measurement Techniques – A.D. Helfrick and W.D. Cooper, PHI, 5th Edition, 2003

References:

1. Electronic Instrumentation & Measurements - David A. Bell, Oxford Univ. Press, 1997.
2. Electronic Measurements And Instrumentation: B.M.Oliver, J.M.cage TMH reprint 2009.
3. Measurement Systems - Emest O. Doebelin and Dhanesh N Manik, 6th Ed., TMH.
4. Electronic Measurements & Instrumentations by K. Lal Kishore, Pearson Education – 2010.
5. Industrial Instrumentation: T.R.Padmanabham Springer 2009.
6. A Course in Electrical and Electronics Measurement and Instrumentation, A. K. Sawhney,Edition 10, DhanpatRai Publications 1994

Course Outcomes:

Upon a successful completion of this course, the student will be able to:

1. Describe the fundamental concepts and operations of various instruments required in measurements.
2. Distinguish the functioning, specification, and applications of signal analysing instruments.

3. Describe the principle of operation, working of different electronic instruments like Digital multi meter, CROs and DSOs.
4. Discuss about different types of transducers and physical parameters measurement.

(A2423) DIGITAL IMAGE PROCESSING
(Professional Elective-I)

L	T	P	C
4	0	0	4

B. Tech. (ECE) VI-Semester

Course objectives:
The objectives of the course are:

- Provide the student with the fundamentals of digital image processing.
- Give the students a taste of the applications of the theories taught in the subject. This will be achieved through the project and some selected lab sessions.
- Introduce the students to some advanced topics in digital image processing.
- Give the students a useful skill base that would allow them to carry out further study should they be interested and to work in the field.

Unit- I: Digital Image Fundamentals
Digital Image fundamentals, Components of Digital Image Processing, Sampling and Quantization, Relationship between pixels.
Image Transforms: 2-D FFT, Properties, Walsh transform, Hadamard Transform, Discrete Cosine Transform, Haar Transform, Slant Transform and Hoteling Transform.

Unit-II: Image Enhancement (Spatial Domain)
Introduction, Image Enhancement in Spatial domain, Enhancement through point operation, Types of point operation, Histogram manipulation, Linear and nonlinear gray level Transformation, Local or neighbourhood operation, Median filter, Spatial domain High-pass filtering.
Image Enhancement (Frequency Domain)
Filtering in Frequency domain, obtaining frequency domain filters from spatial filters, Generating filters directly in the frequency domain, Low pass (Smoothing) and High pass (Sharpening) filters in frequency domain.

Unit- III: Image Restoration
Degradation model, Algebraic approach to restoration, Inverse filtering, least mean square filters, Constrained Least Squares Restoration, Interactive Restoration.

Unit- IV: Image Segmentation

Detection of discontinuities, Edge linking and boundary detection, Thresholding, Region oriented segmentation.

Morphological Image Processing: Dilation and Erosion; Dilation, Structuring Element Decomposition, Erosion, Combining Dilation and Erosion, Opening and Closing, The Hit or Miss Transformation.

Unit- V: Image Compression

Redundancies and their removal methods, Fidelity criteria, Image compression models, Huffman and Arithmetic Coding, Error free compression, Lossy compression, Lossy and Lossless Predictive Coding, Transform based Compression, JPEG 2000 Standards.

Text Books:

1. Digital Image Processing – Rafael C. Gonzalez, Rechard E. Woods, 3rd edition. Pearson, 2008
2. Digital Image Processing – S. Jayaraman, S Esakkirajan, T Veerakumar- TMH, 2010

Reference Books:

1. Digital Image Processing using MATLAB – Rafael C. Gonzalez, Richard E woods and Steven L. Eddings, 2nd Edition, TMH, 2010.
2. Fundamentals of Digital Image Processing – A. K. Jain, PHI, 1989.
3. Digital Image processing and Computer vision – Somka, Hlavac, Boyle Cengage learning (Indian edition) 2008.
4. Introductory Computer vision Imaging Techniques and Solutions – Adrian low, 2008, 2nd Edition.
5. Introduction to Image Processing & Analysis – John C. Russ, J. Christian Russ, CRC press, 2010.

Course outcomes:

Upon successful completion of the course, the students will be able to:

1. Describe the fundamentals of digital image pixel relations, image transforms.
2. Distinguish between spatial domain enhancement and frequency domain enhancement.
3. Analyze the image restoration and segmentation methods.
4. Discriminate between lossless and lossy compression techniques.

(A2511) COMPUTER NETWORKS
(Professional Elective-I)

B. Tech. (ECE) VI-Semester

L	T	P	C
4	0	0	4

Objectives:

- To introduce the fundamental various of computer networks.
- To determine the TCP/IP and OSI models with merits and demerits.
- To explore the various layers of OSI Model
- To introduce UDP and TCP Models.

Unit I:

Introduction: Protocol, Networks, Layering Scenario, TCP/IP Protocol, Protocol Suite: The OSI Model, Internet History Standards and administration; Comparison of the OSI and TCP/IP Reference Model.

Physical Layer: Data Transmission- Guided Transmission media, Wireless Transmission media.

Data Link Layer: Design Issues, CRC Codes, Elementary Data Link Layer Protocols, Sliding Window Protocol.

Unit II:

Multiple Access Protocols: ALOHA, CSMA, Collision free protocols, Ethernet- Physical Layer, Ethernet Mac Sub layer, Data Link layer switching & use of bridges, learning bridges, spanning tree bridges, repeaters, hubs, switches, routers and gateways.

Unit III:

Network Layer: Design Issues, Store and Forward Packet Switching, Connection less and Connection Oriented networks, Routing Algorithms- Optimality principle, Shortest Path, Flooding, Distance Vector routing, Count to Infinity Problem, Hierarchical routing, Congestion Control Algorithms, Admission control.

Unit IV:

Internetworking: Tunneling, Internet Routing, Packet fragmentation, IPV4, IPV6 Protocol, IP Addresses, CIDR, IMCP, ARP, RARP, DHCP.

Transport Layer: Services provided to the upper layers elements of transport protocol-addressing connection establishment, Connection release, Crash Recovery.

Unti V:

The Internet Transport Protocols: Introduction to TCP, The TCP Service Model, The TCP Segment Header, The connection Establishment, The TCP Connection Release, The TCP Connection Management Modeling, The TCP sliding window, The TCP Congestion control, The future of TCP.

Application Layer: Introduction, providing services, Application Layer Paradigms, Client Server Model, Standard Client Server application-HTTP, FTP, Electronic mail, TELNET, DNS, SSH.

Text Books:

1. Computer Networks — Andrew S Tanenbaum, 4th Edition. Pearson Education/PHI
2. William Stallings, Data and Computer Communication, 8th Edition, Pearson Education, Asia-2004.

References:

1 Data Communications and Networking – Behrouz A. Forouzan.Third Edition TMH.

Outcomes:

On completion of the course students will be able to

1. Explain the basic terminology in networking and compare the OSI and TCP/IP reference models.
2. Analyze the error-detection and correction methods in data link layer
3. Apply the routing algorithms to find shortest paths for network-layer packet delivery.
1. Implement the Connection-Oriented and Connection-Less services in Transport Layer.
2. Implement the application layer protocols like http, ftp, telnet and ssh .

(A2424)TELECOMMUNICATION SWITCHING SYSTEMS & NETWORKS
(Professional Elective-I)

B. Tech. (ECE) VI-Semester

L	T	P	C
4	0	0	4

Course objectives:

The following are the course objectives:

- To study fundamentals of Switching, Signalling and traffic in the context of telecommunication network.
- To expose through the evolution of switching systems from manual and electromechanical systems to stored-program-controlled digital systems.
- To study signalling, packet switching and networks.

Unit- I

Switching System: Evolution Of Telecommunications ; Basics of A Switching Systems; Functions of A Switching Systems; Crossbar Switching- Principle of Crossbar Switching; Crossbar Switching Configurations; Cross-Point Technology; Crossbar Exchange Organization; a General Trunking; Electronic Switching; Digital Switching Systems.

Telecommunications Traffic: Introduction; The UNIT Of Traffic; Congestion; Traffic Measurement; A Mathematical Model; Lost-Call Systems- Theory; Traffic Performance; Loss Systems In Tandem; Use Of Traffic Tables; Queuing Systems- The Second Erlang Distribution; Probability Of Delay; Finite Queue Capacity; Some Other Useful Results; Systems With A Single Server; Queue In Tandem; Delay Tables; Applications Of Delay Formulae.

Unit- II

Switching Networks: Single Stage Networks; Gradings- Principle; Two Stage Networks; Three Stage Networks; Four Stage Networks.

Time Division Switching: Basic Time Division Space Switching; Basic Time Division Time Switching; Time Multiplexed Space Switching; Time Multiplexed Time Switching; Combination Switching; Three Stage Combination Switching.

Control of Switching Systems: Call Processing Functions- Sequence Of Operations; Signal Exchanges; State Transition Diagrams; Common Control; Reliability; Availability And Security; Stored Program Control.

Unit - III

Signalling: Introduction; Customer Line Signalling; Audio Frequency Junctions And Trunk Circuits; FDM Carrier Systems-Out band Signalling; In band (VF) Signalling; PCM Signalling; Inter Register Signalling; Common Channel Signalling Principles-General Signalling Networks; CCITT Signalling Systems Number 6; CCITT Signalling System Number 7; The High Level Data Link Control Protocol; Signal UNITs; The Signalling Information Field.

Unit- IV

Packet Switching: Introduction; Statistical Multiplexing; Local Area And Wide Area Networks-Bus Networks; Ring Networks; Compression of Bus And Ring Networks; Optical Fiber Networks; Large Scale Networks-General; Datagrams And Virtual Circuits; Routing; Flow Control; Standards; Frame Relay; Broadband Networks-General; The Asynchronous Transfer Mode; ATM Switches.

Unit- V

Networks: Introduction; Analog Networks; Integrated Digital Networks; Integrated Services Digital Networks; Cellular Radio Networks; Intelligent Networks; Private Networks; Charging; Routing-General, Automatic Alternative Routing.

Text Books:

1. "Telecommunications Switching and Traffic Networks" ,J.E Flood, Pearson Education, 2006.
2. "Telecommunications Switching Systems and Networks", Tyagarajan Viswanathan, Prentice Hall of India Pvt. Ltd., 2006.

Reference Books:

1. John C Bellamy, "Digital Telephony", John-Wiley International student Edition,3rd Edition, 2000.
2. Behrouz A. Forouzan, "Data Communications and Networking", TMH, 2nd Edition, 2002.
3. Tomasi, "Introduction to Data Communications and Networking", Pearson Education, 1st Edition, 2007.

Course outcomes:
On completion of this course, it is expected that the student will be able to:

1. Explain the main concepts of telecommunication network design.
2. Analyse and evaluate fundamental telecommunication traffic models.
3. Analyse the basic modem signalling system.
4. Solve traditional interconnection switching system design problems.
5. Explain the concept of packet switching.

(A2425) CELLULAR & MOBILE COMMUNICATIONS
(Professional Elective – II)

L	T	P	C
4	0	0	4

B. Tech. (ECE) VI-Semester

Course Objective:
The Course Objectives are:

- To provide the students with an understanding of Cellular concepts, frequency reuse, hand-off strategies.
- To enable the students to analyse and understand wireless and mobile cellular communication systems over a stochastic fading channel.
- To provide the student with and understanding of co-channel and non-co-channel interference.
- To give the student an understanding of cell coverage for signal and traffic, diversity techniques and mobile antennas.
- To give the student an understanding of frequency management, channel assignment and types of hand-off.

Unit - I:
Introduction to Cellular Mobile Radio Systems: Limitations of conventional telephone systems, Basic cellular mobile systems, first, second, third and fourth generation cellular wireless systems, Uniqueness of mobile radio environment- Fading-Time dispersion parameters, coherence bandwidth, Doppler spread and coherence time.
Fundamentals of Cellular Radio System Design: Concept of Frequency Reuse, Co- Channel Interference, Co-Channel Interference Reduction Factor, Desired C/ I from a Normal Case in an Omni Directional Antenna System, System Capacity, Trunking and Grade of Service, Improving Coverage and Capacity in Cellular Systems – Cell Splitting, Sectoring, Microcell Zone Concept.

Unit - II: Co–Channel Interference: Measurement of real time Co–Channel Interference, Design of Antenna System, Antenna Parameters and their Effects, Diversity Techniques–Space Diversity, Polarization Diversity, Frequency Diversity and Time Diversity.
Non–Co–Channel Interference: Adjacent Channel Interference, near end far end interference, Cross talk, Effects on coverage and interference by power decrease, Antenna height decrease, Effects of cell site components.

Unit - III:

Cell Coverage for Signal and Traffic: Signal reflection in flat and hilly terrain, Effect of human made structures, Phase difference between direct and reflected paths. Constant standard deviation, Straight line path loss slope, General formula for mobile propagation over water and flat open area, Near and long distance propagation, Path loss from a point to point prediction model in different conditions merits of Lee model.

Cell Site and Mobile Antennas: Space diversity antennas, Umbrella pattern antennas, and Minimum separation of cell site antennas, mobile antennas.

Unit - IV:

Frequency Management and Channel Assignment: Numbering and grouping, Set up access and paging channels, Channel assignments to cell sites and mobile UNITs, Channel sharing and borrowing, Sectorization, Overlaid cells, channel assignment.

Unit - V:

Handoffs and Dropped Calls: Handoff initiation, Types of handoff, Delaying handoff, Advantages of handoff, Power difference handoff, Forced handoff, Mobile assisted and soft handoff, Intersystem handoff, Introduction to dropped call rates and their evaluation.

Text Books:

1. Mobile Cellular Telecommunications – W. C. Y. Lee, McGraw Hill, 2nd Edn. 1989.
2. Wireless Communications – Theodore, S. Rapport, Pearson education. 2nd edn.. 2002.
3. Mobile Cellular Communication – Gottapu Sashi Bhushana Rao, Pearson, 2012.

Reference Books:

1. Principles of Mobile Communications – Gordon L. Stuber, Springer International, 2nd edn... 2001.
2. Modern Wireless Communications – Simon Haykin, Michael Mohar, Perason Education, 2005.
3. Wireless Communications Theory and Techniques – Asrar U. H. Sheikh, Springer, 2004.
4. Wireless Communications and Networking, Vijay Garg, Elsevier Publications, 2007.
5. Wireless Communications – Andrea Goldsmith, Cambridge University Press, 2005.

Course Outcomes:
On Completion of the course, students will be able to

1. Illustrate impairments due to multi path fading channel.
2. Interpret the fundamental techniques to overcome the different fading effects.
3. State co-channel, non-co-channel interferences.
4. Demonstrate the cell coverage for signal and traffic, diversity techniques and mobile antennas.
5. Distinguish the frequency management, channel assignment and types of handoff.

(A2433) SATELLITE COMMUNICATIONS
(Professional Elective-II)

L	T	P	C
4	0	0	4

B. Tech. (ECE) VI-Semester

Course Objectives:
The course objectives are:

- To prepare students to excel in basic knowledge of satellite communication principles.
- To provide students with solid foundation in orbital mechanics and launches for the satellite communication.
- To train the students with a basic knowledge of link design of satellite with a design examples.
- To provide better understanding of multiple access systems and earth station technology.
- To prepare students with knowledge in satellite navigation, GPS & satellite packet communications.

Unit-I:
Communication Satellite: Orbit and Description: A brief History of Satellite Communication, Satellite Frequency bands, Satellite Systems, Applications, Orbital Period and Velocity, Effects of Orbital inclination, Azimuth and Elevation, Coverage and Slant range, Eclipse, Orbital perturbations, Placement of a Satellite in a Geo-Stationary Orbit.

Unit-II:
Satellite Sub-Systems: Altitude and orbit control system, TT&C Sub-System, Altitude control Sub-System, Power Systems, Communication Subsystems, Satellite antenna Equipment.
Satellite Link: Basic transmission theory, system noise temperature and G/T ratio, Basic Link Analysis, Interference Analysis, Design of satellite links for specified C/N,(with and without frequency Re-use), Link Budget.

Unit-III:
Propagation effects: Introduction, Atmospheric Absorption, Cloud Attenuation, Tropospheric and Ionospheric Scintillation and Low angle fading, Rain Induced attenuation, rain induced cross polarization interference.
Multiple Access: Frequency Division Multiple Access(FDMA), Inter-modulation, Calculation of C/N. Time Division Multiple Access(TDMA),

Frame structure, Burst structure, Satellite Switched TDMA On-board processing, Demand Assignment Multiple Access (DAMA) – Types of Demand Assignment, Characteristics, CDMA Spread Spectrum Transmission and Reception

Unit-IV:

Earth Station Technology: Transmitters, Receivers, Antennas, Tracking systems, Terrestrial Interface, Power Test methods, Lower Orbit Considerations.

Satellite Navigation & Global Positioning Systems: Radio and Satellite Navigation, GPS Position Location principles, GPS Receivers, GPS C/A code accuracy, Differential GPS.

Unit-V:

Satellite Packet Communications: Message Transmission by FDMA: M/G/1 Queue, Message Transmission by TDMA, PURE ALOHA-Satellite Packet Switching, Slotted Aloha, Packet Reservation, Tree Algorithm.

Text Books:

1. Satellite Communications- Timothy Pratt, Charles Bostian and Jeremy Allnutt, WSE, Wiley Publications, 2nd Edition, 2003, John Wiley & Sons.
2. Satellite Communication Engineering- Wilbur L. Pritchand, Robert A Nelson and Henri G. Suyderhoud, 2nd Edition, Pearson Publications.
3. Digital Satellite Communications-Tri. T. Ha, 2nd Edition, 1990, Mc. Graw Hill.

Reference Books:

1. Satellite Communications- Dennis Roddy, 2nd Edition, 1996, McGraw Hill.
2. Satellite Communications: Design Principles- M. Richharia, 2nd Edition,BS Publications, 2003.
3. Digital Satellite Communications-Tri. T. Ha,2nd Ed., MGH,1990.
4. Fundamental of Satellite Communications- K. N Raja Rao, PHI, 2004

Course Outcomes:

On Completion of the course, students will be able to

1. Explain the historical background, basic concepts and frequency allocation for satellite communication.
2. Demonstrate orbital mechanics, launch vehicles and launchers
3. Demonstrate the design of satellite links for specified C/N with system design examples.
4. Describe satellite sub systems like Telemetry, tracking, command and monitoring power systems etc.
5. Recognise various multiple access for satellite communication systems and packet communications

(A2427) OPTICAL COMMUNICATIONS
(Professional Elective-II)

L	T	P	C
4	0	0	4

B. Tech. (ECE) VI-Semester

Course Objectives:
The objectives of the course are:

- To realize the significance of optical fibre communications.
- To study the construction and characteristics of optical fibre cable.
- To develop the knowledge of optical signal sources and power launching.
- To identify and understand the operation of various optical detectors.
- To study the design of optical systems and WDM.

Unit- I

Overview of Optical Fiber Communication: Historical development, The general system, Advantages of Optical Fiber Communications, Optical Fiber Wave Guides: Introduction, Ray Theory Transmission, Total Internal Reflection, Acceptance Angle, Numerical Aperture, Skew Rays, Cylindrical Fibers, Modes, V number, Mode Coupling, Step Index Fiber, Graded Index Fiber.

Single mode fibers: Cut off wavelength, Mode Field Diameter, Effective Refractive Index, Fiber materials, Glass, Halide, Active glass, Chalgenide glass, Plastic optical fibers.

Unit-II

Signal Distortion in Optical Fibers: Attenuation, Absorption, Scattering and Bending losses, Core and Cladding losses. Information capacity Determination, Group delay, Types of Dispersion: Material Dispersion, Wave Guide Dispersion, Polarization Mode Dispersion, Intermodal Dispersion, Pulse Broadening. Optical Fiber Connectors: Connector Types, Single Mode Fiber Connectors, Connector Return Loss.

Unit-III

Fiber Splicing: Splicing techniques, Splicing Single Mode Fibers. Fiber Alignment and Joint Loss: Multimode Fiber Joints, Single Mode Fiber Joints, Optical Sources: LEDs, Structures, Materials, Quantum Efficiency, Power, Modulation, Power Bandwidth Product, Injection Laser Diodes: Modes,

Threshold Conditions, External Quantum Efficiency, Laser Diode Rate Equations, Resonant Frequencies. Reliability of LED& ILD.
Source to Fiber Power Launching: Output Patterns, Power Coupling, Power Launching, Equilibrium Numerical Aperture, Laser Diode to Fiber Coupling.

Unit-IV
Optical Detectors: Physical Principles of PIN and APD, Detector Response Time, Temperature Effect on Avalanche Gain, Comparison of Photo Detectors, Optical Receiver Operation: Fundamental Receiver Operation, Digital Signal Transmission, Error Sources, Receiver Configuration, Digital Receiver Performance, Probability of Error, Quantum Limit, Analog Receivers.

Unit- V
Optical System Design: Considerations, Component Choice, Multiplexing, Point-to- Point Links, System Considerations, Link Power Budget with Examples, Overall Fiber Dispersion in Multi Mode and Single Mode Fibers, Rise Time Budget with Examples.
Transmission Distance, Line Coding in Optical Links, WDM, Necessity, Principles, Types of WDM, Measurement of Attenuation and Dispersion, Eye Pattern.

Text Books:
1. Optical Fiber Communications – Gerd Keiser, TMH,4th Edition, 2008.
2. Optical Fiber Communications – John M. Senior, Pearson Education,3rd Edition, 2009.

Reference Books:
1. Fiber Optic Communications – D.K. Mynbaev , S.C. Gupta and Lowell L. Scheiner, Pearson Education, 2005.
2. Text Book on Optical Fibre Communication and it's Applications – S.C.Gupta, PHI, 2005.
3. Fiber Optic Communication Systems – Govind P. Agarwal, John Wiley, 3rd Ediition, 2004.
4. Introduction to Fiber optics by Donald j. Sterling Jr. -Cengage Learning, 2004.
5. Optical Communication Systems- John Gowar, 2nd Edition, PHI

Course Outcomes:
At the end of the course, the student will be able to:

1. Analyse the constructional parameters of optical fibers.
2. Design an optical system.
3. Estimate the losses due to attenuation, absorption, scattering and bending.
4. Compare various optical detectors and choose suitable one for different applications.

(A2428) MICROWAVE & DIGITAL COMMUNICATIONS LAB

B. Tech. (ECE) VI-Semester

L	T	P	C
0	0	3	2

Course Objectives:

The objectives are:

- To study the concepts of generation of digital data.
- To study the concepts of different digital modulation techniques.
- To Study the concept of generation of microwave signal using Reflex Klystron.
- To study the process of measuring the microwave frequency, Attenuation, Impedance, VSWR characteristics, Power.

Part-A (Any four experiments to be conducted)

1. Pulse Code Modulation: Generation and detection
2. Differential Pulse Code Modulation: Generation and detection
3. Delta Modulation
4. Generation and Detection of Amplitude Shift Keying
5. Generation and Detection of Frequency Shift Keying
6. Generation and Detection of Phase Shift Keying
7. Generation and Detection of Differential Phase Shift Keying
8. Generation and Detection of Quadrature Phase Shift Keying
9. Study the spectral characteristics of PAM, QAM

Part-B (Any four experiments to be conducted)

1. Reflex Klystron Characteristics
2. Gunn Diode Characteristics
3. Directional Coupler Characteristics
4. Measurement of Impedance of a given load
5. Measurement of scattering parameters of a Magic Tee
6. Attenuation Measurement
7. VSWR Measurement
8. Measurement of scattering parameters of a circulator.
9. Microwave frequency measurement

Course Outcomes:

On Completion of the course, students will be able to

1. Convert the Analog signal to digital data using PCM, DPCM & DM.
2. Conduct experiments on digital modulation techniques.

3. Explain the process of generation of Microwave signal.
4. Measure the Microwave Signal frequency.
5. Measure the Scattering parameters of Magic Tee, Circulator & Isolator.

(A2003) ADVANCED ENGLISH COMMUNICATION SKILLS LAB

B. Tech. (ECE) VI-Semester

L	T	P	C
0	0	3	2

Introduction

The introduction of the English Language Lab is considered essential at 3rd year level. At this stage the students need to prepare themselves for their careers which may require them to listen to, read, speak and write in English both for their professional and interpersonal communication in the globalised context.

Course Objectives

This Lab focuses on using computer-aided multimedia instruction for language development to meet the following targets:

- To improve the students' fluency in English, through a well developed vocabulary and enable them to listen to English spoken at normal conversational speed by educated English speakers and respond appropriately in different socio-cultural and professional contexts.
- Further, they would be required to communicate their ideas relevantly and coherently in writing.

Syllabus

The following course content is prescribed for the Advanced Communication Skills Lab:

1. **Functional English**
   Starting a conversation, responding appropriately and relevantly, using the right body language, Role play in Different Situations.

2. **Vocabulary building**
   Synonyms and antonyms, word roots, one-word substitutes, prefixes and suffixes, study of word origin, analogy, idioms and phrasal verbs.

3. **Group Discussion**
   Dynamics of group discussion, intervention, summarizing, modulation of voice, body language, relevance, fluency and coherence.

4. **Interview Skills** –

Concept and process, pre-interview planning, opening strategies, answering strategies, Interview through tele and video- conferencing.

5. Resume` and Technical Report writing

Structure and presentation, planning, defining the career objective, projecting ones strengths and skill-sets, summary, formats and styles, Letter-writing.

Reading comprehension – reading for facts, guessing meanings from context, scanning, skimming, inferring meaning and critical reading.

Minimum Requirement:

The English Language Lab shall have:

- The Computer aided Language Lab for 60 students with 60 systems,
- One master console, LAN facility and English language software for self- study by learners.
- The Communication Skills Lab with movable chairs and audio-visual aids with a P.A System, a T. V., a digital stereo –audio & video system and camcorder etc.
- System Requirement (Hardware component):
- Computer network with Lan with minimum 60 multimedia systems with the following specifications:
  P – IV Processor
  d) Speed – 2.8 GHZ
  e) RAM – 512 MB Minimum
  f) Hard Disk – 80 GB
  Headphones of High quality

Suggested Software:

The software consisting of the prescribed topics elaborated above should be procured and used.

- Clarity Pronunciation Power – part II
- Oxford Advanced Learner's Compass, 7th Edition
- DELTA's key to the Next Generation TOEFL Test: Advanced Skill Practice.
- Lingua TOEFL CBT Insider, by Dreamtech
- TOEFL & GRE(KAPLAN, AARCO & BARRONS, USA, Cracking GRE by CLIFFS)

The following software from 'train2success.com'

Preparing for being Interviewed, Positive Thinking, Interviewing Skills, Telephone Skills, Time Management, Team Building, Decision making

Distribution and Weightage of Marks: English Language Laboratory Practical Examination:

1. The practical examinations for the English Language Laboratory shall be conducted as per the University norms prescribed for the core engineering practical sessions.
2. For the Language lab sessions, there shall be a continuous evaluation during the year for **40** sessional marks and **60** year-end Examination marks. Of the **40** marks, **20** marks shall be awarded for day-to-day work and **20** marks to be awarded by conducting Internal Lab Test(s). The year- end Examination shall be conducted by the teacher concerned with the help of another member of the staff of the same department of the same institution.

Course Outcomes

On Completion of the course, students will be able to

1. Organize ideas relevantly and coherently.
2. Engage in debates.
3. Discuss in a group.
4. Face interviews.
5. Write project/research reports/technical reports.
6. Make oral presentations.
7. Write formal letters.
8. Transfer information from non-verbal to verbal texts and vice versa.
9. To take part in social and professional communication.

(A2006) ANALYTICAL SKILLS-II

L	T	P	C
2	0	0	0

B. Tech. (ECE) VI-Semester

Course Objectives:

1. Enabling to present skills confidently and face interviews to capture the right job.
2. Enabling to develop leadership qualities and team building skills
3. Organize the ideas and information relevantly and coherently.
4. Identify and rationalize the relationship between words

Logical Reasoning

- Analogy
- Classification
- Series & Sequence
- Coding & Decoding
- Directions
- Blood Relations
- Seating Arrangements
- Clocks and Calendars

Analytical Ability & Reasoning

- Cubes
- Logical Deductions
- Figure Analysis
- General Puzzles
- Data Sufficiency
- Data Interpretation

Business English

- Basics of Communication Skills
- Articles
- Tenses
- S+ V agreement
- Model Verbs
- Be/do/has/have Forms
- Question Forms

Course Outcomes:
On completion of the course students will be able to

1. Identify and rationalize the relationship between words
2. Apply the logic to solve problems using concept of statement, argument, assumption and course of action.
3. Link words with the codes logically and arrive at correct meanings.
4. Evolve as effective communicators and emerge as good decision makers and managers.

VII SEMESTER

(A2256) MODERN CONTROL THEORY
(Open Elective-I: offered by EEE Department)

B. Tech. (ECE) VII-Semester

L	T	P	C
3	0	0	3

Unit–I: Mathematical Preliminaries Fields, Vectors and Vector Spaces – Linear combinations and Bases – Linear Transformations and Matrices – Scalar Product and Norms – Eigen-values, Eigen Vectors and a Canonical form representation of Linear operators – The concept of state – State Equations for Dynamic systems – Time invariance and Linearity – Non-uniqueness of state model – State diagrams for Continuous-Time State models.

Unit-II: State Variable Analysis Linear Continuous time models for Physical systems– Existence and Uniqueness of Solutions to Continuous-Time State Equations – Solutions of Linear Time Invariant Continuous-Time State Equations – State transition matrix and its properties. General concept of controllability – General concept of Observability – Controllability tests for Continuous-Time Invariant Systems – Observability tests for Continuous-Time Invariant Systems – Controllability and Observability of State Model in Jordan Canonical form – Controllability and Observability Canonical forms of State model.

Unit-III: Non Linear Systems Introduction – Non Linear Systems - Types of Non-Linearities – Saturation – Dead-Zone - Backlash – Jump Phenomenon etc;– Singular Points – Introduction to Linearization of nonlinear systems, Properties of Non-Linear systems – Describing function– describing function analysis of nonlinear systems – Stability analysis of Non-Linear systems through describing functions. Introduction to phase-plane analysis, Method of Isoclines for Constructing Trajectories, singular points, phase-plane analysis of nonlinear control systems.

Unit-IV: Stability Analysis
Stability in the sense of Lyapunov, Lyapunov‘s stability and Lyapunov‘s instability theorems - Stability Analysis of the Linear continuous time invariant systems by Lyapunov second method – Generation of Lyapunov

functions – Variable gradient method – Krasooviski's method. State feedback controller design through Pole Assignment – State observers: Full order and Reduced order.

Unit-V: Optimal Control Introduction to optimal control - Formulation of optimal control problems – calculus of variations – fundamental concepts, functional, variation of functional – fundamental theorem of Calculus of variations – boundary conditions – constrained minimization – formulation using Hamiltonian method – Linear Quadratic regulator.

Text Books

1. Modern Control System Theory by M. Gopal – New Age International - 1984
2. Modern Control Engineering by Ogata.K – Prentice Hall - 1997

Reference Books:

1. Optimal control by Kircks

Course Outcomes

On completion of the course students will be able to

1. Analyze and draw the state diagrams for continuous time state models.
2. Observe the controllability and observability of state models
3. Illustrate the stability analysis of Non-linear systems
4. Determine the stability of Linear Continuous time invariant systems
5. Formulate optimal control problems

(A2362) MATERIAL SCIENCE
(Open Elective-I offered by ME Department)

B. Tech. (ECE) VII-Semester

L	T	P	C
3	0	0	3

Course Objectives:
Selection of materials to suit for particular application play a major role in engineering and technology. Understanding the behavior of materials, particularly structure-property relation, will help selecting suitable materials for a particular application.

Unit – I
Structure of Metals: Bonds in Solids – Metallic bond - crystallization of metals, grain and grain boundaries, effect of grain boundaries on the properties of metal / alloys

Unit -II
Constitution of Alloys: Necessity of alloying, types of solid solutions, Hume Rothery rules, intermediate alloy phases, and electron compounds.

Unit -III
Cast Irons: Structure and properties of White Cast iron, Malleable Cast iron, grey cast iron, Spheroidal graphite cast iron, Alloy cast irons.
Steels: Classification of steels, structure and properties of plain carbon steels, Low alloy steels, Hadfield manganese steels, tool and die steels.

Unit – IV
Non-ferrous Metals and Alloys: Structure and properties of copper and its alloys, Aluminium and its alloys, Titanium and its alloys.

Unit – V
Ceramic materials: Crystalline ceramics, glasses, ceramets, abrasive materials, nano materials – definition, properties and applications of the above.
Composite materials: Classification of composites, various methods of component manufacture of composites, particle – reinforced materials, fiber reinforced materials, metal ceramic mixtures, metal – matrix composites and C – C composites.

Text Books:

1. Introduction to Physical Metallurgy / Sidney H. Avener.
2. Material science & Metallurgy / Kodgire

Reference Books:

1. Science of Engineering Materials / Agarwal
2. Materials Science / Vijendra Singh
3. Elements of Material science / V. Rahghavan
4. An introduction to material science / W.g.vinas & HL Mancini
5. Material science & material / C.D. Yesudian & harris Samuel
6. Engineering Materials and Their Applications – R. A Flinn and P K Trojan / Jaico Books.

Course outcomes:

On completion of this course, a student shall be able to

1. Select the materials suitable for engineering applications
2. Assess the properties of materials upon knowing the structure of the material
3. Synthesize the material to suit for required properties.

(C2161) LOGISTICS AND SUPPLY CHAIN MANAGEMENT
(Open Elective-I offered by MBA Department)

B. Tech. (ECE) VII-Semester

L	T	P	C
3	0	0	3

Course Objective:
The Objective of this course is to gain the knowledge of possibilities of efficient optimization and management of operation in integrated supply chains and also the ability to apply them in the enterprise reality. The course will also strengthen the holistic view on supply chain operations, management and strategy and some current research areas in supply chain management. Consequently the course provides advanced knowledge about logistics and their supporting systems from a supply chain perspective.
***The students need Statistical Table to solve numerical problems.** Prerequisite for the course: Knowledge of Production and Operations Management, Marketing Management and QABD taught in second semester of the programme.

Unit – I
Understanding the Supply Chain: Objective and Importance of Supply Chain Process View of Supply Chain. Competitive and Supply Chain Strategies, Achieving Strategic Fit, Expanding Strategic Scope. Logistics: The Logistical value preposition, The Work of Logistics, Logistical operations, Logistical operating arrangements, Supply chain Synchronization , Supply Chain Drivers and Metrics :Drivers for Supply Chain Performance, Framework for Structuring drivers. Facilities, inventory, transportation, information, sourcing and pricing. Obstacles to Achieving fit, Supply chain performance in India. Case studies

Unit – II
Designing the Supply Chain Network : Role of distribution in the Supply Chain, Factors influencing Distribution network design, Design options for Distribution network, The role of network design in the Supply Chain, Frame work for Network design decisions, Models for facility location and capacity allocation, Planning Demand and Supply in a Supply Chain: Demand Forecasting in Supply Chain: Components of forecast and forecasting methods, Aggregate Planning in Supply Chain: Role of aggregate planning,

Aggregate planning Strategies , Inventory planning and economic theory aberrations. Case studies

Unit – III

Planning and Managing inventories in Supply Chain: Managing Economies of Scale in Supply Chain, Managing Uncertainty in a Supply Chain, Determining optimal level of product inventory. Designing and Planning Transportation Networks: Transportation in a Supply Chain. Case studies

Unit – IV

Managing Cross Functional Drivers in a Supply Chain: Sourcing decisions in a Supply Chain and procurement strategies, Pricing and Revenue Management in a Supply Chain, Information Technology and Coordination in a Supply chain. Case studies

Unit- V

Logistics and Supply chain relationships: Identifying logistics performance indicators –Channel structure – Economics of distribution – channel relationships –logistics service alliances. Managing Global logistics and Global supply chains: Logistics in a global economy – views of global logistics- global operating levels – interlinked global economy - The Global supply chains , Supply Chain Management in Global environment–Global strategy – Global purchasing – Global logistics–Global alliances –Issues and Challenges in Global supply chain Management – Case studies

References

1. Sunil Chopra and Peter Meindl: Supply chain Management: Strategy, Planning and Operation, Third edition, Pearson, 2009.
2. Donald J.Bowersox and David J.Closs: Logistical Management: The Integrated Supply Chain Process, TMH, 2006.
3. Rajasekhar & Acharyulu: Logistics and Supply Chain Management, Excel, 2009.
4. Sridhara Bhat: Logistics and supply chain management, Himalaya, 2009.
5. John T Mentzer: Supply Chain Management, Sage Publications, 2008
6. Donal Waters: Global Logistics, Kogan Page, 2009
7. Christain schuh et al:The purchasing chess board, Springer link,2009.
8. Philip B.Schary, Tage Skjott-Larsen: Managing the Global Supply Chain, Viva, 2008.

9. Joel D wisner, Keong Leong, Keah Choon Tan: Principles of Supply Chain Management- A Balanced approach, Cengage Learning, 2008
10. Rahul V Altekar: Supply Chain Management, Concepts and Cases, PHI , 2008
11. J.L.Gattorna and D.W.Walters: Managing the Supply Chain, Macmillan, 2008
12. Rangaraj: Supply chain Management for competitive advantage, TMH, 2009
13. Kachru: Logistics and Supply Chain Management, Excel, 2009
14. Shah: Supply Chain Management, Pearson, 2009

Course Outcomes

On completion of the course students will be able to

1. Explain various concepts and methods in Logistics and Supply Chain Management.
2. Implement Project Planning, Cost Efficiency and Optimization Techniques
3. Describe the concepts of Logistics and Supply Chain Management in the industry and gain a wider perspective.

(A2509) JAVA PROGRAMMING

(Open Elective-I offered by CSE Department)

B. Tech. (ECE) VII-Semester

L	T	P	C
3	0	0	3

Objectives:

- To understand object oriented programming concepts and applications in problem solving
- Learn the Java programming language: its syntax, idioms, patterns, and styles.
- To learn the basics of Java console and GUI based programs
- Introduce event driven Graphical User Interface (GUI) programming

Unit I:

Java Programming: History of Java, Comments, Data Types, Variables, Constants, Scope and Life Time of Variables, Operators, Hierarchy Expressions, Type Conversions and Casting, Enumerated Types, Control for Block Scope, Conditional Statements, Loops, Break and Continue Statements, Simple Java Standalone Programs, Arrays, Console Input and Output, Formatting Output, Constructors, Methods, Parameter Passing, Static Fields and Methods, Access Controls, This Reference, Overloading Methods and Constructors, Recursions, Garbage Collections, Building Strings, Exploring Strings Class.

Unit II:

Inheritance: Inheritance Hierarchies Super And Sub Classes, Member Access Rules, Super Keyword, And Preventing Inheritance: Final Classes And Methods, The Object Class and Its Methods.

Polymorphism: Dynamic Binding, Method Overloading, Abstract Classes and Methods.

Interface: Interface vs. Abstract Classes, Defining an Interface, Implementing Interfaces, Accessing Implementations through Interfaces References, Extending Interface.

Inner Classes: Use of Inner Classes, Local Inner Classes, Anonymous Inner Classes, Static Inner Classes, Example.

Packages: Defining, Creating and Accessing a Package, Understanding Class path, Importing Packages

Unit III:

Exception Handling: Dealing With Errors, Benefits of Exception Handling, The Classification of Exceptions, Exception Hierarchy, Checked Exceptions And Unchecked Exception, Usage of Try , Catch, Throw, Throws, and Finally, Re-Throwing Exceptions, Exception Specification, Built in Exceptions, Creating Own Exception Sub Classes.

Multithreading: Difference Between Multiple Processes and Multiple Threads, Thread States, Creating Threads, Interrupting Threads, Thread Priorities, Synchronizing Threads, Inter-Thread Communication, Producer Consumer Problem.

Unit IV:

Collection Framework in Java: Introduction to Java Collections, Overview of Java Collection Frame Work, Generics, Commonly used Collection Classes-Array List, Vector, Hash Table, Stack, Enumeration, Iterator, String Tokenizer, Random, Scanner, Calendar and Properties.

Files: Streams-Byte Streams, Character Streams, Text Input /Output , Binary Input/ Output, Random Access File Operations, File Management using File Class.

Connecting to Database: JDBC Type I To IV Drivers, Connecting to a Database, Querying a Database and Processing The Results, Updating Data With JDBC.

Unit V:

GUI Programming with Java: The AWT Class Hierarchy, Introduction to Swing, Swing vs. AWT, Hierarchy for Swing Components, Containers- JFrame, JApplet, JDialog, JPanel, Overview of Some Swing Components, JButton, JLabel, JTextfield, JTextarea, Simple Swing Applications, Layout Management- Layout Manager Types- Border Grid and Flow.

Event Handling: Events, Event Sources, Event Classes, Event Listeners, Relationship Between Event Sources and Listeners, Delegation Event Model, Examples: Handling a Button Click, Handling Mouse Events, Adapter Classes.

Applets: Inheritance Hierarchy for Applets, Differences Between Applets and Applications, Life Cycle of an Applet, Passing Parameters to Applets, Applet Security Issues.

Textbooks:

1. Java Fundamentals: A Comprehensive Introduction, Herbert Schildt and Dale Skrien, TMH.

References:

1. Java for Programming, P.J.Dietel Pearson Education
2. Object Oriented Programming through Java, P.Radha Krishna, and Universities Press.
3. Thinking in Java, Bruce Eckel, Pearson Education

Course Outcomes:

Upon the successful completion of the course, the student will be able:

1. Explain OOPs concepts and basics of java programming (Console and GUI Based)
2. Apply OOPs and java Programming skills in problem solving.
3. Explain development of JAVA applets vs. JAVA applications.
4. Apply various system libraries in programming applications.

(A2508) COMPUTER ORGANIZATION

L	T	P	C
3	0	0	3

B. Tech. (ECE) VII-Semester

Objectives:

- To understand basic components of computers
- To explore the I/O organizations in depth
- To explore the memory organization

Unit I :

Basic Computer Organization – Functions of CPU, I/O Units, and Memory Instructions: Instruction formats- one address, two addresses, zero addresses and three addresses and comparison: addressing modes with numeric examples: Program Control – status bit conditions, conditional branches instructions, Program Interrupts: Types of Interrupts.

Unit II

Input-Output Organizations - I/O Interface, I/O Bus & Interface Modules**:** I/O Vs Memory Bus, Isolated Vs Memory Mapped I/O, Asynchronous data Transfer- Stobe Control, Hand Shaking: Asynchronous Serial Transfer- Asynchronous Communication Interface, Modes of Transfer Programmed I/O, Interrupt Initiated I/O , DMA Controller, DMA Transfer.

Unit III

Memory Organizations**:**
Memory hierarchy, Main Memory, Auxiliary Memory, Associative Memory Match-logic, Cache memory, Virtual Memory.

Unit IV

Parallel Processing Pipelining, Arithmetic Pipeline, Instruction Pipeline, RISC Pipeline-Delayed Load, Delayed Branch

Unit V

Vector Processing-Vector Operations, Matrix Multiplication, Memory Interleaving, Superscalar Processors, Supercomputers, Array processors-Attached array processors, SIMD Array processors

Text Books :

1. Computer Systems Architecture – M. Moris Mano,
2. Computer Organization and Architecture – William Stallings Sixth Edition, Pearson/PHI

Reference Books:

1. Structured Computer Organization – Andrew S. Tanenbaum, 4th Edition PHI/Pearson
2. Fundamentals or Computer Organization and Design, - Sivaraama Dandamudi Springer Int. Edition.
3. Computer Architecture a quantitative approach, John L. Hennessy and David A. Patterson, Fourth Edition Elsevier
4. Computer Architecture: Fundamentals and principles of Computer Design, Joseph D. Dumas II, BS Publication.

Course Outcomes:

On completion of the course student will be able to

1. Define the basic components of computer, including the addressing modes and interrupts.
2. Evaluate the I/O organization and implement the modes of transfer.
3. Write about the memory organization.
4. Write about various Instructions pipeline techniques

(A2429) RADAR SYSTEMS
(Professional Elective III)

B. Tech. (ECE) VII-Semester

L	T	P	C
4	0	0	4

Course objectives:

The objectives of the course are:

- To understand basic functioning of a Radar.
- To understand various technologies involved in the design of Radar transmitters and receivers.
- To learn various Radars like Pulse, CW, MTI, Doppler and tracking Radars and their comparison.

Unit- I

Basic of Radar : Introduction, Maximum Unambiguous Range, Simple form of Radar Equation, Radar Block Diagram and Operation, Radar Frequencies and Applications. Predication of range performance, Minimum Detectable Single, Receiver Noise, Modified Range Equation, Illustrative Problems.

Radar Equation : SNR, Envelope Detector – False Alarm Time and Probability Integration of Radar Pulses, Radar Cross Section of Targets (simple targets - sphere, cone-sphere), Transmitter Power, PRF and Range Ambiguities, System Losses (qualitative treatment). Illustrative Problems.

Unit -II

CW Radar: Doppler Effect, CW Radar – Block Diagram, Isolation between Transmitter and Receiver, Non-zero IF Receiver, Receiver Bandwidth Requirements, Applications of CW radar. Illustrative Problems.

FM-CW Radar: Range and Doppler Measurement, Block Diagram and Characteristics (Approaching/ Receding Targets), FM-CW Altimeter, Limitations of single frequency FM-CW Radar, Multiple Frequency CW Radar.

Unit- III

MTI and Pulse Doppler Radar: Introduction, Principle, MTI Radar with - Power Amplifier Transmitter and Power Oscillator Transmitter, Delay Line Cancellers – Filter Characteristics, Blind Speeds, Double Cancellation, Staggered PRFs. Range Gated Doppler Filters. MTI Radar Parameters, Limitations to MTI Performance.

Unit- IV

Tracking Radar: Tracking with Radar, Conical Scan, Monopulse Tracking Radar – Amplitude Comparison Monopulse, Phase Comparison Monopulse. Tracking in Range, Acquisition and Scanning Patterns.

Unit V

Detection of Radar Signals in Noise: Introduction, Matched Filter Receiver – Response Characteristics and Derivation, Correlation Function and Cross-correlation Receiver

Radar Receivers – Noise Figure and Noise Temperature. Displays – types. Duplexers – Branch type and Balanced type, Circulators as Duplexers. Introduction to Phased Array Antennas – Basic Concepts. Radiation Pattern, Beam Steering and Beam Width changes.

Text Books:

1. Introduction to Radar Systems – Merrill I. Skolnik, TMH Special Indian Edition, 2nd ed., 2007.

Reference Books:

1. Introduction to Radar Systems – Merrill I. Skolnik, THIRD EDITION, Tata McGraw-Hill, 2001.
2. Radar: Principles, Technology. Application-Byron Edde , Pearson Education, 2004
3. Radar Principles- Peebles, Jr., P.Z., Wiley, New York, 1998.

Course Outcomes

On completion of this course, it is expected that the student will be able to:

1. Explain basics of Pulse Radar, Radar Applications, Radar Range and various terminology associate with the Radar.
2. Describe principle of operation of Continuous wave Radar, limitations and its applications.
3. Analyse operation of MTI Radar, its parameters, limitations and applications
4. Explain principle operation of tracking radar and different error determination methods, parameters associate with them.
5. Explain various sub systems used in Radars, antenna arrays and their basic parameters.
6. Explain necessity of matched and non -matched filters, correlation receivers in maximization of Signal to Noise ratio.

(A2512) OPEARATING SYSTEMS
(Professional Elective III)

L	T	P	C
4	0	0	4

B. Tech. (ECE) VII-Semester

Objectives:

- To understand main components of OS and their working .
- To study the operations performed by OS as a resource manager.
- To understand the scheduling policies of OS.
- To understanding process concurrency and synchronization.
- To understand the concepts of input/output , storage and file management.
- To study different OS and compare their features

Unit – I:

Operating System Introduction: Operating System Objectives and functions, Computer System Architecture, OS Structure, OS Operations, Evaluation of operating Systems- Simple Batch, Multi programmed, Time-shared, Personal Computer, Parallel, Distributed Systems, Real-Time systems, Special Purpose systems, OS Services, User Os Interface, System Calls, Types of System Calls, System Programs, Operating System Design and Implementation, OS Structure, Virtual Machines.

Unit – II:

Process and CPU Scheduling – Process concepts-The Process, Process State, Process Control Block, Threads, Process Scheduling-Scheduling Queues, Schedulers, Context switch, Preemptive Scheduling, Dispatcher, Scheduling Criteria, Scheduling algorithms, Multiple-Processor Scheduling, Real –time Scheduling, Thread Scheduling, Case Studies: Linux, windows.

Process coordination–Process synchronization, The Critical Section problem, Peterson's solution, Synchronization Hardware, Semaphores, and Classic Problems of Synchronization, Monitors, Case Studies: Linux, Android.

Unit – III:

Memory Management and Virtual memory – Logical & Physical Address space, Swapping, Contiguous Allocation, Paging, Structure of Page Table, Segmentation, Segmentation with Paging, Virtual memory, Demand paging, Performance of Demand paging, Page Replacement, Page Replacement Algorithms, Allocation of Frames, Thrashing.

Unit- IV:

File System Interface- The Concept of a File, Access methods, Directory Structure, File System Mounting, File Sharing, Protection, File System Implementation- File System Structure, Allocation methods, Free-space Management, Directory Implementation, Efficiency and Performance.

Mass Storage Structure– Overview of Mass Storage Structure, Disk Structure, Disk Attachment, Disk Scheduling, Disk Management, Swap space Management.

Unit – V:

Deadlocks – System Model, Deadlock Characterization, Methods for Handling Deadlocks, Deadlock Prevention, Deadlock Avoidance, Deadlock Detection and Recovery from Deadlock.

P**rotection –**System Protection, Goals of Protection, Principles of Protection, Domain of Protection, Access Matrix, Implementation of Access Matrix, Access Control, Revocation of Access Rights, Capability-Based Systems, Language-Based Protection.

Text Books:

1. Operating System Principles- Abraham Silberchatz, Peter B. Galvin, Greg Gagne 8TH Edition, John Wiley.
2. Operating Systems – Internals and Design Principles, William Stallings, Sixth Edition, Pearson education.

Reference Books:

1. Modern Operating Systems, Andrew S Tanenbaum 3rd edition Pearson/PHI
2. Operating System A Design Approach-Crowley,TMH

Course Outcomes:

On completion of this course, it is expected that the student will be able to:

1. Apply optimization techniques for the improvement of system performance.
2. Ability to understand the synchronous and asynchronous communication mechanisms in their respective OS.
3. Learn about minimization of turnaround time, waiting time and response time and also maximization of throughout put with keeping CPU as busy as possible.
4. Ability to compare the different OS.

(A2430) WIRELESS COMMUNICATIONS & NETWORKS
(Professional Elective - III)

L	T	P	C
4	0	0	4

B. Tech. (ECE) VII-Semester

Course Objectives:

The course objectives are:

- To develop the knowledge on theoretical concepts that forms basic of wireless communications.
- To enable the students to analyse various kinds of wireless networks and its operations.
- To enable students to understand the concept of frequency reuse and able to apply it in the design of cellular system.
- To analyse various modulation schemes and multiple access techniques that are used in wireless communications,
- To develop an analytical perspective on the design and analysis of the traditional and emerging wireless networks.
- To enable the students to understand the architecture and operation of various wireless wide area networks such as GSM, IS-95, GPRS, SMS and LAN.
- To introduce students the emerging technique OFDM and its importance in the wireless communications.

Unit- I: The Cellular Concept-System Design Fundamentals

Introduction, Frequency reuse, channel assignment strategies. Handoff Strategies-Prioritizing Handoffs, Practical Handoff considerations, Interference and system capacity-Co channel Interference and system capacity, Channel planning for wireless Systems, Adjacent Channel interference , Power control for Reducing interference, Trunking and grade off service, improving coverage & capacity in Cellular Systems-cell splitting,

Unit- II: Mobile Radio Propagation: Large-Scale Path Loss

Introduction to Radio wave Propagation, Free Space Propagation Model, Relating Power to Electric Field, The Three Basic Propagation Mechanisms, Reflection-Reflection from Dielectrics, Brewster Angle Reflection from perfect conductors, Ground Reflection (Two-Ray) Model, Diffraction-Fresnet Zone Geometry, Knife-edge Diffraction, Scattering, Outdoor Propagation Models- Longley-Ryce Model, Okumura Model, Hata Model, PCS Extension to Hata Model, Walfisch and Bertoni Model, Wideband PCS Microcell Model, Indoor Propagation Models-Partition losses (Same Floor),

Partition losses between Floors, Log-distance path loss model, Ericsson Multiple Breakpoint Model, Attenuation Factor Model, Signal penetration into buildings, Ry Tracing and Site Specific Modelling.

Unit- III: Mobile Radio Propagation: Small- Scale Fading And Multipath

Small Scale Multipath propagation –Factors influencing small scale fading, Doppler shift, Impulse Response Model of a multipath channel- Relationship between Bandwidth and Received power, Small-Scale Multipath Measurements-Direct RF Pulse System, Spread Spectrum Sliding Correlator Channel Sounding, Frequency Domain Channels Sounding, Parameters of Mobile Multipath Channels-Time Dispersion Parameters, Coherence Bandwidth, Doppler Spread and Coherence Time, Types of Small-Scale Fading-Fading effects Due to Multipath Time Delay Spread, Flat Fading, Frequency selective fading, Fading effects Due to Doppler Spread-Fast fading, slow fading, Statical Models for multipath Fading Channels-Clarke's model for flat fading, spectral shape due to Doppler spread in Clarke's model, Simulation of Clarke and Gans Fading Model, Level crossing and fading statistics, Two-ray Rayleigh Fading Model.

Unit – IV: Equalization and Diversity

Introduction, Fundamentals of Equalization, Training A Generic Adaptive Equalizer, Equalizers in a communication Receiver, Linear Equalizers, Non-linear Equalization-Decision Feedback Equalization (DFE), Maximum Likelihood Sequence Estimation (MLSE) Equalizer, Algorithms for adaptive equalization-Zero Forcing Algorithm, Least Mean Square Algorithm, Recursive least squares algorithm. Diversity Techniques-Derivation of selection Diversity improvement, Derivation of Maximal Ratio Combining improvement, Practical Space Diversity Consideration-Selection Diversity, Feedback or Scanning Diversity, Maximal Ratio Combining, Equal Gain Combining, Polarization Diversity, Frequency Diversity, Time Diversity, RAKE Receiver.

Unit –V: Wireless Networks

Introduction to wireless Networks, Advantages and disadvantages of Wireless Local Area Networks, WLAN Topologies, WLAN Standard IEEE 802.11, IEEE 802.11 Medium Access Control, Comparison of IEEE 802.11 a,b,g and n standards, IEEE 802.16 and its enhancements, Wireless PANs, HiperLan, WLL.

Text Books:

1. Wireless Communications, Principles, Practice – Theodore, S. Rappaport, 2nd Ed., 2002, PHI
2. Wireless Communications-Andrea Goldsmith,2005 Cambridge University Press.
3. Mobile Cellular Communication – Gottapu Sasibhushana Rao, Pearson Education, 2012.

Reference Books:

1. Principles of wireless Networks –Kaveh PahLaven and P. Krishnamurthy, 2002, PE.
2. Wireless Digital Communications – Kamilo Feher, 1999,PHI.
3. Wireless Communication and Networking – William Stallings, 2003,PHI
4. Wireless Communication –Upen Dalal, Oxford Univ. Press.
5. Wireless Communications and Networking – Vijay K. Gary, Elsevier.

Course Outcomes:

Upon completion of the course, the student will be able to:

1. Explain about fundamental and theoretical concept involved in Wireless Communications.
2. Describe cellular system design concepts.
3. Analyse various multiple access schemes used in wireless communication.
4. Explain Wide Area Networks and their performance analysis.
5. Describe Wireless Local Area Networks and their specifications.
6. Explain some of the existing and emerging wireless techniques.

(A2431) DATA COMMUNICATIONS
(Professional Elective - IV)

L	T	P	C
4	0	0	4

B. Tech. (ECE) VII-Semester

Course Objective:

- It is essential to understand the theoretical aspects of data communication systems for today's multi-disciplinary applications
- To discuss the different types of digital pulse modulation and demodulation techniques
- To understand the information capacity of a channel by studying the concept of information theory
- To know about telephone instruments and signals
- To know the efficient representation of sources, by providing source coding techniques

Unit I: Introduction to data communications, networking, signals, noise, modulation and demodulation. Data communication network architecture, layered network architecture, open systems interconnection, data communications circuits, serial and parallel data transmission, data communications circuit arrangements, data communication networks, alternate protocol suites. Information capacity, bits, bit rate, baud, and M-ARY encoding.

Unit II: Metallic cable transmission media & optical fiber transmission media: metallic transmission lines, transverse electromagnetic waves, characteristics of electromagnetic waves, transmission line classifications, metallic transmission line types, metallic transmission line equivalent circuit, wave propagation on metallic transmission lines, metallic transmission line losses, block diagram of an optical fiber communications system, optical fiber versus metallic cable facilities.

Unit III: Digital transmission & multiplexing and t-carriers digital transmission : pulse modulation, pulse code modulation, dynamic range, signal–to-quantization noise voltage Ratio, linear versus nonlinear PCM codes
Multiplexing: Time- division multiplexing, t1 digital carrier system, north American digital multiplexing hierarchy, digital line encoding, t carrier systems, European digital carrier system, statistical time – division

multiplexing, frame synchronization, frequency- division multiplexing, wavelength- division multiplexing, synchronous optical network

Unit IV: Telephone instruments and signals: The subscriber loop, standard telephone set, basic telephone call procedures, call progress tones and signals, cordless telephones, caller id, electronic telephones, paging systems. The telephone circuit: The local subscriber loop, telephone message- channel noise and noise weighting, units of powers measurement, transmission parameters and private-line circuits, voice-frequency circuit arrangements, crosstalk.

Unit V: Data communication codes, bar codes, error control, error detection, error correction, data formats, data communications hardware, character synchronization.

Text Books:

1. Introduction to Data Communications and Networking, Wayne Tomasi, Pearson Education.

Reference Books:

1. Data Communications and Networking, Behrouz A Forouzan, Fourth Edition.Tmh.
2. Computer Communications and Networking Technologies, Gallow, Secondedition Thomson
3. Computer Networking and Internet, Fred Halsll, Lingana Gouda Kulkarni, Fifth Edition, Pearson Education

Course Outcomes:

At the end of the course, the student will be able to:

1. Attain the knowledge on basic concepts of data communication systems.
2. Explain the elements of data communications systems, different types of transmission medias and different digital modulation techniques
3. Attain the knowledge on different telephone instruments, signal and circuits
4. Describe different error detecting and correcting codes.

(A2426) EMBEDDED SYSTEMS DESIGN
(Professional Elective - IV)

L	T	P	C
4	0	0	4

B. Tech. (ECE) VII-Semester

Course Objective:

- For embedded systems, the course will enable the students to :
- Understand the basics of an embedded system
- Program an embedded system
- To learn the method of designing an Embedded System for any type of applications
- To understand operating systems concepts, types and choosing RTOS.

Unit- I: Introduction to Embedded Systems

Definition of Embedded System, Embedded Systems Vs General Computing Systems, History of Embedded Systems, Classification, Major Application Areas, Purpose of Embedded Systems, Characteristics and Quality Attributes of Embedded Systems.

Unit- II: Typical Embedded System

Core of the Embedded System: General Purpose and Domain Specific Processors, ASICs, PPLDs, Commercial Off- The- Shelf Components (COTS), Memory,: ROM, RAM, Memory according to the type of Interface, Memory Shadowing, Memory selection for Embedded Systems, Sensors and Actuators, Communication Interface: On-board and External Communication Interfaces.

Unit –III: Embedded Firmware

Reset Circuit, Brown-out Protection Circuit, Oscillator UNIT, Real Time Clock, Watchdog Timer, Embedded Firmware Design Approaches and Development Languages.

Unit – IV: RTOS Based Embedded System Design

Operating System Basics, Types of Operating Systems, Tasks, Process and Threads, Multiprocessing and Multitasking, Task Scheduling.

Unit – V: Task Communication

Shared Memory, Message Passing, Remote Procedure Call and Sockets, Task Synchronization: Task Communication/ Synchronization issues, Task Synchronization Techniques, Device Drivers, How to choose an RTOS.

Text Book:

1. Introduction to Embedded Systems – Shibu K.V. McGraw Hill
2. Embedded System Design – Frank Vahid, Tony Givargis, John Wiley

Reference Books:

1. Embedded Systems – Raj Kamal, TMH
2. Embedded Systems – Lyla, Pearson, 2013
3. An Embedded Software Primer- David E Simon, Pearson Education

Course Outcomes:

Upon completion of this course, the student will be able to

1. Define embedded systems and list various types of embedded systems
2. Attain the knowledge of interfacing various types of memories, sensors and Input / Output devices to processor.
3. Describe firmware of a processor.
4. Classify various types of Real time operating Systems.

(A2541) CLOUD COMPUTING
(Professional Elective - IV)

L	T	P	C
4	0	0	4

B. Tech. (ECE) VII-Semester

Objectives:

- To explain the evolving computer model called cloud computing
- To introduce the various levels of services that can be achieved by cloud
- To describe the security aspects in the cloud.

Unit-I

System Modeling, Clustering and Virtualization: Distributed system models and Enabling Technologies, Computer Clusters for Scalable Parallel Computing, Virtualization machines an Virtualization of clusters and Data centers.

Case Study: Walk through in to Ubuntu 12.04 Operating System.

Unit-II

Foundations: Introduction to cloud computing, Migrating into a cloud, Enriching the 'Integration as a Service' Paradigm for the cloud Era, The Enterprise Cloud Computing Paradigm.

Unit-III

Infrastructure as a Service(IAAS) & Platform and Software as a Service(PAAS/SAAS): Virtual machines provisioning and migration services, On the Management of Virtual machines for Cloud Infrastructure, Enhancing Cloud Computing Environments using a cluster as a Service, Secure Distributed Data Storage in Cloud Computing.

Aneka, Comet Cloud, T-System, Workflows Engine for Clouds, Understanding Scientific, Applications for Cloud Environments.

Unit-IV

Monitoring, Management and Applications: An Architecture for Federated Cloud Computing, SLA Management in Cloud Computing, Performance Prediction for HPC on Clouds, Best Practices in Architecting Cloud Applications in the AWS Cloud, Building Content Delivery networks using Clouds, Resource Cloud Mashups.

Case Study: Apache hbase 0.92.1, Apache hadoop 2.2.0.

Unit-V

Governance and Case Studies: Organizational Readiness and Changes management in the Cloud age, Data, Security in the Cloud, Legal Issues in Cloud computing, Achieving Production Readiness for Cloud Services.

Text Books:

1. Cloud Computing: Principles and Paradigms by Rajkumar Buyya, James Broberg and Andrzej M. Goscinski, Wiley,2011.
2. Distributed and Cloud Computing, Kai Hwang, Geoffery C,Fox, Jack J. Dongarra, Elsevier, 2012.

Reference Books:

1. Cloud Computing: A Practical Approach, Anthony T. Velte, Toby J.Velte, Robrt Elsenpeter, Tata McGraw Hill, 2011.
2. Enterprise Cloud Computing, Gautam Shroff, Cambridge University Press, 2010.
3. Cloud Computing: Implementation, Management and Security, John W. Rittinghouse, James F.Ransome, CRC Press, rp2012.
4. Cloud Application Architectures: Building Applications and Infrastructure in the cloud, George Reese, O'Reilly, SPD, rp2011.
5. Cloud Security and Privacy: An Enterprise Perspective on Risks and Compliance, Tim Mather, Subra Kumaraswamy, Shahed Latif, O'Reilly, SPD, rp2011.

Outcomes:

On completion of the course students will be able to

1. Analyze the systems, protocols & mechanisms required for cloud computing.
2. Design & implement cloud computing applications.
3. Understand the appropriate hardware, software required for cloud computing
4. Implement the cloud computing driven commercial systems such as Google Apps, Microsoft Azure, Amazon web and other business cloud apps.

(A2506) DESIGN & ANALYSIS OF ALGORITHMS
(Professional Elective - V)

L	T	P	C
4	0	0	4

B. Tech. (ECE) VII-Semester

Objectives:

- To analyze performance of algorithms.
- To choose the appropriate data structure and algorithm design method for a specified application.
- To understand how the choice of data structures and algorithm design methods impacts the performance of programs.
- To solve problems using algorithm design methods such as the greedy method, divide and conquer , dynamic programming, backtracking and branch and bound.

Unit I:

Introduction: Algorithm, pseudo code for expressing algorithms, Performance Analysis: Space and Time Complexity, Asymptotic Notation: Big Oh Notation, Omega Notation, Theta Notation, Little oh and Little omega Notation, Randomized Algorithms, Amortized Analysis.

Divide and Conquer: General Method, applications-Binary Search, Finding Maximum and Minimum, Quick Sort, Selection Sort, Merge Sort, Stassen's Matrix Multiplication.

Unit II:

Searching & Traversal Techniques: Efficient Non recursive binary tree traversal algorithms, Heap Sort, Disjoint set operations ,union & find algorithms, spanning trees, Graph Traversals-Breadth first search and Depth first search, AND/OR graphs, game trees, Connected Components, Bi-Connected Components.

Unit III:

Greedy Method: General Method, applications-Job sequencing with deadlines, Knapsack problem, Minimum Cost Spanning Trees, Single Source Shortest Path Problem, and Optimal Storage on tapes, Optimal merge patterns.

Dynamic Programming: General Method, applications-Multistage Graphs, Optimal Binary Search trees, 0/1 Knapsack problem, All Pair Shortest path problem, Travelling Sale person problem, Reliability Design.

UNIT-IV:

Backtracking: General method, applications-n-queen problem, sum of subsets problem, graph coloring, Hamiltonian Cycles.

Branch and Bound: General method, applications-Traveling sales person problem,0/1 knapsack problem-LC Branch and Bound solution, FIFO Branch and Bound solution.

UNIT-V:

NP-Hard and NP -Complete Problems: Basic Concepts, Non-Deterministic algorithms, NP-Hard and NP-Complete Classes, NP-Hard problems, Cooke's theorem (Proof not required).

Text Books

1. Fundamentals of Computer Algorithms,2nd Edition,Ellis Horowitz,Satraj Sahani and S.Rajasekharan,Universities Press,2008.
2. Foundations of Algorithms,4th edition, R Neapolitan and K.Naimipour,Jones and Barlett Learning.
3. Design and Analysis of Algorithms,P.H.Dave,H.B.Dave Pearson Education,2008.

References Books

1. Computer Algorithms, Introduction to Design and analysis,3rd Edition,Sara Baase,Allen,Van Gelder,Pearson Education.
2. Algorithm Design: Foundations , Analysis and Internet Examples, M.T.Goodrich and R.Tomassia,John Wiley and Sons.
3. Fundamentals of Sequentuials and Paralle Algorithms,K.A.Berman and J.L Paul, Cenage learning.
4. Introduction to the Design and Analysis of Algorithms,A.Levitin,Pearson Education.
5. Introduction to Algorithms,3rd Edition,T.H Cormen,C.E.Leiserson, Rl. Rivest,and C.Stein,PHI Pvt Ltd.
6. Design and Analysis of Algorithms,Aho,Ullman and Hopcroft,Pearson Education,2004.

Course Outcomes

On Completion of the course, students will be able to

1. Analyze algorithms and improve the efficiency of algorithms.
2. Apply different designing methods for development of algorithms to realistic problems, such as divide and conquer, greedy and etc.
3. Ability to understand and estimate the performance algorithms.

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(A2434) DIGITAL SIGNAL PROCESSORS AND ARCHITECTURES
(Professional Elective - V)

L	T	P	C
4	0	0	4

B. Tech. (ECE) VII-Semester

Course Objectives:

- To recall digital transform techniques.
- To introduce architectural features of programmable DSP Processors of TI and Analog Devices.
- To give practical examples of DSP Processor architectures for better understanding.
- To develop the programming knowledge using Instruction set of DSP Processors.
- To understand interfacing techniques to memory and I/O devices.

Unit-I:

Review of Digital Signal Processing: Introduction, A Digital signal-processing system, The sampling process, Discrete time sequences. Discrete Fourier Transform (DFT) and Fast Fourier Transform (FFT), Linear time-invariant systems, Digital filters, Decimation and interpolation.

Computational Accuracy in DSP Implementations: Number formats for signals and coefficients in DSP systems, Dynamic Range and Precision, Sources of error in DSP implementations, A/D conversion errors, DSP computational errors, D/A conversion Errors, Compensating filter.

Unit-II:

Architectures for Programmable DSP Devices: Basic Architectural features, DSP Computational Building Blocks, Bus Architecture and Memory, Data Addressing Capabilities, Address Generation UNIT, Programmability and Program Execution, Speed Issues, Features for External Interfacing.

Unit-III:

Programmable Digital Signal Processors: Commercial Digital signal processing Devices, Data Addressing modes of TMS320C54XX DSPs, Data Addressing modes of TMS320C54XX Processors, Memory space of TMS320C54XX Processors, Program Control, TMS320C54XX instructions and Programming, On-Chip Peripherals, Interrupts of TMS320C54XX processors, Pipeline Operation of TMS320C54XX Processors.

Unit-IV:

Analog Devices Family of DSP Devices: Analog devices family of dsp devices- ALU and MAC Block diagram, Shifter Instruction, Base Architecture of ADSP 2100, ADSP-2181 high performance processor.

Introduction to Blackfin Processor- The Blackfin Processor, Introduction to Micro signal Architecture, Overview of Hardware processing UNITs and Register files, Address Arithmetic UNIT, Control UNIT, Bus Architecture and Memory, Basic peripherals.

Unit-V:

Interfacing Memory and I/O Peripherals to Programmable DSP Devices:

Memory space organization, External bus interfacing signals, Memory interface, Parallel I/O interface, Programmed I/O, Interrupts and I/O, Direct memory access (DMA).

Text Books:

1. Digital Signal Processing-Avtar Singh and S.Srinivasan, Thomson Publications, 2004
2. A Practical Approach to Digital Signal Processing- K. Padmanabhan, R. Vijayarajeswaran, Ananthi. S, New Age International, 2006/2009.
3. Embedded Signal Processing with the Micro Signal Architecture Publisher: Woon- Seng Gan, Sen M. Kuo, Wiley-IEEE Press, 2007

References:

1. Digital Signal Processors, Architecture, Programming and Applications- B. Venkata Ramani and M. Bhaskar, 2002, TMH.
2. Digital Signal Processing- Jonatham Stein, 2005, John Wiley.
3. DSP Processor Fundamentals, Architectures & Features- Lapsleyetal, S.Chand & Co.
4. Digital Signal Processing Applications Using the ADSP-2010 Family by The Applications Engineering Staff of Analog Devices, DSP Division, Edited by Army Mar, PHI
5. The Scientist and Engineer's Guide to digital Signal Processing by Steven W. Smith, Ph.D., California Technical Publishing, ISBN 0-9660176-3-3, 1997

Course Outcomes:

Upon completion of this course, the student will be able to

1. Demonstrate the FFT and DFT of a given signal and distinguish various errors in digital signal processing.

2. Describe the DSP computational building blocks.
3. Describe the architecture and addressing modes of TMS320C54XX series DSP Processor.
4. Describe the architecture of ADSP2100 DSP Processor and The BLACKFIN Processor.
5. Interface memory, I/O devices and DMA controller with DSP processors.

(A2435) REAL TIME OPERATING SYSTEMS
(Professional Elective - V)

B. Tech. (ECE) VII-Semester

L	T	P	C
4	0	0	4

Course Objectives:

The objective of the course is to

- Understand the need of Embedded Real time operating systems.
- Understand the basic commands of Unix/Linux operating systems.
- Learn the difference between the real time and standard operating system.
- Attain the knowledge on the tasks, semaphores, message queues and Interrupt handling in embedded real time operating systems.
- Aware of different type of real time operating systems like RT Linux, MicroC/OS-II, Vx Works, Embedded Linux, Tiny OS, and Basic Concepts of Android OS.

Unit-I: Introduction

Introduction to Unix/Linux, Overview of Commands, File I/O (open, create, close, lseek, read, write), Process Control (fork, vfork, exit, wait, waitpid, exec).

Unit - II:

Real Time Operating Systems

Brief History of OS, Defining RTOS, The Scheduler, Objects, Services, Characteristics of RTOS, Defining a Task, Tasks States and Scheduling, Task Operations, Structure, Synchronization, Communication and Concurrency.

Defining Semaphores, Operations and Use, Defining Message Queue, States, Content, Storage, Operations and Use

Unit - III:

Objects, Services and I/O

Pipes, Event Registers, Signals, Other Building Blocks, Component Configuration, Basic I/O Concepts, I/O Subsystem

Unit - IV:

Exceptions, Interrupts and Timers

Exceptions, Interrupts, Applications, Processing of Exceptions and Spurious Interrupts, Real Time Clocks, Programmable Timers, Timer Interrupt Service Routines (ISR), Soft Timers, Operations.

Unit - V:

Case Studies of RTOS

RT Linux, Micro C/OS-II, Vx Works, Embedded Linux, Tiny OS, and Basic Concepts of Android OS.

Text books:

1. Real Time Concepts for Embedded Systems – Qing Li, Elsevier, 2011

Reference books:

1. Embedded Systems- Architecture, Programming and Design by Rajkamal, 2007, TMH.
2. Advanced Unix Programming, Richard Stevens
3. Embedded Linux: Hardware, Software and Interfacing – Dr. Craig Hollabaugh

Course Outcomes:

At the end of the course, the student will be able to:

1. Explain how to work on basic commands on the UNIX/LINUX Operating Systems.
2. Recognise the different operations and uses of real time operating systems.
3. Distinguish the Objects, Services and I/O of real time operating systems like Pipes, Event Registers, Signals, Other Building Blocks, Component Configuration, Basic I/O Concepts, I/O Subsystem.
4. Apply the different types of Exceptions, Interrupts and Timers on real time operating systems.
5. Acquire qualitative knowledge about the different types of embedded real time operating systems

(A2436) DIGITAL SIGNAL PROCESSING LAB

B. Tech. (ECE) VII-Semester

L	T	P	C
0	0	3	2

Course Objectives:

This course is an essential course that provides design techniques for processing all type of signals in various fields. The main objectives are:

- To provide background and fundamental material for the analysis and processing of digital signals.
- To familiarize the relationships between continuous – time and discrete – time signals and systems.
- To study fundamentals of time, frequency and Z – plane analysis and to discuss inter - relationships of these analytic method.
- To study the designs and structures of digital (IIR and FIR) filters from analysis to synthesis for a given specifications.
- The impetus is to introduce a few real – world signal processing applications.
- To acquaint in FFT algorithms, Multi – rate signal processing techniques and finite world length effects

Note:

- Minimum of 12 experiments are to be conducted.
- The programs shall be implanted in software (using MATLAB / LAB VIEW / C programming /OCTAVE or Equivalent) and hardware (Using TI / Analog devices / Motorola / Equipment DSP processors).

List of Experiments

1. Generation of Sinusoidal waveform / signal based on recursive difference equations.
2. To find DFT/IDFT of given DT signal
3. To find frequency response of a given system given in (Transfer Function / Differential equation form).
4. Implementation of FFT of given sequence
5. Determination of Power Spectrum of a given signal(s).
6. Implementation of LP FIR filters for a given sequence.
7. Implementation of HP FIR filters for a given sequence.
8. Implementation of LP IIR filters for a given sequence.
9. Implementation of HP IIR filters for a given sequence.
10. Generation of Sinusoidal signal through filtering
11. Implementation of Decimation Process.

12. Implementation of Interpolation Process.
13. Implementation of I/D sampling rate converters.
14. Impulse response of first order systems.
15. Impulse response of second order systems.

Course Outcomes:
On completion of this subject, the students should be able to:

1. Perform Time, Frequency and Z- transform analysis on signals and systems.
2. Apply z-transform, DTFT, DFT and FFT to analyze and design DSP systems.
3. Analyze and Observe Magnitude and phase characteristics (Frequency response Characteristics) of digital filters.
4. Design Multi-rate filters for various applications of DSP.

(A2437) VLSI LAB

B. Tech. (ECE) VII-Semester

L	T	P	C
0	0	3	2

Course objective

The objective of the course is to

- To identify the Design rules for Layout design.
- To define the concepts of Physical verification, placement & routing, timing analysis and power analysis of the circuits.
- To describe the usage of EDA tools in the design, analysis and simulation of VLSI circuits.
- To apply the concept of placement and routing using CAD Tools.

Experiments

1. Introduction to layout design rules
2. Layout, physical verification, placement & route for complex design, static timing
3. Analysis, IR drop analysis and crosstalk analysis of the following circuits
4. Basic logic gates
5. CMOS inverter
6. CMOS NOR/NAND gates
7. CMOS XOR and MUX gates
8. CMOS 1-bit full adder
9. Static/Dynamic logic circuit (register cell)
10. Latch
11. Pass transistor
12. Layout of any combinational circuit (complex CMOS logic gates)-learning about data paths
13. Introduction to SPICE simulation and coding of NMOS/CMOS circuit
14. SPICE simulation of basic analog circuits: Inverter/Differential amplifier
15. Analog Circuit simulation (AC analysis)-CS & CD amplifier
16. System level design using PLL

Course Outcomes:
Upon successfully completing the course, the student should be able to:

1. Design and analyze the performance the VLSI Circuits using EDA tools.
2. Estimate the timing simulation and summarize performance analysis.
3. Create the layout of any circuit and verify the design rules.
4. Implement and simulate any analog circuit using SPICE simulator.
5. Analyze the performance parameters of any Analog circuit in SPICE.

VIII SEMESTER

(A2022) MANAGEMENT SCIENCE

L	T	P	C
4	0	0	4

B. Tech. (ECE) VIII-Semester

Objectives:

- Understand the concepts of management Administration and find & the difference between Organizing and organization and principles of Organization.
- Identifies the factors determining plant location and explain the concepts of plant layout, marketing functions and the concepts of marketing and selling and channels of distribution.
- Understand the concept of job analysis, job description and job specification and the concepts of network, PERT and CPM& Understanding the direct cost and indirect cost.
- To identify the internal and external environmental factors and SWOT Analysis.
- The widely known concepts and practices prevalent in modern business and service Organization.

Unit -I

Introduction to Management & Organization: Introduction to Management : Concepts of Management and organization- nature, importance and Functions of Management, Taylor's Scientific Management Theory, Fayol's Principles of Management, Mayo's Hawthorne Experiments, Maslow's Theory of Human Needs, Douglas McGregor's Theory X and Theory Y, Herzberg's Two-Factor Theory of Motivation, Systems Approach to Management, Leadership Styles, Social responsibilities of Management.

Unit -II

Operations & Marketing Management: Principles and types of plant layout-Methods of Production, Work study Basic procedure involved in method study and Work Measurement-Business process reengineering Statistical Quality Control: control charts for variables and Attributes and Acceptance sampling, Total Quality Management (TQM), Six sigma, Deming's contribution to quality, objectives of inventory control EOQ, ABC Analysis, Purchase Procedure, Stores Management and Stores Records. JIT System, Supply chain management functions of marketing, marketing mix, marketing Strategies based on product life cycle, channels of distribution.

Unit -III

Human Resource Management: Human Resources Management (HRM) : Concepts of HRM, HRD and Personnel Management and Industrial Relations (PMIR), HRM vs. PMIR, Basic functions of HR Manager: Manpower planning, Recruitment, Selection, Training and Development, Placement, Wage and Salary Administration, Promotion, Transfer, Separation, Performance Appraisal, Grievance Handling and Welfare Administration, Job EvaluationandMeritRating.CapabilityMaturityModel,Levels-Performance Management System.

Unit -IV

Project Management: Project Management (PERT/CPM) : Network Analysis, Programme Evaluation and Review Technique (PERT), Critical Path Method (CPM), Identifying critical path, Probability of Completing the project within given time, Project Cost Analysis, Project Crashing. (simple problems)

Unit- V

Strategic Management and Contemporary Strategic Issues: Strategic Management : Mission, Goals, Objectives, Policy, Strategy, Programmes, Elements of Corporate Planning Process, Environmental Scanning, Value Chain Analysis, SWOT Analysis, Steps in Strategy Formulation and Implementation, Generic Strategy alternatives. Bench Marking and Balance Score Card as contemporary Business Strategies.

Text Books:

1. Aryasri: Management Science, McGraw Hill,2012.
2. Vijay kumar and Apparao Management Science, Cenage, 2012.

References:

1. Kotler Philip & Keller Kevin Lane: Marketing Mangement,pearson,2012
2. Koontz &Weihrich: Essentials of Management, McGraw Hill, 2012.
3. Thomas N.Duening& John M.Ivancevich Management—Principles and Guidelines, iztantra,2012.
4. KanishkaBedi, Production and Operations Management, Oxford University Press, 2012.
5. Schermerhorn, Capling, Poole &Wiesner: Management, Wiley, 2012.. Parnell: Strategic Management, Cengage2012.

6. Lawrence R Jauch, R.Gupta & WilliamF.Glueck: Business Policy and Strategic Management, Frank Bros.2012.

Course Outcomes:

On completion of the course students will be able to

1. Apply management skills and demonstrate leadership qualities in the practical situation.
2. Analyze the statistical data for drawing inference to make decisions and understand the volatility of market.
3. Exhibit higher level of proficiency in understanding the human behavior in different conditions.
4. So problems to cope with future uncertain with PERT/CPM.
5. Formulate and implement strategies and understand the importance of being visionary in achieving goals using SWOT analysis.

(A2363) ELEMENTS OF MECHANICAL ENGINEERING
(Open Elective-II offered by ME Department)

B.Tech (ECE): VIII Semester

L T P C
3 0 0 3

Course objective

The content of this course shall provide the student the basic concepts of various mechanical systems and exposes the student to a wide range of equipment and their utility in a practical situation. It shall provide the fundamentals of Steam, I.C. Engines, compressors, manufacturing methods and transmission systems that usually exist in engineering.

Unit –I:

Steam boilers: Classification of boilers, essentialities of boilers, selection of different types of boilers, study of boilers, boiler mountings and accessories. Performance of boilers, working principle of steam turbines.

Unit-II:

Metal joining: Arc welding, resistance welding, gas welding, brazing and soldering Metal forming: forging – operations, rolling and extrusion principles

Machine tools: Lathe classification, specifications, and operations.

Casting: Steps involved in making a casting – Advantages and applications. – Patterns and Pattern making

Unit-III:

Reciprocating and rotary air compressors: uses of compressed air, types, working principle, work done, simple problems.

Refrigeration: concepts, principle of refrigeration and types of refrigeration.

Unit-IV:

Internal combustion engines: classification of IC engines, basic engine components and nomenclature, working principle of engines, Four strokes and two stroke petrol and diesel engines, comparison of CI and SI engines, comparison of four stroke and two stroke engines, simple problems such as indicated power, brake power, friction power, specific fuel consumption, brake thermal efficiency, indicated thermal efficiency and mechanical efficiency.

Unit-V:

Belts –Ropes : belt and rope drives, velocity ratio, slip, length of belt , open belt and cross belt drives, ratio of friction tensions, centrifugal tension in a belt, power transmitted by belts and ropes, initial tensions in the belt, simple problems.

Gear trains: classification of gears, gear trains velocity ratio, simple, compound and reverted gear trains and simple problems.

Text Books:

1. Mechanical Engineering Science/ K R Gopala Krishna/ Subhas publications
2. Thermal Engineering/ Ballaney, P.L/ Khanna Publishers, 2003
3. Elements of Mechanical Engineering / A.R.Asrani, S.M.Bhatt and P.K.Shah/ B.S. Publs**.**
4. Elements of Mechanical Engineering/ M.L.Mathur, F.S.Metha & R.P.Tiwari/ Jain Brothers, 2009
5. Production Technology / P.N.Rao/ McGraw-Hill publications
6. Theory of Machines/ S.S. Rattan/ Tata McGraw Hill , 2004 & 2009

Course outcomes:

After completing the course, the student shall be able to

1. Select different mechanical elements and manufacturing processes.
2. Evaluate the performance of Boilers, I.C Engines and Compressors.
3. Analyze power transmission by belt, rope, chain and gear trains.

(A2517) INFORMATION SECURITY
(Open Elective - II: offered by CSE Department)

B.Tech (ECE) **L T P C**
3 0 0 3

Objectives

- Explain the objectives of information security
- Explain the importance and application of each of confidentiality, integrity, authentication and availability
- To understand various cryptographic algorithms
- To understand the basic categories of threats to computers and networks

Unit I:

Attacks on Computers and Computer Security: Introduction to Information Security, the need for security, Security approaches, Principles of Security, Types of Security attacks, Security Services, Security Mechanisms, A model for Network Security.

Cryptographic Techniques: Introduction, plain text and cipher text, substitution Techniques, transposition techniques, encryption and decryption, symmetric and asymmetric key cryptography, steganography, Key range and key size, possible types of attacks.

Unit II:

Symmetric Key Ciphers: Block cipher principles, DES, AES, Blowfish, Differential and linear cryptanalysis, Block cipher modes of operations, stream ciphers, RC4, location and placement of encryption function, key distribution

Asymmetric key Ciphers: Principles of public key cryptosystems, key distribution, RSA, Diffie-Hellman key exchange, ECC algorithms.

Unit III:

Message Authentication Algorithms and Hash Functions: Authentication Requirements, Functions, Message Authentication Codes, Hash Functions, Secure Hash Functions, HMAC, CMAC, Digital Signatures, Knapsack algorithm.

Authentication Applications: Kerberos, X.509 authentication Services, Public key Infrastructure, Biometric Authentication.

Unit IV:
E-Mail-Security: Pretty Good Privacy, S/MIME
IP Security: IP Security Overview, IP Security Architecture, Authentication Header, Encapsulating Security payload, Combining Security associations, Key management.

Unit V:
Web Security: Web Security Considerations, Secure Socket Layer and Transport layer Security, Secure Electronic transaction,
Intruders, Virus & Firewall: Intruders, intrusion detection, Virus and virus related threats, Counter measures, Firewall design principles, Types of firewalls password management.
Case studies on Cryptography and Security: Secure Inter-branch payment transaction, Cross site scripting Vulnerability, Virtual Elections

Textbooks:
1. Cryptography and Network Security : William Stallings, Pearson Education, 4th Edition
2. Cryptography and Network Security : Atul Kahate, Mc Graw Hill, 2nd Edition

References:
1. Cryptography and Network Security: C.K.Shyamala, N. Harani, Dr.T.R. Padmanabhan, Wiley India, 1st Edition.
2. Cryptography and Network Security: Forouzan Mukhopadhyay, Mc Graw Hill, 2nd Edition
3. Information Security, Principles and Practice: mark stamp, Wiley India.
4. Principles of Computer Security: WM. Arthur Conklin, Greg White, TMH
5. Introduction to Network Security: Neal Krawetz, CENGAGE Learning
6. Network Security and Cryptography: Bernard Menezes CENGAGE Learning

Course Outcomes
On completion of the course students will be able to
1. Describe public key cryptosystem
2. Describe the enhancement made to IPV4 by IPSec
3. Discuss the fundamental ideas of public key cryptography
4. Generate and distribute a PGP key pair and use the PGP package to send an encrypted email message.
5. Discuss web security and firewalls

(C2164) ENTREPRENEURSHIP
(Open Elective - II: Open Elective offered by MBA)

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B.Tech (ECE): VIII Semester

Aim: The aim of this subject is to inspire students to become entrepreneurs so that they will emerge as job providers rather than job seekers.
Learning Outcome: By the end of this course the students should be able to understand the mindset of the entrepreneurs, identify ventures for launching, develop an idea on the legal framework and also understand strategic perspectives in entrepreneurship.

Unit I:
Understanding Entrepreneurial Mindset- The revolution impact of entrepreneurship- The evolution of entrepreneurship- Approaches to entrepreneurship- Process approach- Twenty first centaury trends in entrepreneurship.

Unit II:
The individual entrepreneurial mind-set and Personality- The entrepreneurial journey- Stress and the entrepreneur- the entrepreneurial ego- Entrepreneurial motivations. Corporate Entrepreneurial Mindset- the nature of corporate entrepreneur- conceptualization of corporate entrepreneurship Strategy-sustaining corporate entrepreneurship.

Unit III:
Launching Entrepreneurial Ventures- opportunities identification- entrepreneurial Imagination and Creativity- the nature of the creativity process-Innovation and entrepreneurship. Methods to initiate Ventures-Creating new ventures-Acquiring an Established entrepreneurial venture-Franchising-hybrid- disadvantage of Franchising.

Unit IV:
Legal challenges of Entrepreneurship-Intellectual property protection-Patents, Copyrights-Trade marks and Trade secrets-Avoiding trademark pitfalls. Formulation of the entrepreneurial Plan- The challenges of new

venture start-ups, Poor financial Understanding-Critical factors for new venture development-The Evaluation process-Feasibility criteria approach.

Unit V:

Strategic perspectives in entrepreneurship- Strategic planning-Strategic actions- strategic positioning-Business stabilization- Building the adaptive firms-Understanding the growth stage-Unique managerial concern of growing ventures.

Journal :

- **The Journal of Entrepreneurship,** Entrepreneurship Development Institute of India, Ahmedabad
- **Journal of Human Values** : IIM Calcutta.

References:

1. D F Kuratko and T V Rao "Entrepreneurship- A South-Asian Perspective "Cengage Learning, 2012. **(For PPT, Case Solutions Faculty may visit : login.cengage.com)**
2. Vasant Desai "Small Scale industries and entrepreneurship" Himalaya publishing 2012.
3. Rajeev Roy "Entrepreneurship" 2e, Oxford, 2012.
4. B.Janakiram and M.Rizwana" Entrepreneurship Development :Text & Cases, Excel Books,2011.
5. Stuart Read, Effectual Entrepreneurship, Routledge, 2013.
6. Robert Hisrich et al "Entrepreneurship" 6th e, TMH, 2012.
7. Nandan H, Fundamentals of Entrepreneurship, PHI, 2013
8. Shejwalkar, Entrepreneurship Development, Everest, 2011
9. Khanka, Entrepreneurship Development, S. Chand, 2012

Course Outcomes

On Completion of the course, students will be able to

1. Explain importance of entrepreneurship.
2. Apply the legal competency to run the enterprise successfully.
3. Explain the process used to launch an entrepreneurial venture.
4. Adopt appropriate methods to the demanding situations to become a successful entrepreneur.

(A2246) POWER SYSTEM ENGINEERING
(Open Elective - II: offered by EEE)

B.Tech (ECE): VIII Semester

L	T	P	C
3	0	0	3

Unit-I: Power Generating Stations

Thermal Power Stations: Line diagram of Thermal Power Station (TPS) showing paths of coal, steam, water, air, ash and flue gases.- Brief description of TPS components: Economizers, Boilers, Super heaters, Turbines, Condensers, Chimney and Cooling towers.

Hydro Electric Power station: Elements of hydroelectric power station-types-concept of pumped storage plants-storage requirements, mass curve (explanation only) estimation of power developed from a given catchment area: head and efficiencies.

Gas and Nuclear Power Stations Nuclear Power Stations: Nuclear Fission and Chain reaction.- Nuclear fuels- Principle of operation of Nuclear reactor.-Reactor Components: Moderators, Control rods, Reflectors and Coolants.- Radiation hazards: Shielding and Safety precautions-

Unit-II: Performance of Transmission Lines

Classification of Transmission Lines - Short, medium and long line and their model representations - Nominal-T, Nominal-Pie and A, B, C, D Constants for symmetrical & Asymmetrical Networks - Long Transmission Line-Rigorous Solution, evaluation of A,B,C,D Constants,

Underground Cables

Types of Cables, Construction, Types of Insulating materials, Calculations of Insulation resistance and stress in insulation, Capacitance of Single Core cable.

Unit-III: Distribution Systems

D.C. Distribution Systems: Classification of Distribution Systems - Comparison of DC vs AC and Under-Ground vs Over-Head Distribution Systems- Radial D.C Distributor fed at one end and at both the ends (equal/unequal Voltages) and Ring Main Distributor.

A.C. Distribution Systems: Voltage Drop Calculations in A.C. Distributors for the following cases: Power Factors referred to receiving end voltage and referred to respective load voltages.

Unit-IV: Power System Protection.
Causes of over voltage, principle of operation and construction of lightning arrestors, circuit breakers and relays and their classification, significance of fuses and classification, construction of HRC fuse.
Neutral grounding: Solid, resistance, reactance-arching grounds and grounding practices

Unit-V: Power factor correction and Voltage Control: Causes of low p.f - Methods of Improving p.f -Phase advancing and generation of reactive kVAR using static Capacitors-Most economical p.f. for constant kW load and constant kVA type loads, Numerical Problems. Dependency of Voltage on Reactive Power flow.- Methods of Voltage Control: Shunt Capacitors, Series Capacitors, Synchronous Capacitors, Tap changing and Booster Transformers

Text Books
1. A Text Book on Power System Engineering by M.L.Soni, P.V.Gupta, U.S. Bhatnagar, A. Chakrabarthy, Dhanpat Rai & Co Pvt. Ltd.
2. Electrical power systems - by C.L. Wadhwa, New Age International (P) Limited, Publishers, 1998.

Reference Books
1. Elements of Power Station design and practice by M.V. Deshpande, Wheeler Publishing.
2. Electrical Power Generation, Transmission and Distribution by S.N.Singh., PHI, 2003.
3. Gas turbine performance, by PP Wals, P.Fletcher, Blackwell Publisher, 2004.
4. Principles of Power Systems by V.K Mehta and Rohit Mehta S.CHAND & COMPANY LTD., New Delhi 2004.
5. Power system Analysis-by John J Grainger William D Stevenson, TMC Companies, 4th edition
6. Power System Analysis and Design by B.R.Gupta, Wheeler Publishing.
7. Power System Analysis by Hadi Saadat – TMH Edition.
8. Electrical Power Transmission system engineering Analysis and design by Turan Gonen, CRC press (Taylor & Francis Group) Special Indian Edition,2/e.

Course Outcomes

On Completion of the course, students will be able to

1. Explain the operation and design of different power plants.
2. Describe the factors involved in the designing of a DC and AC distribution systems.
3. Demonstrate the causes for low power factor, voltage drop and methods to improve them
4. Elucidate different factors involved in economizing power generation.

(A2241) RENEWABLE ENERGY SOURCES
(Open Elective - III: offered by EEE)

B.Tech (ECE): VIII Semester

L T P C
3 0 0 3

Course Objective

It introduces solar energy its radiation, collection, storage and application. It also introduces the Wind energy, Biomass energy, geothermal energy and ocean energy as alternative energy sources.

Unit – I: Solar Energy

Principles of solar radiation: Role and potential of new and renewable source, the solar energy option, Environmental impact of solar power, physics of the sun, the solar constant, extraterrestrial and terrestrial solar radiation, solar radiation on titled surface, instruments for measuring solar radiation and sun shine, solar radiation data.

Solar energy collection: Flat plate and concentrating collectors, classification of concentrating collectors, orientation and thermal analysis, advanced collectors.

Storage and applications: Different methods, Sensible, latent heat and stratified storage, solar ponds. Solar Applications- solar heating/cooling technique, solar distillation and drying, photovoltaic energy conversion.

Unit-II: Wind energy

Sources and potentials, horizontal and vertical axis windmills, performance characteristics, Betz criteria

Unit-III: Bio-mass

Principles of Bio-Conversion, Anaerobic/aerobic digestion, types of Bio-gas digesters, gas yield, combustion characteristics of bio-gas, utilization for cooking, I.C.Engine operation and economic aspects.

Unit-IV: Geothermal energy

Resources, types of wells, methods of harnessing the energy, potential in India.

Ocean energy: OTEC, Principles utilization, setting of OTEC plants, thermodynamic cycles. Tidal and wave energy: Potential and conversion techniques, mini-hydel power plants, and their economics.

Unit-V: Direct energy conversion
Need for DEC, Carnot cycle, limitations, principles of DEC.

Text Books
1. Non-Conventional Energy Sources /G.D. Rai
2. Renewable Energy Technologies /Ramesh & Kumar /Narosa

Reference Books
1. Renewable energy resources/ Tiwari and Ghosal/ Narosa.
2. Non-Conventional Energy / Ashok V Desai /Wiley Eastern.
3. Non-Conventional Energy Systems / K Mittal /Wheeler
4. Solar Energy /Sukhame

Course Outcomes
On Completion of the course, students will be able to

1. Interpret the principles of solar radiation, collection and application.
2. Explain the concepts of Wind energy generation
3. Demonstrate the concepts of Bio-mass energy and operation of IC engines
4. Illustrate the perception of Geo-thermal energy and production in India
5. Elucidate the ideology of direct energy conversion

(A2156) REMOTE SENSING & GIS
(Open Elective - III: Offered by CE Department)

B.Tech (ECE): VIII Semester

L	T	P	C
3	0	0	3

Unit -I

Introduction to Photogrammetry: Principles & types of aerial photograph, geometry of vertical aerial photograph, Scale & Height measurement on single vertical aerial photograph, Height measurement based on relief displacement, Fundamentals of stereoscopy, fiducial points, parallax measurement using fidcial line.

Unit - II

Remote Sensing: - Basic concept of Remote sensing, Data and Information, Remote Sensing data collection, Remote sensing advantages & Limitations, Remote sensing process.

Electro-magnetic Spectrum, Energy interactions with atmosphere and with earth surface features (Soil, Water, Vegetation), Indian Satellites and Sensors characteristics, Resolution, Map and Image and False color composite, introduction to digital data, elements of visual interpretation techniques.

Unit -III

Geographical Information Systems: Introduction to GIS; Components of a GIS; Geospatial Data: Spatial Data - Attribute Data - joining Spatial and Attribute Data; GIS operations: Spatial Data input- Attribute data Management - Data display - Data Exploration - Data Analysis. COORDINATE SYSTEMS: Geographic Coordinate System: Approximation of Earth, Datum; Map Projections; Types of Map Projection parameters - Commonly used Map Projections - Projected Coordinate Systems.

Unit- IV

Vector Data Model: Representation of simple features - Topology and its importance; coverage and its data structure, Shape file; Data Models for composite features Object Based Vector Data Model; Classes and Their Relationship; The Geobase Data model; Geometric representation of spatial Feature and Data Structure, Topology rules.

Unit -V

Raster Data Model: Elements of Raster data Model, Types of Raster Data, Raster Data Structure, Data Conversion, Integration of Raster and Vector data.

Data Input: Metadata, Conversion of Existing data, creating new data; Remote Sensing data, Field data, Text data, Digitizing, Scanning, on Screen digitizing, importance of source map, Data Editing.

Text Books:

1. Remote Sensing and its applications by LRA Narayana University Press 1999.
2. Principals of Geo Physical Information Systems – Peter A Burragh and Rachael A. Mc Donnell, Oxford Publishers 2004.

References:

1. Concepts & Techniques of GIS by C.P.Lo Albert, K.W. Yonng, Prentice Hall (India)
2. Remote Sensing and Geographical Information systems by M.Anji Reddy JNTU Hyderabad 2001, B.S. Publications.
3. GIS by Kang – Tsung Chang, TMH Publications & Co.,
4. Basics of Remote sensing & GIS by S. Kumar, Laxmi Publications.
5. Fundamental of GIS by Mechanical Designs John Wiley & Sons.

Course Outcomes:

On Completion of the course, students will be able to

1. Explain the concepts of Photogrammetry and Remote Sensing Technology.
2. Acquire skills in handling instruments, tools, techniques and modeling while using Remote Sensing Technology.
3. Explain the topology, data structure with GIS.
4. Explain the Vector and Rester models using data inputs from the maps.

(A2562) FUNDAMENTALS OF WEB TECHNOLOGIES
(Open Elective - III: offered by CSE Department)

B.Tech (ECE): VIII Semester

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Objectives:

- To design and develop web pages using html5, CSS positioning, servlets and JDBC.
- Understanding and writing a well-formed XML schemas and documents.
- Using JSP as view component in MVC based web applications.

Unit-I

Introduction to Web Technologies:

History of the Web, OSI Reference Model, Understanding Web System Architecture, Understanding 3-Tier Web Architecture Web Browsers-Retrieving Documents on the Web: The URL and Domain Name System, Overview of HTTP- Sending the Request, The Server Response, Using Cookies to Remember User Information, Exploring Web Technologies HTML, Introduction to XML, JavaScript, PHP

Unit-II

HTML: Introducing HTML Document Structure, Creating Headings on a Web Page, Working with Links, Creating a Paragraph, Working with Images, Working with Tables, Working with Frames, Introduction to Forms and HTML Controls, Introducing Cascading Style Sheets

Unit-III

Introduction to XML, XML document structure, Document Type Definition, Namespaces, XML Schemas, Displaying raw XML documents, Displaying XML documents with CSS, X Path Basics, XSLT, XML Processors.

Unit-IV

Introduction to Java script, java script and forms Variables, Functions, Operators, Conditional statements and Loops, Arrays DOM, Strings, Event and Event Handling, Java Script Closures.

Introduction to Ajax, Pre-Ajax java Script Communication techniques, XML Http Request Object, Data formats, Security Concerns, User Interface design for Ajax. Introduction to Python, Objects and Methods, Flow of Control, Dynamic web pages.

Unit-V

Introduction to PHP: Overview of PHP, General Syntactic Characteristics, Primitives, Operations, Expressions, Control Statements, Arrays, Functions, Pattern matching, Form handling, Files, Cookies, Session Tracking. Database access Through Web: Architectures for Database Access- Database access with Perl - Database access with PHP-Database access with JDBC

Text Books:

1. Web Technologies Black Book. Kogent Learning Solutions Inc. Dreamtech Press, 2009
2. Wendy Willard "HTML5" McGraw Hill Education (India) Edition, 2013

References

1. Powell, The Complete Reference AJAX, Tata-McGraw-Hill, 2011.
2. John Pollock, "Java Script" Fourth Edition, McGraw Hill Education (India) Edition,2013.
3. Jim Keogh, The Complete Reference I2EE, Tata-McGraw-Hill, 2002.

Outcomes:

On Completion of the course, students will be able to

1. Explain how www works
2. Develop simple web forms
3. Write XML scripts
4. Write simple java script programs
5. Write simple python programs

(C2165) BASICS OF INSURANCE & TAXATION
(Open Elective - III: offered by MBA Department)

B.Tech (ECE): VIII Semester

L T P C
3 0 0 3

(Students must read text book. Faculty are free to choose any other cases)

Course Objective:
The Objective of the course is to provide the candidates with sound knowledge of the important provisions of the Income Tax law and their applications.

Unit I: Introduction to Life Insurance and General Insurance : Introduction to Life Insurance - Principles of Life Insurance - Life insurance products, pensions and annuities , Introduction to General Insurance. Principles of General Insurance. Types of General Insurance - Personal general insurance products (Fire, Personal Liability, Motors, Miscellaneous Insurance). Terminology, clauses and covers.

Unit II: Claim Management & Re-Insurance : Claim Management - Claim Settlement - Legal Framework - Third party Administration, Insurance ombudsman - Consumer Protection Act - Re-Insurance in Life Insurance - Retention Limits - Methods of Re-insurance.

Unit III: General Perspectives and Income Tax rate Structure: Historical background of Taxation Laws in India, Fundamental Principles of Income Tax and concepts, Government Financial Policies regarding Taxation. Tax structure and its Role in Indian Economy, Residential Status, Non Resident persons & Non Ordinary Resident, Previous year and Assessment year Tax: Fees and Cess, Capital Expenditure and Capital Income. Revenue Expenditure and Revenue Income, Tax Evasion and Tax Avoidance, Direct and Indirect Taxes.

Unit IV:
Heads and Sources of Income and Exemptions & Deductions under the Income Tax: Salary and Fringe Benefit Tax, Income from House Property, Income from Business; Profession or Vocation, Capital Gains, Income from

other sources. (Theory only), Exemptions & Deductions under the Income Tax Act, Income exempt u/s 10 of the I.T. Act, Permissible deductions under Chapter VI of I.T. Act, Relief, Double Taxation Relief.

Unit V:

Assessment Procedures: PAN AND TAN, Filing of return and e-filling, Advance payment of Tax, Tax deduction at source, Tax Collection at Source, Refund of Tax, and Types of Assessment. Computation of Income in Individuals

Reference Books:

1. Dr H C Meharotra and Dr S P Goyal – Income Tax Law & Accounts: Sahitya Bhavan Publications.
2. Direct Taxes & Practice : Dr. V K Singhania, Taxman Publications.
3. Gour and Narang - Income Tax Law and Practice, Kalyani Publication
4. Taxation: H.Prem raja - Sri Hamsrala publications
5. Practicals in Taxation: H. Prem raja - Sri Hamsrala publications.
6. Income Tax: B.B. Lal, Pearson Education
7. Taxation: R.G. Saha, Himalaya Publishing House Pvt. Ltd
8. Income Tax: Johar, McGraw Hill Education
9. Taxation Law and Practice: Balachandran & Thothadri, PHI Learning

Course Outcomes:

On Completion of the course, students will be able to

1. Explain the basic legal concepts and general principles of Insurance sector.
2. Describe basic insurance terminology and how insurance works.
3. Implement claim management and settlement.
4. Explain the importance of income tax and its structure
5. Prepare tax assesments, computation of individual Incomes
6. Analyze tax exemptions and deductions of income tax.
7. Explain the producedure for filing e-filing Tax, ITDS, PAN & TAN.

(A2245) ELECTRICAL MACHINES AND DRIVES
(Open Elective-III: Offered by EEE Department)

B.Tech (ECE): VIII Semester

L T P C
3 0 0 3

Course Objectives

- To understand the basic concepts of different types of electrical machines and their performance.
- To study the different methods of starting D.C motors and induction motors.
- To study the conventional and solid-state drives

Unit I: Introduction

Basic Elements – Types of Electric Drives –Block diagram- factors influencing the choice of electrical drives – heating and cooling curves – Loading conditions and classes of duty – Selection of power rating for drive motors with regard to thermal overloading and Load variation factors

Unit II: Drive Motor Characteristics

Mechanical characteristics – Speed-Torque characteristics of various types of load and drive motors – Braking of Electrical motors – DC motors: Shunt, series and compound - single phase and three phase induction motors. Types of D.C Motor starters – Typical control circuits for shunt and series motors – Three phase squirrel cage and slip ring induction motors.

Unit III: Power Electronic Converters

Brief introduction to power electronics converters-Rectifiers, Choppers, AC-AC Converters, Inverters.

Unit IV: Conventional And Solid State Speed Control Of D.C. Drives

Speed control of DC series and shunt motors – Armature and field control, Ward Leonard control system - Using controlled rectifiers and DC choppers –applications.

Unit V: Conventional And Solid State Speed Control Of A.C. Drives

Speed control of three phase induction motor – Voltage control, voltage / frequency control, slip power recovery scheme – Using inverters and AC voltage regulators – applications.

Text Books

1. Vedam Subrahmaniam, "Electric Drives (concepts and applications)", Tata McGrawHill, 2001
2. Nagrath .I.J. & Kothari .D.P, "Electrical Machines", Tata McGraw-Hill, 1998

Reference Books

1. Pillai. S.K "A first course on Electric drives", Wiley Eastern Limited, 1998
2. M.D. Singh, K.B. Khanchandani, "Power Electronics", Tata McGraw-Hill, 1998
3. H.Partab, "Art and Science and Utilisation of electrical energy", Dhanpat Rai and Sons, 1994

Course Outcomes

On Completion of the course, students will be able to

1. Point out the factors influencing the choice of electric drives
2. Discriminate different characteristics of electric motors.
3. Illustrate various types of power electronic converters
4. Analyze the solid state speed control of DC drives
5. Elucidate the solid state speed control of AC drives