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	***Course Group/ Category***	***Course Description***	***Range of***

Classification			***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 Work	**Project Work**	B.Tech. Project or UG Project or UG Major Project	**10% to 15%**
	Industrial Training/ Mini- Project	Industrial Training/ Internship/ UG Mini-Project/ Mini-Project	
	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 $\geq$ 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 **i**th Course, and G_i represents the Grade Points (GP) corresponding to the Letter Grade awarded for that **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 ≥ 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 R15 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	
≥7.5	First Class with Distinction	**From the CGPA secured from 144 credits**
≥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–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.	In case of students of the college, they shall be expelled from 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	Cancellation of the performance in that Course and all other Courses the candidate has

	special scrutiny.	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

****

CMR COLLEGE OF ENGINEERING & TECHNOLOGY
(Autonomous)
Department of (EEE)

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 and become center of excellence through research in the areas of Electrical & Electronics Engineering.

Department Mission:
- To impart quality and contemporary education in the realm of Electrical & Electronics Engineering.
- To pursue research and new technologies in Electrical & Electronics Engineering and related disciplines in order to serve the needs of the society.

Program Educational Objectives:
PEO 1: Excel in their professional career and higher education in Electrical & Electronics Engineering and chosen fields.

PEO 2: Demonstrate leadership qualities, teamwork and professional ethics to serve the society.

PEO 3: Adapt to state of art technology through continuous learning in the areas of interest.

Program Outcomes:

PO1: Ability to apply knowledge of mathematics, science, and engineering

PO 2: Ability to identify, formulate, and solve engineering problems.

PO 3: Ability to design solutions for complex engineering problems with appropriate consideration for the society.

PO 4: Ability to use research-based knowledge and research methods including design of experiments to provide valid conclusions.

PO5: Ability to identify and solve engineering problems, using modern tools for complex design.

PO6: Ability to design a system within realistic constraints such as social, health and safety.

PO 7: Ability to understand the impact of engineering solutions in a global, economic, environmental, and societal context with sustainability.

PO 8: Commitment to professional ethics and responsibilities for engineering practice.

PO 9: Ability to function on multidisciplinary teams.

PO 10: Ability to communicate technical information through professional quality.

PO 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.

PO 12: Ability to engage in, lifelong learning.

B Tech (EEE) Course Structure

B.Tech (Electrical & Electronics Engineering)

I Semester

Course Code	Group	Course	L	T	P	C
A2001	HS	English	3	0	0	3
A2007	BS	Engineering Mathematics-I	3	1	0	3
A2012	BS	Engineering Physics -I	3	0	0	3
A2501	BS	Computer Programming through 'C'	3	1	0	3
A2308	ES	Engineering Drawing	2	0	4	4
A2002	HS	English Language Communication Skills Lab	0	0	3	2
A2014	ES	Engineering Physics Lab	0	0	3	2
A2549	ES	Computer Programming Lab	0	0	3	2
A2551	BS	IT Workshop	0	0	3	2
		Total	14	2	16	24

II Semester

Course Code	Group	Course	L	T	P	C
A2015	BS	Engineering Chemistry	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
A2502	ES	Data Structures through 'C'	3	1	0	3
A2201	PC	Network Theory-I	3	1	0	3
A2018	BS	Engineering Chemistry Lab	0	0	3	2
A2305	ES	Engineering Workshop	0	0	3	2
A2550	ES	Data Structures Lab	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
A2206	PC	Network Theory-II	3	1	0	3
A2202	PC	Electromagnetic Fields	4	1	0	4
A2317	ES	Fluid Mechanics & Hydraulic Machinery	3	1	0	3
A2401	ES	Electronic Devices & Circuits	4	1	0	4
A2203	PC	Electrical Machines-I	3	1	0	3
A2321	ES	Fluid Mechanics & Hydraulic Machinery Lab	0	0	3	2
A2404	ES	Electronic Devices & Circuits Lab	0	0	3	2
A2023	HS	Gender Sensitization	0	0	3	2
		Total	20	6	9	**26**

IV Semester

Course Code	Group	Course	L	T	P	C
A2204	PC	Power Systems-I	3	1	0	3
A2205	PC	Electrical Machines-II	4	1	0	4
A2019	HS	Environmental Studies	3	0	0	3
A2403	ES	Switching Theory & Logic Design	3	1	0	3
A2407	ES	Electronic, Pulse and Digital Circuits	3	0	0	3
A2207	PC	Control Systems	4	0	0	4
A2208	PC	Electrical Machines Lab -I	0	0	3	2
A2209	PC	Electrical Circuits & Simulation Lab	0	0	3	2
A2004	MC	Soft Skills and Professional Ethics	2	0	0	0
		Total	22	3	6	24

V Semester

Course Code	Group	Course	L	T	P	C
A2210	PC	Power Systems-II	4	1	0	4
A2021	HS	Managerial Economics & Financial Analysis	3	0	0	3
A2414	ES	Linear & Digital IC Applications	3	0	0	3
	PE	***Professional Elective I***	3	1	0	3
A2250	*EEE*	*Smart Electric Grid*				
A2213	*EEE*	*Linear System Analysis*				
A2212	*EEE*	*Optimization Techniques*				
A2214	PC	Power Electronics	3	1	0	3
A2215	PC	Electrical Machines-III	4	1	0	4
A2216	PC	Electrical Machines Lab– II	0	0	3	2
A2217	PC	Control Systems & Simulation Lab	0	0	3	2
A2005	MC	Analytical Skills-1	2	0	0	0
		Total	22	4	6	24

VI Semester

Course Code	Group	Course	L	T	P	C
A2218	PC	Power Semiconductor Drives	4	0	0	4
A2211	PC	Electrical Measurements & Instrumentation	3	0	0	3
A2219	PC	Power Systems-III	3	1	0	3
A2220	PC	Computer Methods in Power Systems	4	0	0	4
	PE	***Professional Elective II***	3	1	0	3
A2221	*EEE*	*Advanced Control Systems*				
A2222	*EEE*	*Non Conventional Energy Sources*				
A2223	*EEE*	*Principles of Reliability Engineering*				
A2419	*ECE*	*Digital Signal Processing*				
	PE	***Professional Elective III***	3	1	0	3
A2227	*EEE*	*FACTS Controllers*				
A2228	*EEE*	*Power Quality*				
A2229	*EEE*	*High Voltage Engineering*				

A2003	HS	Advanced English Communication Skills Lab	0	0	3	2
A2224	PC	Power Electronics & Simulation Lab	0	0	3	2
A2006	MC	Analytical Skills – II	2	0	0	0
		Total	22	3	6	24

VII Semester

Course Code	Group	Course	L	T	P	C
A2225	PC	Utilization of Electrical Energy	3	1	0	3
A2226	PC	Power System Operation & Control	3	0	0	3
A2460	ES	Basics of Microprocessors & Microcontrollers	3	1	0	3
	OE	***Open Elective I***	3	0	0	3
	PE	***Professional Elective IV***	3	1	0	3
A2231		*Extra High Voltage AC Transmission*				
A2232		*H V D C Transmission*				
A2233		*Digital Control Systems*				
	PE	***Professional Elective V***	3	1	0	3
A2234		*Neural Networks and Fuzzy Systems*				
A2235		*Energy Managmenet*				
A2236		*Industrial Automation and Control*				
A2417	ES	Microprocessors & Microcontrollers Lab	0	0	3	2
A2230	PC	Electrical Measurements Lab	0	0	3	2
A2237	P	Industry Oriented Mini Project	0	0	2	2
		Total	18	4	8	24

VIII Semester

Course Code	Group	Course	L	T	P	C
A2022	BS	Management Science	4	0	0	4
	OE	***Open Elective II***	3	0	0	3
	OE	***Open Elective III***	3	0	0	3
A2238	PW	Comprehensive Viva	0	0	0	2

A2239	PW	Technical Seminar	0	0	3	2
A2240	PW	Main Project	0	12	6	10
		Total	10	12	9	24

Total Credits of Programme(Excluding Gender Sensitization): 192

Open Electives			L	T	P	C
Open Elective I			3	0	0	3
A2451	*ECE*	*Microcontrollers and Applications*				
A2362	*ME*	*Material Science*				
A2510	*CSE*	*Database Management Systems*				
A2153	*CE*	*Solid and Hazardous Waste Management*				
Open Elective II			3	0	0	3
A2363	*ME*	*Elements of Mechanical Engineering*				
A2509	*CSE*	*JAVA Programming*				
A2157	*CE*	*Disaster Management and Mitigation*				
A2452	*ECE*	*Principles of Electronic Communications*				
Open Elective III			3	0	0	3
A2454	*ECE*	*Fundamentals of Embedded Systems*				
A2562	*CSE*	*Fundamentals of Web Technologies*				
A2155	*CE*	*Environmental Impact Assessment and Management*				
A2364	*ME*	*Elements of Automobile Engineering*				
C2165	*MBA*	*Basics of Insurance and Taxation*				

CMR COLLEGE OF ENGINEERING & TECHNOLOGY
(AUTONOMOUS)

DETAILED SYLLABUS

I SEMESTER

(A2001) ENGLISH

B. Tech. (EEE) I-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

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.

Reference Books

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.

(A2007) ENGINEERING MATHEMATICS-I

B. Tech. (EEE) I-Semester

L	T	P	C
3	1	0	3

Course Objectives:

- Obtain and understand formation and solution of matrices. Solutions of linear systems through matrices.
- Learn to find Eigen values, Eigen vectors and usage of Cayley-Hamilton Theorem. Understanding real & complex matrices and reduction to Canonical form.
- Develop the skills pertinent to the practice of mathematics and to formulate problems on continuous and differentiable functions.
- The areas of bounded regions can be found using methods of integrations.
- 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

B. Tech. (EEE) I-Semester

L	T	P	C
3	0	0	3

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.

(A2501) COMPUTER PROGRAMMING THROUGH 'C'

B.Tech(EEE) 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.

(A2308) ENGINEERING DRAWING
(Electrical & Electronics Engineering)

B.Tech (EEE): I Semester

L	T	P	C
2	0	4	4

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 (Using 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 and combinations
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

By undergoing this course, students will be

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.

(A2002) ENGLISH LANGUAGE COMMUNICATION SKILLS LAB

B. Tech. (EEE) I-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

By the end 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.

(A1014) ENGINEERING PHYSICS LAB

B.Tech EEE: I-Semester

L	T	P	C
0	0	3	2

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).

(A2549) COMPUTER PROGRAMMING LAB

B.Tech(EEE) 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.

(A2551) IT WORKSHOP

B.Tech(EEE) I 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)

II SEMESTER

(A2015) ENGINEERING CHEMISTRY
(Common to CSE, ECE&EEE)

B.Tech (EEE) II-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.

(A2008) ENGINEERING MATHEMATICS-II

B.Tech (EEE) II-Semester

L	T	P	C
3	1	0	3

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 EEE II-Semester

L	T	P	C
3	1	0	3

Course Objectives

- Obtain an intuitive and working understanding of some Mathematical Methods for the basic problems of numerical analysis.
- Develop some experience in the implementation of numerical methods in engineering applications by using a computer.
- Solutions of Ordinary Differential Equations using numerical methods.
- 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.
- 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

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

B.Tech EEE II-Semester

L	T	P	C
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

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.

(A2502) DATA STRUCTURES THROUGH 'C'

B.Tech EEE 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:

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.

(A2201) NETWORK THEORY – I

B.Tech (EEE) II-Semester

L	T	P	C
3	1	0	3

Objective

This course introduces the basic concepts of circuit analysis which is the foundation for all 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.

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 and Delta-to-Star transformation, Nodal analysis, Mesh Analysis, Super Node and Super Mesh for D.C.excitations.

Unit – II: Single Phase 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 – Concept of Reactance, Impedance, Susceptance and Admittance – Phase and Phase difference – Concept of power factor, Complex power, Real and Reactive powers – J-notation, Complex and Polar forms of representation.

Unit – III: Locus diagrams, Resonance & Magnetic Circuits

Locus diagrams – Series R-L, R-C and parallel combination with variation of various parameters – Resonance – Series, Parallel circuits, concept of band width and Q factor.

Magnetic circuits-Faraday's laws of electromagnetic induction-concept of self and mutual inductance, Dot convention-Coefficient of coupling, Composite Magnetic Circuit-analysis of series and parallel magnetic circuits.

Unit – IV: Network topology

Definitions-Graph-Tree, Basic cutset and Basic Tieset matrices for planar networks-Loop and Nodal methods of analysis of Networks with dependent & independent voltage and current sources-Duality & Dual networks

Unit – V: Network theorems (with DC & AC)
Tellegen's, Superposition, Reciprocity, Thevenin's, Norton's. Maximum Power Transfer, Millman's and Compensation theorems for DC & AC excitations.

Text Books
1. Engineering Circuit Analysis – by William Hayt and Jack E. Kimmerly, Mc Graw Hill Company, 6th edition.
2. Circuits & Networks by A.Sudhakar and Shyammohan S Palli,Tata McGraw-Hill
3. Electric Circuits by A.Chakrabarthy,Dhanipat Rai & Sons

Reference Books
1. Network Analysis by M.E.Van Valkenberg.
2. Linear Circuit Analysis (time domain phasor and Laplace transform approaches).Second edition by Raymond
3. A.Decarlo and PEN-MIN-LIN.Oxford University Press.Second edition 2004.
4. Electrical Circuits Theory by K.Rajeswaran,Pearson Education 2004.
5. Basic Circuit Analysis by D.R.Cunningham & J.A.Stuller,Jaico Publications.

Course Outcomes
On completion of the course, students will be able to
1. Reduce a electric network using source transformation, Kirchhoff's laws
2. Identify when & how to use network reduction & theorem with DC and AC excitations.
3. Explain the principle of AC fundamentals, series parallel circuits, locus diagram and resonance.
4. Explain basic principle of magnetic circuits & applications.
5. Analyze networks adopting network topology and concept of duality and dual networks.

(A2018) ENGINEERING CHEMISTRY LAB

B.Tech (EEE) II-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

Reference Books

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

At the end of the course the student 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

(Common to All Branches)

B.Tech (EEE) II-Semester

L	T	P	C
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

(A2550) DATA STRUCTURES LAB

B.Tech (EEE) 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

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

III SEMESTER

(A2010) SPECIAL FUNCTIONS & COMPLEX ANALYSIS

B. Tech. (EEE) 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 $e^z, \operatorname{Im} z, z^2, z^n, \sin z, \cos z, z + a/z$. 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 Yr Edition 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

(A2206) NETWORK THEORY-II

B.Tech (EEE) III-Semester

L	T	P	C
3	1	0	3

Objective

This course is an extension of Network Theory –I. The emphasis of this course is laid on the Three phase Circuits. , transient analysis, Network functions and parameters, filters and Fourier analysis of circuits

Unit- I: Three Phase Circuits

Three phase circuits: Phase sequence-Star and delta connection-Relation between line and phase voltages and currents in balanced systems-Analysis of balanced and unbalanced 3 phase circuits Measurement of active and reactive power.

Unit-II: D.C & AC Transient Analysis

Transient response of R-L,R-C,R-L-C circuits (Series and parallel combination) for D.C & AC excitation-Initial conditions-solution method using differential equation and Laplace transforms.

Unit-III: Network Functions

The concept of Complex Frequency, physical Interpretation of Complex Frequency, Transform Impedance and Transform Circuits, Series and parallel Combination of Elements, Terminal Pairs or Ports, Networks Functions for One-port and Two-port Network Poles and Zeros of Network Functions, Significance of poles and Zeros, Properties of Driving Point Functions, Properties of Transfer Functions, Necessary Conditions for Driving Point Functions, Necessary Conditions for Transfer Functions, Time Domain Response from Pole Zero Plot

Unit-IV: Network Parameters & Filters

Two port network parameters –Z, Y, ABCD and hybrid parameters and their relations Cascaded networks, concept of transformed network-2port network parameters using transformed variables.

Filters

Low pass, High pass, Band pass, Band elimination, prototype filter design

Unit-V: Fourier analysis of A.C Circuits

The Fourier theorem, consideration of symmetry, exponential form of Fourier series, line spectra and phase angle spectra, Fourier integrals and Fourier transforms, properties of Fourier transforms.

Text Books

1. Electric circuits by A.Chakrabarthy, Dhanpat Rai & Sons
2. Circuits & Networks by A.Sudhakar and Shyammohan S Palli,Tata McGraw-Hill
3. Electric circuit analysis by B.Subrahmanyam, I.K.international

Reference Books

1. Network Analysis by M.E.Van Valkenberg
2. Electric circuit Analysis by C.L.Wadhwa,New Age international
4. Electric circuits by David A.Bell,Oxford University press
5. Basic circuit analysis by D.R.Cunningham & J.A.Stuller, Jaico Publicaitons.
6. Electric Circuit theory by K.Rajeswaran, Pearson Education 2004.

Course Outcomes

1. Analyze and categorize three phase circuits.
2. Perform transient analysis on basic electrical circuits with AC and DC excitations.
3. Demonstrate network functions with the concept of Complex Frequency.
4. Compute two port network parameters, assess various types of filters.
5. Apply Fourier transforms to analyze AC circuits.

(A2202) ELECTROMAGNETIC FIELDS

B.Tech (EEE) III-Semester **L T P C**
4 1 0 4

Objective
The objective of this course is to introduce the concepts of electric field and magnetic fields and their applications which will be utilized in the development of the theory for power transmission lines and electrical machines.

Unit – I: Electrostatics
Electrostatic Fields – Coulomb's Law – Electric Field Intensity (EFI) – EFI due to a line and a surface charge – Work done in moving a point charge in an electrostatic field – Electric Potential – Properties of potential function – Potential gradient – Guass's law – Application of Guass's Law – Maxwell's first law, div (D)=ρv . Laplace's and Poison's equations – Solution of Laplace's equation in one variable

Unit – II: Conductors Dielectric & Capacitance
Electric dipole – Dipole moment – potential and EFI due to an electric dipole – Torque on an Electric dipole in an electric field – Behaviour of conductors in an electric field – Conductors and Insulators.
Electric field inside a dielectric material – Polarization – Dielectric – Conductor and Dielectric – Dielectric boundary conditions, Capacitance – Capacitance of parallel plate and spherical and co-axial capacitors with composite dielectrics – Energy stored and energy density in a static electric field – Current density – Conduction and Convection current densities – Ohm's law in point form – Equation of continuity

Unit – III: Magneto Statics
Static magnetic fields – Biot-Savart's law – Oesterd's experiment - Magnetic field intensity (MFI) – MFI due to a straight current carrying filament – MFI due to circular, square and solenoid current – Carrying wire – Relation between magnetic flux, magnetic flux density and MFI – Maxwell's second Equation, div(B)=0.
Ampere's circuital law and its applications
Ampere's circuital law and its applications viz. MFI due to an infinite sheet of current and a long current carrying filament – Point form of Ampere's circuital law – Maxwell's third equation, Curl (H)=Jc, Field due to a circular loop, rectangular and square loops.

Unit – IV: Force in Magnetic fields and Magnetic Potential:

Magnetic force - Moving charges in a Magnetic field – Lorentz force equation – force on a current element in a magnetic field – Force on a straight and a long current carrying conductor in a magnetic field – Force between two straight long and parallel current carrying conductors – Magnetic dipole and dipole moment – a differential current loop as a magnetic dipole – Torque on a current loop placed in a magnetic field .

Scalar Magnetic potential and its limitations – vector magnetic potential and its properties – vector magnetic potential due to simple configurations – Vector Poisson's equations.

Self and Mutual inductance

Self and Mutual inductance – Neumans's formulae – Determination of self-inductance of a solenoid and toroid and mutual inductance between a straight long wire and a square loop wire in the same plane – energy stored and density in a magnetic field. Introduction to permanent magnets, their characteristics and applications.

Unit – V: Time Varying Fields*:*

Time varying fields – Faraday's laws of electromagnetic induction – Its integral and point forms – Maxwell's fourth equation, Curl (E)=-∂B/∂t – Statically and Dynamically induced EMFs – Simple problems -Modification of Maxwell's equations for time varying fields – Displacement current.

Text Books

1. "Engineering Electromagnetics" by William H. Hayt & John. A. Buck, Mc. Graw-Hill Companies, 7th Editon.2006.
2. "Electro Magnetic Fields" by Sadiku, Oxford Publications

Reference Books

1. "Introduction to Electro Dynamics" by D J Griffiths, Prentice-Hall of India Pvt.Ltd, 2nd editon
2. "Electromagnetics" by J P Tewari.
3. "Electromagnetics" by J. D Kraus Mc Graw-Hill Inc. 4th edition 1992.
4. "Electromagnetic fields", by S. Kamakshaiah, Right Publishers, 2007.

Course Outcomes

On completion of the course, students will be able to

1. Analyze electro-static fields using Gauss law
2. Apply Poisson's equations / Laplace transforms to solve boundary wall problems.

3. Apply current density, continuity equation to evaluate properties of conductor, dielectrics, and capacitance
4. Evaluate static magnetic fields using Biot Savarts law and Ampere's law.
5. Explore the forces & torques exerted by magnetic field on various current distributions using laplace domain.
6. Establish relationship between time variant & invariant electric & magnetic fields using Faradays Laws, Lenz's Laws & Maxwell's equations

(A2317) FLUID MECHANICS & HYDRAULIC MACHINERY

B.Tech (EEE) III-Semester

L	T	P	C
3	1	0	3

Objectives

- The purpose of this course is to learn the fluid properties and Fundamentals of fluid statics and fluid flow
- To introduce the concepts of flow measurements and flow through pipes
- To impart the knowledge on turbo machinery, hydro electric power stations ,pumps and turbines

Unit I

Fluid Statics: Dimensions and Units, physical properties of fluids-specific gravity, viscosity, surface tension- Vapour pressure and their influence on fluid motion-Atmospheric, gauge and vaccum pressure- Measurement of pressure- Piezometer, U-Tube and Differential Manometers.

Unit II

Fluid kinematics: Stream line, path line and steak line and stream line, classification of flows steady & un steady, uniform & non uniform, laminar & turbulent, rotational & irrotational flows-Equation of continuity for one dimensional flow and three dimensional flow.

Fluid Dynamics: Surface & body forces Euler's & Bernouli's equations for flow along a stream line, moment equation and its applications on force on pipe bend. Measurement of flow: pitot tube, venture meter and orifice meter, flow nozzle.

Unit III

Closed Conduit Flow: Reynold's experiment-Darcy Weisbach equation-Minor losses in pipes-Pipes in series and pipes in parallel-total energy line-hydraulic gradient line.

Boundary Layer Concepts: Definition, thicknesses, characteristics along thin plate, laminar and turbulent boundary layers (No derivations) boundary layer in transition, separation of boundary layers submerged objects-drag and lift .

Unit IV

Basics and Hydraulic Turbine Turbo Machinery: Hydro dynamic force on jets on stationary and moving plate, inclined, and curved vanes, jet striking centrally and at tip, velocity diagrams, work done and efficiency , flow over radial vanes.

Classification of turbines, heads and efficiencies, impulse and reaction turbines, Pelton wheel, Francis turbine, and Kaplan turbine-Working proportions, work done, efficiencies, hydraulic design-draft tube theory-functions and efficiency.

Unit V

Performance of Hydraulic Turbines and Pumps: Geometric similarity, unit and specific quantities, characteristic curves, governing of turbines, selection of type of turbines, cavitation, surge tank, water hammer.

Centrifugal Pumps: Classification, working, work done-barometric head-Losses and efficiencies specific speed- Performance characteristic curves, NPSH.

Reciprocating Pumps: Working, discharge, slip, indicator diagrams.

Text Books

1. 'Hydraulics, Fluid mechanics and hydraulic machinery' by MODI and SETH
2. Fluid mechanics and hydraulic machines by Rajput

Reference Books

1. Fluid Mechanics and fluid power engineering by D.S.Kunar, Kotaria and sons.
2. Fluid Mechanics and Machinery by D. Rama Durgaiah, New age international.
3. Hydraulic Machines by Banga and Sharma, Khanna publishers

Course Outcomes

1. Explain the basic properties of fluids.
2. Analyze the kinematics of fluids and dynamics of fluid flows.
3. Describe the boundary layer theory and impact of jets.
4. Compare different types of turbines and pumps.

(A2401) ELECTRONIC DEVICES & CIRCUITS

B.Tech (EEE) 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.

(A2203) ELECTRICAL MACHINES - I

B.Tech (EEE) III-Semester

L	T	P	C
3	1	0	3

Objective

Electrical machines course is one of the important courses of the Electrical discipline. In this course the different types of DC generators and motors which are widely used in industry are covered and their performance aspects are studied.

Unit – I: Electromechanical Energy Conversion

Electromechanical Energy conversion – Forces and torque in magnetic field systems – Energy balance – Energy and force in a singly excited magnetic field system, determination of magnetic force - co-energy – Multi excited magnetic field systems.

Unit – II D.C. Generators – Construction & Operation

D.C. Generators – Principle of operation – Action of commutator – Constructional features – Armature windings – Lap and Wave windings – Simplex and Multiplex windings – Use of laminated armature – E. M.F Equation – Problems

Armature reaction in D.C. Generator

Armature reaction – Cross magnetizing and De-magnetizing AT/pole – Compensating winding – Commutation – Reactance voltage – Methods of improving commutation.

Unit – III: Types of DC Generators & Load characteristics

Methods of Excitation – Separately excited and self excited generators – Build-up of E.M.F - Critical field resistance and critical speed - Causes for failure to self excite and remedial measures.

Load Characteristics of Generators

Load characteristics of shunt, series and compound generators – Parallel operation of d.c series generators – use of equalizer bar and cross connection of field windings – load sharing.

Unit – IV: D.C. Motors & Speed Control Methods

D.C Motors – Principle of operation – Back E.M.F. - Torque equation – Characteristics and application of shunt, series and compound motors – Armature reaction and commutation.

Speed control of D.C. Motors

Speed control of d.c. Motors: Armature voltage and field flux control methods. Ward-Leonard system. Principle of 3 point and 4 point starters – protective devices.

Unit – V: Testing of D.C. Machines

Testing of d.c. machines: Losses – Constant & Variable losses – calculation of efficiency – condition for maximum efficiency

Methods of testing – direct, indirect and regenerative testing – brake test – Swinburne's test – Hopkinson's test – Field's test – Retardation test – separation of stray losses in a d.c. motor test.

Text Books

1. Electric Machines – by I.J.Nagrath & D.P.Kothari, Tata Mc Graw-Hill Publishers, 7th Edition 2005.
2. Electrical Machines – P.S. Bimbra., Khanna Publishers

Reference Books

1. Performance and Design of D.C Machines – by Clayton & Hancock, BPB Publishers
2. Electrical Machines -S.K. Battacharya,
3. Electric Machines by I.J. Nagrath & D.P. Kothari, Tata Mc Graw – Hill Publishers, 3rd edition, 2004.
4. Electric Machinery – A. E. Fritzgerald, C. Kingsley and S. Umans, Mc Graw-Hill Companies, 5th editon

Course Outcomes

On completion of the course, students will be able to

1. Perform electromechanical energy conversions for different excited systems
2. Explain constructional features, types, operation of DC generators.
3. Analyze the characteristics of different DC generators.
4. Differentiate between various types of speed control methods of DC motor.
5. determine losses and efficiency of DC machines by conducting direct and indirect tests

(A2321) FLUID MECHANICS & HYDRAULIC MACHINERY LAB

B.Tech (EEE) III-Semester

L	T	P	C
0	0	3	2

1. Calibration of Venturimeter & Orifice meter
2. Determination of Coefficient of discharge for a small orifice by a constant head method.
3. Determination of Coefficient of discharge for an external mouth piece by variable head method.
4. Calibration of contracted Rectangular Notch and /or Triangular Notch
5. Determination of Coefficient of loss of head in a sudden contraction and friction factor.
6. Verification of Bernoulli's equation.
7. Performance test on single stage centrifugal pump
8. Performance test on reciprocating pump Turbo Wheel
9. Performance and specific speed test on Francis Turbine
10. Performance and specific speed test on Kaplan Turbine
11. Performance Impact of jet on vanes
12. Suitability test on centrifugal pump
13. Drag and Lift Coefficients of an Aerofoil model.
14. Performance and Specific speed test on Pelton wheel (or test on multi stage pump)

Any ten of the above experiments are to be conducted

Course Outcomes

Upon completion of the course students will be able to:

1. Calibrate discharge measuring devises and find discharge through the venture meter and the orifice meter
2. Calibrate discharge measuring devises for open channel/free flow like rectangular and triangular notch.
3. Determine coefficient of discharge for outlet devises viz., small orifices and mouth pieces.
4. Determine performance characteristics of popular turbines, pumps and determine coefficient of friction factor for minor losses and verify Bernoulli's equation.

(A2404) ELECTRONIC DEVICES & CIRCUITS LAB

B.Tech (EEE) 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
   i. Multi meters (Analog and Digital)
   ii. Function Generator
   iii. Regulated Power Supplies
   iv. 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

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. Design different amplifier cirucuites using BJT and FET.

(A2023) GENDER SENSITIZATION
(An Activity-based Course)
B.Tech (EEE) 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.

IV SEMESTER

(A2204) POWER SYSTEMS - I

B.Tech (EEE) IV-Semester

L	T	P	C
3	1	0	3

Objective

Electrical Power plays significant role in day to day life of entire mankind. This course concerns the generation and distribution of power along with the economic aspects.

Unit-I: Thermal &Hydro Power 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. Classification of turbines, impulse and reaction turbines pelton wheel, Francis turbine and Kaplan turbine-working proportions, work done, efficiencies, hydraulic design-draft tube-theory-functions and efficiency

Unit-II: 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- Types of Nuclear reactors and brief description of PWR, BWR and FBR.

Gas Power Stations: Principle of Operation and Components (Block Diagram Approach Only)

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- Requirements and Design features of Distribution Systems-Voltage Drop Calculations (Numerical Problems) in D.C Distributors for the

following cases: 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 (Numerical Problems) in A.C. Distributors for the following cases: Power Factors referred to receiving end voltage and referred to respective load voltages.

Unit –IV: Substations, Power factor and Voltage Control

Substations: Classification of substations: **Air insulated substations** - Indoor & Outdoor substations: Substations layout showing the location of all the substation equipment. Bus bar arrangements in the Sub-Stations: Simple arrangements like single bus bar, sectionalized single bus bar, main and transfer bus bar system with relevant diagrams.

Gas insulated substations (GIS) – Advantages of Gas insulated substations, different types of gas insulated substations, single line diagram of gas insulated substations, bus bar, construction aspects of GIS, Installation and maintenance of GIS, Comparison of Air insulated substations and Gas insulated substations.

Power factor 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

Unit-V: Economic Aspects of Power Generation

Load curve, load duration and integrated load duration curves-load, demand, diversity, capacity, utilization and plant use factors- Numerical Problems.

Tariff Methods: Costs of Generation and their division into Fixed, Semi-fixed and Running Costs. Desirable Characteristics of a Tariff Method.- Tariff Methods: Flat Rate, Block-Rate, two-part, three –part, and power factor tariff methods and Numerical Problems

Text Books

1. A Text Book on Power System Engineering by M.L.Soni, P.V.Gupta, U.S.Bhatnagar and A.Chakraborti, Dhanpat Rai & Co. Pvt. Ltd., 1999.
2. Electrical Power Systems by C.L.Wadhawa, New Age International (P) Limited, Publishers 1997.

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.

Course Outcomes

1. Illustrate different types of power plants
2. Classify DC and AC distribution systems.
3. Categorize and discriminate different types of substations.
4. Interpret different methods to improve the power factor.
5. Appraise the economics of power generation

(A2205) ELECTRICAL MACHINES -II

B.Tech (EEE) IV-Semester

L	T	P	C
4	1	0	4

Objective

As an extension of Electrical machines I course this subject facilitates to study the performance of Transformers and Induction motors which are the major parts of industrial drives and agricultural pump sets.

Unit – I: Single Phase Transformers-Construction & Operation

Single phase transformer types-constructional details-minimization of hysteresis and eddy current losses-EMF equation-operation on no load and on load-phasor diagrams**.** Equivalent circuit-losses and efficiency-regulation. All day efficiency-effect of variations of frequency & supply voltage on iron losses.

Unit – II: Testing of Single Phase Transformer

OC and SC tests-Sumpner's test-predetermination of efficiency and regulation-separation of losses test-parallel operation with equal and unequal voltage ratios

Unit – III Auto & Polyphase transformers

Auto transformers-equivalent circuit-comparison with two winding transformers.

Polyphase Transformers

Polyphase transformers-Polyphase connections – Y/Y,Y/D,D/Y,D/D and open Delta Third harmonics in phase voltages-three winding transformers-tertiary windings-determination of Zp,Zs, and Zt transients in switching-off load and on load tap changing. Scott connection

Unit- IV: Three phase Induction Motors

Three phase induction motors-construction details of cage and wound rotor machines-production of a rotating magnetic field-principle of operation-rotor emf and rotor frequency-rotor reactance, rotor current and pf at standstill and during operation.

Characteristics of Induction Motors

Rotor power input, rotor copper loss and mechanical power developed and their inter relationship-torque equation-deduction from torque equation-expressions for maximum torque and starting torque-torque slip characteristic-double cage and deep bar rotors-equivalent circuit-phasor diagram-crawling and cogging.

Unit- V: Circle Diagram of Induction Motors

Circle diagram-no load and blocked rotor tests-predetermination of performance-methods of starting and starting current and torque calculations.

Speed Control Methods

Speed control-change of frequency; change of poles and methods of consequent poles; cascade connection, injection of an emf into rotor circuit (qualitative treatment only)-induction generator-principle of operation.

Text Books

1. Electric Machines – by I.J.Nagrath & D.P.Kothari, Tata Mc Graw-Hill Publishers, 7th Edition 2005.
2. Electrical Machines – by P.S. Bimbra, Khanna Publishers.

Reference Books

1. The Performance and Design of A.C.Machines – by M.G.Say, ELBS and Ptiman & Sons.
2. Electric Machinery – by A.E. Fitzgerald, C.Kingsley and S.Umans, Mc Graw-Hill Companies, 5th edition, 1990.
3. Theory of Alternating Current Machinery by Langsdorf, Tata Mc Graw-Hill, 2nd edition.
4. Electro mechanics-II, S.Kama kashiah, Right Publishers

Course Outcomes

1. Explain constructional features, types, operation of single phase transformer.
2. Analyze the performance of single phase transformer.
3. Contrast between polyphase transformer and auto transformer.
4. Describe operation of poly phase Induction Motor and its performance characteristics
5. Differentiate between various types of speed control methods of induction motor

(A2019) ENVIRONMENTAL STUDIES
(Common to All Branches)

B.Tech (EEE) IV-Semester

L	T	P	C
3	0	0	3

Course Objectives:

Student will be able to

- 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 successful completion of this course, the students should 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

(A2403) SWITCHING THEORY AND LOGIC DESIGN

B.Tech (EEE) IV-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

(A2407) ELECTRONIC PULSE AND DIGITAL CIRCUITS

B.Tech (EEE) 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
5. Electronic Circuit Analysis - Rashid, Cengage Learning, 2013
6. Electronic Devices and Circuit Theory - Robert L.Boylestad, Louis Nashelsky, 9 Ed., 2008 PE.
7. Micro electric Circuits-Sedra and Smith-5Ed., 2009, Oxford University

Press.
8. Electronic Circuit Analysis - K. Lal Kishore, 2004, BSP.
9. 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 (EEE) 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 uses 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.

(A2208) ELECTRICAL MACHINES LAB – I

B.Tech (EEE) IV-Semester

L	T	P	C
0	0	3	2

Objective

This lab introduces the direct and indirect tests on DC machines to know the performance and various speed control techniques are done practically.

Compulsory Experiments:

1. Magnetization characteristics of DC shunt generator. Determination of critical field resistance and critical speed.
2. Load test on DC shunt generator. Determination of characteristics.
3. Load test on DC series generator. Determination of characteristics.
4. Load test on DC compound generator. Determination of characteristics.
5. Hopkinson's test on DC shunt machines. Predetermination of efficiency.
6. Fields test on DC series machines. Determination of efficiency.
7. Swinburne's test and speed control of DC shunt motor. Predetermination of efficiencies.
8. Brake test on DC compound motor. Determination of performance curves.

In addition to the above eight experiments, atleast any two of the experiments from the following list are required to be conducted:

1. Brake test on DC shunt motor. Determination of performance curves.
2. Retardation test on DC shunt motor. Determination of losses at rated speed.
3. Separation of losses in DC shunt motor.

Course Outcomes

On completion of the course, students will be able to

1. Explain the process of emf induced in DC generator**.**
2. Analyze the characteristics of different types of DC generators by performing load test.
3. Evaluate performance of DC machines through different tests.
4. Determine the efficiency of DC M/G by conducting Hopkinson's test.
5. Draw the performance curves of a different DC motors by brake tests.

(A2209) ELECTRICAL CIRCUITS & SIMULATION LAB

B.Tech (EEE) IV-Semester

L	T	P	C
0	0	3	2

Objective

This course provides the indepth knowledge of theorems by verifying practically. It also introduces the resonance phenomena and power measurement in AC circuits

PART-A: Electrical Circuits

1. Verification of Thevenin's, and Norton's Theorems
2. Verification of Superposition and Maximum Power Transfer Theorems
3. Verification of RMS value of complex wave
4. Verification of Compensation Theorem
5. Verification of Reciprocity, Millmann's Theorems
6. Locus Diagrams of RL and RC Series Circuits
7. Series and Parallel Resonance
8. Determination of Self, Mutual Inductances and Coefficient of coupling
9. Determination of Z and Y Parameters
10. Determination of Transmission and hybrid parameters
11. Measurement of Active Power for Star and Delta connected balanced loads
12. Measurement of Reactive Power of Star and Delta connected balanced loads
13. Measurement of 3-phase Power by two Wattmeter Method for unbalanced loads

PART-B: PSPICE Simulation

1. Simulation of DC Circuits
2. DC Transient response
3. Mesh Analysis
4. Nodal Analysis

NOTE:

- **PSPICE** software Package is necessary
- **Eight** experiments are to be conducted from PART-A and any **Two** from PART-B

Course Outcomes

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

1. Determine the thevenenin's voltage & resistance of a circuit, able to determine the Norton's current and resistance of a circuit.
2. Solve a multi source network using super position theorem.
3. Determine Z, Y and H, ABCD Parameters of a circuit.
4. Determine active power and reactive power for various loads.
5. Solve many unknown resources in a complex circuit using Simulation(PSPICE)
6. Determine load resistance in a circuit to transfer maximum power using maximum power transfer theorem.

(A2004) SOFT SKILLS & PROFESSIONAL ETHICS

B.Tech (EEE) 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 proces

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 entrepreunerial venture.

Reference

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

V SEMESTER

(A2210) POWER SYSTEMS-II

B.Tech (EEE) V-Semester

L	T	P	C
4	1	0	4

Objective

This course is an extension of Power systems-I . It deals with basic theory of transmission lines modeling and their performance analysis. Also this course gives emphasis on mechanical design of transmission lines, cables and insulators.

Unit-I: Transmission Line Parameters

Types of conductors - calculation of resistance for solid conductors - Calculation of inductance for single phase and three phase, single and double circuit lines, concept of GMR & GMD, symmetrical and asymmetrical conductor configuration with and without transposition, Numerical Problems.

Calculation of capacitance for 2 wire and 3 wire systems, effect of ground on capacitance, capacitance calculations for symmetrical and asymmetrical single and three phase, single and double circuit lines, Numerical Problems.

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, Numerical Problems.

Mathematical Solutions to estimate regulation and efficiency of all types of lines - Numerical Problems.

Long Transmission Line-Rigorous Solution, evaluation of A,B,C,D Constants, Interpretation of the Long Line Equations, Incident, Reflected and Refracted Waves -Surge Impedance and SIL of Long Lines, Wave Length and Velocity of Propagation of Waves - Representation of Long Lines - Equivalent-T and Equivalent Pie network models (numerical problems).

Unit- III: Power System Transients and Factors Governing the Performance of Transmission line

Types of System Transients - Travelling or Propagation of Surges - Reflection and Refraction Coefficients - Termination of lines with different types of conditions - Open Circuited Line, Short Circuited Line, T-Junction, Lumped Reactive Junctions (Numerical Problems)

Various Factors Governing the Performance of Transmission line: Skin and Proximity effects - Description and effect on Resistance of Solid Conductors -Ferranti effect - Charging Current - Effect on Regulation of the Transmission Line, Shunt Compensation. Corona - Description of the phenomenon, factors affecting corona, critical voltages and power loss.

Unit-IV: Mechanical Design and Line Insulators

Sag and Tension Calculations with equal and unequal heights of towers, Effect of Wind and Ice on weight of Conductor, Numerical Problems - Stringing chart and sag template and its applications. Types of Insulators, String efficiency and Methods for improvement, Numerical Problems - voltage distribution, calculation of string efficiency, Capacitance grading and Static Shielding.

Unit-V: Underground Cables

Types of Cables, Construction, Types of Insulating materials, Calculations of Insulation resistance and stress in insulation, Numerical Problems. Capacitance of Single and 3-Core belted cables, Numerical Problems.Grading of Cables - Capacitance grading, Numerical Problems, Description of Inter-sheath grading.

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. Power system Analysis-by John J Grainger William D Stevenson, TMC Companies, 4th edition
2. Power System Analysis and Design by B.R.Gupta, Wheeler Publishing.
3. Power System Analysis by Hadi Saadat – TMH Edition.
4. Electrical Power Transmission system engineering Analysis and design by Turan Gonen, CRC press (Taylor & Francis Group) Special Indian Edition,2/e.

Course Outcomes:

By the end of this course students will be able to

1. Compute transmission parameters for various lines.
2. Estimate the efficiency and regulation of transmission systems.
3. Synthesis of transmission line design.
4. Elucidate the construction and types of underground cables.

(A2021) MANAGERIAL ECONOMICS & FINANCIAL ANALYSIS

B.Tech (EEE) V-Semester

L	T	P	C
3	0	0	3

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.

Text Books

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

Reference Books

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.

(A2414) LINEAR & DIGITAL IC APPLICATIONS

B.Tech (EEE) V-Semester

L	T	P	C
3	0	0	3

Course Objectives

The main objectives of the course are:

- 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 1st 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

(A2250) SMART ELECTRIC GRID
(Professional Elective-I)

B.Tech (EEE) V-Semester

L	T	P	C
3	1	0	3

Course Objectives:

- To group various aspects of the smart grid,
- To defend smart grid design to meet the needs of a utility
- To select issues and challenges that remains to be solved
- To analyze basics of electricity, electricity generation, economics of supply and demand, and the various aspects of electricity market operations in both regulated and deregulated environment.

Unit–I: Introduction

Introduction to smart grid- Electricity network-Local energy networks-Electric transportation- Low carbon central generation-Attributes of the smart grid- Alternate views of a smart grid.

SMART GRID TO EVOLVE A PERFECT POWER SYSTEM: Introduction- Overview of the perfect power system configurations- Device level power system- Building integrated power systems Distributed power systems- Fully integrated power system-Nodes of innovation.

Unit–II: DC distribution and smart grid AC vs DC sources-Benefits of and drives of DC power delivery systems-Powering equipment and appliances with DC-Data centers and information technology loads-Future neighborhood-Potential future work and research.

Unit–III: Dynamic Energy Systems Concept Smart energy efficient end use devices-Smart distributed energy resources-Advanced whole building control systems- Integrated communications architecture-Energy management-Role of technology in demand response- Current limitations to dynamic energy management-Distributed energy resources-Overview of a dynamic energy management-Key characteristics of smart devices- Key characteristics of advanced whole building control systems-Key characteristics of dynamic energy management system.

Unit–IV: Energy Port as Part of the Smart Grid: Concept of energy - Port, generic features of the energy port. Carbon Credits

Unit–V: Efficient Electric End – Use Technology Alternatives Existing technologies – lighting - Space conditioning - Indoor air quality - Domestic water heating - hyper efficient appliances - Ductless residential heat pumps and air conditioners - Variable refrigerant flow air conditioning-Heat pump water heating - Hyper efficient residential appliances - Data center energy efficiency- LED street and area lighting - Industrial motors and drives - Equipment retrofit and replacement - Process heating - Cogeneration, Thermal energy storage - Industrial energy management programs - Manufacturing process-Electro-technologies, Residential, Commercial and industrial sectors.

Text Books:

1. Clark W Gellings, "The Smart Grid, Enabling Energy Efficiencyand Demand Side Response"- CRC Press, 2009.
2. Jean Claude Sabonnadière, NouredineHadjsaïd, "Smart Grids", Wiley-ISTE, IEEE Press,May 2012

Reference books:

1. JanakaEkanayake, KithsiriLiyanage, Jianzhong.Wu, Akihiko Yokoyama, Nick Jenkins, "Smart Grid: Technology and Applications"- Wiley, 2012.
2. James Momoh, "Smart Grid: Fundamentals of Design and Analysis"- Wiley, IEEE Press, 2012.

Course Outcomes:

Upon the completion of the subject, the student will be able to

1. Illustrate the structure of an electricity market.
2. Depict the advantages of DC distribution and developing technologies.
3. Discriminate the trade-off between economics and reliability of an electric power system.
4. Contrast various investment options in electricity markets.
5. Infer smart and intelligent domestic systems.

(A2213) LINEAR SYSTEM ANALYSIS
(Professional Elective-I)

B.Tech (EEE) V-Semester

L	T	P	C
3	1	0	3

Course Objective

This course deals with significance of state space analysis, role of Fourier transforms and Laplace transforms in linear systems, testing of polynomials, realization of different networks and sampling phenomena.

Unit-I: State variable analysis

Choice of state variables in Electrical networks-Formulation of state equations for Electrical networks-Equivalent source method. Network topological method - Solution of state equations-Analysis of simple networks with state variable approach.

Unit–II: Fourier series and Fourier transform representation

Introduction, Trigonometric form of Fourier series, Exponential form of Fourier series, Wave symmetry, Fourier integrals and transforms, Fourier transform of a periodic function, Properties of Fourier Transform ,Parseval's theorem , Fourier transform of some common signals, Fourier transform relationship with Laplace Transform.

Applications of Fourier series and Fourier transform representation

Introduction, Effective value and average values of non sinusoidal periodic waves, currents, Power Factor, Effects of harmonics, Application in Circuit Analysis, Circuit Analysis using Fourier series.

Unit – III: Wavelet transforms:

Definition of a wavelet -General formulae-Examples: continuous wavelet-transforms and interpretation, Mexican hat wavelet, Morlet wavelet - Comparison and interpretation- Orthogonal wavelet transform, Discrete wavelets, Orthogonal wavelets, Fast wavelet transform, Examples of orthogonal wavelets

Unit-IV: Testing of polynomials & network synthesis

Elements of realizability-Hurwitz polynomials-positive real functions-Properties-Testing-Sturm's Test, examples.

Network synthesis: Synthesis of one port LC networks-Foster and Cauer methods-Synthesis of RL and RC one port networks-Foster and Cauer methods

Unit-V: Sampling

Sampling theorem – Graphical and Analytical proof for Band Limited Signal impulse sampling, natural and Flat top Sampling, Reconstruction of signal from its samples, effect of under sampling – Aliasing, introduction to Band Pass sampling, Cross correlation and auto correlation of functions, properties of correlation function, Energy density spectrum, Power density spectrum, Relation between auto correlation function and Energy / Power spectral density function.

Text Books

1. Networks and systems-D Roy Chowdhary, New Age International
2. Network Analysis and Synthesis – Umesh Sinha- Satya Prakashan Publications
3. An Introduction to Wavelet Analysis Publisher: Anebooks - Springer (2008) by by David F. Walnut.
4. Introduction to Wavelet Transform: A Signal Processing Approach by S. V. Narasimhan, Publisher: Narosa Book Distributors Pvt Ltd Edition: 2011
5. Insight into Wavelets: From Theory to Practice by K.P. Ramachandran, K.I. Resmi, N.G. Soman.

Reference Books

1. Linear System Analysis – A N Tripathi, New Age International
2. Engineering Network Analysis and Filter Design- Gopal G Bhisk & Umesh
3. Linear system analysis by A.Cheng, Oxford publishers.

Course Outcomes: Upon the completion of the subject, the student will be able to

1. Analyze linear systems in state space domain.
2. Apply the knowledge of Fourier transforms to analyze Electrical Circuit.
3. Elucidate different types of wavelet transforms
4. Analyze and synthesize electrical networks by Foster and Cauer methods.
5. Illustrate the concept of discrete time systems.

(A2212) OPTIMIZATION TECHNIQUES
(Professional Elective-I)

B.Tech (EEE) V-Semester

L	T	P	C
3	1	0	3

Course Objective

This course introduces various optimization techniques i.e classical, linear programming, transportation problem, simplex algorithm, dynamic programming, Constrained and unconstrained optimization techniques for solving and optimizing an electrical and electronic engineering circuits design problems in real world situations.

Unit – I: Introduction and Classical Optimization Techniques:

Statement of an Optimization problem – design vector – design constraints – constraint surface – objective function – objective function surfaces – classification of Optimization problems. Single variable Optimization – multi variable Optimization without constraints – necessary and sufficient conditions for minimum/maximum – multivariable Optimization with equality constraint. Solution by method of Lagrange multipliers – multivariable Optimization with inequality constraints – Kuhn – Tucker conditions.

Unit – II: Linear Programming

Standard form of a linear programming problem – geometry of linear programming problems – definitions and theorems – solution of a system of linear simultaneous equations – pivotal reduction of a general system of equations – motivation to the simplex method – simplex algorithm.

Unit – III: Transportation Problem & Unconstrained Optimization

Finding initial basic feasible solution by north – west corner rule, least cost method and Vogel's approximation method – testing for optimality of balanced transportation problems.

One – dimensional minimization methods: Classification, Fibonacci method and Quadratic interpolation method. Univariate method, Powell's method and steepest descent method.

Unit – IV Constrained Nonlinear Programming:
Characteristics of a constrained problem, Classification, Basic approach of Penalty Function method; Basic approaches of Interior and Exterior penalty function methods. Introduction to convex Programming Problem.

Unit – VI Dynamic Programming:
Dynamic programming multistage decision processes – types – concept of sub optimization and the principle of optimality – computational procedure in dynamic programming – examples illustrating the calculus method of solution - examples illustrating the tabular method of solution.

Text Books

1. Engineering optimization. Theory and practice". S. S.Rao, New Age International (P) Limited.
2. Optimization Methods in Operations Research and systems Analysis, K.V. Mittal and C. Mohan, New Age International (P) Limited.

Reference Books

1. Operations Research, Dr. S.D.Shama. Introductory Operations Research, H.S. Kasene & K.D. Kumar, Springer (India), Pvt .LTc.
2. Operations Research: An Introduction, H.A.Taha, Pearson Pvt. Ltd.
3. Operations Research, RK. Hard Bronson, Govindasami Naadimuthu, Tata Mc Graw — Hill Company Limited.

Course Outcomes:
Up on the completion of this course student will be able to

1. Formulate and solve mathematical model (linear programming problem) for a physical situations like production, distribution of goods and economics.
2. Apply the concept of simplex method and its extensions to dual simplex algorithm.
3. Solve the problem of transporting the products from origins to destinations with least transportation cost.
4. Convert and solve the practical situations into non-linear programming problem.
5. Apply the conceptual things of dynamic programming to real world problems and applications

(A2214) POWER ELECTRONICS

B.Tech (EEE) V-Semester

L	T	P	C
3	1	0	3

Course Objective:
With the advent of semiconductor devices, revolution is taking place in the power transmission distribution and utilization. This course introduces the basic concepts of power semiconductor devices, converters and choppers and their analysis.

Unit – I: Power Semi Conductor Devices and Commutation Circuits
Thyristors – Silicon Controlled Rectifiers (SCR's) – BJT – Power MOSFET – Power IGBT and their characteristics – Basic theory of operation of SCR – Static characteristics – Turn on and turn off methods- Dynamic characteristics of SCR - Turn on and Turn off times - Two transistor analogy – SCR firing circuits - Series and parallel connections of SCR's – Snubber circuit details – Specifications and Ratings of SCR's, BJT, IGBT - Numerical problems

Unit – II: Single & Three Phase Semi & Full Controlled Converters
Phase control technique – Single phase Line commutated converters – Half controlled converters with Resistive, RL loads and RLE load – Fully controlled converters- Midpoint and Bridge connections with Resistive, RL loads and RLE load– Derivation of average load voltage and current – Line commutated inverters -Active and Reactive power inputs to the converters without and with Freewheeling Diode, Effect of source inductance – Derivation of load voltage and current – Numerical problems.

Three Phase Line Commutated Converters
Three phase converters – Three pulse and six pulse converters – Mid point and bridge connections average load voltage With R and RL loads – Effect of Source inductance–Dual converters (both single phase and three phase) - Waveforms –Numerical Problems.

Unit – III: AC Voltage Controllers, Traic & Cyclo Converters
AC voltage controllers – Single phase two SCR's in anti parallel – With R and RL loads –Derivation of Average & RMS load voltage, current and power factor wave forms- Numerical problems
TRAIC- Modes of operation of TRAIC

Cyclo converters – Single phase midpoint cyclo converters with Resistive and inductive load (Principle of operation only) – Bridge configuration of single phase cyclo converter (Principle of operation only) – Waveforms

Unit – IV: Choppers

Choppers – Time ratio control and Current limit control strategies – Step down choppers Derivation of load voltage and currents with R, RL and RLE loads- Step up Chopper – load voltage expression
Morgan's chopper – Jones chopper, Voltage and Current Commutated Choppers, and Oscillation chopper (Principle of operation only) Waveforms — AC Chopper – Problems.

Unit – V: Inverters

Inverters – Single phase inverter – Basic series inverter – Basic parallel inverter– Waveforms –Voltage Source Inverter, Current Source Inverter– Mc Murray and Mc Murray – Bedford inverters - Control techniques for inverters - Stepped Wave & Pulse width modulation techniques and Comparison – Numerical problems.

Text Books

1. Power Electronics – by M. D. Singh & K. B. Kanchandhani, Tata Mc Graw – Hill Publishing company, 1998.
2. Power Electronics – by Vedam Subramanyam, New Age International (P) Limited, Publishers
3. P.S.Bhimbra."Power Electronics',Khanna publications

Reference Books

1. Power Electronics : Circuits, Devices and Applications – by M. H. Rashid, Prentice Hall of India, 2nd edition, 1998
2. Power Electronics - by V.R.Murthy , 1st edition -2005, OXFORD University Press
3. Power Electronics-by P.C.Sen, Tata Mc Graw-Hill Publishing.
4. Thyristorised Power Controllers – by G. K. Dubey, S. R. Doradra, A. Joshi and R. M. K. Sinha, New Age International (P) Limited Publishers, 1996.

Course Outcomes:

By the end of this course students will be able to

1. Explain the operation and performance characteristics of various semi conductor devices.

2. Design and analyze various rectifier circuits.
3. Modulate AC voltage & frequency for various load applications.
4. Illustrate different types of choppers
5. Design and analyze various inverter circuits.

(A2215) ELECTRICAL MACHINES-III

B.Tech (EEE) V-Semester

L	T	P	C
4	1	0	4

Course Objective

This subject is an extension of previous machines courses. It deals with the detailed analysis of Synchronous generators and motors which are the prime source of electrical power generation and its utilities. Also concerns about the different types of single phase motors which are having significant applications in house hold appliances and control systems.

Unit- I*:* Synchronous Generators

Constructional Features of round rotor and salient pole machines – Armature windings – Integral slot and fractional slot windings; Distributed and concentrated windings – distribution, pitch and winding factors – E.M.F Equation. Harmonics in generated e.m.f. – suppression of harmonics – armature reaction - leakage reactance – synchronous reactance and impedance – experimental determination - phasor diagram – load characteristics.

Unit- II: Regulation of synchronous Generator: Regulation by synchronous impedance method, M.M.F. method, Z.P.F. method and A.S.A. methods – salient pole alternators – two reaction analysis – experimental determination of X_d and X_q (Slip test) Phasor diagrams – Regulation of salient pole alternators.

Unit- III: **Parallel operation of Synchronous Generator**

Synchronizing alternators with infinite bus bars – synchronizing power torque – parallel operation and load sharing - Effect of change of excitation and mechanical power input. Analysis of short circuit current wave form – determination of sub-transient, transient and steady state reactances.

Unit – IV: Synchronous Motors

Theory of operation – phasor diagram – Variation of current and power factor with excitation – synchronous condenser – Mathematical analysis for power developed.

Power Circles: Excitation and power circles- Hunting and its suppression – methods of starting- synchronous induction motor

Unit – V: Single Phase Motors & Special Motors

Single phase Motors: Single phase induction motor – Constructional features-Double revolving field theory –Equivalent circuit, split-phase motors –capacitor start capacitor run motors– shaded pole motor.

Principle & performance of A.C. Series motor-Universal motor – stepper motor.

Text Books

1. Electric Machines – by I.J.Nagrath & D.P.Kothari, Tata Mc Graw-Hill Publishers, 7th Edition 2005.
2. Electrical Machines – by P.S. Bimbra, Khanna Publishers.

Reference Books

1. The Performance and Design of A.C.Machines – by M.G.Say, ELBS and Pitman & Sons.
2. Electric Machinery – by A.E. Fitzgerald, C.Kingsley and S.Umans, Mc Graw-Hill Companies, 5th edition, 1990.
3. Theory of Alternating Current Machinery by Langsdorf, Tata Mc Graw-Hill, 2nd edition.
4. Electro mechanics-III (Synchronous and single phase machines), S.Kamakshaiah, Right Publishers

Course Outcomes:

By the end of the course students will be able to

1. Explain constructional features, types, operation of alternator.
2. Perform Parallel operation of Synchronous Generator.
3. Describe the operation and starting methods of synchronous motor.
4. Illustrate the operation of different types of single phase induction motor and special motors

(A2216) ELECTRICAL MACHINES LAB – II

B.Tech (EEE) V-Semester

L	T	P	C
0	0	3	2

Course Objective

This lab is an extension to Electrical Machines –I lab which facilitates to know the performance of transformers, Induction motors and synchronous motors

The following experiments are required to be conducted as compulsory experiments:

1. O.C. & S.C. Tests on Single phase Transformer
2. Sumpner's test on a pair of single phase transformers
3. Brake test on three phase Induction Motor
4. No-load & Blocked rotor tests on three phase Induction motor
5. Regulation of a three phase alternator by synchronous impedance & M.M.F. methods
6. V and Inverted V curves of a three phase synchronous motor.
7. Equivalent Circuit of a single phase induction motor
8. Determination of Xd and Xq of a salient pole synchronous machine

In addition to the above eight experiments, atleast any two of the following experiments are required to be conducted from the following list:

1. Parallel operation of Single phase Transformers
2. Separation of core losses of a single phase transformer
3. Scott connection of transformers
4. Regulation of three-phase alternator by Z.P.F. and A.S.A methods
5. Efficiency of a three-phase alternator
6. Heat run test on a bank of 3 Nos. of single phase Delta connected transformers
7. Measurement of sequence impedance of a three-phase alternator.

(A2217) CONTROL SYSTEMS & SIMULATION LAB

B.Tech (EEE) V-Semester

L	T	P	C
0	0	3	2

Course Objective

This course aim to enforce the knowledge of different controlling techniques in open loop and closed loop systems. It also introduces the concept of MATLAB to simulate different frequency response plots

The following experiments are required to be conducted as compulsory experiments:

1. Time response of Second order system
2. Effect of feedback on DC servo motor
3. Transfer function of DC motor
4. Transfer function of DC generator
5. Characteristics of magnetic amplifiers
6. Characteristics of AC servo motor
7. PSPICE simulation of Op-Amp based Integrator and Differentiator circuits.
8. Stability analysis (Bode, Root Locus, Nyquist) of Linear Time Invariant system using MATLAB

In addition to the above eight experiments, atleast any two of the following experiments are required to be conducted from the following list:

1. Linear system analysis (Time domain analysis, Error analysis) using MATLAB.
2. State space model for classical transfer function using MATLAB – Verification.
3. Programmable logic controller – Study and verification of truth tables of logic gates, simple Boolean expressions and application of speed control of motor.
4. Effect of P, PD, PI, PID Controller on a second order systems
5. Temperature controller using PID
6. Characteristics of Synchros

Reference Books

1. Simulation of Electrical and electronics Circuits using PSPICE – by M.H.Rashid, M/s PHI Publications.
2. PSPICE A/D user's manual – Microsim, USA.
3. PSPICE reference guide – Microsim, USA.
4. MATLAB and its Tool Books user's manual and – Mathworks, USA.

(A2005) ANALYTICAL SKILLS - I

B.Tech (EEE) V-Semester

L	T	P	C
2	0	0	0

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. QuantativeApptitude 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

(A2218) POWER SEMICONDUCTOR DRIVES

B.Tech (EEE) VI-Semester

L	T	P	C
4	0	0	4

Objective

This course is an extension of Power Electronics applications to AC and DC drives. Control of DC motor drives with single phase and three phase converters and choppers are given in detail. The control of AC motor drives with variable frequency converters and variable voltage are presented.

Unit – I: Control of DC motors through phase controlled Converters

Introduction to Thyristor controlled Drives, Single Phase semi and Fully controlled converters connected to d.c separately excited and d.c series motors – continuous current operation – output voltage and current waveforms – Speed and Torque expressions – Speed – Torque Characteristics- Problems on Converter fed d.c motors.

Three phase semi and fully controlled converters connected to d.c separately excited and d.c series motors – output voltage and current waveforms – Speed and Torque expressions – Speed – Torque characteristics – Problems.

Unit – II: Four Quadrant operation of DC Drives

Introduction to Four quadrant operation – Motoring operations, Electric Braking – Plugging, Dynamic and Regenerative Braking operations. Four quadrant operation of D.C motors by dual converters – Closed loop operation of DC motor (Block Diagram Only)

Unit-III: Control of DC motors by Choppers

Single quadrant, Two –quadrant and four quadrant chopper fed dc separately excited and series excited motors – Continuous current operation – Output voltage and current wave forms – Speed torque expressions – speed torque characteristics – Problems on Chopper fed d.c Motors – Closed Loop operation (Block Diagram Only)

Unit – IV: Control of Induction Motor

Stator side control: Variable voltage characteristics:-Control of Induction Motor by Ac Voltage Controllers – Waveforms – speed torque characteristics.

Variable frequency characteristics:-Variable frequency control of induction motor by Voltage source and current source inverter and cyclo converters-PWM control – Comparison of VSI and CSI operations – Speed torque

characteristics – numerical problems on induction motor drives – Closed loop operation of induction motor drives (Block Diagram Only)
Rotor side control: Static rotor resistance control – Slip power recovery – Static Scherbius drive – Static Kramer Drive – their performance and speed torque characteristics – advantages applications – problems

Unit – V: Control of Synchronous Motors
Separate control & self control of synchronous motors – Operation of self controlled synchronous motors by VSI and CSI cycloconverters. Load commutated CSI fed Synchronous Motor – Operation – Waveforms – speed torque characteristics – Applications – Advantages and Numerical Problems – Closed Loop control operation of synchronous motor drives (Block Diagram Only), variable frequency control, Cyclo converter, PWM, VFI, CSI

Text Books
1. Fundamentals of Electric Drives – by G K Dubey Narosa Publications
2. Power Electronic Circuits, Devices and applications by M.H.Rashid, PHI.

Reference Books
1. Power Electronics – MD Singh and K B Khanchandani, Tata – McGraw-Hill Publishing company,1998
2. Modern Power Electronics and AC Drives by B.K.Bose, PHI.
3. Thyristor Control of Electric drives – Vedam Subramanyam Tata McGraw Hill Publilcations.
4. A First course on Electrical Drives – S K Pillai New Age International (P) Ltd. 2nd Editon.

Course Outcomes:
By the end of this course students will be able

1. Modulate the speed of various DC Motors using single and three phase rectifiers.
2. Elucidate multi quadrant operation of a DC drive.
3. Describe the Chopper fed DC drive and analyze the performance.
4. Control the speed of Induction Motor by using various methods.
5. Explain the operation, characteristics, applications, advantages & closed loop operation of self & separately controlled synchronous Motors by CSI & VSI Cycloconverters.

(A2211) ELECTRICAL MEASUREMENTS & INSTRUMENTATION

B.Tech (EEE) VI-Semester

L	T	P	C
3	0	0	3

Course Objective

This course introduces the basic principles of all measuring instruments. It also deals with the measurement of RLC parameters voltage, current Power factor, power, energy and magnetic measurements.

Unit-I: Introduction to Measuring Instruments

Classification – deflecting, control and damping torques – Ammeters and Voltmeters – PMMC, moving iron type instruments – expression for the deflecting torque and control torque – Errors and compensations, extension of range using shunts and series resistance. Electrostatic Voltmeters-electrometer type and attracted disc type – Extension of range of E.S. Voltmeters.

Unit –II: Potentiometers and Instrument transformers

Principle and operation of D.C. Crompton's potentiometer – standardization – Measurement of unknown resistance, current, voltage. A.C. Potentiometers: polar and coordinate types standardization – applications.
CT and PT – Ratio and phase angle errors

Unit –III: Measurement of Power & Energy

Single phase dynamometer wattmeter, LPF and UPF, Double element and three element dynamometer wattmeter, expression for deflecting and control torques – Extension of range of wattmeter using instrument transformers – Measurement of active and reactive powers in balanced and unbalanced systems.

Single phase induction type energy meter – driving and braking torques – errors and compensations – testing by phantom loading using R.S.S. meter. Three phase energy meter – trivector meter, maximum demand meters.

Unit – IV: D.C & A.C Bridges

Method of measuring low, medium and high resistance – sensitivity of Wheatstone's bridge – Carey Foster's bridge, Kelvin's double bridge for measuring low resistance, measurement of high resistance – loss of charge method.

Measurement of inductance, Quality Factor - Maxwell's bridge, Hay's bridge, Anderson's bridge, Owen's bridge. Measurement of capacitance and loss angle - Desauty bridge. Wien's bridge – Schering Bridge.

Unit-V: Transducers & Oscilloscope

Transducers: Definition of transducers, Classification of transducers, Advantages of Electrical transducers, Characteristics and choice of transducers; Principle of operation of resistor, inductor, LVDT and capacitor transducers; LVDT Applications, Strain gauge and its principle of operation, guage factor, Thermistors, Thermocouples, Piezo electric transducers, photovoltaic, photo conductive cells, photo diodes.

Oscilloscope: Cathode ray oscilloscope-Cathode ray tube-time base generator-horizontal and vertical amplifiers-CRO probes-applications of CRO-Measurement of phase and frequency-lissajous patterns.

Text Books

1. Electrical & Electronic Measurement & Instruments by A.K.Sawhney Dhanpat Rai & Co. Publications.
2. Electrical & Electronic Measurement & Instruments by R.K Rajput, S.Chand & Company Ltd**.**

Reference Books

1. Electrical Measurements and measuring Instruments – by E.W. Golding and F.C. Widdis, fifth Edition, Wheeler Publishing
2. Electrical Measurements – by Buckingham and Price, Prentice – Hall
3. Electrical Measurements by Harris.
4. Electrical Measurements: Fundamentals, Concepts, Applications – by Reissland, M.U, New Age International (P) Limited, Publishers.

Course Outcomes:

Upon the completion of this subject students will be able to

1. Classify and identify various types of measuring instruments.
2. Explain constructional features, types and operation of various measuring instruments
3. Evaluate the values of Resistance, Inductance and Capacitance using various bridges.
4. Elucidate the operation of CRO & types of transducers.

(A2219) POWER SYSTEMS - III

B.Tech (EEE) VI-Semester

L	T	P	C
3	1	0	3

Objective

This course introduces all varieties of Circuit Breakers and Relays for protection of Generators, Transformers and feeder bus bars from over voltages and other hazards. It emphasize on Neutral grounding for overall protection.

Unit – I: Circuit Breakers

Circuit Breakers: Elementary principles of arc interruption, Recovery, Restriking Voltage and Recovery voltages.- Restriking Phenomenon, Average and Max. RRRV, Numerical Problems - Current Chopping and Resistance Switching - CB ratings and Specifications: Types and Numerical Problems. – Auto reclosures. Description and Operation of following types of circuit breakers: Minimum Oil Circuit breakers, Air Blast Circuit Breakers, Vacuum and SF6 circuit breakers.

Unit – II: Electromagnetic and Static Relays

Principle of Operation and Construction of Attracted armature, Balanced Beam, induction Disc and Induction Cup relays.

Relays Classification: Instantaneous, DMT and IDMT types. Application of relays: Over current/ Under voltage relays, Direction relays, Differential Relays and Percentage Differential Relays.

Universal torque equation,

Distance relays: Impedance, Reactance and Mho and Off-Set Mho relays, Characteristics of Distance Relays and Comparison.

Static Relays: Static Relays verses Electromagnetic Relays.

Unit – III: Generator & Transformer protection

Protection of generators against Stator faults, Rotor faults, and Abnormal Conditions. Restricted Earth fault and Inter-turn fault Protection. Numerical Problems on % Winding Unprotected.

Protection of transformers: Percentage Differential Protection, Numerical Problem on Design of CT s Ratio, Buchholtz relay Protection.

Unit –IV: Feeder and Bus-Bar Protection, Protection against over voltages

Protection of Lines: Over Current, Carrier Current and Three-zone distance relay protection using Impedance relays. Translay Relay.

Protection of Bus bars – Differential protection.

Protection against over voltages

Generation of Over Voltages in Power Systems.-Protection against Lightning Over Voltages - Valve type and Zinc-Oxide Lighting Arresters - Insulation Coordination -BIL, Impulse Ratio, Standard Impulse Test Wave, Volt-Time Characteristics.

Unit – V: Neutral Grounding

Grounded and Ungrounded Neutral Systems.- Effects of Ungrounded Neutral on system performance. Methods of Neutral Grounding: Solid, Resistance, Reactance - Arcing Grounds and Grounding Practices.

Text books:

1. Switchgear and Protection – by Sunil S Rao, Khanna Publlishers
2. Power System Protection and Switchgear by Badri Ram , D.N Viswakarma, TMH Publications
3. Electrical Power Systems – by C.L.Wadhwa, New Age International (P) Limited, Publishers, 3rd editon

Reference books:

1. Fundamentals of Power System Protection by Paithankar and S.R.Bhide., PHI, 2003.
2. Art & Science of Protective Relaying – by C R Mason, Wiley Eastern Ltd.
3. A Text book on Power System Engineering by B.L.Soni, Gupta, Bhatnagar, Chakrabarthy, Dhanpat Rai & Co.

Course Outcomes:

Upon the completion of this subject students will be able to

1. Illustrate the constructional features, types and operation of various circuit breakers and relays.
2. Interpret the concept of Feeder and Bus-Bar Protection.
3. Identify various Faults in electrical machines and their protection.
4. Examine the need of neutral grounding systems.

(A2220) COMPUTER METHODS IN POWER SYSTEMS

B.Tech (EEE) VI-Semester

L	T	P	C
4	0	0	4

Course Objective

This course introduces formation of Z bus of a transmission line, power flow studies by various methods. It also deals with short circuit analysis and analysis of power system for steady state and transient stability.

Unit –I: Power System Network Matrices

Graph Theory: Definitions, Bus Incidence Matrix, Y_{bus} formation by Direct and Singular Transformation Methods, Numerical Problems.

Formation of Z_{Bus}: Partial network, Algorithm for the Modification of Z_{Bus} Matrix for addition element for the following cases: Addition of element from a new bus to reference, Addition of element from a new bus to an old bus, Addition of element between an old bus to reference and Addition of element between two old busses (Derivations and Numerical Problems).- Modification of Z_{Bus} for the changes in network (Problems)

Unit –II: Power flow Studies & Load Flows

Necessity of Power Flow Studies – Data for Power Flow Studies – Derivation of Static load flow equations

Load flow solutions using Gauss Seidel Method: Acceleration Factor, Load flow solution with and without P-V buses, Algorithm and Flowchart. Numerical Load flow Solution for Simple Power Systems (Max. 3-Buses): Determination of Bus Voltages, Injected Active and Reactive Powers (Sample One Iteration only) and finding Line Flows/Losses for the given Bus Voltages.

Newton Raphson Method in Rectangular and Polar Co-Ordinates Form: Load Flow Solution with or without PV Busses- Derivation of Jacobian Elements, Algorithm and Flowchart.

Decoupled and Fast Decoupled Methods. Comparison of Different Methods – DC load Flow

Unit – III: Short Circuit Analysis

Per-Unit System of Representation. Per-Unit equivalent reactance network of a three phase Power System, Numerical Problems.

Symmetrical fault Analysis: Short Circuit Current and MVA Calculations, Fault levels, Application of Series Reactors, Numerical Problems.

Unit –IV: **Symmetrical Component Theory**

Symmetrical Component Transformation, Positive, Negative and Zero sequence components: Voltages, Currents and Impedances.

Sequence Networks: Positive, Negative and Zero sequence Networks, Numerical Problems.

Unsymmetrical Fault Analysis: LG, LL, LLG faults with and without fault impedance, Numerical Problems.

Unit –V: Power System Stability Analysis

Steady State Stability Analysis: Elementary concepts of Steady State, Dynamic and Transient Stabilities.

Description of Steady State Stability Power Limit, Transfer Reactance, Synchronizing Power Coefficient, Power Angle Curve and Determination of Steady State Stability and Methods to improve steady state stability.

Transient State Stability Analysis

Derivation of Swing Equation. Determination of Transient Stability by Equal Area Criterion, Application of Equal Area Criterion, Critical Clearing Angle Calculation.- Solution of Swing Equation: Point-by-Point Method. Methods to improve Stability - Application of Auto Reclosing and Fast Operating Circuit Breakers.

Text Books

1. Computer Techniques in Power System Analysis, M.A.Pai, TMH Publications,
2. Computer techniques and models in power systems, K.Uma rao. I.K.International.

Reference Books

1. Power System Analysis, PSR Murry, BS Publications.
2. Power system Analysis Operation and control, Abhijit Chakrabarth, Sunita Haldar, PHI.
3. Power System Analysis, Hadi Saadat , TMH.
4. Modern Power System Analysis, Turan Gonen, CRC Press.
5. Modern Power Systems Analysis, Xi — Fan Wang, Yonghua Song, Malcolm Living, Springer International.
6. Electrical Power Systems Analysis, Security and Deregulation, P.
7. Venkatesh, B. V. Manikandan, S. Charles Raja, A.Srinivasan, PHI. Modern Power system Analysis, I.J.Nagrath & D.P.Kothari: Tata McGraw-Hill Publishing Company.
8. Power System Analysis, **T.** K. Nagasarkar, M. S. Sukhija. Oxford University Press.

9. Power System Analysis by Grainger and Stevenson, Tata McGraw Hill.

Course Outcomes:

Upon the completion of this subject students will be able to

1. Formulate the incidence, network matrices and model the power system components.
2. Perform steady state power flow analysis of power system networks using Gauss-Seidel, Newton-Raphson and fast decoupled iterative methods.
3. Analyze short circuit faults in power system networks using Z_{Bus} method.
4. Perform contingency analysis for power system networks using Z_{Bus} method.

(A2221) ADVANCED CONTROL SYSTEMS
(Professional Elective-II)

B.Tech (EEE) VI-Semester

L	T	P	C
3	1	0	3

Objective

This subject deals with state space, describing function, phase and stability analysis including controllability and observability. It also deals with modern control and optimal control systems.

Unit-I: State space analysis

State Space Representation of electrical and mechanical systems, Solutions of State Equation, State Transition Matrix, Canonical Forms-Controllable Canonical Form, Observable Canonical Form, Jordan Canonical Form.

Tests for controllability and observability for continuous time systems-Time varying case, minimum energy control,

Time invariant case, Principle of Duality, Controllability and observability form Jordan canonical form and other canonical forms.

Unit-II: Describing function analysis

Introduction to nonlinear systems, Types of nonlinearities, describing functions, describing function analysis of nonlinear control systems

Unit-III: Phase-plane analysis

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 Lypanov's instability theorems. Direct method of Lypanov for the Linear and Nonlinear continuous time autonomous systems**.**

Unit-V: Controller Design

Effect of state feedback on controllability and observability. Design of State Feedback Control through Pole placement. Full order observer and reduced order observer. Minimization of functional of single function, constrained minimization. Minimum principle. Control variable inequality constraints. Control and state variable inequality constraints. Euler Lagrangine Equation.

Text Books

1. Modern Control System Theory-by M.Gopal, New Age International Publishers, 2nd edition.1996
2. Modern Control Engineering-by K.Ogata, Prentice Hall of India, 3rd edition, 1998
3. Text book by K.P.Das

Reference Books

1. Control Systems Engineering by I.J.Nagarath and M.Gopal, New Age International (P) Ltd.
2. Digital Control and State Variable Methods-by M.Gopal,Tata Mc Graw-Hill Companies,1997.
3. Control Systems theory and applications, S.K Bhattacharya, Pearson.
4. Control Systems, N.C.Jagan, BS Publications.
5. Control systems, A.Ananad Kumar, PHI.
6. Control Systems Engineering, S.Palani, Tata-McGraw-Hill.
7. Control systems, Dhanesh N.Manik, Cengage Learning.
8. Control Systems Engineering, I. J. Nagrath and M. Gopal, New Age International (P) Limited, Publishers.
9. Control Systems, N.K.Sinha, New Age International (P) Limited Publishers.
10. Modern Control Engineering, Yaduvir Singh, S. Janardhanan, Cengage Learning.
11. Modern Control Engineering, K. Ogata, Prentice Hall of India, 3d edition, 1998.
12. Modern Control System Theory, M. Gopal, New Age International Publishers.
13. Modern Control Engineering, D. Roy Choudhury, PHI Learning.
14. Digital Control and State Variable Methods, M. Gopal, Tata Mc Graw Hill Companies.
15. Systems and Control by Stainslaw H.Zak,Oxford Press,2003.
16. Modern control system-by Dorf, Pearson

Course Outcomes:

Upon the completion of this subject students will be able to

1. Assess the controllability and observability for a given system.
2. Identify and analyze non-linear systems using describing function and phase plane analysis.
3. Design analysis of linear and non-linear systems using Lyapunov function for stable systems.
4. Design of pole assignment and controller.

(A2222) NON CONVENTIONAL ENERGY SOURCES
(Professional Elective-II)

B.Tech (EEE) VI-Semester

L	T	P	C
3	1	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. Solar Energy: Principles of Thermal Collection and Storage, S. P. Sukhatme and J. K. Nayak, TMH, New Delhi, 3rd Edition.
2. Non-Conventional Energy Sources /G.D. Rai
3. Renewable Energy Resources, John Twidell and Tony Weir, Taylor and Francis.
4. Energy Science: Principles, Technologies and Impacts, John Andrews and Nick Jelly, Oxford.

Reference Books

1. Handbook of renewable technology Ahmed and Zobaa, Ramesh C Bansal,World scientific, Singapore.
2. Renewable Energy Technologies /Ramesh & Kumar /Narosa.
3. Renewable energy technologies – A practical guide for beginners – Chetong Singh Solanki, PHI.
4. Renewable energy resources/ Tiwari and Ghosal/ Narosa.
5. Non-Conventional Energy / Ashok V Desai /Wiley Eastern.

Course Outcomes:
Upon the completion of this subject students will be able to

1. Illustrate solar radiation data and classify solar thermal collectors with their applications.
2. Explain wind energy conversion systems.
3. Explain basic principle and working of tidal, biomass, fuel cell and geothermal systems.
4. Demonstrate direct energy conversion**.**

(A2223) PRINCIPLES OF RELIABILITY ENGINEERING
(Professional Elective-II)

B.Tech (EEE) VI-Semester

L	T	P	C
3	1	0	3

Course Objective

This subject introduces the concept of probability, reliability, distribution functions and various methods and techniques to calculate and estimate the reliability of different engineering problems and models.

Unit – I: Basics of Probability theory & Distribution

Basic probability theory – rules for combining probabilities of events – Bernoulli's trials – probabilities density and distribution functions – binomial distribution – expected value and standard deviation of binomial distribution.

Unit – II: Network Modelling and Reliability Analysis

Analysis of Series, Parallel, Series-Parallel networks – complex networks – decomposition method.

Unit – III: Reliability functions

Reliability functions f(t), F(t),R(t),h(t) and their relationships – exponential distribution – Expected value and standard deviation of exponential distribution – Bath tub curve – reliability analysis of series parallel networks using exponential distribution – reliability measures MTTF, MTTR, MTBF.

Unit – IV: Markov Modelling

Markov chains – concept of stochastic transitional probability Matrix, Evaluation of limiting state Probabilities. – Markov processes one component repairable system – time dependent probability evaluation using Laplace transform approach – evaluation of limiting state probabilities using STPM – two component repairable models.

Unit – V: Frequency & Duration Techniques

Frequency and duration concept – Evaluation of frequency of encountering state, mean cycle time, for one , two component repairable models – evaluation of cumulative probability and cumulative frequency of encountering of merged states.

Text Books

1. Reliability Evaluation of Engg. System – R. Billinton, R.N.Allan, Plenum Press, New York, reprinted in India by B.S.Publications, 2007.
2. Reliability Evaluation of Power systems – R. Billinton, R.N.Allan, Pitman Advance Publishing Program, New York, reprinted in India by B.S.Publications, 2007.

Course Outcomes:

Upon the completion of this subject students will be able to

1. Apply the probability theory and binomial distribution to power system networks.
2. Model parallel and series networks.
3. Illustrate various reliability functions.
4. Summarize reliability analysis of various models through different methods reliability functions, repairable irreparable systems through markov modeling frequency and duration techniques.

(A2419) DIGITAL SIGNAL PROCESSING
(Professional Elective-II)

B.Tech (EEE) VI-Semester

L	T	P	C
3	1	0	3

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. Fundamentals of Digital Signal Processing- Loney Ludeman, John Wiley, 2009.

Reference books:

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 – Taan S.EIAli, CRC press, 2009.
5. Digital Signal Processing – A practical approach, Emmanuel C.Ifeachor and Barrie W.Jervis, 2nd Edition Pearson Education, 2009.
6. Digital Signal Processing - Nagoor kani, 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 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 tradeoffs between normal and multi rate DSP techniques and finite length word effects.

(A2227) FACTS CONTROLLERS
(Professional Elective-III)

B.Tech (EEE) VI-Semester

L	T	P	C
3	1	0	3

Course Objective: It deals with basic FACTS concepts, static shunt and series compensation and combined compensation techniques.

Unit-I: Facts Concepts Transmission interconnections power flow in an AC system, loading capability limits, Dynamic stability considerations, importance of controllable parameters basic types of FACTS controllers, benefits from FACTS controllers.

Unit-II: Voltage Source Converters Single phase three phase full wave bridge converters transformer connections for 12 pulse 24 and 48 pulse operation. Three level voltage source converter, pulse width modulation converter, basic concept of current source Converters, and comparison of current source converters with voltage source converters.

Unit-III: Static Shunt Compensation Objectives of shunt compensation, mid-point voltage regulation voltage instability prevention, improvement of transient stability, Power oscillation damping, Methods of controllable VAR generation, variable impedance type static VAR generators switching converter type VAR generators hybrid VAR generators.

Unit-IV: SVC and STATCOM The regulation and slope transfer function and dynamic performance, transient stability enhancement and power oscillation damping operating point control and summary of compensator control.

Unit-V: Static Series Compensators
Concept of series capacitive compensation, improvement of transient stability, power oscillation damping, and functional requirements of GTO thyristor controlled series capacitor (GSC), thyristor switched capacitor (TSSC), and thyristor controlled series capacitor (TCSC) Control schemes for GSC TSSC and TCSC.

Text Books

1. Understanding FACTS, Concepts and Technology of Flexible AC Transmission Systems, Narain. G. Hingorani, Laszlo Gyugyi, IEEE Press, Wiley India.
2. Facts Controllers In Power Transmission and Distribution · Padiyar, K.R. New Age International

Reference Books

1. Thyristor — Based Conrollers for Electrical Transmission Systems, R.Mohan Mathur, Rajiv K. Varma.Wiley India.
2. FACTS Modeling and Simulation in Power Networks, Enrique Acha, Wiley India Distributed by BSP Books Pvt. Ltd.

Course Outcomes:

By the completion of this course students will be able to

1. Comprehend the importance of controllable parameters and benefits of FACTS controllers.
2. Analyze different converters viz.3, 6 and 12 pulse converter.
3. Recognize the significance of static shunt and series compensation
4. Illustrate the functional operation and control of GCSC, TSSC and TCSC.

(A2228) POWER QUALITY
(Professional Elective-III)

B.Tech (EEE) VI-Semester

L	T	P	C
3	1	0	3

Course Objective: This subject deals with the various power quality phenomenon, their origin and monitoring, mitigation methods and the effects of various power quality phenomenon in various equipments.

Unit-I: Introduction: Introduction of the Power Quality (PQ) problem, Terms used in PQ: Voltage, Sag, Swell, Surges, Harmonics, over voltages, spikes, Voltage fluctuations, Transients, Interruption, overview of power quality phenomenon, Remedies to improve power quality, power quality monitoring.

Unit-II: Long & Short Interruptions: Interruptions – Definition – Difference between failures, outage, Interruptions – causes of Long Interruptions – Origin of Interruptions – Limits for the Interruption frequency – Limits for the interruption duration – costs of Interruption – Overview of Reliability evaluation to power quality, comparison of observations and reliability evaluation. **Short interruptions**: definition, origin of short interruptions, basic principle, fuse saving, voltage magnitude events due to re-closing, voltage during the interruption, monitoring of short interruptions, difference between medium and low voltage systems. Multiple events, single phase tripping – voltage and current during fault period, voltage and current at post fault period, stochastic prediction of short interruptions

Unit- III: 1 & 3-Phase Voltage Sag Characterization
Voltage sag – definition, causes of voltage sag, voltage sag magnitude, and monitoring, theoretical calculation of voltage sag magnitude, voltage sag calculation in non-radial systems, meshed systems, and voltage sag duration. Three phase faults, phase angle jumps, magnitude and phase angle jumps for three phase unbalanced sags, load influence on voltage sags.

Unit-IV: Power Quality Considerations in Industrial Power Systems
Voltage sag – equipment behavior of Power electronic loads, induction motors, synchronous motors, computers, consumer electronics, adjustable speed AC drives and its operation. Mitigation of AC Drives, adjustable speed DC drives and its operation, mitigation methods of DC drives.

Unit-V: Mitigation Of Interruptions & Voltage Sags: Overview of mitigation methods – from fault to trip, reducing the number of faults, reducing the fault clearing time changing the power system, installing mitigation equipment, improving equipment immunity, different events and mitigation methods. System equipment interface – voltage source converter, series voltage controller, shunt controller, combined shunt and series controller.

Power Quality and EMC Standards: Introduction to standardization, IEC Electromagnetic compatibility standards, European voltage characteristics standards, PQ surveys.

Text Books

1. Electrical Power System Quality Mark F. McGranaghan, Surya Santoso, H. Wayne Beaty, Roger C. Dugan,McGraw-Hill Education,
2. Power Quality: VAR Compensation in Power Systems R. Sastry Vedam, Mulukutla S. Sarma CRC Press

Reference book:

1. Understanding Power Quality Problems‖ by Math H J Bollen. IEEE Press

Course Outcomes:

Up on the completion of this course students will be able to

1. Classify the power quality problems
2. Identify the harmonic sources and the effects of harmonic distortion
3. Analyze voltage sag problems and suggest preventive techniques.
4. Elucidate the mitigation of interruptions & voltage sags.

(A2229) HIGH VOLTAGE ENGINEERING
(Professional Elective-III)

B.Tech (EEE) VI-Semester

L	T	P	C
3	1	0	3

Course Objective

This subject deals with the detailed analysis of Breakdown occur in gaseous, liquids and solid dielectrics. Information about generation and measurement of High voltage and current. In addition the High voltage testing methods are also discussed.

Unit- I: Introduction to high voltage technology and applications

Electric Field Stresses, Gas / Vaccum as Insulator, Liquid Dielectrics, Solids and Composites, Estimation and Control of Electric Stress, Numerical methods for electric field computation, Surge voltages, their distribution and control, Applications of insulating materials in transformers, rotating machines, circuit breakers, cable power capacitors and bushings.

Unit- II: Break down in dielectric materials

Gases as insulating media, collision process, Ionization process, Townsend's criteria of breakdown in gases, Paschen's law. Liquid as Insulator, pure and commercial liquids, breakdown in pure and commercial liquids.

Intrinsic breakdown, electromechanical breakdown, thermal breakdown, breakdown of solid dielectrics in practice, Breakdown in composite dielectrics, solid dielectrics used in practice.

Unit- III: Generation measurement of high voltages and currents

Generation of High Direct Current Voltages, Generation of High alternating voltages, Generation of Impulse Voltages, Generation of Impulse currents, Tripping and control of impulse generators.

Measurement of High Direct Current voltages, Measurement of High Voltages alternating and impulse, Measurement of High Currents-direct, alternating and Impulse, Oscilloscope for impulse voltage and current measurements.

Unit- IV: Over voltage phenomenon and insulation co-ordination

Natural causes for over voltages – Lightning phenomenon, Overvoltage due to switching surges, system faults and other abnormal conditions, Principles

of Insulation Coordination on High voltage and Extra High Voltage power systems.

Unit -V: Non-destructive testing of material and electrical apparatus
Measurement of D.C Resistivity, Measurement of Dielectric Constant and loss factor, Partial discharge measurements.
High voltage testing of electrical apparatus
Testing of Insulators and bushings, Testing of Isolators and circuit breakers, testing of cables, Testing of Transformers, Testing of Surge Arresters, Radio Interference measurements.

Text Books
1. High Voltage Engineering by M.S.Naidu and V. Kamaraju – TMH Publications, 3rd Edition
2. High Voltage Engineering: Fundamentals by E.Kuffel, W.S.Zaengl, J.Kuffel by Elsevier, 2nd Edition.

Reference Books
1. High Voltage Engineering by C.L.Wadhwa, New Age Internationals (P) Limited, 1997.
2. High Voltage Insulation Engineering by Ravindra Arora, Wolfgang Mosch, New Age International (P) Limited, 1995.

Course Outcomes:
Upon the completion of this subject students will be able to
1. Realize the importance of high voltage technology and its applications
2. Comprehend the breaking phenomena and dielectric strength of different mediums(solids, gaseous, liquids).
3. Design analysis for the measurement of high voltages and currents.
4. Elucidate different causes of over voltages and insulation coordination for over voltages
5. Distinguish different types of testing methodologies of various high voltage apparatus

(A2003) ADVANCED ENGLISH COMMUNICATION SKILLS LAB

B.Tech (EEE) 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. Organise 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. Take part in social and professional communication.

(A2224) POWER ELECTRONICS & SIMULATION LAB

B.Tech (EEE) VI-Semester

L	T	P	C
0	0	3	2

Course Objective

This lab introduces the practical knowledge of power semiconductor devices, converters and choppers for different applications. The above converters also simulated in MATLAB and PSPICE and the waveforms will be compared.

The following experiments are required to be conducted as compulsory experiments:

1. Gate firing circuits for SCR's
2. Single Phase AC Voltage Controller with R and RL Loads
3. Single Phase fully controlled bridge converter with R and RL loads
4. DC Jones chopper with R and RL Loads
5. Single Phase Cycloconverter with R and RL loads
6. Single Phase half controlled converter with R load
7. Single Phase series inverter with R and RL loads
8. PSPICE simulation of single-phase full converter using RLE loads and single-phase AC voltage controller using RLE loads.

In addition to the above eight experiments, atleast any two of the following experiments are required to be conducted from the following list:

1. PSPICE simulation of resonant pulse commutation circuit and Buck chopper.
2. PSPICE simulation of single phase Inverter with PWM control.
3. Study of Characteristics of SCR, MOSFET & IGBT
4. Forced Commutation circuits (Class A, Class B, Class C, Class D & Class E)
5. Three Phase half controlled bridge converter with R-load
6. Single Phase Bridge converter with R and RL loads
7. Single Phase dual converter with RL loads
8. Operation of MOSFET based chopper
9. Single Phase Parallel, inverter with R and RL loads

Reference Books

1. Simulation of Electric and Electronic circuits using PSPICE – by M.H.Rashid, M/s PHI Publications.
2. PSPICE A/D user's manual – Microsim, USA.
3. PSPICE reference guide – Microsim, USA.
4. MATLAB and its Tool Books user's manual and – Mathworks, USA.
5. Spice for power electronics and electric power by Rashid, CRC Press

(A2006) ANALYTICAL SKILLS-II

B.Tech (EEE) VI-Semester

L	T	P	C
2	0	0	0

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

VII SEMESTER

(A2225) UTILIZATION OF ELECTRICAL ENERGY

B.Tech (EEE) VII-Semester

L	T	P	C
3	1	0	3

Course Objective

This subject deals with the fundamentals of illumination and its classification and the electric heating and welding. It gives the detailed study of all varieties of Electric drives and their application to electrical traction systems.

Unit – I: Electric Drives

Type of electric drives, choice of motor, starting and running characteristics, speed control, temperature rise, particular applications of electric drives, types of industrial loads, continuous, intermittent and variable loads, load equalization.

Unit – II: Electric heating & welding

Electric heating: Advantages and methods of electric heating, resistance heating induction heating and dielectric heating.

Electric welding, resistance and arc welding, electric welding equipment, comparison between A.C. and D.C. Welding.

Unit – III: Illumination

Introduction, terms used in illumination, laws of illumination, polar curves, photometry, integrating sphere, sources of light.

Various illumination methods

Discharge lamps, MV and SV lamps – comparison between tungsten filament lamps and fluorescent tubes, Basic principles of light control, Types and design of lighting and flood lighting.LED Lighting

Unit – IV: Electric traction – I

System of electric traction and track electrification. Review of existing electric traction systems in India. Special features of traction motor, methods of electric braking-plugging rheostat braking and regenerative braking.

Mechanics of train movement. Speed-time curves for different services – trapezoidal and quadrilateral speed time curves.

Unit – V: Electric traction-II

Calculations of tractive effort, power, specific energy consumption for given run, effect of varying acceleration and braking retardation, adhesive weight and braking retardation, adhesive weight and coefficient of adhesion.

Text Books

1. Utilization of Electric Energy – by E. Openshaw Taylor, Orient Longman.
2. Generation, Distribution and Utilization of electrical Energy – by C.L. Wadhwa, New Age International (P) Limited, Publishers, 1997.

Reference Books

1. Utilization of Electrical Power including Electric drives and Electric traction – by N.V.Suryanarayana, New Age International (P) Limited, Publishers, 1996.
2. Art & Science of Utilization of electrical Energy – by Partab, Dhanpat Rai & Sons.

Course Outcomes:

Upon the completion of this subject students will be able to

1. Choose a right drive for a particular application.
2. Comprehend different types of Electric Heating , Welding and Illumination
3. Discuss the basic fundamental of electric traction
4. Discuss mechanics of Train movement.
5. Plot trapezoidal and quadrilateral speed time curves and discuss specify energy consumption

(A2226) POWER SYSTEM OPERATION & CONTROL

B.Tech (EEE): VII-Semester

L	T	P	C
3	0	0	3

Course Objective

This subject deals with Economic operation of Power Systems, Hydrothermal scheduling and modeling of turbines, generators and automatic controllers. It emphasize on single area and two area load frequency control and reactive power control.

Unit – I: Economic Operation of Power Systems

Optimal operation of Generators in Thermal Power Stations, - heat rate Curve – Cost Curve – Incremental fuel and Production costs, input-output characteristics, Optimum generation allocation with line losses neglected. Optimum generation allocation including the effect of transmission line losses – Loss Coefficients, General transmission line loss formula.

Unit – II: Hydrothermal Scheduling

Optimal scheduling of Hydrothermal System: Hydroelectric power plant models, scheduling problems-Short term Hydrothermal scheduling problem.

Unit –III: Modelling of Turbine, Generator and Controllers

Modelling of Turbine: First order Turbine model, Block Diagram representation of Steam Turbines and Approximate Linear Models.

Modelling of Generator (Steady State and Transient Models): Description of Simplified Network Model of a Synchronous Machine (Classical Model), Description of Swing Equation (No Derivation) and State-Space II-Order Mathematical Model of Synchronous Machine.

Modelling of Governor: Mathematical Modeling of Speed Governing System – Derivation of small signal transfer function.

Modelling of Excitation System: Fundamental Characteristics of an Excitation system, Transfer function, Block Diagram Representation of IEEE Type-1 Model

Unit – IV: Single Area &Two-Area Load Frequency Control

Necessity of keeping frequency constant. Definitions of Control area – Single area control – Block diagram representation of an isolated power system – Steady state analysis – Dynamic response – Uncontrolled case. Load frequency control of 2-area system – uncontrolled case and controlled case, tie-line bias control

Load Frequency Controllers

Proportional plus Integral control of single area and its block diagram representation, steady state response, Load Frequency Control and Economic dispatch control.

Unit – V: Reactive Power Control & Smart Grid

Overview of Reactive Power control – Reactive Power compensation in transmission systems – advantages and disadvantages of different types of compensating equipment for transmission systems; load compensation – Specifications of load compensator, Uncompensated and compensated transmission lines: shunt and Series Compensation.(Qualitative Treatment)

Introduction to smart grids

Introduction to Smart Grid, Smart Grid architecture layers, Features of smart grid, Smart Grid Technology.

Text Books

1. Electrical Power Systems by C.L.Wadhwa, Newage International-3rd Edition
2. Modern Power System Analysis – by I.J.Nagrath & D.P.Kothari Tata M Graw – Hill Publishing Company Ltd, 2nd edition.
3. Operation and Control in Power Systems, PSR Murthy, BS Publications.

Reference Books

1. Electric Energy systems Theory – by O.I.Elgerd, Tata Mc Graw-hill Publishing Company Ltd., Second edition.
2. Power System Analysis by Grainger and Stevenson, Tata McGraw Hill.
3. Power System Analysis by Hadi Saadat – TMH Edition.
4. Power System Operation and Control, Dr. K. Uma Rao, Wiley India Pvt. Ltd.
5. Power System Analysis and Design by J.Duncan Glover and M.S.Sarma., THOMPSON, 3rd Edition Cengage Learning

Course Outcomes:

Upon the completion of this subject students will be able to

1. Estimate and Dispatch the load economically among thermal plants
2. Examine the hydrothermal scheduling.
3. Model turbine, generator, governor and excitation systems.
4. Describe single area and two area load frequency controls.
5. Interpret reactive power control and compensation and describe the features of smart grid

(A2460) BASICS OF MICROPROCESSORS & MICROCONTROLLERS

B.Tech (EEE) VII-Semester

L	T	P	C
3	1	0	3

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, 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 and memory interfacing

Memory interfacing, 8255 PPI, Various Modes of Operation and Interfacing to 8086, Interfacing keyboard, Display, D/A and A/D Converter.

Communication Interface: Serial Communication Standards, Serial Data Transfer Schemes

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, AndhePallavi, 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 with 8086 microprocessor.
4. Describe the architecture of 8051 microcontroller.
5. Write assembly language programs for various 8051 interrupts.

(A2451) MICRO CONTROLLERS AND APPLICATIONS

(**Open Elective-I: Offered by ECE Department**)

B.Tech (EEE): VII-Semester

L	T	P	C
3	0	0	3

Course Objective:

- To develop an in-depth understanding of the operation of Microcontrollers, Machine language programming
- To acquire the skill set to interface the microcontrollers with outside world for controlling applications.

Unit-I

Introduction to Microprocessors and Microcontrollers: Introduction to Microprocessor and Micro Controller, Number system and Binary arithmetic. Microprocessor Architecture (8085 and 8086) and Microcomputer System, memory map and addressing, memory classification, review of logic device for Interfacing, Memory Interfacing, Overview of 8086 Instruction Set, stacks and Interrupts.

Unit-II

The 8051 Architecture: 8051 Microcontroller hardware, Program Counter and Data Pointer, A and B CPU registers, Flags and Program Status Word (PSW),Internal Memory : Internal RAM – Stack and Stack Pointer, Special Function Registers, Internal ROM, Input / Output Pins, ports and Circuits, External Memory, Timers and Counters, Serial data Input/ Output, interrupts.

Unit-III

8051 Instruction set: Assembly Language Programming Process, Addressing Modes, Assembler Directives, Data Transfer, Arithmetic, Logical and Branch Instructions, Decimal Arithmetic, Interrupt Programming, Serial Data Communication.

8051 Programming: Basic Assembly Language Programming, Input/ Output Port Programming, 8051 Timer / Counter Programming, 8051 Serial Communication Programming, 8051 Interrupt Programming.

Unit-IV

8051 Applications: Introduction, Interfacing Keyboards, Key pads, Interfacing Displays (Seven Segment Displays and LCD's), Interfacing A/D Convertors, Interfacing D/A Convertors, Interfacing Hardware Circuits for

Multiple Interrupts, 8051 Interfacing with 8255, Interfacing External Memory with 8051.

Unit-V

Introduction to Advanced Architectures: ARM and SHARC, Processor and memory organization and Instruction level parallelism; Networked embedded System: Bus protocols, I2 bus and Can bus; Internet-Enabled Systems, Design Example-elevator Controller.

Text Books:

1. K.J. Ayala "The 8051 Micro controller, Architecture, Programming 8-Applications "Thomson Delmar Learning
2. RS Gaonkar, "Microprocessors Architecture, Programming and Applications "Penram International.
3. 'Computers as Components- Principles of Embedded Computing System Design', Wayne Wolf, Elsevier (2^{nd} Edition)

Reference Books:

1. M. A. Mazidi& J.G Mazidi." The 8051 Micro controller 8- Embedded System "Pearson Education.
2. B. Ram "Fundamentals of Microprocessors and Microcomputers "DhanpatRai and Sons.

Course Outcomes:

Up on completion of the course students will be able to:

1. Explain the internal organization of popular 8051 Microcontrollers.
2. Describe hardware and software interaction and integration.
3. Perform, design and develop simple Microcontrollers-based systems in real time scenarios.

(A2362) MATERIAL SCIENCE
(**Open Elective-I: Offered by ME Department**)

B.Tech (EEE) VII-Semester

L	T	P	C
3	0	0	3

Course Objective
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, Aluminum and its alloys, Titanium and its alloys.

Unit – V
Ceramic materials: Crystalline ceramics, glasses, cermets, 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. Raghavan
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.

(A2510)DATA BASE MANAGEMENT SYSTEMS
(Open Elective-I: Offered by CSE Department)

B.Tech (EEE)VII-Semester

L	T	P	C
3	0	0	3

Course Objectives

- To understand the basic concepts and the applications of database systems.
- To master the basics of SQL and construct queries using SQL.
- To understand the relational database design principles.
- To become familiar with the basic issues of transaction processing and concurrently control.
- To become familiar with database storage structures and access technologies.

Unit I:

Introduction: Data base System Applications, Purpose of Database Systems, View of Data – Data Abstraction –Instances and Schemas – data Models – the ER Model – Relational Model – Other Models – Database Languages – DDL – DML – database Access for applications Programs – data base Users and Administrator, History of data base systems

Introduction to Data base design and ER diagrams – ER Model - Entities, Attributes and Entity sets – Relationships and Relationship sets – Additional features of ER Model – Conceptual Design with ER model – Conceptual Design for Large Enterprise.

Introduction to the Relational Model, Integrity constraints over Relations, Enforcing Integrity Constraints, Query Relational Data, Logical database Design, Introduction to views- Destroying/ altering tables & Views

Unit II:

Relational Algebra & Calculus– Selection and projection set operations – renaming – Joins – Division – Examples of Algebra overviews – Relational calculus – Tuple relational Calculus – Domain relational calculus – Expressive Power of Algebra and calculus.

Form of Basic SQL Query- Examples of SQL Queries – introduction to Nested Queires, Correlated Nested Queries, Set comparison Operators, Aggregate Operators, Null values comparison, using Null values, logical connectives, AND, OR & NOT Impact on SQL constructs, Outer Joins, Disallowing Null Values, and Complex Integrity constraints in SQL Triggers

and Active Data bases.

Unit III:

Introduction to Schema Refinement – Problems Caused by redundancy, Decompositions – Problem related to decomposition, Functional Dependencies - Reasoning about FDS, Normal Forms – FIRST,SECOND, THIRD Normal forms – BCNF –Properties of Decompositions- Loss less-join Decomposition, Dependency preserving Decomposition, Schema Refinement in Data base Design – Multi valued Dependencies – FOURTH Normal Form, Join Dependencies, FIFTH Normal form, Inclusion Dependencies

Unit IV:

Transaction management Transaction Concept- Transaction State-Implementation of Atomicity and Durability – Concurrent – Executions – Serializability- Recoverability – Implementation of Isolation – Testing for serializability-

Concurrency control-Lock –Based Protocols – Timestamp Based Protocols- Validation- Based Protocols – Multiple Granularity.

Recovery System- Failure classification, storage structure, Recovery & atomicity, Log – Based Recovery – Recovery with Concurrent Transactions – Buffer Management – Failure with loss of nonvolatile storage-Advance Recovery systems- Remote Backup systems.

Unit V:

Overview of Storage and Indexing: Data on External Storage, File Organization and Indexing

– Clustered Indexes, Primary and Secondary Indexes, Index data Structures – Hash Based Indexing, Tree based Indexing, Comparison of File Organizations. Storing data: Disks and Files: -The Memory Hierarchy – Redundant Arrays of Independent Disks.

Tree Structured Indexing: Intuitions for tree Indexes, Indexed Sequential Access Methods (ISAM) B+Trees: A Dynamic Index Structure, Search, Insert, and Delete.

Hash Based Indexing: Static Hashing, Extendable hashing, Linear Hashing, Extendible Vs. Linear Hashing.

Textbooks:

1. Data base Management Systems, Raghu Ramakrishnan, Johannes Gehrke, TMH, 3rd Edition, 2003.
2. Data base System Concepts, A.Silberschatz, H.F. Korth, S.Sudarshan,

McGraw hill, VI edition, 2006.
3. Fundamentals of Database Systems 5th edition, Ramez Elmasri, Shamkant B.Navathe, Pearson Education, 2008.

Reference books:

1. Database Management System Oracle SQL and PL/SQL, P.K.Das Gupta, PHI.
2. Database System Concepts, Peter Rob & Carlos Coronel, Cengage Learning, 2008.
3. Database Systems, A Practical approach to Design Implementation and Management Fourth edition, Thomas Connolly, Carolyn Begg, Pearson education.
4. Database-Principles,Programming,andPerformance,P.O'Neil,E.O'Neil, 2nd Edition Elesevier
5. Fundamentals of Relational Database Management Systems, S.Sumathi, S.Esakkirajan, Springer.
6. Introduction to Database Management, M.L.Gillenson and others, Wiley Student Edition.
7. Database Development and Management, Lee Chao, Auerbach publications, Taylor & Francis Group.
8. Introduction to Database Systems, C.J.Date, Pearson Education.

Course Outcomes:

Upon the completion of this subject students will be able to

1. Demonstrate the basic elements of a relational database management system.
2. Identify the data models for relevant problems.
3. Design entity relationship and convert entity relationship diagrams into RDBMS and formulate SQL queries on the respect data.
4. Apply normalization for the development of application softwares.

(A2153)- SOLID AND HAZARDOUS WASTE MANAGEMENT
(Open Elective-I: Offered by CE Department)

B.Tech (EEE): VII-Semester

L	T	P	C
3	0	0	3

Unit I
Solid Waste
Definition of solid wastes – types of solid wastes – Sources - Industrial, mining, agricultural and domestic – Characteristics. Solid waste Problems - impact on environmental health – Concepts of waste reduction, recycling and reuse.
Handling and segregation of wastes at source. Collection and storage of municipal solid wastes; analysis of Collection systems. Transfer stations – labeling and handling of hazardous wastes.

Unit II
Municipal Solid Waste Management
Solid waste processing technologies. Mechanical and thermal volume reduction. Biological and chemical techniques for energy and other resource recovery: composting, vermicomposting, termigradation, fermentation. Incineration of solid wastes. Disposal in landfills: site selection, design, and operation of sanitary landfills; Leachate and landfill gas management; landfill closure and post-closure environmental monitoring; landfill remediation. Regulatory aspects of municipal solid waste management.

Unit III
Hazardous Wastes
Hazardous waste definition. Physical and biological routes of transport of hazardous substances – sources and characterization categories and control. Sampling and analysis of hazardous wastes – analytical approach for hazardous waste characterization – proximate analysis – survey analysis – directed analysis – analytical methods.

Unit IV
Hazardous Wastes Management
Sources and characteristics: handling, collection, storage and transport, TSDF concept. Hazardous waste treatment technologies - Physical, chemical and thermal treatment of hazardous waste: solidification, chemical fixation, encapsulation, pyrolysis and incineration. Hazardous waste land fills - Site

selections, design and operation. HW reduction, recycling and reuse, Regulatory aspects of HWM.

Unit V

Waste Management

Biomedical waste: Definition, sources, classification, collection, segregation Treatment and disposal.

Radioactive waste: Definition, Sources, Low level and high level radioactive wastes and their management, Radiation standard by ICRP and AERB Waste characteristics, generation, collection, transport and disposal.

Book Recommended

1. Hazardous waste management Charles A. Wentz. Second edition 1995. McGraw Hill International Publications.
2. Integrated solid waste management George Tchobanoglous, Hilary Theisen & Sammuel A. Vigil.
3. Criteria for hazardous waste landfills – CPCB guidelines 2000.
4. Hazardous waste management by Prof. Anjaneyulu.
5. Environmental Sciences by Daniel B. Botkin and Edward A. Keller, Wiley student, 6th edition- 2009.
6. Standard handbook of Hazardous waste treatment and disposal by Harry M. Freeman, McGraw Hill
7. Management of Solid waste in developing countries by Frank Flintoff , WHO regional publications 1976.

Course Outcomes

1. Explain sampling and characterization of solid waste; analysis of hazardous waste constituents including QA/QC issues
2. Explain health and environmental issues related to solid waste management.
3. Apply steps in Hazardous waste management-waste reduction at source, collection techniques, materials and resource recovery/recycling, transport, optimization of solid waste
4. Explain methods of transport, treatment and disposal techniques and economics of the waste management options

(A2231) EXTRA HIGH VOLTAGE AC TRANSMISSION
(Professional Elective-IV)

B.Tech (EEE) VII-Semester

L	T	P	C
3	1	0	3

Course Objective

The objective of this course is to introduce the concepts of extra high voltage AC transmission emphasize on the behavior of the line parameters for extra high voltages, voltage gradients of the transmission line conductor's gradients, effect of corona, electrostatic field calculations, travelling wave theory concept, voltage control when line carries extra high voltages.

Unit-I: Preliminaries and ground reactive parameters

Necessity of EHV AC transmission – advantages and problems–power handling capacity and line losses- mechanical considerations – resistance of conductors – properties of bundled conductors – bundle spacing and bundle radius- Examples. Line inductance and capacitances – sequence inductances and capacitances – modes of propagation – ground return – Examples

Unit-II: Voltage gradients of conductors

Electrostatics – field of sphere gap – field of line changes and properties – charge – potential relations for multi-conductors – surface voltage gradient on conductors – distribution of voltage gradient on sub-conductors of bundle – Examples.

Unit-III: Corona effects

Power loss and audible noise (AN) – corona loss formulae – charge voltage diagram – generation, characteristics - limits and measurements of AN – relation between 1-phase and 3-phase AN levels – Examples. Radio interference (RI) - corona pulses generation, properties, limits – frequency spectrum – modes of propagation – excitation function – measurement of RI, RIV and excitation functions – Examples.

Unit-IV: Electro static field and Travelling wave theory

Electrostatic field: calculation of electrostatic field of EHV/AC lines – effect on humans, animals and plants – electrostatic induction in unexercised circuit of double-circuit line – electromagnetic interference-Examples. Traveling wave expression and solution- source of excitation- terminal conditions-open circuited and short-circuited end- reflection and refraction coefficients-Lumped parameters of distributed lines-generalized constants-No load voltage conditions and charging current.

Unit-V: Voltage control

Power circle diagram and its use – voltage control using synchronous condensers – cascade connection of shunt and series compensation – sub synchronous resonance in series capacitor – compensated lines – static VAR compensating system.

Text Books

1. EHVAC Transmission Engineering by R. D. Begamudre, New Age International (p) Ltd.
2. HVAC and DC Transmission by S. Rao

Course Outcomes

Upon the completion of this subject students will be able to

1. Explain the behavior of the line parameters for extra high voltages.
2. Illustrate the concepts of voltage gradient and effects of corona.
3. Perform calculations on electrostatic fields and travelling waves.
4. Apply the voltage control of EHVAC transmission to real world problems.

(A2232) HVDC TRANSMISSION
(**Professional Elective-IV**)

B.Tech (EEE)VII-Semester

L	**T**	**P**	**C**
3	**1**	**0**	**3**

Course Objectives: This subject deals with the importance of HVDC transmission, analysis of HVDC converters, Faults and protections, Harmonics and Filters. It also deals with Reactive power control and Power factor improvements of the system.

Unit-I: Introduction General consideration, Power Handling Capabilities of HVDC Lines Basic Conversion principles, static converter configuration.

Unit-II: Static Power Converters 3-pulse, 6-pulse, and 12-pulse converters, converter station and Terminal equipment, commutation process, Rectifier and inverter operation, equivalent circuit for converter – special features of converter transformers. Harmonics in HVDC Systems, Harmonic elimination, AC and DC filters.

Unit-III: Control of HVDC Converters and Systems Constant current, constant extinction angle and constant ignition angle control Individual phase control and equidistant firing angle control DC power flow control. Interaction between HV AC and DC systems – Voltage interaction Harmonic instability problems and DC power modulation.

Unit-IV: MTDC Systems & Over Voltages Series parallel and series parallel systems their operation and control. Over voltages due to disturbances on DC side, over voltages due to DC and AC side line faults.

Unit-V: Converter Faults & Protection Converter faults, over current protection – valve group, and DC line protection over voltage protection of converters, surge arresters.

Text books:

1. HVDC Power Transmission Systems: Technology and system Interactions – by K.R.Padiyar, New Age International (P) Limited, and Publishers.
2. EHVAC and HVDC Transmission Engineering and Practice – S.Rao.

Reference Books:

1. HVDC Transmission – J.Arrillaga .IEE,Power and energy series
2. Direct Current Transmission – by E.W.Kimbark, John Wiley & Sons.
3. Power Transmission by Direct Current – by E.Uhlmann, B.S.Publications.

Course Outcomes:

Up on the completion of this course the students will be able

1. Identify significance of DC over AC transmission system, types and application of HVDC links in practical power systems.
2. Analyze different converters viz.3,6 and 12 pulse converter.
3. Analyze AC/DC system interactions and know the operation and control of various MTDC systems.
4. Model AC/DC system and apply protection for HVDC system against transient overvoltage and over currents

(A2233) DIGITAL CONTROL SYSTEMS
(**Professional Elective-IV**)

B.Tech (EEE)VII-Semester

L	T	P	C
3	1	0	3

Course Objective

This course gives fundamentals of digital control systems, Z-Transforms, state space representation of the control systems, concepts of controllability and observability, estimation of stability in different domains, design of discrete time control systems, compensators, state feedback controllers, state observers through various transformations

Unit – I: Sampling and reconstruction and Z – transforms

Introduction, Examples of Data control systems – Digital to Analog conversion and Analog to Digital conversion, sample and hold operations. Introduction, Linear difference equations, pulse response, Z – transforms, Theorems of Z – Transforms, the inverse Z – transforms. Z-Transform method for solving difference equations; Pulse transforms function, block diagram analysis of sampled – data systems, mapping between s-plane and z-plane.

Unit – II: State Space Analysis

State Space Representation of discrete time systems, Pulse Transfer Function Matrix solving discrete time state space equations, State transition matrix and it's Properties, Methods for Computation of State Transition Matrix, Discretization of continuous time state – space equations

Unit – III: Controllability and Observability

Concepts of Controllability and Observability, Tests for controllability and Observability. Duality between Controllability and Observability, Controllability and Observability conditions for Pulse Transfer Function

Unit –IV: Stability Analysis

Mapping between the S-Plane and the Z-Plane – Primary strips and Complementary Strips – Constant frequency loci, Constant damping ratio loci, Stability Analysis of closed loop systems in the Z-Plane. Jury stability test – Stability Analysis by use of the Bilinear Transformation and Routh Stability criterion.

Unit– V*:* Design of discrete time control system by conventional methods
Transient and steady – State response Analysis – Design based on the frequency response method – Bilinear Transformation and Design procedure in the w-plane

State feedback controllers and observers
Design of state feedback controller through pole placement – Necessary and sufficient conditions, Ackerman's formula. State Observers – Full order and Reduced order observers.

Text Books
1. Discrete-Time Control systems - K. Ogata, Pearson Education/PHI, 2nd Edition

Reference Books
1. Digital Control Systems, Kuo, Oxford University Press, 2nd Edition, 2003.
2. Digital Control and State Variable Methods by M.Gopal, TMH

Course Outcomes
Upon the completion of this subject students will be able to

1. Sample continuous-time systems to get discrete-time systems
2. Analyze discrete control systems using z-transforms
3. Estimate the controllability and observability of discrete time systems and analyze the stability
4. Design discrete control systems via pole placement
5. Design observers for discrete control systems

(A2234) NEURAL NETWORKS AND FUZZY SYSTEMS
(**Professional Elective-V**)

B.Tech (EEE): VII-Semester

L	T	P	C
3	1	0	3

Course Objectives: This course introduces the basics of Neural Networks and essentials of Artificial Neural Networks with Single Layer and Multilayer Networks. It introduces Fuzzy sets and Fuzzy Logic system components. This subject is very important and useful for doing Project Work. The main objective of this course is to provide the student with the basic understanding of neural networks and fuzzy logic fundamentals.

Unit-I:
Biological neuron Vs artificial neuron, structure and activation functions – Neural network architectures –learning methods, stability and convergence .Single layer networks –Mcculloh–pitts neuron model, Perceptron training and algorithm, delta learning, widrow-Hoff learning rules, limitations, adaline and modification.

Unit-II:
Multilayer networks, architectures and modeling, BP algorithm, radial basis functions. Unsupervised learning-Winner all learning, out star learning, Counter propagation networks, self organizing networks-Kohonen.

Unit-III:
Grossberg, Hamming NET, MAXNET, Hopfiled networks, recurrent and associative memory, BAM and ART architectures Fuzzy sets and systems – geometry of fuzzy sets – theorems – fuzzy and neural function estimators – FAM system architectures – Uncertainty and estimation – Types of uncertainty.

Unit-IV:
Measures of Fuzziness – Classical measures of uncertainty – measures of Dissonance – confession specificity – knowledge base defuzzifictuon.

Unit-V:
Application to load forecasting, load flow, fault detection-unit commitments, LF control – economic dispatch, Neuro-Fuzzy controllers.

Text Books

1. Artificial neural networks – B.Yegna Narayana –PHI -1st edition 1999.
2. Neural networks – Simon Haykin – prentice hall international inc.1999.
3. Neural networks and fuzzy system – Bart Kosko – 2nd edition, 2001

Reference Books

1. Neural network fundamentals with graphs, algorithms & applications – N.K.Bose and Liang –McGraw hill, 1996.
2. Fuzzy logic with fuzzy applications – T.J.Rosee-Mcgraw hill 1997.

Course Outcomes:

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

1. Comprehend the concepts of artificial neural networks and fuzzy logic.
2. Analyze various networks.
3. Realize the concept of fuzziness involved in various systems and fuzzy set theory.
4. Comprehend the fuzzy logic control and adaptive fuzzy logic and to design the fuzzy control using genetic algorithm.
5. Analyze the application of Neuro-Fuzzy controllers to real time systems.

(A2235) ENERGY MANAGEMENT
(**Professional Elective-V**)

B.Tech (EEE): VII-Semester

L	T	P	C
3	1	0	3

Course Objective

This subject provides detailed analyses of energy saving and efficiency improving techniques which are essential for now a day's depleted resources

Unit-I

Non conventional sources: Solar energy, solar heat , solar electricity ,other solar energy harvestings, Wind energy , types of wind turbines, types of generators for wind energy conversions, tidal energy , types of tidal basins, introduction to bio energy, types of MHD generation, mini hydro

Unit –II

Energy conservation and Economics: Energy conservation techniques in domestic, Electricity pricing,

Energy efficient motors, modern efficient lighting sources, power factor improving techniques, power quality and improvement methods , energy policy of India

Unit-III

Energy Audit : Need for Audit, Types of Audit, Energy audit methods, Audit for electrical drives, maximizing efficiency, audit instruments, sample energy audit format , energy audit for building

Energy fuel and saving techniques

Unit-IV

Computer applications in energy management : Role of computers in Energy management ,simulation ,soft wares , power and energy management tools , peak demand limiting , computer aided manufacturing

Unit-V

Environmental impact on energy : Global warming, CO_2 emissions, ozone layer depletion and prevention, EIA ,EIA methods, Appraisal and public hearing , EIA of world , Rules for clearance

Text Book:

1. Energy Management , Umesh Rathore ,S.K. Kataria and sons publisher

Reference Books:

1. Generation , Distribution and Utilization of electrical energy , C.L. Wadhwa , New age international (p) Ltd.

2. Non conventional energy sources, G.D Rai , Khanna Publishers

Course Outcomes

Upon the completion of this subject students will be able to

1. Comprehend the non conventional source generation techniques.
2. Improve the energy efficiency through auditing skills.
3. Employ the energy management softwares.

(A2236) INDUSTRIAL AUTOMATION AND CONTROL
(**Professional Elective-V**)

B.Tech (EEE): VII-Semester

L	T	P	C
3	1	0	3

Course Objective: The aim of this course is to introduce students with present Industrial Automation scenario. The broad knowledge of essential component of present industrial Automation Industry such as Programmable Logic Controller (PLC), Distributed Control System (DCS), Supervisory Control and Data Acquisition (SCDA), industrial drives, human machine interface will enable the students to maintain the above automation controls systems used in the present industry.

Unit-I

Control System and Automation Strategy Evolution of instrumentation and control, Role of automation in industries, Benefits of automation, Introduction to automation tools PLC, SCADA, DSC, Hybrid DSC/PLC, Automation strategies evaluation, Control system audit, Performance criteria, Safety systems.

Unit-II

Actuators & Sensors: Servomotors, Stepper motors, Process I/O systems. Local & remote I/O systems.

Controllers: Different types of controllers, Single loop and Multiloop controllers and their tunning, , Direct controllers and their tunning, Direct Digital Controllers, Software implementation of Multiloop Controllers. Distributed Control Systems.

Unit-III

Sequence Control: Programmable Logic Controllers (PLC) Introduction, Architecture, Definition of discrete state process control, PLC Vs PC, relay diagram, ladder diagram, ladder diagram examples, Relay sequencers, Timer bar counters, PLC design, Study at least on industrial PLC.

Unit-IV

Supervisory Controllers: Functionally of Supervisory Control Level, Process Optimization, Recipe Management Material. Tracking. Man-machine interfaces.

Unit-V

Process Operation Management Systems: Overview of process operation management systems, order, inventory management, process scheduling, quality management.

Industrial Communication Systems: Characteristic features of industrial networks. Low level networks and their features, Field bus architecture. Performance aspects of Industrial Automation Systems.

Text Books:

1. Complete Control of Processes by M. Chidambaram Narosa Publishers .Chidhambaram

Reference Books:

1. Webb J.W-Programmable controllers: Principle and Applications, PHI New Delhi
2. Parr A –Programmable Controllers: An Engineers' Guide, Newnes, Butterworth-HeinnemanLtd- 1993. 3. Liptak B.G (ED)-Process Control H andbook,Vol-2 Chilton book Co.
4. Noltinc - Handbook for Instrumentation Engineers.
5. Bollinger J.G and Duffie N.A-Computer control of machines and processes, Reading M A, Addison-Wesley, 1988.

Course Outcomes:

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

1. Identify the concepts of automated machines and equipment and describe the terms and phrases associated with industrial automation.
2. Explain different types of controllers and list basic Devices in Automated Systems
3. Comprehend the concepts of supervisory control
4. Identify Practical Programmable Logic Controller Applications and demonstrate basic PLC Skills.

(A2417) MICROPROCESSORS & MICROCONTROLLERS LAB

B.Tech (EEE): VII-Semester

L	T	P	C
0	0	3	2

Course Objective

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 Microprocessors / Microcontrollers-based systems.

(A2230) ELECTRICAL MEASUREMENTS LAB

B.Tech (EEE): VII-Semester

L	T	P	C
0	0	3	2

Course Objective

This lab introduces the different calibration techniques of different meters and three phase reactive power measurement. It also aims at measurement of different parameters using bridges, potentiometers and transducers

The following experiments are required to be conducted as compulsory experiments:

1. Calibration and Testing of single phase energy Meter
2. Calibration of dynamometer power factor meter
3. Crompton D.C. Potentiometer – Calibration of PMMC ammeter and PMMC voltmeter
4. Kelvin's double Bridge – Measurement of resistance – Determination of Tolerance.
5. Dielectric oil testing using H.T testing Kit
6. Schering bridge & Anderson bridge.
7. Measurement of 3 phases reactive power with single-phase wattmeter.
8. Measurement of parameters of a choke coil using 3 voltmeter and 3 ammeter methods

In addition to the above eight experiments, atleast any two of the experiments from the following list are required to be conducted:

9. Calibration LPF wattmeter – by Phantom testing
10. Measurement of 3 phase power with single watt meter and 2 No's of C.T.
11. C.T testing using mutual Inductor-Measurement of % ratio error and phase angle of given C.T by Null method
12. P.T. testing by comparison-V.G as Null detector-Measurement of % ratio error and phase angle of the given P.T.
13. LVDT and capacitance pickup-characteristics and Calibration
14. Resistance strain gauge-strain measurements and Calibration

VIII SEMESTER

(A2022) MANAGEMENT SCIENCE

B.Tech (EEE) VIII-Semester

L	T	P	C
4	0	0	4

Course 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.

Reference Books

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, Biztantra, 2012.
4. Kanishka Bedi, Production and Operations Management, Oxford University Press, 2012
5. Schermerhorn, Capling, Poole &Wiesner: Management, Wiley, 2012.
6. Parnell: Strategic Management, Cengage2012.

7. Lawrence R Jauch, R.Gupta & William F. Glueck: Business Policy and Strategic Management, Frank Bros.2012.

Course Outcomes:

Upon the completion of this subject 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 (EEE) VIII-Semester

L	T	P	C
3	0	0	3

Course objectives: 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:

4. Mechanical Engineering Science/ K R Gopala Krishna/ Subhas publications
5. Thermal Engineering/ Ballaney,P.L/ Khanna Publishers, 2003
6. Elements of Mechanical Engineering/ A.R.Asrani, S.M.Bhatt and P.K.Shah/ B.S. Publs**.**
7. Elements of Mechanical Engineering/ M.L.Mathur, F.S.Metha & R.P.Tiwari/ Jain Brothers, 2009
8. Production Technology / P.N.Rao/ McGraw-Hill publications
9. Theory of Machines/ S.S. Rattan/ Tata McGraw Hil , 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.

(A2509) JAVA PROGRAMMING
(Open Elective-II: Offered by CSE Department)

B.Tech (EEE) VIII-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 0f 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
4. Programming in Java, S.Malhotra and S.Choudhary, Oxford University Press

Course Outcomes:

Upon the 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 in problem solving.
3. Develop JAVA applets vs. JAVA applications.
4. Realize the use of various system libraries.

(A2157) DISASTER MANAGEMENT AND MITIGATION
(Open Elective-II: Offered by CE Department)

B.Tech (EEE) VIII-Semester

L	T	P	C
3	0	0	3

Course Objectives

1. To Understand basic concepts in Disaster Management
2. To Understand Definitions and Terminologies used in Disaster Management
3. To Understand Types and Categories of Disasters
4. To Understand the Challenges posed by Disasters
5. To understand Impacts of Disasters

Unit - I

Environmental Hazards & Disasters: Meaning of Environmental hazards, Environmental Disasters and Environmental stress. Concept of Environmental Hazards, Environmental Stress & Environmental Disasters. Different approaches & relation eith human Ecology - Landscape Approach - Ecosystem Approach - Perception approach - Human ecology & its application in geographical researches.

Types of Environmental hazards & Disasters: Natural hazards and Disasters - Man induced hazards & Disasters - Natural Hazards - Planetary Hazards / Disasters - Extra Planetary Hazards/ Disasters - Planetary Hazards - Endogenous Hazards - Exogenous Hazards -

Unit - II

Endogenous Hazards: Volcanic Eruption - Earthquakes - Landslides - Volcanic Hazards/ Disasters - Causes and distribution of Volcanoes - Hazardous effects of Volcanic eruptions - Environmental impacts of volcanic eruptions - Earthquake Hazards/ disasters - Causes of Earthquakes- Distribution of earthquakes - Hazardous effects of - earthquakes - Earthquake Hazards in India -- Human adjustment, perception & Mitigation of earthquake.

Unit - III

Exogenous hazards/ disasters: infrequent events - Cumulative atmospheric hazards / disasters.

Infrequent events: Cyclones - Lighting - Hailstorms.

Cyclones: Tropical cyclones & local storms - Destruction by tropical cyclones & local stromes (causes, distribution human adjustment, perception & mitigation) Droughts:- Impacts of droughts - Drought hazards in India - Drought control measures - Extra planetary Hazards/ Disasters - Man induced Hazards / Disasters - Physical hazards / Disasters - Soil Erosion.
Soil Erosion:- Mechanics forms of soil Erosion - Factors & Causes of Soil Erosion - Conversation measures of soil Erosion.
Chemical hazards/ disasters: Release of toxic chemicals, nuclear explosion - Sedimentation processes Sedimentation processes: Global Sedimentation problems - Regional Sedimentation problems - Sedimentation problems - Sedimentation & environmental problems - Corrective measures of Erosion & Sedimentation
Biological hazards / Disasters: - Population Explosion.

Unit - IV

Emerging approaches in Disaster Management: Three Stages

- Pre - Disaster stage (Preparedness)
- Emergency Stage
- Post Disaster stage - Rehabilitation

Natural Disaster Reduction & Management

- Provision of immediate relief measures of disaster affected people
- Prediction of hazards & Disasters
- Measures of adjustment to natural hazards

Unit –V

Disaster Management: An integrated approach for disaster preparedness, mitigation & awareness.
Mitigation-institutions-discuss the work of following:
Meteorological observatory, Seismological observatory, Volcanology institution, Hydrology Laboratory
Industrial safety inspectorate, institution of urban & regional planners, Chambers of Architects, Engineering Council, National standard committee, Integrated planning- Contingency management preparedness- Education on disaster, Community involvement, The adjustment of human population to natural hazards & disasters Role of Media,
Monitoring Management: Discuss the programme of disaster research & mitigation of disaster of following organizations.
International Council for Scientific Unions (ICSU)- Scientific committee on problem of the Environment (SCOPE), International Geosphere- Biosphere programme (IGBP), World federation of Engineering organizations (WFED),

National Academy of sciences- World meteorological organizations (WMO), Geographical information system (GIS), International Association of seismology & physics of Earth's interior (IASPEI), Various U.N agencies like UNCRD, IDNDR, WHO, UNESCO, UNICEF, UNEP.

Text Books:

1. Disaster Mitigation: Experience and Reflections by Pardeep Sahni.
2. Natural Hazards & Disasters by Donald Hyndman & David Hyndman - Cengage Learning.

Reference Books:

1. R.B/Singh (Ed) Environmental Geography, Heritage Publishers New Delhi, 1990.
2. Savinder Sign Environmental Geography, Prayag Pustak Bhawan, 1997
3. Kates, B.I & White, G.F The Environment as Hazards, oxford, New York, 1978.
4. R.B. Singh (Ed) Disaster Management, Rawat Publication, New Delhi, 2000

Course Outcomes

1. Explain the key concepts, perspectives of Emergency Management in terms of Endogenous and Exogenous hazards.
2. Apply the emerging approaches in disaster management.
3. Apply integrated approach for disaster preparedness, mitigation and awareness,
4. Discuss work of various institutions related to Monitoring Management i.e., various international organizations.

(A2452) PRINCIPLES OF ELECTRONIC COMMUNICATIONS
(Open Elective-II: Offered by ECE Department)

B.Tech (EEE) VIII-Semester

L	T	P	C
3	0	0	3

Course Objectives:

- To study the concept of analog communication systems.
- To study about different digital modulation techniques such as PCM, DM and various shift keying techniques.
- To study the concepts of different digital modulation techniques
- To study about different error detecting and error correcting codes like block codes, cyclic codes and convolution codes

Unit I: Basics of Communication System

Introduction

Block diagram of Communication system, Radio communication: Types of communications, Analog, Pulse, and Digital, Types of Signals, Fourier Transform for various signals, Fourier Spectrum, Power spectral density, Correlation, Convolution, Time Division Multiplexing, Frequency Division Multiplexing.

Unit II:

Amplitude Modulation: Need for modulation, Types of Amplitude modulation: AM, DSBSC, SSBSC, Power and BW requirements, Generation of AM, DSBSC, SSBSC, Demodulation of AM: Diode detector, Coherent detection of DSBSC& SSBSC.

Unit III:

Angle Modulation

Frequency & Phase Modulation, Advantages of FM over AM, Bandwidth consideration, Narrow band FM, Wide band FM, Comparison of FM and PM.

Pulse Modulation Sampling, Sampling Theorem for Band limited signals, Types of Pulse modulation: PAM, PWM, PPM, Generation and demodulation of PAM, PWM, PPM.

Unit IV:

Digital communication

Advantage, Block diagram of PCM, Quantization error, DPCM, Adaptive DPCM, DM and Comparison.

Digital Modulation: ASK, FSK, PSK, DPSK, QPSK, coherent and Non-coherent reception.

Unit V:

Information Theory: Concept of Information, Rate of Information and entropy, Source coding for optimum rate of information, Coding efficiency, Shannon Fano coding, Huffman Coding.

Error Control Coding: Introduction, Error detection and Correction codes, Block codes, Convolution codes.

Textbooks:

1. Communication SystemsAnalogand Digital–R. P. Singh, SD Sapre, TMH, 20th reprint, 2004.
2. Principles of Communication Systems – H Taub& D. Schilling, GautamSahe, TMH, 3rd Edition, 2007.
3. Communication Systems – B.P. Lathi, BS Publication, 2004.

References:

1. Analog and Digital Communication – K. Sam Shanmugam, Willey, 2005.
2. Electronics & Communication System – George Kennedy and Bernard Davis, TMH 2004.
3. Digital Communications- John G. Proakis, MasoudSalehi- 5th Edition, Mcgarw- Hill, 2008.

Course Outcomes:

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

1. Explain the baseband signal & systems.
2. Differentiate between AM and FM transmission and Reception.
3. Describe basic concepts of digital communication systems.
4. Explain basic concepts of different digital modulation techniques.
5. List different error detecting and error correcting codes.

(A2454) FUNDAMENTALS OF EMBEDDED SYSTEMS
(Open Elective-III: Offered by ECE Department)

B.Tech (EEE) VIII-Semester

L	T	P	C
3	0	0	3

Course Objective:

- For embedded systems, the course will enable the students to :
- Understand the basics of an embedded system
- 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

Unit- II: Typical Embedded System

Core of the Embedded System: General Purpose and Domain Specific Processors, Memory, ROM, RAM, 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

Text Book:

1. Introduction to Embedded Systems – Shibu K.V. McGraw Hill

Reference Books:

1. Embedded Systems – Raj Kamal, TMH
2. Embedded System Design – Frank Vahid, Tony Givargis, John Wiley.
3. Embedded Systems – Lyla, Pearson, 2013
4. 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.

(A2562) FUNDAMENTALS OF WEB TECHNOLOGIES
(Open Elective-III: Offered by CSE Department)

B.Tech (EEE) VIII-Semester

L	T	P	C
3	0	0	3

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.

Course Outcomes

1. Describe the architecture of World Wide Web
2. Design web pages and web forms
3. Apply XML to manipulate and store data with heterogeneous applications.
4. Write a maintainable Java Script program
5. Develop applications using PHP

(A2155)- ENVIRONMENTAL IMPACT ASSESSMENT AND MANAGEMENT
(Open Elective –III: Offered by CE Department)

B.Tech (EEE) VIII-Semester

L	T	P	C
3	0	0	3

Unit – I

Basic concept of EIA : Initial environmental Examination, Elements of EIA, - factors affecting E-I-A Impact evaluation and analysis, preparation of Environmental Base map, Classification of environmental parameters.

Unit – II

E I A Methodologies: introduction, Criteria for the selection of EIA Methodology, E I A methods, Ad-hoc methods, matrix methods, Network method Environmental Media Quality Index method, overlay methods, cost/benefit Analysis.

Unit – III

Impact of Developmental Activities and Land use: Introduction and Methodology for the assessment of soil and ground water, Delineation of study area, Identification of actives.

Procurement of relevant soil quality, Impact prediction, Assessment of Impact significance, Identification and Incorporation of mitigation measures. E I A in surface water, Air and Biological environment: Methodology for the assessment of Impacts on surface water environment, Air pollution sources, Generalized approach for assessment of Air pollution Impact.

Assessment of Impact of development Activities on Vegetation and wildlife, environmental Impact of Deforestation – Causes and effects of deforestation.

Unit – IV

Environmental Audit & Environmental legislation objectives of Environmental Audit, Types of environmental Audit, Audit protocol, stages of Environmental Audit, onsite activities, evaluation of Audit data and preparation of Audit report.

Unit-V

Post Audit activities, The Environmental pollution Act, The water Act, The Air (Prevention & Control of pollution Act.), Mota Act, Wild life Act.

Case studies and preparation of Environmental Impact assessment statement for various Industries.

Text Books:

1. Environmental Impact Assessment Methodologies, by Y. Anjaneyulu, B.S. Publication, Sultan Bazar, Hyderabad.
2. Environmental Science and Engineering, by J. Glynn and Gary W. Hein Ke – Prentice

Reference Books:

1. Environmental Science and Engineering, by Suresh K. Dhaneja – S.K.,Katania & Sons Publication., New Delhi.
2. Environmental Pollution and Control, by Dr H.S. Bhatia – Galgotia Publication (P) Ltd, Delhi

Course Outcomes

1. Explain the current EIA methods and the techniques and tools used, current assessment methods and legislation pertaining to air, water and land.
2. Prepare an Environmental audit report.
3. Interpret The Environmental Act, The Water Act, The Air (Prevention and control of pollution Act.), Motor Act and Wild Life Act, with preparation of EIA statement for various industries.

(A2364) ELEMENTS OF AUTOMOBILE ENGINEERING
(Open Elective-III: Offered by ME Department)

B.Tech (EEE) 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/ electrical/ electronic systems used in automobiles. It shall provide the fundamentals of power generation, drives and controls used in automobiles.

Unit – I
Introduction : Components of four wheeler automobile – chassis and body – power unit – power transmission – rear wheel drive, front wheel drive, 4 wheel drive – types of automobile engines, engine construction – engine lubrication, splash and pressure lubrication systems, oil filters, oil pumps – crank case ventilation – engine service, re boring, decarburization

Unit – II
Fuel System : S.I. Engine : Fuel supply systems, Mechanical and electrical fuel pumps – carburetor – types – air filters – petrol injection. **C.I. Engines :** Requirements of diesel injection systems, types of injection systems, fuel pump, nozzle, Alternative fuels for Automobiles-injection, Classification, Properties, Hybrid vehicles injection timing, testing of fuel, pumps.
Cooling System : Cooling Requirements, Air Cooling, Liquid Cooling and Forced Circulation System – Radiators – Types – Cooling Fan - water pump, thermostat, evaporating cooling – pressure sealed cooling – antifreeze solutions.

Unit – III
Electrical System : Charging circuit, generator, current – voltage regulator – starting system, bendix drive mechanism solenoid switch, lighting systems, Horn, wiper, fuel gauge – oil pressure gauge, engine temperature indicator etc.
Ignition System: Function of an ignition system, battery ignition system, constructional features of storage battery, auto transformer, contact breaker points, condenser and spark plug – Magneto coil ignition system, electronic ignition system using contact breaker, electronic ignition using contact triggers – spark advance and retard mechanism.

Unit – IV

Transmission System: Clutches, principle, types- cone clutch, single plate clutch, multi plate clutch, magnetic and centrifugal clutches, fluid fly wheel – Gear boxes, types, sliding mesh, construct mesh, synchro mesh gear boxes, epicyclic gear box , over drive torque converter. Propeller shaft – Hoatch – Kiss drive, Torque tube drive universal joint, differential rear axles – types – wheels and tyres.

Steering System: Types of steering mechanism – Ackerman steering mechanism, Davis steering mechanism

Unit – V

Suspension System: Objects of suspension systems – rigid axle suspension system, torsion bar, shock absorber, Independent suspension system.

Braking System: Mechanical brake system, Hydraulic brake system, Master cylinder, wheel cylinder tandem master cylinder Requirement of brake fluid, Pneumatic and vacuum brakes.

Text Books

1. Automobile Engineering ,Vol. 1 & Vol. 2/ Kripal Singh
2. Automobile Engineering , Vol. 1 & Vol. 2 ,by K.M Gupta,Umesh publication

Reference Books

1. A System approach to Automotive Technology by Jack Erjavec YesDee publishing pvt Ltd.
2. Automobile Engineering / William Crouse
3. Automotive Mechanics / Heitner
4. Alternative fuels of Automobiles by P.RamiReddy,Frontline publications.

Course outcomes:

By undergoing this course, a student shall be able to

1. Identify power generation, transmission and control mechanisms in an automobile
2. Manipulate the chemical, thermal, mechanical and electrical energies in an automobile
3. Infer the interaction between subsystems

(C2165) BASICS OF INSURANCE AND TAXATION
(Open Elective-III: Offered by MBA Department)

B.Tech (EEE) 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:

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:

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.