

ACADEMIC REGULATIONS

B.Tech. Regular Four Year Degree Programme
(for the batches admitted from the academic year 2014–15)
&
B.Tech. (Lateral Entry Scheme)
(for the batches admitted from the academic year 2015–16)

ACADEMIC REGULATIONS COURSE STRUCTURE AND DETAILED SYLLABI OF ELECTRICAL AND ELECTRONICS ENGINEERING

FOR
B.Tech. Regular Four Year Degree Programme
(for the batches admitted from the academic year 2014–15)
&
B.Tech. (Lateral Entry Scheme)
(for the batches admitted from the academic year 2015–16)



SREE VIDYANIKETHAN ENGINEERING COLLEGE
(AUTONOMOUS)

(Affiliated to JNTU Anantapur, Approved by AICTE
Accredited by NBA; NAAC with 'A' grade)
Sree Sainath Nagar, A.Rangampet, Near Tirupati - 517 102. A.P.

SVEC14 - B.TECH - ELECTRICAL AND ELECTRONICS ENGINEERING

VISION

To be one of the Nation's premier Engineering Colleges by achieving the highest order of excellence in Teaching and Research.

MISSION

- To foster intellectual curiosity, pursuit and dissemination of knowledge.
- To explore students' potential through academic freedom and integrity.
- To promote technical mastery and nurture skilled professionals to face competition in ever increasing complex world.

QUALITY POLICY

Sree Vidyanikethan Engineering College strives to establish a system of Quality Assurance to continuously address, monitor and evaluate the quality of education offered to students, thus promoting effective teaching processes for the benefit of students and making the College a Centre of Excellence for Engineering and Technological studies.

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

VISION

To become the Nation's premiere Centre of excellence in electrical engineering through teaching, training, research and innovation to create competent engineering professionals with values and ethics.

MISSION

1. Department of Electrical Engineering strives to create human resources in Electrical Engineering to contribute to the nation development and improve the quality of life.
2. Imparting Knowledge through implementing modern curriculum, academic flexibility and learner centric teaching methods in Electrical Engineering.
3. Inspiring students for aptitude to research and innovation by exposing them to industry and societal needs to create solutions for contemporary problems.
4. Honing technical and soft skills for enhanced learning outcomes and employability of students with diverse background through comprehensive training methodologies.
5. Inculcate values and ethics among students for a holistic engineering professional practice.

PROGRAM EDUCATIONAL OBJECTIVES

After few years of graduation, graduates will

1. be enrolled in academic programs in the disciplines of electrical engineering or other disciplines.
2. be employed as productive and valued engineers in reputed organizations.
3. assume increasingly responsible positions and use the technical skills and analytical acumen to address professional values, ethics, leadership and team skills for execution of complex technological solutions.

PROGRAM OUTCOMES

After successful completion of the program, student will be able to

1. demonstrate knowledge of computing mathematics, sciences and concepts of electrical and electronics engineering.
2. analyze electrical and electronics systems.
3. design and develop electrical and electronics systems.
4. solve problems related to electrical and electronics engineering.
5. use modern tools for design and development of electrical and electronics systems for effective and efficient operation.
6. create solutions of social context with the concepts of electrical and electronics engineering.
7. practice electrical and electronics engineering in compliance with environmental standards.
8. follow ethical code of conduct in all professional activities.
9. achieve personal excellence and will be able to work in groups.
10. communicate effectively in all professional transactions.
11. develop life skills for effective project management.
12. appreciate the significance and applications of electrical and electronics engineering and engage in lifelong learning for knowledge and skill up-gradation.

The Challenge of Change

“Mastery of change is in fact the challenge of moving human attention from an old state to a new state. Leaders can shift attention at the right time and to the right place. The real crisis of our times is the crisis of attention. Those who lead are the ones who can hold your attention and move it in a purposeful way. Transformation is nothing but a shift in attention from one form to another. The form of a beautiful butterfly breaks free from a crawling caterpillar. If you pay enough attention, you would be able to see how the butterfly hides within the caterpillar. The leader points out a butterfly when the follower sees only a caterpillar”.

- Debashis Chatterjee

SREE VIDYANIKETHAN ENGINEERING COLLEGE

(Autonomous)

(Affiliated to J.N.T. University Anantapur, Anantapuramu)

ACADEMIC REGULATIONS

B.Tech. Regular Four Year Degree Program
(for the batches admitted from the academic year 2014–15)
&
B.Tech. (Lateral Entry Scheme)
(for the batches admitted from the academic year 2015–16)

For pursuing four year undergraduate Degree Program of study in Engineering (B.Tech) offered by Sree Vidyanikethan Engineering College under Autonomous status and herein after referred to as SVEC (Autonomous):

- 1. Applicability** : All the rules specified herein, approved by the Academic Council, shall be in force and applicable to students admitted from the academic year 2014-2015 onwards. Any reference to "College" in these rules and regulations stands for SVEC (Autonomous).
- 2. Extent:** All the rules and regulations, specified hereinafter shall be read as a whole for the purpose of interpretation and as and when a doubt arises, the interpretation of the Chairman, Academic Council is final. As per the requirements of statutory bodies, Principal, Sree Vidyanikethan Engineering College shall be the Chairman, Academic Council.
- 3. Admission** :
 - 3.1. Admission into first year of Four Year B.Tech. Degree Program of study in Engineering:**
 - 3.1.1. Eligibility:** A candidate seeking admission into the First Year of four year B.Tech. Degree Program should have
 - (i) passed either Intermediate Public Examination (I.P.E.) conducted by the Board of Intermediate Education, Andhra Pradesh, with Mathematics, Physics and Chemistry as optional courses (or any equivalent examination recognized by JNTUA, Anantapuramu) or a Diploma in Engineering in the relevant branch conducted by the Board of Technical Education, Andhra Pradesh (or equivalent Diploma recognized by JNTUA, Anantapuramu) for admission as per the guidelines of Andhra Pradesh State Council of Higher Education (APSCHE).
 - (ii) secured a rank in the EAMCET examination conducted by APSCHE for allotment of a seat by the Convener, EAMCET, for admission.

3.1.2. Admission Procedure: Admissions shall be made into the first year of four year B.Tech. Degree Program as per the stipulations of APSCHE, Government of Andhra Pradesh:

- (a) By the Convener, EAMCET, (for Category-A Seats).
- (b) By the Management (for Category-B Seats).

3.2. Admission into the Second Year of Four year B.Tech Degree Program in Engineering

3.2.1. Eligibility: Candidates qualified in ECET and admitted by the Convener, ECET. In all such cases for admission, when needed, permissions from the statutory bodies are to be obtained.

3.2.2. Admission Procedure: **20%** of the sanctioned strength in each Program of study as lateral entry students or as stipulated by APSCHE shall be filled by the Convener, ECET.

4. Programs of study offered leading to the award of B.Tech. Degree

Following are the four year undergraduate Degree Programs of study offered in various branches in SVEC (Autonomous) leading to the award of B.Tech. (Bachelor of Technology) Degree:

- 1) B.Tech (Civil Engineering)
- 2) B.Tech (Computer Science & Engineering)
- 3) B.Tech (Computer Science & Systems Engineering)
- 4) B.Tech (Electrical & Electronics Engineering)
- 5) B.Tech (Electronics & Communication Engineering)
- 6) B.Tech (Electronics & Instrumentation Engineering)
- 7) B.Tech (Information Technology)
- 8) B.Tech (Mechanical Engineering)

5. Academic Year: The College shall follow Year-wise pattern for the First year courses of four year B.Tech Program and semester system from second year onwards for conducting all its curricula. An academic year shall consist of a first semester and a second semester from second year onwards and the summer vacation follows in sequence.

The first year of four year B.Tech Program shall have duration to accommodate a minimum of **31** instructional weeks. The first and second semesters (from second year onwards) shall have the duration to accommodate a minimum of **16** instructional weeks per semester.

First Year B.Tech. (38 weeks)	Instruction Period: I Spell : 07 weeks II Spell : 12 weeks III Spell : 12 weeks	31 weeks
	Mid-term Examinations: I Mid: 1 week II Mid: 1 week III Mid : 1 week	3 weeks
	Preparation & Practical Examinations	2 weeks
	External Examinations	2 weeks
	Summer vacation	4 weeks
First Semester (22 weeks)	Instruction Period: I Spell : 7 weeks II Spell : 9 weeks	16 weeks
	Mid-term Examinations: I Mid: 1 week II Mid: 1 week	2 weeks
	Preparation & Practical Examinations	2 weeks
	External Examinations	2 weeks
	Semester Break	2 weeks
Second Semester (22 weeks)	Instruction Period: I Spell : 7 weeks II Spell : 9 weeks	16 weeks
	Mid-term Examinations: I Mid : 1 week II Mid : 1 week	2 weeks
	Preparation & Practical Examinations	2 weeks
	External Examinations	2 weeks
	Summer Vacation	6 weeks

6. Course Structure: Each Program of study shall consist of:

- General Courses comprising of the following:
 - i. Language / Communication Skills
 - ii. Humanities and Social Sciences
 - iii. Economics and Principles of Management
 - iv. Environmental Sciences

The above areas are common to all branches.

- Basic Science Courses comprising of the following:
 - i. Computer Programming with Numerical Analysis
 - ii. Mathematics
 - iii. Physics
 - iv. Chemistry

The above courses are common to all branches.

- Engineering Science Courses comprising of the following, pertaining to the branch:
 - i. Engineering Graphics
 - ii. Workshop Practice
 - iii. Engineering Mechanics
 - iv. Electrical Sciences
 - v. Thermodynamics
 - vi. Material Sciences and Engineering
 - vii. Building Materials
 - viii. Surveying
 - ix. Basic Electronics
 - x. Computer Programming and Data Structures
 - xi. IT Workshop
 - xii. Fluid Mechanics
- Professional core courses:
The list of professional core courses are chosen as per the suggestions of the experts, to impart broad based knowledge needed in the concerned branch of study.
- Elective courses:
Elective courses shall be offered to the students to diversify their spectrum of knowledge. The elective courses can be chosen based on the interest of the student to broaden his individual skills and knowledge.

Distribution of types of courses is indicated below:

General Courses	5-10%
Basic Science Courses	15-20%
Engineering Science Courses	15-20%
Professional Core Courses	40-50%
Elective Courses	10-15%

Contact Hours: Depending on the complexity and volume of the course, the number of contact hours per week shall be assigned.

7. Credit System: Credits are assigned based on the following norms as given in Table 1.

Table 1

Course	Year Pattern		Semester Pattern	
	Hour(s)/Week	Credits	Hour(s)/Week	Credit (s)
Theory	01	02	01	01
Practical	03	03	03	02
Seminar	--	--	--	02
Comprehensive Viva-Voce	--	--	--	02
Project Work	--	--	--	10

- i. As a norm, for the theory courses, **one credit** for one contact hour per week is assigned in semester system. In yearly pattern **two credits** for one contact hour per week is assigned.
- ii. As a norm, for practical courses **two credits** will be assigned for three contact hours per week in semester pattern. In yearly pattern **three credits** will be assigned for three contact hours per week.
- iii. Tutorials do not carry any credits.
- iv. For courses like Project/Seminar/Comprehensive Viva-Voce, where formal contact hours are not specified, credits are assigned based on the complexity of the work to be carried out.

The four year curriculum of any B. Tech. Program of study shall have total of **187** credits. However the curriculum for lateral entry students shall have a total of **142** credits.

8. Examination System: All components in any Program of study shall be evaluated through internal evaluation and/ or an external evaluation conducted as year-end/semester-end examination.

8.1. Distribution of Marks:

Sl. No.	Course	Marks	Examination and Evaluation	Scheme of examination
1.	Theory	70	Year-end / Semester-end examination of 3 hours duration (External evaluation)	The examination question paper in theory courses shall be for a maximum of 70 marks. The question paper shall be of descriptive type with 5 questions, taken one from each unit of syllabus, having internal choice and all 5 questions shall be answered. All questions carry equal marks.
		30	Mid-term Examination of 2 hours duration (Internal evaluation).	<p>The question paper shall be of descriptive type with 4 essay type questions out of which 3 are to be answered and evaluated for 24 marks and also 6 short answer questions out of which all are to be answered and evaluated for 6 marks.</p> <p>For I B.Tech: Three (03) mid-term examinations, each for 30 marks are to be conducted. For a total of 30 marks, 75% of average of better two and 25% of the other examination are added and finalized.</p> <p>Mid-I: After first spell of instruction (I Unit).</p> <p>Mid-II: After second spell of instruction (II to III Units).</p> <p>Mid-III: After third spell of instruction (IV to V Units).</p> <p>For a Semester: Two mid-term examinations each for 30 marks are to be conducted. For a total of 30 marks, 75% of better one of the two and 25% of the other one are added and finalized.</p> <p>Mid-I: After first spell of instruction (I to II Units).</p> <p>Mid-II: After second spell of instruction (III to V Units).</p>

Sl. No.	Course	Marks	Examination and Evaluation		Scheme of examination
2	Laboratory	50	Year-end / Semester-end Lab Examination for 3 hours duration (External evaluation)		50 marks are allotted for laboratory/drawing examination during year-end / semester-end. <i>Combined laboratories shall be conducted separately for 3 hours duration each.</i>
		25	15	Day-to-Day evaluation	Performance in laboratory experiments/drawing and Record.
			10	Internal evaluation	For first year three practical tests and for semester two practical tests shall be conducted. Average of the tests is to be finalized for 10 marks.
3	a) Seminar	50	Semester-end Examination		50 marks are allotted for Seminar during semester-end evaluation by the Departmental Committee (DC) as given in 8.2.1.
	b) Comprehensive Viva-Voce	100	Semester-end Examination		Comprehensive Viva-Voce examination shall be conducted at the end of IV Year II Semester by a committee as given in 8.2.2.
5	Project Work	200	140	External evaluation	Semester-end Project Viva-Voce Examination by Committee as detailed in 8.2.3.
			60	Internal evaluation	Continuous evaluation by the DC as detailed in 8.2.3.

8.2 Seminar/Comprehensive Viva-Voce/Project Work/ Design and Drawing of Irrigation Structures Evaluation:

8.2.1 For the seminar, the student shall collect information through literature survey on a specialized topic and prepare a technical report, showing his understanding over the topic, and submit to the Department just before presentation. The report and the presentation shall be evaluated at the end of the semester by the Departmental Committee (DC) consisting of Head of the Department, concerned supervisor and a senior faculty member. The DC is constituted by the Principal on the recommendations of the Head of the Department.

8.2.2 Comprehensive Viva-Voce examination shall be conducted by a committee consisting of HOD and two senior faculty members.

- 8.2.3** The project Viva-Voce examination shall be conducted by a Committee consisting of External examiner (nominated by the Chief Controller of Examinations), HOD and concerned Supervisor. The evaluation of project work shall be conducted at the end of the IV year II semester. The Internal Evaluation shall be made by the DC, on the basis of two project reviews conducted on the topic of the project.
- 8.2.4.** Mid-term examinations for Design and Drawing of Irrigation Structures shall be conducted similar to like in other theory courses. However, semester-end examination comprises of two questions and out of which one question has to be answered for 70 marks.
- 8.3. Eligibility to appear for the year-end / semester-end examination:**
- 8.3.1** A student shall be eligible to appear for year-end / semester-end examinations if he acquires a minimum of 75% of attendance in aggregate of all the courses in a year/ semester.
- 8.3.2** Condonation of shortage of attendance in aggregate up to 10% (65% and above and below 75%) in first year or each semester may be granted by the College Academic Committee.
- 8.3.3** Shortage of Attendance below 65% in aggregate shall in no case be condoned.
- 8.3.4** Students whose shortage of attendance is not condoned in first year/any semester are not eligible to take their end examination of that class and their registration shall stand cancelled.
- 8.3.5** A student shall not be promoted to the next semester unless he satisfies the attendance requirements of the current year/ semester, as applicable. The student may seek readmission for the year/ semester when offered next. He will not be allowed to register for the courses of the year/semester while he is in detention. A student detained due to shortage of attendance, will have to repeat that year/semester when offered next.
- 8.3.6** A stipulated fee shall be payable to the College towards condonation of shortage of attendance.
- 8.4. Evaluation:** Following procedure governs the evaluation.
- 8.4.1.** Marks for components evaluated internally by the faculty shall be submitted to the Controller of Examinations one week before the commencement of the End examinations. The marks for the internal evaluation components shall be added to the external evaluation marks secured in the Year-end/Semester-end examinations, to arrive at total marks for any course in that Year/semester.
- 8.4.2.** Performance in all the courses is tabulated course-wise and shall be scrutinized by the Examination Committee and moderation is applied if needed, and course-wise marks are finalized. Total marks obtained in each course are converted into letter grades.
- 8.4.3.** Student-wise tabulation shall be done and individual grade Sheet shall be generated and issued to the student.

8.5. Personal verification / Revaluation / Recounting:

Students shall be permitted for personal verification/request for recounting/ revaluation of the Year-end/Semester-end examination answer scripts within a stipulated period after payment of prescribed fee.

After recounting or revaluation, records are updated with changes if any and the student shall be issued a revised grade sheet. If there are no changes, the student shall be intimated the same through a notice.

8.6. Supplementary Examination:

In addition to the regular year-end / semester-end examinations conducted, the College may also schedule and conduct supplementary examinations for all the courses of other year/ semesters when feasible for the benefit of students. Such of the candidates writing supplementary examinations may have to write more than one examination per day.

9. Academic Requirements for promotion/ completion of regular B.Tech Program of study:

The following academic requirements have to be satisfied in addition to the attendance requirements for promotion/ completion of regular B.Tech Program of study.

For students admitted into B.Tech. (Regular) Program:

9.1 A student shall be deemed to have satisfied the minimum academic requirements for each theory, laboratory course and project work, if he secures not less than 40% of marks in the year-end/semester-end examination and a minimum of 40% of marks in the sum total of the internal evaluation and Year-end/ Semester-end examination taken together. For the seminar and comprehensive Viva-Voce, he should secure not less than 40% of marks in the semester-end examination.

9.2 A student shall be promoted from second year to third year of Program of study only if he fulfills the academic requirement of securing **33** credits from

- a. One regular and one supplementary examinations of first year.
- b. One regular examination of second year first semester irrespective of whether or not the candidate appears for the year-end/semester-end examination as per the normal course of study.

- 9.3** A student shall be promoted from third year to fourth year of Program of study only if he fulfils the academic requirements of securing **58** credits from the following examinations,
- Two regular and two supplementary examinations of first year
 - Two regular and one supplementary examinations of second year first semester
 - One regular and one supplementary examinations of second year second semester
 - One regular examination of third year first semester irrespective of whether or not the candidate appears for the year-end/semester-end examination as per the normal course of study and in case of getting detained for want of credits by sections 9.2 and 9.3 above, the student may make up the credits through supplementary examinations.

9.4 A student shall register for all the **187** credits and earn all the **187** credits. Marks obtained in all the **187** credits shall be considered for the calculation of the DIVISION based on CGPA.

9.5 A student who fails to earn **187** credits as indicated in the course structure within **eight** academic years from the year of their admission shall forfeit his seat in B.Tech. Program and his admission stands cancelled.

For Lateral Entry Students (batches admitted from the academic year 2015–2016):

9.6 A student shall be deemed to have satisfied the minimum academic requirements for each theory, practical course and project, if he secures not less than 40% of marks in the semester-end examination and a minimum of 40% of marks in the sum total of the internal evaluation and semester-end examination taken together. For the seminar and comprehensive Viva-Voce, he should secure not less than 40% of marks in the semester-end examination.

9.7 A student shall be promoted from third year to fourth year only if he fulfils the academic requirements of securing **36** credits from the following examinations.

- Two regular and one supplementary examinations of II year I semester
- One regular and one supplementary examinations of II year II semester
- One regular examination of III year I semester.

irrespective of whether or not the candidate appears for the semester-end examination as per the normal course of study and in case of getting detained for want of credits the student may make up the credits through supplementary examinations.

- 9.8** A student shall register for all **142** credits and earn all the **142** credits. Marks obtained in all the **142** credits shall be considered for the calculation of the DIVISION based on CGPA.
- 9.9** A student who fails to earn **142** credits as indicated in the course structure within **six** academic years from the year of their admission shall forfeit his seat in B.Tech Program and his admission stands cancelled.
- 10. Transitory Regulations:**
Students who got detained for want of attendance (**or**) who have not fulfilled academic requirements (**or**) who have failed after having undergone the Program in earlier regulations (**or**) who have discontinued and wish to continue the Program are eligible for admission into the unfinished semester from the date of commencement of class work with the same (**or**) equivalent courses as and when courses are offered and they will be in the academic regulations into which they are presently readmitted. A regular student has to satisfy all the eligibility requirements within the maximum stipulated period of **eight years**, and a lateral entry student within **six years**, for the award of B.Tech Degree.
- 11. Grades, Grade Point Average and Cumulative Grade Point Average:**
- 11.1. Grade System:** After all the components and sub-components of any course (including laboratory courses) are evaluated, the final total marks obtained shall be converted into letter grades on a "**10 point scale**" as described below.

Grades conversion and Grade points attached

% of Marks obtained	Grade	Description of Grade	Grade Points (GP)
> = 95	S	Superior	10
> = 85 to < 95	O	Outstanding	9
> = 75 to < 85	A	Excellent	8
> = 65 to < 75	B	Very Good	7
> = 55 to < 65	C	Good	6
> = 45 to < 55	D	Fair	5
> = 40 to < 45	E	Pass	4
< 40	F	Fail	0
Not Appeared	N	Absent	0

Pass Marks: A student shall be declared to have passed theory course, laboratory course and project work if he secures minimum of 40% marks in external examination, and a minimum of 40% marks in the sum total of internal evaluation and external examination taken together. For the seminar and comprehensive Viva-Voce, he shall be declared to have passed if he secures minimum of 40% of marks in the semester-end examination. Otherwise he shall be awarded fail grade - **F** in such a course irrespective of internal marks. **F** is considered as a fail grade indicating that the student has to pass the year-end/semester-end examination in that course in future and obtain a grade other than **F** and **N** for passing the course.

11.2. Grade Point Average (GPA):

Grade Point Average (GPA) shall be calculated as given below on a "10 point scale" as an index of the student's performance at the end of 1 year/ each semester:

$$GPA = \frac{\sum(C \times GP)}{\sum C}$$

where **C** denotes the credits assigned to the courses undertaken in that Year/ semester and **GP** denotes the grade points earned by the student in the respective courses.

Note: GPA is calculated only for the candidates who passed all the courses in that Year/Semester.

11.3. Cumulative Grade Point Average (CGPA):

The CGPA for any student is awarded only when he completes the Program i.e., when the student passes in all the courses prescribed in the Program. The CGPA is computed on a 10 point scale as given below:

$$CGPA = \frac{\sum(C \times GP)}{\sum C}$$

where **C** denotes the credits assigned to courses undertaken up to the end of the Program and **GP** denotes the grade points earned by the student in the respective courses.

12. Grade Sheet: A grade sheet (Marks Memorandum) shall be issued to each student indicating his performance in all courses registered in that semester/year indicating the GPA.

13. Transcripts: After successful completion of the entire Program of study, a transcript containing performance of all academic years shall be issued as a final record. Duplicate transcripts will also be issued, if required, after payment of requisite fee. Partial transcript will also be issued upto any point of study to a student on request.

14. **Award of Degree:** The Degree shall be conferred and awarded by Jawaharlal Nehru Technological University Anantapur, Anantapuramu on the recommendations of the Chairman, Academic Council of SVEC (Autonomous).

14.1. **Eligibility:** A student shall be eligible for the award of B.Tech Degree if he fulfills all the following conditions:

- Registered and successfully completed all the components prescribed in the Program of study to which he is admitted.
- Successfully acquired the minimum required credits as specified in the curriculum corresponding to the branch of study within the stipulated time.
- Obtained CGPA greater than or equal to 4.0 (Minimum requirement for declaring as passed).
- Has no dues to the College, Hostel, Library etc. and to any other amenities provided by the College.
- No disciplinary action is pending against him.

14.2. **Award of Division:** Declaration of Division is based on CGPA.

Awarding of Division

CGPA	Division
≥ 7.0	First Class with Distinction
≥ 6.0 and < 7.0	First Class
≥ 5.0 and < 6.0	Second Class
≥ 4.0 and < 5.0	Pass Class

15. **Additional academic regulations:**

15.1 A student may appear for any number of supplementary examinations within the stipulated time to fulfill regulatory requirements for award of the degree.

15.2 In case of malpractice/improper conduct during the examinations, guidelines shall be followed as given in the **Annexure-I**.

15.3 Courses such as Project, Seminar and Comprehensive Viva-Voce may be repeated only by registering in supplementary examinations.

15.4 When a student is absent for any examination (Mid-term or Year-end/Semester-end) he shall be awarded **zero** marks in that component (course) and grading will be done accordingly.

15.5 When a component is cancelled as a penalty, he shall be awarded zero marks in that component.

- 16. Withholding of Results:**
If the candidate has not paid dues to the College/University (or) if any case of indiscipline is pending against him, the result of the candidate shall be withheld and he will not be allowed/promoted to the next higher year/semester.
- 17. Amendments to regulations:**
The Academic Council of SVEC (Autonomous) reserves the right to revise, amend, or change the Regulations, Scheme of Examinations, and / or Syllabi or any other policy relevant to the needs of the society or industrial requirements etc., without prior notice.
- 18. General:**
The words such as "he", "him", "his" and "himself" shall be understood to include all students irrespective of gender connotation.
Note: *Failure to read and understand the regulations is not an excuse.*

Annexure-I

**GUIDE LINES FOR DISCIPLINARY ACTION FOR MALPRACTICES /
IMPROPER CONDUCT IN EXAMINATIONS**

Rule No.	Nature of Malpractices/ Improper conduct	Punishment
	<i>If the candidate:</i>	
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 for four consecutive semesters from class work and all Year-end/Semester-end examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat. The performance of the original candidate who has been impersonated, shall be cancelled in all the courses of the examination (including labs 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 four consecutive semesters from class work and all Year-end/Semester-end examinations, if his involvement is established. Otherwise, The candidate is debarred for two consecutive semesters from class work and all Year-end/Semester-end examinations. The continuation of the course by the candidate is subject 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.

Rule No.	Nature of Malpractices/ Improper conduct	Punishment
4.	Smuggles in 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 Year-end/Semester-end examinations. The continuation of the course by the candidate is subject 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 only.
6.	Refuses to obey the orders of the Chief Controller of Examinations/Controller of Examinations/any officer on duty or misbehaves or creates disturbance of any kind in and around the examination hall or organizes a walk out or instigates others to walk out, or threatens the Controller of Examinations 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 Controller of Examinations, 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. If the candidate physically assaults the invigilator/Controller of the Examinations, then the candidate is also debarred and forfeits his/her seat. 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 Year-end/Semester-end examinations. The continuation of the course by the candidate is subject 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.

Note: Whenever the performance of a student is cancelled in any course(s) due to Malpractice, he has to register for Year-end/ Semester-end Examinations in that course(s) consequently and has to fulfill all the norms required for the award of Degree.

SREE VIDYANIKETHAN ENGINEERING COLLEGE
(Autonomous)

COURSE STRUCTURE

ELECTRICAL AND ELECTRONICS ENGINEERING
I Year B.Tech. (Yearly Pattern)

Code	Subject	Periods per week			C	Scheme of Examination Max. Marks		
		L	T	P		Int.	Ext.	Total
14BT1HS01	Technical English	2	-	-	4	30	70	100
14BT1BS01	Engineering Physics	2	1	-	4	30	70	100
14BT1BS02	Engineering Chemistry	2	1	-	4	30	70	100
14BT1BS03	Engineering Mathematics	3	1	-	6	30	70	100
14BT1BS04	Mathematical Methods	3	1	-	6	30	70	100
14BT1ES01	Programming in C and Data Structures	3	1	-	6	30	70	100
14BT1ES03	Computer-Aided Engineering Drawing	-	1	3	3	25	50	75
14BT1BS05	Engineering Physics and Engineering Chemistry Lab.	-	-	3	3	25	50	75
14BT1ES04	Programming in C and Data Structures Lab.	-	-	3	3	25	50	75
14BT1ES06	Engineering and IT Workshop	-	-	3	3	25	50	75
14BT1HS02	English Language Communication Skills Lab.	-	-	3	3	25	50	75
	TOTAL	15	6	15	45	305	670	975

ELECTRICAL AND ELECTRONICS ENGINEERING
B.Tech. II Year - I SEMESTER

Course Code	Course Title	Periods per week			C	Scheme of Examination Max. Marks		
		L	T	P		Int.	Ext.	Total
14BT3BS02	Special Functions and Complex Analysis	3	1	-	3	30	70	100
14BT3HS01	Environmental Sciences	3	1	-	3	30	70	100
14BT30201	Electromagnetic Fields	3	1	-	3	30	70	100
14BT30202	DC Machines	3	1	-	3	30	70	100
14BT30203	Electric Circuits	3	1	-	3	30	70	100
14BT30402	Semiconductor Devices and Circuits	3	1	-	3	30	70	100
14BT30221	Electric Circuits Lab	-	-	3	2	25	50	75
14BT30421	Semiconductor Devices and Circuits Lab	-	-	3	2	25	50	75
	Total	18	6	6	22	230	520	750

ELECTRICAL AND ELECTRONICS ENGINEERING
B.Tech. II Year - II SEMESTER

Course Code	Course Title	Periods per week			C	Scheme of Examination Max. Marks		
		L	T	P		Int.	Ext.	Total
14BT4HS02	Professional Ethics	3	1	-	3	30	70	100
14BT40201	Signals and Networks	3	1	-	3	30	70	100
14BT40202	Generation of Electric Power	3	1	-	3	30	70	100
14BT40203	Electrical and Electronic Measurements	3	1	-	3	30	70	100
14BT40204	Transformers and Induction Machines	3	1	-	3	30	70	100
14BT40405	Switching Theory and Logic Design	3	1	-	3	30	70	100
14BT40431	Analog Electronic Circuits	3	1	-	3	30	70	100
14BT40221	Electrical Measurements and Testing Lab	-	-	3	2	25	50	75
14BT40222	DC Machines Lab	-	-	3	2	25	50	75
	Total	21	7	6	25	260	590	850

ELECTRICAL AND ELECTRONICS ENGINEERING
B.Tech. III Year - I SEMESTER

Course Code	Course Title	Periods per week			C	Scheme of Examination		
		L	T	P		Int.	Ext.	Total
14BT4HS01	Business Communication and Presentation Skills	3	1	-	3	30	70	100
14BT5HS01	Managerial Economics and Principles of Accountancy	3	1	-	3	30	70	100
14BT50201	Control Systems	3	1	-	3	30	70	100
14BT50202	Computer Organization and Architecture	3	1	-	3	30	70	100
14BT50203	Synchronous Machines	3	1	-	3	30	70	100
14BT50204	Transmission of Electric Power	3	1	-	3	30	70	100
14BT51003	Linear and Digital IC Applications	3	1	-	3	30	70	100
14BT50423	Analog Electronics and IC lab	-	-	3	2	25	50	75
14BT50221	AC Machines Lab	-	-	3	2	25	50	75
	Total	21	7	6	25	260	590	850

ELECTRICAL AND ELECTRONICS ENGINEERING
B.Tech. III Year - II SEMESTER

Course Code	Course Title	Periods per week			C	Scheme of Examination Max. Marks		
		L	T	P		Int.	Ext.	Total
14BT5HS02	Management Science	3	1	-	3	30	70	100
14BT60201	Microprocessors and Microcontrollers	3	1	-	3	30	70	100
14BT60202	Power Electronics	3	1	-	3	30	70	100
14BT60203	Switchgear and Protection	3	1	-	3	30	70	100
14BT60204	Distribution of Electric Power	3	1	-	3	30	70	100
	Professional Elective – I							
14BT60205	Instrumentation							
14BT60206	Advanced Control Systems							
14BT60207	High Voltage Engineering	3	1	-	3	30	70	100
14BT60208	Computer Aided Electrical Machine Design							
14BT51201	Computer Networks							
14BT60221	Electrical Systems and Simulation Lab	-	-	3	2	25	50	75
14BT60222	Microprocessors and Microcontrollers Lab	-	-	3	2	25	50	75
	Total	18	6	6	22	230	520	750

ELECTRICAL AND ELECTRONICS ENGINEERING
B.Tech. IV Year - I SEMESTER

Course Code	Course Title	Periods per week			C	Scheme of Examination Max. Marks		
		L	T	P		Int.	Ext.	Total
14BT70201	Power Semiconductor Drives	3	1	-	3	30	70	100
14BT70202	Power System Operation and Control	3	1	-	3	30	70	100
14BT70203	Power System Analysis	3	1	-	3	30	70	100
14BT60401	Digital Signal Processing	3	1	-	3	30	70	100
	Open Elective	3	1	-	3	30	70	100
	Professional Elective – II							
14BT70204	Reactive Power Compensation and Management							
14BT70205	Soft Computing Techniques	3	1	-	3	30	70	100
14BT70206	Advanced Microcontrollers							
14BT60431	Principles of Communication							
14BT70531	Advanced Data Structures							
14BT70221	Power Electronics and Drives Lab	-	-	3	2	25	50	75
14BT70222	Power Systems and Simulation Lab	-	-	3	2	25	50	75
14BT70223	Seminar	-	-	-	2	-	50	50
	Total	18	6	6	24	230	570	800

ELECTRICAL AND ELECTRONICS ENGINEERING
B.Tech. IV Year - I SEMESTER
Open Electives

Offering Dept	Course Code	Course Title
BS&H	14BT6HS01	Banking and Insurance
BS&H	14BT6HS02	Cost Accounting and Financial Management
BS&H	14BT6HS03	Entrepreneurship for Micro, Small and Medium Enterprises
CE	14BT70105	Disaster Mitigation and Management
CE	14BT70106	Environmental Pollution and Control
CE	14BT70107	Contract Laws and Regulations
CE	14BT70108	Planning for Sustainable Development
CE	14BT70109	Rural Technology
ME	14BT60305	Artificial Intelligence and Robotics
ME	14BT60306	Global Strategy and Technology
ME	14BT60307	Intellectual Property Rights and Management
ME	14BT60308	Managing Innovation and Entrepreneurship
ME	14BT60309	Material Science
CSE	14BT60502	Engineering System Analysis and Design
EIE	14BT71005	Microelectromechanical Systems
IT	14BT61203	Bio-Informatics
IT	14BT61204	Cyber Security and Laws

ELECTRICAL AND ELECTRONICS ENGINEERING
B.Tech. IV Year - II SEMESTER

Course Code	Course Title	Periods per week			Credits	Scheme of Examination		
		L	T	P		Max. Marks		
						Int.	Ext.	Total
14BT80201	Utilization of Electrical Energy	3	1	-	3	30	70	100
14BT80202	HVDC and FACTS	3	1	-	3	30	70	100
Professional Elective - III								
14BT80203	Power Quality							
14BT80204	Reliability Engineering and Applications to Power Systems	3	1	-	3	30	70	100
14BT80205	EHVAC Transmission							
14BT80206	Smart Grid Technology							
14BT60403	VLSI Design							
Professional Elective - IV								
14BT80207	Energy Audit and Demand Side Management							
14BT80208	Power System Deregulation	3	1	-	3	30	70	100
14BT80209	Solar and Wind Energy Conversion Systems							
14BT70402	Embedded Systems							
14BT40502	Database Management Systems							
14BT80221	Comprehensive Viva-Voce	-	-	-	2	-	100	100
14BT80222	Project Work	-	-	20	10	60	140	200
Total:		12	4	-	24	180	520	700

B.Tech I Year
14BT1HS01: TECHNICAL ENGLISH

(Common to All Branches of Engineering)

Internal Marks	External Marks	Total Marks	L	T	P	C
30	70	100	2	-	-	4

PREREQUISITE: Basic Grammar and Fundamentals of Writing Skills

COURSE DESCRIPTION: The course consists of lessons which include characters, speeches and short stories: 'My Early Days', 'Speech by N. R. Narayana Murthy', 'Dr. C.V. Raman: The Celebrated Genius', 'The Town by the Sea' and 'The Model Millionaire'. The course also covers the principles of Language and Communication Skills (Listening, Speaking, Reading and Writing Skills).

COURSE OUTCOMES: After completion of the course, the students will be able to:

1. Acquire fundamental and functional knowledge of English Language, grammar and communication skills.
2. Identify and analyze productive skills (speaking and writing) and receptive skills (listening and reading) of English Language proficiency for effective communication and practice.
3. Design and develop functional skills for professional practice through English.
4. Communicate effectively with the engineering community and society to comprehend and deliver effective solutions.
5. Inculcate an attitude to upgrade competence of English knowledge and communication to engage in independent and lifelong learning.

DETAILED SYLLABUS:

UNIT – I:

My Early Days by **A. P. J. Abdul Kalam** from **All About English** by Cambridge University Press India Pvt Ltd. 2014.

Communication: Importance of Communication – Language as a tool of Communication – Communicative Skills (Listening, Speaking, Reading and Writing) – Effective Communication – Verbal and Non-Verbal Communication.

UNIT – II:

A Speech by N. R. Narayana Murthy from **All About English** by Cambridge University Press India Pvt Ltd, 2014.

Listening: Meaning and Art of Listening – Importance of Listening – Traits of a Good Listener – Reasons for Poor Listening – Types of Listening– Barriers to Effective Listening

UNIT – III:

The Town by the Sea by Amitav Ghosh from **All About English** by Cambridge University Press India Pvt Ltd, 2014.

Speaking: Achieving Confidence, Clarity, and Fluency – Paralinguistic Features – Types of Speaking – Barriers to Speaking.

UNIT – IV:

Sir. C. V. Raman: The Celebrated Genius from **All About English** by Cambridge University Press India Pvt. Ltd, 2014.

Reading: Reading and Interpretation – Intensive and Extensive Reading– Critical Reading – Reading Comprehension – Techniques for Good Comprehension – SQ3R Reading Technique

UNIT – V:

The Model Millionaire by **Oscar Wilde** from **All About English** by Cambridge University Press India Pvt. Ltd, 2014.

Writing: Characteristics – Language – Elements of Style – Techniques for Good Technical Writing – Avoiding Plagiarism - Referencing and Styling.

TEXT BOOKS:

1. *All About English*, Cambridge University Press India Pvt. Ltd., First Edition, 2014.
2. Meenakshi Raman and Sangeetha Sharma, *Technical Communication*, Oxford University Press, New Delhi, 2012.

REFERENCE BOOKS:

1. M. Ashraf Rizvi, *Effective Technical Communication*, Tata McGraw–Hill, Publishing Company Limited, First Edition, 2005.
2. Martin Hewings, *Advanced English Grammar: A Self Study Reference and Practice Book for Advanced South Asian Students*, Cambridge University press, First South Asian Edition, New Delhi, 1999.

B.Tech. I Year
14BT1BS01: ENGINEERING PHYSICS
(Common to All Branches of Engineering)

Internal Marks	External Marks	Total Marks	L	T	P	C
30	70	100	2	1	-	4

PREREQUISITE: Intermediate/Senior Secondary Physics

COURSE DESCRIPTION: The course deals with different lasers, optical fibers and holograms, theory of relativity, acoustics of buildings, crystallography, principles of quantum mechanics, band theory of solids, properties of dielectric materials, semiconductors, properties and application of magnetic materials, nanomaterials, and superconductors.

COURSE OUTCOMES :

After completion of the course a successful student will be able to

1. Acquire basic knowledge of lasers, optical fibers, holography, theory of relativity, acoustics, crystallography, quantum mechanics, dielectrics, magnetic materials, semiconductors, superconductors and nanomaterials.
2. Develop skills in designing of lasers, fiber optic cable, holograms, acoustically good hall, semiconductor devices and nanomaterials.
3. Develop problem solving skills in engineering context.

DETAILED SYLLABUS:

UNIT-I: LASERS, FIBER OPTICS AND HOLOGRAPHY

Lasers: Introduction, characteristics of laser, principles of lasing action, spontaneous and stimulated emission of radiation, Einstein's coefficients, population inversion, Ruby laser, Helium-Neon laser, semiconductor laser, applications of lasers.

Fiber optics: Introduction, construction and working principle of optical fiber, acceptance angle, acceptance cone and numerical aperture, types of optical fibers and refractive index profiles, attenuation and losses in fibers, optical fiber communication system, applications of optical fibers in sensors and medicine.

Holography: Introduction, construction of a hologram, reconstruction of image from hologram, applications.

UNIT-II: SPECIAL THEORY OF RELATIVITY, ACOUSTICS OF BUILDINGS AND CRYSTALLOGRAPHY

Special Theory of Relativity: Introduction, absolute frame of reference, time dilation, length contraction, addition of velocities, mass-energy equivalence, energy-momentum relation.

Acoustics of Buildings: Introduction, basic requirement of acoustically good hall, reverberation and time of reverberation, Sabine's formula for reverberation time (qualitative treatment), absorption coefficient of sound and its measurement, factors affecting the architectural acoustics and their remedies.

Crystallography: Introduction, crystal planes, crystal directions and Miller indices, separation between successive (hkl) planes, X-ray diffraction by crystal planes, Bragg's law, Laue and powder methods.

UNIT-III :PRINCIPLES OF QUANTUM MECHANICS AND BAND THEORY OF SOLIDS

Principles of Quantum Mechanics: Black body radiation – Wien's law, Rayleigh-Jeans law and Planck's law (qualitative treatment), waves and particles, matter waves, de-Broglie's hypothesis, G.P. Thomson experiment, Heisenberg's uncertainty principle, Schrödinger's one dimensional wave equation (time independent), significance of wave function, particle in a one dimensional potential box, Fermi-Dirac distribution and effect of temperature (qualitative treatment), scattering-source of electrical resistance.

Band Theory of Solids: Electron in a periodic potential, Kronig-Penney model (qualitative treatment), origin of energy band formation in solids, effective mass of electron, distinction between metals, semiconductors and insulators based on band theory.

UNIT-IV: DIELECTRIC PROPERTIES OF MATERIALS AND SEMICONDUCTORS

Dielectric Properties of Materials: Introduction, dielectric constant, electronic, ionic and orientation polarizations (qualitative treatment), local field, Clausius-Mossotti equation, frequency dependence of polarisability (qualitative treatment), ferro and piezo electricity.

Semiconductors: Introduction, intrinsic and extrinsic semiconductors, carrier concentration, electrical conductivity in semiconductors, drift and diffusion currents, Einstein's relation, Hall effect, direct and indirect band gap semiconductors, p-n junction, energy band diagram of p-n diode, diode equation (qualitative), LED, photo diode and solar cell.

UNIT-V :MAGNETIC PROPERTIES OF MATERIALS, SUPERCONDUCTIVITY AND NANOMATERIALS

Magnetic Properties of Materials: Introduction, origin of magnetic moment, classification of magnetic materials into dia, para, ferro, anti-ferro and ferri magnetism, hysteresis, soft and hard magnetic materials.

Superconductivity: General properties, Meissner effect, penetration depth, Type-I and Type-II superconductors, flux quantization, Josephson effects, BCS theory, applications of superconductors.

Nanomaterials: Introduction, surface area to volume ratio, quantum confinement, properties of nanomaterials, synthesis of nanomaterials by ball milling, plasma arcing, pulsed laser deposition and sol-gel methods, carbon nanotubes-properties and applications, applications of nanomaterials.

TEXTBOOKS:

1. S. Mani Naidu, *Engineering Physics*, Pearson Education, 2013.
2. P. K. Palaniswamy, *Engineering Physics*, Scitech Publications

REFERENCE BOOKS:

1. R. K. Gaur and S. L. Gupta, *Engineering Physics*, Dhanpat Rai Publications (P) Ltd., 8th Edition, 2001.
2. M. R. Srinivasan, *Engineering Physics*, New Age International (P) Limited, Publishers, 1st Edition, 2010.

B.Tech. I Year
14BT1BS02 : ENGINEERING CHEMISTRY
(Common to All Branches of Engineering)

Internal Marks	External Marks	Total Marks	L	T	P	C
30	70	100	2	1	-	4

PREREQUISITE: Intermediate/Senior Secondary Chemistry

COURSE DESCRIPTION: This course deals with various engineering materials, electro-chemical cells, corrosion, water technology, fuel technology, lubricants, nano chemistry, and green chemistry.

COURSE OUTCOMES:

After successful completion of the course the student is able to:

1. Acquire basic knowledge in liquid crystals, conducting Polymers, Composites, Chemical sensors, insulators, Electro chemical cells, corrosion phenomenon, fuels, Nanomaterials and principles of Green Chemistry and Green Engineering.
2. Develop analytical skills in:
 - a. Determination of hardness of water.
 - b. Determination of viscosity, flame and fire points, cloud and pour points.
 - c. Determination of calorific value of fuels.
3. Develop skills in design of:
 - a. Methods for control of corrosion
 - b. Chemical methods for the synthesis of Nanomaterials.
4. Develop skills for providing solutions through:
 - a. Mitigation of hardness of water.
 - b. Control of corrosion
 - c. Newer Nanomaterials for specific applications
5. Acquire awareness to societal issues on:
 - a. Chemical materials utility and their impact.
 - b. Quality of water.
 - c. Phenomenon of corrosion.
6. Imbibe attitude to practice engineering in compliance to environmentally benign techniques such as:
 - a. Green computing
 - b. Green construction
 - c. Green manufacturing systems

DETAILED SYLLABUS:

UNIT – I: CHEMISTRY OF ENGINEERING MATERIALS

Liquid Crystals – Introduction, chemical structure, classification, engineering applications.

Conducting Polymers – Definition, types of conducting polymers and their engineering applications. **Composites** – Introduction, advantages of composites, constituents of composites, types of composites, applications of composites. **Sensors** - Introduction, types of sensors, electrochemical sensors, applications. **Insulators** – Definition, characteristic properties of insulators and classification of insulators.

UNIT–II: WATER TECHNOLOGY

Introduction, types of water, impurities in water and their consequences. Hardness of water, units of hardness, measurement of hardness by EDTA method, disadvantages of hardness. Softening methods – Ion exchange process, Zeolite process-Municipal water treatment. Boiler Troubles. Desalination of brackish water by Electro dialysis and Reverse osmosis. Numerical problems on measurement of hardness of water.

UNIT–III: ELECTROCHEMICAL CELLS AND CORROSION

Electrode potential, Nernst's equation, Electrochemical cells, EMF of an electrochemical cell. Reference electrodes- Standard Hydrogen Electrode (SHE), Calomel electrode.

Batteries: Introduction, types of Batteries. Ni-Cd battery, lithium – ion battery-applications.

Fuel Cells: Definition, $H_2 - O_2$ fuel cell, phosphoric acid fuel cells, proton exchange membrane fuel cells, solid oxide fuel cells. Applications of fuel cells.

Corrosion: Introduction, definition, types of corrosion, galvanic corrosion, concentration cell corrosion, control of corrosion – Electroplating method (Nickel electroplating).

UNIT–IV: LUBRICANTS AND FUEL TECHNOLOGY

Lubricants: Definition, functions of lubricants, mechanism of lubrication, classification of lubricants, properties of lubricants – viscosity, flash and fire points, cloud and pour points, aniline points, neutralization number and mechanical strength.

Fuel Technology: Introduction, classification, characteristics of a good fuel, calorific value, liquid fuels, petroleum, refining of petroleum, knocking, octane number, cetane number, power alcohol, synthetic petrol, gaseous fuels, important gaseous fuels.

UNIT–V: NANO CHEMISTRY AND GREEN CHEMISTRY

Nano Chemistry: Introduction, classification of nanomaterials, properties of nanomaterials, methods of synthesis – sol-gel process, Chemical Vapour Deposition (CVD), Plasma Enhanced Chemical Vapour Deposition (PECVD). Applications of nanomaterials.

Green Chemistry: Introduction, tools of Green chemistry, principles of green chemistry, examples of Green chemistry, principles of Green Engineering, Green computing, Green construction, Green manufacturing systems.

TEXT BOOKS:

1. P.C.Jain & Monika Jain, *Engineering Chemistry*, Dhanpat Rai Publishing Company (P) Ltd, New Delhi, 17th edition, 2013.
2. K.N. Jayaveera, G.V. Subba Reddy & C. Ramachandraiah *Engineering Chemistry*, Mc. Graw-Hill Higher Education, Hyderabad, 1st edition, 2013.

REFERENCE BOOKS:

1. A.K. Bandyopadhyay, *Hand book of Nanostructured materials and Nanotechnology*, New Age international publishers, 2nd edition, 2010.
2. Paul T. Anastas, John C Warner, *Green Chemistry: Theory and practice*, Oxford University Press, 2000.

B.Tech. I Year
14BT1BS03 : ENGINEERING MATHEMATICS
 (Common to All Branches of Engineering)

Internal Marks	External Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	6

PREREQUISITE: Intermediate/ Senior Secondary Mathematics

COURSE DESCRIPTION: Engineering mathematics is an application oriented course for various fields of engineering. In this course, Differential equations, partial differentiation as applied to various engineering problems; Integration and its applications to find lengths, areas and volumes of objects, Laplace transforms and their applications, fundamentals of vector calculus are presented.

COURSE OUTCOMES:

After the completion of this course, a successful student is able to

1. Acquire knowledge in Differential equations, finding maximum and minimum values attained by functions of several variables, evaluating double and triple integrals, Laplace transforms and differentiation and integration of vector functions.
2. Develop analytical skills in solving problems involving
 - (a) Non homogeneous linear differential equations
 - (b) Flux and fluid mechanics by vector methods.
 - (c) Complex integrations using Laplace transforms.
 - (d) the length of curves, areas, surfaces and volumes of revolutions.
3. Develop skills in designing Mathematical models for
 - (a) L-C and R-C circuits.
 - (b) Newton's Law of cooling and heat transfer.
4. Develop skills in providing solutions for
 - (a) problems involving L-R-C oscillatory circuits
 - (b) linear, surface and volume integrals by vector methods
 - (c) work done, flux through vector integrations

DETAILED SYLLABUS:

UNIT-I : DIFFERENTIAL EQUATIONS- APPLICATIONS

Ordinary differential equations – Linear and Bernoulli type – exact equations and reducible to exact. Orthogonal trajectories (both cartesian and polar forms). Newton's Law of cooling, Law of natural growth and decay. Non-homogeneous linear differential equations of second and higher order with constant coefficients. Methods of finding the particular integrals for $Q(x) = e^{ax}, \sin ax, \cos ax, x^n, e^{ax} V(x), x V(x)$. Method of variation of parameters . Applications to L-R-C circuits.

UNIT-II: PARTIAL DIFFERENTIATION & APPLICATIONS OF DERIVATIVES

Functions of two or more variables – Homogeneous functions – total derivatives – derivatives of implicit function – Jacobian – maxima and minima of functions of two variables with and without constraints – Lagrange's method of undetermined multipliers. Radius, centre and circle of curvature, tracing of curves in cartesian, parametric and polar forms.

UNIT-III: APPLICATIONS OF INTEGRATION

Applications of integration to – length of curves, area of surfaces of revolution and volume of solids of revolution – Double integrals – change of variables and change of order of integration. Evaluation of Triple integrals -volume as double integral.

UNIT-IV: LAPLACE TRANSFORMS- APPLICATIONS

Laplace transforms of standard functions – Properties of Laplace transforms–First and second shifting Theorems. Laplace transforms of derivatives and integrals–Laplace transforms of periodic functions – Unit step function – Dirac delta function – Inverse transforms–Convolution theorem. Applications of Laplace transforms to linear differential equations with constant coefficients.

UNIT-V : VECTOR CALCULUS

Vector differentiation – gradient, divergence, curl and vector identities. Laplacian Operator. **Vector integration:** Line integrals independent of path – work done, conservative field and scalar potential functions. Surface integrals, flux and volume integrals. Verifications and applications of vector integral theorems: Greens theorem, Stokes theorem and Gauss divergence theorem (without proof).

TEXT BOOK:

1. T.K.V. Iyengar, B. Krishna Gandhi, S. Ranganatham and M.V.S.S.N. Prasad, *Engineering Mathematics*, Vol. 1, S. Chand & Company, 12th edition, 2013.

REFERENCE BOOKS:

1. Grewal, B.S., *Higher Engineering Mathematics*, Khanna Publishers, 42nd edition, 2012.
2. Kreyszig, E., *Advanced Engineering Mathematics*, John Wiley and Sons, 8th edition, 2006.

B.Tech. I Year
14BT1BS04 : MATHEMATICAL METHODS
(Common to CSE, CSSE, IT, ECE, EIE and EEE)

Internal Marks	External Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	6

PREREQUISITE: Intermediate/ Senior Secondary Mathematics

COURSE DESCRIPTION: This course deals with obtaining the numerical solutions for algebraic and transcendental equations. Fundamentals of matrix theory including introduction to Eigen values, Cayley- Hamilton's theorem, numerical solutions to differential equations, transformation techniques for solving engineering problems and applications of partial differential equations are presented.

COURSE OUTCOMES:

After the completion of this course, a successful student is able to

1. Acquire basic knowledge in
 - (a) solving linear equations through matrix methods.
 - (b) solving algebraic and transcendental equations by various mathematical methods.
 - (c) fitting of various types of curves to the given data
 - (d) finding the numerical values to derivatives and integrals through different mathematical methods.
 - (e) solving differential equations numerically through various methods.
 - (f) solving difference equations using z –transforms.
2. Develop analytical skills in
 - (a) evaluating the properties of functions through Fourier series and Fourier transforms.
 - (b) solving boundary value problems in engineering using Fourier transform
3. Design novel mathematical methods for
 - (a) fitting geometrical curves to the given data.
 - (b) for solving the differential equations.
 - (c) the problems involving heat transformations.
 - (d) constructing the interpolating polynomials to the given data and drawing inferences.

DETAILED SYLLABUS:

UNIT-I : MATRIX THEORY AND APPLICATIONS

Rank of a matrix, echelon form, normal form, inverse of a matrix by normal form. Homogenous and non-homogenous linear systems, consistency and solutions of linear system of equations. Solutions of equations by Gauss elimination method. Eigen values, Eigen vectors and properties. Cayley– Hamilton Theorem (without proof), inverse and powers of a matrix using Cayley– Hamilton Theorem, diagonalization of a matrix, quadratic forms, nature of quadratic form and reduction of quadratic form to its normal form.

UNIT-II: NUMERICAL SOLUTIONS, CURVE FITTING AND INTERPOLATION

Solutions of Algebraic and Transcendental equations by bisection method, Regula – Falsi method, Newton – Raphson method. Curve fitting by the principle of least squares, fitting of a straight line, parabola and exponential curves. Interpolation, forward difference operator, backward difference operator, central difference operator. Relationship between different operators. Interpolation using Newton's forward formula, Newton's backward formula, Lagrange's interpolation formula.

UNIT-III: NUMERICAL DIFFERENTIATION AND INTEGRATION, SOLUTIONS OF O D E

Numerical differentiation using Newton's forward formula, Newton's backward formula. Numerical integration using trapezoidal rule, Simpsons 1/3 rule, Simpsons 3/8 rule. Numerical solutions of first order ordinary differential equations using Taylor series, Euler's method modified Euler's method, Runge – Kutta method (4th order only).

UNIT-IV : TRANSFORMATION TECHNIQUES

Fourier series , Dirichlets conditions, determination of Fourier coefficients (Euler's formulae), even and odd functions. Half-range Fourier sine and cosine expansions. Fourier integral theorem (statement only), Fourier sine and cosine integrals, Fourier sine and cosine transforms, inverse transforms. Z – transforms, inverse Z– transform, properties, damping rule, shifting rule, initial and final value theorems. Convolution theorem, solution of difference equations by Z– transforms.

UNIT – V: APPLICATIONS OF PARTIAL DIFFERENTIAL EQUATIONS

Formation of partial differential equations . Method of separation of variables for second order partial differential equations – solutions of one dimensional wave equation – heat equation -Laplace equation.

TEXTBOOK:

1. T.K.V. Iyenger, B. Krishna Gandhi, S. Ranganadham and M.V.S.S.N. Prasad, *Mathematical Methods*, S.Chand and Company, 8th edition, 2013.

REFERENCE BOOKS:

1. B.S. Grewal, *Higher Engineering Mathematics*, Khanna publishers, 42nd edition, 2012.
2. S.S.Sastry, *Introductory Methods of Numerical Analysis*, Prentice Hall of India, 4th edition, 2005.

B.Tech. I Year
14BT1ES01: PROGRAMMING IN C & DATA
STRUCTURES

(Common to ECE, EEE, EIE, ME and CE)

Internal Marks	External Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	6

PREREQUISITE: Nil

COURSE DESCRIPTION: This course deals with fundamentals of programming in C language such as syntax of C, mechanisms of input and output processing, derived data types like arrays, strings and pointers. Also file in C and data structures are discussed.

COURSE OUTCOMES:

After the completion of this course, a successful student is able to

1. Gain knowledge on developing algorithms and programming techniques.
2. Gain analytical skills on
 - a. Searching and sorting
 - b. File management functions.
 - c. Various Data Structures
3. Design various applications using basic data structures like linked list, stacks and queues
4. Gain competence to represent and solve real time problems using tree data structures.

DETAILED SYLLABUS:

Unit-I:

Programming Languages- Compiler, Interpreter, Loader, and Linker-Program execution- Classification of programming-Algorithms and flowcharts .

Basics of C: Introduction, Standardizations of C language, Developing Programs in C, Structure of C program, Variables, Data Types, Declaration, Token, Operators and expressions, L values and R values, Type Conversion in C.

Unit-II

Input and Output: Basic screen and key board I/O in C , Non formatted input and output , Formatted Input and output. Control Statements: Specifying Test Condition for Selection and Iteration, Writing Test Expressions, Conditional Execution and Selection, Iterative and Repetitive Execution, GOTO Statement, Special Control statements, Nested loops.

Unit-III

Arrays and Strings: One dimensional Array, Strings: One-Dimensional Character Arrays, Multidimensional Arrays, Arrays of Strings. Functions: Concept of function, Call by Value Mechanism, passing arrays to Functions, Scope and extent, Storage classes, Inline function, Recursion, Searching and sorting.

Unit-IV

Pointers: Introduction, Understanding Memory Address, Address Operators, pointer, Void pointer, Null pointer, use of pointers, arrays and pointers, Pointer and strings, pointer arithmetic, pointers to pointers, pointer to arrays, Pointers to functions, Dynamic memory allocation, Pointer and const Qualifier. User-defined data types and variables: Structures, union, Enumerations types, Bitfields.

Files in C: Working with text files, Binary files, Random Access files, other file management functions, Command line arguments, C preprocessor, Type qualifier.

Unit-V

Linked Lists: Singly Linked Lists, Circular Linked lists, Doubly Linked list Applications of Linked Lists. Stacks and Applications, Queues, Other Variations of Queues, Applications, Tree-Binary tree, Traversals, Kinds of binary trees, Binary Search tree, Application of tree.

TEXT BOOK:

1. PradipDey and Manas Ghosh, *Programming in C*, 2nd edition, Oxford University Press, New Delhi, 2007

REFERENCE BOOKS:

1. D. Samanta, *Classic Data Structures*, 2nd edition, PHI Learning, New Delhi, 2004
2. Behrouz A. Forouzan and Richard F. Gilberg, *A Structured Programming Approach using C*, 3rd edition, Cengage Learning, New Delhi, 2007.

B.Tech. I Year
14BT1ES03: COMPUTER AIDED
ENGINEERING DRAWING
(Common to All Branches of Engineering)

Internal Marks	External Marks	Total Marks	L	T	P	C
25	50	75	-	1	3	3

PREREQUISITE: Nil

COURSE DESCRIPTION: This course deals with the concepts of computer-aided sketching, and orthographic and isometric projections of geometric entities (both 2D and 3D) through computer aided drafting packages.

COURSE OUTCOMES: After completion of the course, a successful student is able to :

1. Produce different views and projection in drawing.
2. Use modern CAD software for different designs.
3. Create multi-view drawings suitable for presentation to a general audience.

DETAILED SYLLABUS:

UNIT I – INTRODUCTION TO COMPUTER AIDED SKETCHING

Introduction, Drawing Instruments and their uses, BIS conventions, Lettering, Dimensioning, Different types of lines, Material conventions and free hand practicing, Definitions of Principle planes and other planes. Computer screen, layout of the software, Creation of 2D/3D environment, Selection of drawing size and scale, Standard tool bar/menus, Coordinate system, and description of most commonly used toolbars, Navigational tools, Commands and creation of Lines, Co-ordinate points, axes, polylines, square, rectangle, polygons, splines, circles, ellipse, text, move, copy, off-set, mirror, rotate, trim, extend, break, chamfer, fillet, curves, constraints viz. tangency, parallelism, inclination and perpendicularity.

UNIT II – ORTHOGRAPHIC PROJECTIONS

Introduction, Definitions- Planes of projection, reference line and conventions employed, Projections of points in all the four quadrants, Projections of straight lines (located in First quadrant/first angle only), Projection of lines inclined to one plane, inclined to both the planes, finding true lengths and true inclinations (No application problems).

UNIT III – ORTHOGRAPHIC PROJECTIONS OF PLANE SURFACES

Introduction, Definitions-projections of plane surfaces-triangle, square, rectangle, rhombus, pentagon, hexagon and circle, planes in different positions by change of position method only (Simple problems inclined to any one plane only)

UNIT IV – PROJECTIONS OF SOLIDS

Introduction, Projections of right regular prisms, pyramids, cylinders and cones in different positions. (Simple problems inclined to any one plane only). Isometric projections and isometric views.

UNIT V – SECTIONS AND DEVELOPMENT OF LATERAL SURFACES OF SOLIDS

Introduction, Section planes and sectional views of right regular solids - prisms, cylinder, pyramids and cone resting with base on HP. True shapes of the sections.

Development of Surfaces: Right regular solids – prisms, cylinder, pyramids, cone and their sectional parts.

TEXT BOOKS:

1. D.M. Kulkarni, A.P. Rastogi and A.K. Sarkar, *Engineering Graphics with Auto CAD*, PHI Learning Private Limited, Revised Edition, August 2010.
2. N D Bhat & V M Panchal, *Engineering Drawing*, Charotar Publishing House, Gujarat, 51st edition, 2013.

REFERENCE BOOKS:

1. Sham Tickoo, *AutoCAD 2013 For Engineers And Designers*, Dreamtech Press, 2013
2. T Jeyapoovan, *Engineering Drawing and Graphics Using Autocad*, Vikas Publishing House, 3rd Edition, 2010.
3. Jolhe, *Engineering Drawing*, Tata McGraw Hill Education Private Limited, 1st Edition, 2007.
4. Basant Aggarwal, *Engineering Drawing*, Tata McGraw Hill Education Private Limited, 1st Edition, 2008.

B.Tech. I Year
14BT1BS05: ENGINEERING PHYSICS &
ENGINEERING CHEMISTRY LABORATORY

(Common to All Branches of Engineering)

Internal Marks	External Marks	Total Marks	L	T	P	C
25	50	75	-	-	3	3

PREREQUISITE: Intermediate Physics & Chemistry

COURSE DESCRIPTION:

Engineering Physics: The course deals with experimental verification of characteristics of p-n junction diode, photodiode, LED, and semiconductor laser diode. It also covers experimental determination of energy gap and carrier concentration of a semiconductor material, wave length of a laser source, rigidity modulus of a material, size of fine particle, dielectric constant, numerical aperture of optical fibre, frequency of electrically vibrating tuning fork and magnetic field along axial line of a current carrying coil. Verification of transverse laws of stretched string is also included.

Engineering Chemistry: This course deals with the estimation of hardness, alkalinity and dissolved oxygen of water samples by volumetric methods. It provides hands-on experience on different instrumental methods such as conductivity meter, potentiometer, pH meter, and colorimeter. This course also deals with the methods of synthesis of nano metal-oxides and novalac resin.

COURSE OUTCOMES:

Engineering Physics:

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

1. Acquire analytical skills in the determination of
 - a) Wave length of laser.
 - b) Divergence angle for laser beam.
 - c) Numerical aperture of an optical fibre.
 - d) Hall coefficient for semiconductor material.
 - e) Energy gap of semiconductor material.
 - f) Verifying the laws of stretched string.
 - g) Characteristics of p.n. junction diode, and light emitting diode.

Engineering Chemistry:

After completion of the course, a successful student is able to:

1. Acquire analytical skills in the estimation of hardness of water, alkalinity of water, dissolved oxygen in water and estimation of iron through wet laboratory methods.
2. Acquire analytical skills in the determination of P^H of a solution, EMF of a solution, spectrophotometric determination of iron and estimation of iron in cement through instrumental methods of analysis.
3. Develop skills in the designing of synthetic methods for the preparation of polymers and Nanomaterials.

List of experiments :

Engineering Physics:

Conduct a minimum of any **Ten** of the following experiments.

1. Determination of wavelength of a laser source using diffraction grating
2. Determination of numerical aperture of an optical fiber
3. I-V Characteristics of a p-n junction diode
4. Characteristics of LED source.
5. Hall effect
6. Photo diode – characteristics
7. Energy gap of a material of a p-n Junction
8. Magnetic field induction along the axis of a current carrying coil- Stewart and Gee's method
9. Melde's experiment - transverse & longitudinal modes
10. Verification of transverse laws of stretched string - Sonometer
11. Determination of dielectric constant
12. Characteristics of laser source.
13. Determination of particle size by using a laser source
14. Determination of the rigidity modulus of the material of wire using torsional pendulum

Engineering Chemistry:

List of Experiments:

A minimum of any **Ten** experiments are to be conducted among the following:

1. Estimation of Hardness of water by EDTA method.
2. Estimation of alkalinity of Water.
3. Estimation of Dissolved Oxygen in water.
4. Estimation of Ferrous Iron by Dichrometry.
5. Conductometric titration of strong acid Vs strong base
6. Determination of P^H of a given solution by P^H metry.
7. Estimation of Ferrous ion by Potentiometry.
8. Estimation of Ferric iron in cement by Colorimetric method.
9. Preparation of Novalac Resin.
10. Synthesis of Nano metal-oxide using sol– gel process.
11. Determination of the capacity of the given cation-exchange Resin.
12. Measurement of viscosity by Redwood viscometer.

Duration: 3 Periods for each experiment

TEXT BOOKS:

1. *Physics Laboratory Manual*
2. K. Mulkanti, *Practical Engineering Chemistry*, BS Publications, 2013.
3. K.N. Jayaveera, K.B. Chandra Sekhar, *Chemistry laboratory manual*, S.M. Enterprises Limited, 2013.

B.Tech. I Year
14BT1ES04: PROGRAMMING IN C & DATA
STRUCTURES LAB

(Common to ECE, EEE, EIE, ME and CE)

Internal Marks	External Marks	Total Marks	L	T	P	C
25	50	75	-	-	3	3

PREREQUISITE: - - -

COURSE DESCRIPTION: This course provides programming practice in C language specifically syntax of C, input-output processing, derived data types, file processing, and data structures.

COURSE OUTCOMES:

After the completion of this course, a successful student is able to

1. Design, code, test, debug and execute programs in C.
2. Implement and use common features found in C programs – arrays, pointers, strings, stacks and queues.
3. Select the appropriate data structure and algorithm design method for a specified problem.

Week 1:

- a. Write a C program to print the string "SVEC" at four corners and center of the screen using single printf statement.
- b. Mr. Gupta deposits Rs.1000 in a bank. The bank gives simple interest of 15% per annum. Write a program to determine the amount in Mr. Gupta's account at the end of 5 years. (Use the formula $I = PTR/100$)
- c. Write a program to exchange the values of two variables without using the third variable.

Week 2:

- a. A cashier has currency notes of denominations Rs.10, Rs. 50 and Rs. 100. If the amount to be withdrawn is input in hundreds, find the total number of notes of each denomination the cashier will have to give to the withdrawer.
- b. In a town, the percentage of men is 52. The percentage of total literacy is 48. If total percentage of literate men is 35 of the total population, write a program to find the total number of illiterate men and women if the population of the town is 8000.
- c. Assume that any month is of 30 days. Input total days through keyboard. Find out the exact number of Years, Months & Days.

Week-3

- a. Write a program that reads in a number, then reads in a single digit and determines whether the first number contains the digit. If it does, the program should display how many times the digit occurs in the number.
- b. Write a program to print Pythagoras triplets $a = m^2 - n^2$, $b = (m^2 + n^2)/2$, $c = (m^2 + n^2)/2$ where $m = 1, 3, 5, \dots$; $n = m + 2, m + 4, \dots$
- c. Write a program to produce the following pattern:

a. 1 2 3 4 5 6 7 8 9 10	b. 1 2 3 4 5 6 7 8 9 10
1 2 3 4 5 6 7 8 9	2 3 4 5 6 7 8 9 10
1 2 3 4 5 6 7 8	3 4 5 6 7 8 9 10
1 2 3 4 5 6 7	4 5 6 7 8 9 10
1 2 3 4 5 6	5 6 7 8 9 10
1 2 3 4 5	6 7 8 9 10
1 2 3 4	7 8 9 10
1 2 3	8 9 10
1 2	9 10
1	10

Week-4

- a. Write a C program to generate Pascal's triangle.
- b. Write a C program to construct a pyramid of numbers.

Week-5

- a. The formula used to calculate the amount of interest on a bank account that compounds interest daily is

$$i = p(1 + r)^d - p$$

where:

- i is the total interest earned,
- p is the principal (the amount originally deposited in the account),
- r is the rate of interest as a decimal less than 1 (for example, 15 percent is expressed as 0.15), and
- d is the number of days the money is earning interest.

Write a program that accepts values for p, r and d and calculates the interest earned.

- b. A character is entered through keyboard. Write a program to determine whether the character entered is a capital letter, a small case letter, a digit or a special symbol. The following table shows the range of ASCII values for various characters.

<u>Characters</u>	<u>ASCII values</u>
A - Z	65 - 90
a - z	97 - 122
0 - 9	48 - 57

Special Symbols 0 - 47, 58 - 64, 91- 96, 123 - 127

- c. Write a C program to convert a given decimal number into its equivalent
 - i. Binary Number
 - ii. Octal Number
 - iii. Hexadecimal Number
 - iv. Quinary Number(base 5)

Week-6

- a. Write a program, which takes two integer operands and one operator from the user, performs the operation and then prints the result. (Consider the operators +, -, *, /, %, use switch statement)
- b. Write a program to find the sum of individual digits of a positive integer.
- c. 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 program to generate the first N terms of the sequence.
- d. Write a program to generate all the prime numbers between 1 and N, where N is a value supplied by the user.

Week 7:

- a. Write a program to find the largest and smallest number in a list of integers.
- b. Write a program to perform the following:
 - i) Addition of two matrices.
 - ii) Multiplication of two matrices.

Week-8

- a. Write a C program that uses functions to perform the following operations:
 - i) To insert a sub-string in to 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
- c. Write a C Program to implement all string operations.
 1. Find the length of string
 2. Reverse the string.
 3. Comparing the two strings.
 4. Copy the string .

Week -9:

- a. 2's complement of a number is obtained by scanning it from right to left and complementing all the bits after the first appearance of a 1. Thus 2's complement of 11100 is 00100. Write a C program to find the 2's complement of a binary number.
- b. Write a C program to convert a Roman numeral to its decimal equivalent.

Week 10:

- a. Write a C program to count the lines, words and characters in a given text.
- b. Write a program that simulates a password entry.
- c. Write a program to read a five letter word and generate all possible combinations of two-letter words using those five letters.

Week 11:

- Write a program to perform the following:
- i) Linear search
 - ii) Binary search

Week 12:

- Write a program to perform the following:
- i) Selection sort
 - ii) Insertion sort
 - iii) merge Sort
 - iv) Quick sort

Week 13:

Write programs to perform the following using recursion

- i) To find the factorial of a given integer.
- ii) To solve Towers of Hanoi problem

Week-14

- a. Write a C Program to return a substring from a main string using pointers.
- b. Write a C program to return character frequency count in a text using pointers

Week-15

- 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.)
- b. Write a Program to enter records of students display in sorted order according to ID number.
- c. Define a structure to store employee's data with the following specifications:
Employee-Number, Employee-Name, Basic pay, Date of Joining
 - i) Write a function to store 10 employee details.
 - ii) Write a function to implement the following rules while revising the basic pay.
 - If Basic pay \leq Rs.5000 then increase it by 15%.
 - If Basic pay $>$ Rs.5000 and \leq Rs.25000 then it increase by 10%.
 - If Basic pay $>$ Rs.25000 then there is no change in basic pay.
 - iii) Write a function to print the details of employees who have completed 20 years of service from the date of joining.

Week-16

- a. Write a program which copies one text file to another.
- b. Write a program to reverse the first N characters of a given text file.

Note: The file name and N are specified through command line.

- c. Consider the following text file:

Input File:

S.No.	Customer_ID	Item No.	Qty.	Price Per Item (Rs.)
1.	C01	I1	2	10
2.	C02	I2	5	50
3.	C03	I2	5	50
4.	C04	I4	10	10

Write a program to print the output in following format by giving the Customer_ID as an input.

Output:

S.V. PROVISION STORES		
TIRUPATI		
Customer_ID: C01		Date: 12-08-2010
Item	Qty	Price
I1	2	20
Total		20

Week - 17:

Write a program to implement the following operations on Singly Linked List

a. List Creation b. Insertion c. Deletion d. Display

Week -18:

Write a program to implement the following operations on Circular Linked List

a. List Creation b. Insertion c. Deletion d. Display

Week -19 :

Write a program to implement the following operations on Doubly Linked List

a. List Creation b. Insertion c. Deletion d. Display

Week- 20:

Write a program to implement stack operations using:

i) Arrays ii) Pointers

Week -21 :

Write a program to implement linear queue operations using:

i) Arrays ii) Pointers

Week -22:

a) Write a program to implement circular queue operations using arrays

b) Write a program to implement traversals of a Binary tree

i. Preorder ii. Post order iii. Inorder

Week- 23

Write a program to implement insertion and deletion in a binary search tree.

REFERENCE BOOKS:

1. Behrouz A. Forouzan and Richard F. Gilberg, "**A Structured Programming Approach using C,**" Third Edition, Cengage Learning, New Delhi, 2007.
2. PradipDey and Manas Ghosh, "**Programming in C**", Second Edition, Oxford University Press, New Delhi, 2007
3. D. Samanta, "**Classic Data Structures**", Second Edition, PHI Learning, New Delhi, 2004.

B.Tech. I Year
14BT1ES06: ENGINEERING & IT WORKSHOP
(Common to All Branches of Engineering)

Internal Marks	External Marks	Total Marks	L	T	P	C
25	50	75	-	-	3	3

PREREQUISITE: - - -

COURSE DESCRIPTION:

Engineering Workshop: The course provides hands-on training in the trades Carpentry, Fitting, House-wiring, Tin Smithy, Foundry. Overview of metal cutting processes, plumbing and welding is provided through live demonstrations.

IT Workshop: This course deals with practice sessions on PC hardware, Internet, World Wide Web, MS-Word, Excel, Power Point and Publisher. Demonstrations on installations of system software such as MS-Windows, Linux and device drivers, hardware and software troubleshooting, and protecting the personal computer from viruses and other cyber attacks are include.

COURSE OUTCOMES:

ENGINEERING WORKSHOP:

After completion of the course, a successful student is able to :

1. Utilize workshop tools for engineering practice.
2. Employ skills for the production a component for real time applications.
3. Appreciate the hard work and intuitive knowledge of the manual workers.

IT WORKSHOP:

After the completion of the course the student will be able to:

1. Acquire analytical skills in:
 - (a) Identification of functional parts of PC
 - (b) Internet and World Wide Web.
 - (c) Computer security issues and preventive measures.
 - (d) Operating Systems.
2. Design document and presentations effectively.
3. Apply modern tools to develop IT based applications.
4. Gain effective communication skills through IT tools.
5. Update knowledge and skills in PC maintenance and usage of latest Operating Systems and Office automation tools.

**DETAILED SYLLABUS:
ENGINEERING WORKSHOP:**

1. Trades for Exercise:

Any TWO jobs from each trade should be performed.

- a) **Carpentry Shop** : Cross lap joint, mortise and tenon, T-joint, dove tail joint.
- b) **Fitting Shop** : Square fit and V-fit, semi circular fit, dove tail fit.
- c) **Sheet Metal Shop** : Trapezoidal tray, square tin, funnel, cylinder.
- d) **House wiring** : Wiring for two lamps (bulbs) with independent switch controls with or without looping, wiring for stair case lamp, tube light connection, godown wiring.
- (e) **Foundry** : Preparation of casting using single piece pattern,
Preparation of casting using split piece pattern

2. Trades for Demonstration:

- a) **Welding**
- b) **Metal Cutting**
- c) **Plumbing**

In addition to the above, hand tools, hand machines, models of jobs, materials with names such as different woods, wood faults, plastics, steels, meters, gauges, equipment, first-aid and shop safety shall be demonstrated through charts, layouts, figures, circuits, CDs/DVDs.

TWORKSHOP:

a) PC Hardware

Week 1: Identify the peripherals of a personal computer, components in a Central Processing Unit (CPU) and its functions, block diagram of CPU along with the configuration of each peripheral.

Week 2: Demonstrating assembling and disassembling of the Personal Computer.

Week 3: Introduction to Operating Systems, Components of OS, Installation of Microsoft Windows-XP Operating System.

Week 4: Introduction to LINUX OS, Installation of LINUX OS, Basic DOS commands – mkdir, cd, cls, del, copy, attrib, date, path, type, format, exit. Basic commands in LINUX - cat, ls, pwd, rm, rmdir, cd, cp, mv, who, date, cal, clear, man, wc.

Week 5: Hardware & Software Troubleshooting: Diagnosis of PC malfunction, types of faults, common issues and how to fix them. Basic Hardware & Software Troubleshooting steps, PC diagnostic tools.

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b) MS-Office:

MS Word

Week 6: Introduction to MS-Word, Importance of Word as Word Processor, Overview of toolbars, Saving, Accessing files, Using help and resources. Create a word document using the features: Formatting fonts, Drop cap, Applying text effects, Using character spacing, Borders and shading, Inserting headers and footers, Using date and time option.

Week 7: Create a word document in MS-Word using the features: Inserting tables, Bullets and numbering, Changing text direction, Hyperlink, Images from files and Clipart, Drawing toolbar and Word art.

Week 8: Create an invitation using Mail Merge in MS-Word

MS Power Point:

Week 9: Introduction to MS-Power Point, Utilities, Overview of toolbars, PPT orientation, slide layouts, Types of views.

Create a Power Point Presentation using the features: Slide Layouts, Inserting Text, Word Art, Formatting Text, Bullets and Numbering, Auto Shapes, Lines and Arrows.

Week 10: Create a Power Point Presentation using the features: Auto content wizard, Hyperlinks, Inserting images, Clip art, Audio, Video, Custom animation, Slide hiding, Tables and Charts.

MS Excel:

Week 11: Introduction to MS-Excel as a Spreadsheet tool, Overview of toolbars, accessing, Saving excel files, Using help and resources.

Create a spreadsheet using the features: Gridlines, Format cells, Summation, Auto fill, Formatting text, Formulae in Excel Charts.

Week 12: Create a spreadsheet using the features: Split cells, Sorting, Conditional formatting, Freeze panes, Pivot tables, Data validation.

MS Publisher & World Wide Web

Week 13: Introduction to MS-Publisher, Overview of toolbars, Saving files, Templates, Layouts.

Create a website using the features: Home page, About us, Department, Contact page.

Internet & Computer Security

Week 14: Search Engines and Cyber Hygiene: Introduction to computer networking, Demonstration on network components, Drivers loading and Configuration settings, Mapping of IP addresses, Configuration of Internet and Wi-Fi. Bookmarks, Search toolbars and pop up blockers. Types of search engines and how to use search engines, Awareness of various threats on Internet, Types of attacks and how to overcome. Installation of antivirus software, Configuration of personal firewall and Windows update on Computers.

REFERENCE BOOKS:

ENGINEERING WORKSHOP:

1. V. Ramesh Babu, *Engineering Work shop practice*, VRB Publishers Private Limited, 2009.
2. P.Kannaiah and K.L.Narayana, *Work shop Manual*, SciTech Publishers, 2009.
3. K. Venkata Reddy, *Workshop Practice Manual*, BS Publications, 2008

IT WORKSHOP:

1. Vikas Gupta, *Comdex Information Technology Course Tool Kit*, 2nd edition, WILEY Dreamtech, New Delhi, 2006.
2. ITL Education, *Introduction to Information Technology*, 2nd edition, Pearson Education, New Delhi, 2005.
3. *IT Workshop Laboratory Manual*, Department of IT, SVEC, 2014.

B.Tech. I Year
14BT1HS02: ENGLISH LANGUAGE
COMMUNICATION SKILLS LABORATORY
(Common to All Branches of Engineering)

Internal Marks	External Marks	Total Marks	L	T	P	C
25	50	75	-	-	3	3

PREREQUISITE: Basic Speaking and Listening Skills.

COURSE DESCRIPTION: The course contains practice sessions which are classified into software based learning, grammar and activities. English Speech Sounds and Phonemic Transcription, Word Stress and Sentence Stress, Accent, Rhythm and Intonation, Paralinguistic Features, Vocabulary Building, are aided by software. Grammar sessions include Functional Grammar: Tenses, Speech, Voice, Error Correction and Essay Writing. Just a Minute, Impromptu Speech and Elocution, Role Plays, Telephonic Etiquette, Listening Skills, Describing People, Places and Objects, Presentation Skills and Information Transfer are activity oriented.

COURSE OUTCOMES:

On the successful completion of the course, the students will / should be able to

1. Gain practical knowledge in
 - English Speech Sounds
 - Stress Patterns in word and sentence
 - Intonation Patterns
 - Paralinguistic Features
 - Vocabulary Enrichment
2. Analyse the functional part of the grammatical elements for writing grammatically correct English in various academic and personal practices.
3. Develop various language functions to fulfil the purpose of speaking and writing in academic, professional and personal contexts.
4. Apply the knowledge of the usage of various language software for enhancing the language skills more and more thereby acquiring unconsciously the language functions and elements that are commonly used in various contexts.
5. Communicate effectively with engineering community and society in various formal, informal and neutral situations.

6. Demonstrate various language functions by participating in
 - Just A Minute
 - Impromptu Speech
 - Elocution
 - Role Plays
 - Presentations
7. Engage in lifelong learning for the development of the communicative competence for meeting the global challenges.

Detailed list of experiments / Lab practice Sessions:

1. English Speech Sounds and Phonemic Transcription
2. Word Stress and Sentence Stress
3. Accent, Rhythm and Intonation
4. Paralinguistic Features.
5. Vocabulary Building
 - a. Importance of Vocabulary Enrichment in Speaking: Spelling
 - b. Synonyms–Antonyms–Prefix–Suffixes–One Word Substitutes
 - c. Idioms and Phrases–Homophones–Homonyms–Homographs.
6. Functional Grammar
 - a. Parts of Speech
 - b. Tenses
 - c. Change of Speech
 - d. Change of Voice
 - e. Word Order and Error Correction
 - f. Essay Writing
7. Just a Minute, Impromptu Speech and Elocution
8. Role Plays
9. Telephonic Etiquette
10. Listening Skills
11. Describing People, Places and Objects
12. Presentation Skills
13. Information Transfer

REFERENCES:

1. Departmental Lab Manual

SUGGESTED SOFTWARE:

1. Mastering English: Vocabulary, Grammar, Punctuation and Composition.
2. Dorling Kindersley Series of Grammar, Punctuation, Composition etc.
3. Language in Use 1, 2 and 3
4. Learning to Speak English 8.1, the Learning Company – 4 CDs.
5. English in Mind, Herbert Puchta and Jeff Stranks with Meredith Levy, Cambridge.
6. English Pronunciation Dictionary by Daniel Jones
7. Speech Solutions
8. Cambridge Advanced Learner's Dictionary - 3rd Edition
9. Centronix - Phonetics
10. Rosetta Stone
11. Let's Talk English, Regional Institute of English South India.

II B.Tech. I Semester
14BT3BS02: SPECIAL FUNCTIONS AND
COMPLEX ANALYSIS

(Common to ECE, EEE, and EIE)

Internal Marks	External Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITE(S): Engineering Mathematics

COURSE DESCRIPTION: Beta, Gamma functions and their properties; Limits and continuity of functions, analyticity of complex functions; Integration, power series, singularities, residues; conformal mapping with applications.

COURSE OUTCOMES: On successful completion of the course, the student will be able to

1. acquire knowledge in
 - beta and Gamma functions
 - expressing complex functions in power series
 - differentiation and integration of complex functions
 - conformal mappings and bilinear transformations
 - Expressing complex functions in terms of graphs and power series
2. develop analytical skills in providing solutions for problems involving
 - fluid, Electrical and Magnetic Potential functions
 - integration of complex functions
 - improper real integrals
3. develop skills in analyzing
 - the properties exhibited by complex functions in Argand plane.
 - the properties of complex functions by expressing them in power series and graphs.
 - properties of improper integrals through residue theory.

DETAILED SYLLABUS:

UNIT-I: SPECIAL FUNCTIONS

Beta and gamma functions - properties - relationship between beta and gamma functions. Applications - evaluation of improper integrals using beta and gamma functions. Bessel function - generating function (without proof) - recurrence relations - orthogonality.

UNIT-II: ANALYTIC FUNCTIONS

Function of a complex variable - limits and continuity of functions. Differentiability - analyticity, Cauchy - Riemann equations (both cartesian and polar). Conjugate and harmonic conjugate functions - Milne Thompson method. Potential functions.

UNIT-III : COMPLEX INTEGRATION AND POWER SERIES

Line integral - Evaluation of line integrals along curves and closed contours
- Cauchy's Integral theorem (without proof) - Cauchy's integral formula
- Derivatives of analytic function - Generalized integral formula- Evaluation of integrals using integral formula. Taylor's theorem (without proof) - Laurent's theorem (without proof) - Power series expansion of complex functions.

UNIT-IV: RESIDUE THEOREM - APPLICATIONS

Zeros and Singularities - Types of singularities - Residues - Evaluation of Residues at poles - Pole of order m and pole at infinity - Residue theorem - Evaluation of integrals using residue theorem - Evaluation of improper and real integrals of the type:

$$\text{i) } \int_0^{2\pi} f(\cos \theta, \sin \theta) d\theta \quad \text{ii) } \int_{-\infty}^{\infty} f(x) dx \quad \text{iii) } \int_{-\infty}^{\infty} e^{imx} f(x) dx$$

UNIT-V: CONFORMAL MAPPINGS

Definition, examples and mappings defined by Translation, Rotation, Inversion. Bilinear transformation - Properties - Fixed points, Cross ratio. Invariance of circles under bilinear transformation. Determination of bilinear transformation using three given points.

TEXT BOOKS:

1.T.K.V. Iyenger, B. Krishna Gandhi,...et. al. *Text book of Engineering Mathematics*, Vol - III, S. Chand & Company, 8th edition, 2011.

REFERENCE BOOKS:

- 1.Grewal, B.S, *Higher Engineering Mathematics*, Khanna Publishers, Delhi, 42nd edition, 2012.
- 2.Shahnaz Bathul, *Special Functions and Complex Variables*, PHI Learning, 2nd edition, 2010.

II B.Tech. I Semester
14BT3HS01: ENVIRONMENTAL SCIENCES
(Common to ECE, EEE & EIE)

Internal Marks	External Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITE(S): Engineering Physics and Engineering Chemistry

COURSE DESCRIPTION: Introduction to environment, Need for public awareness; Natural resources, conservation and management; Ecology and ecosystems; Biodiversity, conservation and management; Environment pollution and Control; Social issues and environment; Human population and environment; Field study and analysis.

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

1. acquire knowledge in
 - diverse components of environment and natural resources
 - ecosystem and biodiversity & its conservation methods
 - population growth and human health
 - green technology
2. identify and resolve the issues related to sources of different types of pollutions.
3. provide solutions to individuals, industries and government for sustainable development of natural resources.
4. create awareness on environmental degradation and to bring best management practices to protect environment.
5. develop skills in analyzing reports on environment for sustainable development.
6. apply environmental ethics in protection of diversified ecosystems.

DETAILED SYLLABUS:

UNIT - I: MULTIDISCIPLINARY NATURE OF ENVIRONMENT AND NATURAL RESOURCES

Multidisciplinary nature of environment: Definition, scope and importance of multidisciplinary nature of environment, segments of environment - lithosphere, hydrosphere, atmosphere and biosphere, need for public awareness.

Natural Resources: Renewable and Non-renewable resources and associated problems - (a) forest resources: use and over exploitation, deforestation - causes, effects and remedies, case studies, (b) water resources - use and over utilization of surface & ground water, conflicts over water - benefits and problems of large dams, case studies, (c) mineral

resources - mining, adverse effects, case studies (d) food resources - world food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer - pesticide problem, water logging and salinity, case studies (e) energy resources - growing needs, renewable energy resources - solar, wind, hydropower, hydrogen fuel and non-renewable energy resources - coal, natural gas, nuclear energy, role of an individual in conservation of natural resource and equitable use of resources for sustainable lifestyles.

UNIT - II: ECOSYSTEMS AND BIODIVERSITY

Ecosystems: Definition and concept of an ecosystem, structure and function of an ecosystem - producers, consumers and decomposers, food chains, food webs and ecological pyramids - introduction, types, characteristic features, structure and functions of forest ecosystem, desert ecosystem, aquatic ecosystem - ponds, lakes & oceans, energy flow in the ecosystem, ecological succession. Biodiversity: Definition, concept and value of biodiversity, role of biodiversity in addressing new millennium challenges, hot spots of biodiversity, threats to biodiversity - habitat loss, poaching of wildlife, man-wild life conflicts, endemic, endangered and extinct species of India, conservation of biodiversity-in-situ and ex-situ.

UNIT - III: ENVIRONMENTAL POLLUTION AND CONTROL

Definition, causes, adverse effects and control measures of: (a) air pollution (b) water pollution (c) soil pollution (d) noise pollution (e) thermal pollution (f) nuclear pollution, solid waste management - causes, effects and control measures of urban and industrial wastes, hazards and disaster management - floods, earthquakes, tsunamis, case studies.

UNIT - IV: SOCIAL ISSUES AND THE ENVIRONMENT

From unsustainable to sustainable development, urban problems related to energy, environmental ethics - issues and possible solutions, global warming, acid rain, ozone layer depletion, nuclear accidents and case studies, wasteland reclamation, consumerism and waste products, environment protection act, air (prevention and control of pollution) act, water (prevention and control of pollution) act, wildlife protection act, forest conservation act, issues involved in enforcement of environmental legislation, public environmental awareness.

UNIT - V: HUMAN POPULATION AND THE ENVIRONMENT

Population growth, population characteristics and variation among nations, population explosion, family welfare programme, environment and human health, human rights, value education, HIV/AIDS, women and child welfare,

role of information technology in environment and human health, case studies. Field work: visit to a local area to document environmental assets - pond/forest/grassland/hill/mountain/Environment Impact Assessment procedures for local environmental issues or assignment/seminar.

TEXT BOOKS:

1. A.Kaushik and C.P. Kaushik, *Environmental Studies*, New Age International (P) Ltd Publications, 4th Edition, 2014.
2. Erach Barucha, *Environmental Studies*, Orient Blackswan, 2nd Edition, 2013.

REFERENCE BOOKS:

1. R. Rajagopalan, *Environmental Studies*, Oxford University Press, 2nd Edition, 2011.
2. Benny Joseph, *Environmental Studies*, Tata McGraw-Hill, 2nd Edition, 2009.
3. Dr. B S Chauhan, *Environmental Studies*, University Science Press, 1st Edition, 2008.
4. M. Anji Reddy, *Textbook of Environmental Sciences and Technology*, BS Publications, 2007.
5. Larry W Canter, *Environmental Impact Assessment*, McGraw-Hill Education, 2nd edition, 1996.

II B.Tech. I Semester
14BT30201: ELECTROMAGNETIC FIELDS

Internal Marks	External Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITE(S): Engineering Mathematics, Engineering Physics

COURSE DESCRIPTION: Static electric fields; Gauss's law and its applications; Potential and Potential Gradient; steady magnetic fields; Ampere's circuital law and its applications; force in magnetic fields; behavior of various materials in electric and magnetic fields; inductance and capacitance calculations; Maxwell's equations for both time variant and time invariant fields.

COURSE OUTCOMES: on successful completion of the course, student will be able to

1. demonstrate knowledge on:
 - static electric fields due to electric charges
 - static magnetic fields due to steady currents
 - time varying electric and magnetic fields
2. analyze the Maxwell's equations for both time variant and time invariant electric and magnetic fields.
3. evaluate
 - electric field and capacitance by applying Gauss's law.
 - Magnetic field and inductance by applying Ampere's circuital law.
4. apply various laws of electromagnetics to investigate the performance of electric machines.

DETAILED SYLLABUS:

UNIT - I: ELECTROSTATICS - 1

Introduction to electrostatic fields, coulomb's law in vector form, electric field intensity (E_F), E_F due to various charge distributions, electric flux density, Gauss's law, application of Gauss's law - symmetrical charge distributions, differential volume element, Divergence theorem, Maxwell's first equation in point and integral form. Energy expended in moving a point charge in an electric field, electric potential, potential for different charge distributions, potential gradient, Maxwell's second equation in point and integral form - numerical problems.

UNIT - II: ELECTROSTATICS - II

Electric Dipole, Dipole moment, Potential and E_F due to an electric Dipole. Current density, conduction and convection current density, Ohm's law in point form, current continuity equation, Conductors and Dielectric materials, properties, boundary conditions between conductor and dielectric material, two perfect dielectric materials, law of refraction, polarization, capacitance, capacitance of a parallel plate capacitor (with and without composite dielectric), energy density in electrostatic field - numerical problems.

UNIT - III: MAGNETOSTATICS

Introduction to Magnetic fields, relation between Magnetic flux density and Magnetic Field Intensity (MFI), Biot-Savart's law, MFI due to various current carrying elements, Ampere's Circuital law, Maxwell's third equation in point and integral form, Stoke's theorem, applications of Ampere's Circuital law - infinite line current, infinite sheet of current, infinitely long co-axial transmission line, solenoid and toroid. Maxwell's fourth equation in point and integral form. Scalar magnetic potential and vector magnetic potential - numerical problems.

UNIT - IV: FORCE IN MAGNETIC FIELDS

Force due to magnetic fields, Lorentz force equation, force on a straight and long current carrying conductor in a magnetic field, force between two straight long and parallel current carrying conductors. Magnetic dipole and dipole moment, torque on a current loop placed in a magnetic field, magnetization, magnetic materials, magnetic boundary conditions between different magnetic materials, self-inductance of a solenoid, toroid, co-axial cable and two wire transmission line, energy density in magnetic field - numerical problems.

UNIT - V: TIME VARYING FIELDS

Introduction to time varying fields, Faraday's laws of electromagnetic induction, statically and dynamically induced EMF, concept of displacement current, modifications of Maxwell's equations for time varying fields, poynting theorem - numerical problems.

TEXT BOOKS:

1. William H. Hayt and John A. Buck, *Engineering Electromagnetics*, McGraw Hill Education (India) Pvt. Ltd., 8th edition, 2014.
2. Matthew N.O. Sadiku, *Principles of Electromagnetics*, Oxford University Press, New Delhi, 4th edition, 2007.

REFERENCE BOOKS:

1. Gangadhar K.A. and Ramanathan P.M., *Electromagnetic Field Theory*, Khanna Publishers, New Delhi, 2011.
2. Joseph A. Edminister, *Theory and Problems of Electromagnetics*, Schaum's Outline Series, Tata McGraw Hill Inc., New Delhi, 2009.

II B.Tech. I Semester
14BT30202: DC MACHINES

Internal Marks	External Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITE(S): Engineering Physics, Engineering Physics and Engineering Chemistry Lab.

COURSE DESCRIPTION: Electromechanical energy conversion; construction, operation, characteristics, performance evaluation and applications of various DC machines.

COURSE OUTCOMES: On successful completion of the course, student will be able to

1. demonstrate knowledge on
 - different types of singly- and multi- excited magnetic field systems.
 - construction, operation and characteristics of DC machines.
 - starting and speed control of DC motors.
 - testing of DC machines.
 - armature reaction and commutation.
 - armature windings for DC machines.
 - starters for DC motors
2. analyze the operation of DC machine for various operating conditions.
3. design armature windings for DC machines and starters for DC motors.
4. evaluate the performance of DC machines.
5. select suitable DC machine for domestic and industrial applications.

DETAILED SYLLABUS:

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.

Fundamentals of DC Machine: Principle and operation of generator and motor, constructional details.

UNIT - II: DC GENERATORS

Armature windings - lap and wave, simplex and multiplex, single layer and multi layer, equalizer rings and dummy coils. Losses - constant, variable and minimization of losses. Calculation of efficiency - condition for maximum efficiency. EMF equation and methods of excitation. Armature reaction - cross magnetizing and de-magnetizing AT/pole, compensating winding. Commutation - reactance voltage, methods of improving commutation - numerical problems.

UNIT - III: CHARACTERISTICS OF DC GENERATORS

Build-up of EMF, critical field resistance and critical speed, causes for failure of self excitation and remedial measures. Internal and external characteristics of shunt, series and compound generators. Applications. Parallel operation of DC generators - conditions for parallel operation, use of equalizer bars and cross connection of field windings, load sharing - numerical problems.

UNIT - IV: DC MOTORS

Back EMF, torque equation. Characteristics and applications of shunt, series and compound motors. Speed control of DC motors (shunt and series) - armature voltage, field flux control and Ward-Leonard methods. 2, 3 and 4-point starters - numerical problems.

UNIT - V: TESTING OF DC MACHINES

Brake test, Swinburne's test, Hopkinson's test, field's test, retardation test, separation of stray losses test - numerical problems.

TEXT BOOKS:

1. J. B Gupta, *Theory and performance of Electrical Machines (DC machines, Poly phase Circuits & AC machines) in SI Units*, S.K. Kataria & Sons, New Delhi, 14th edition, 2013.
2. I.J. Nagrath & D.P. Kothari, *Electric Machines*, Tata Mc Graw - Hill Publishers, New Delhi, 4th edition, 2010.

REFERENCE BOOKS:

1. S.K. Bhattacharya, *Electrical Machines*, Tata McGraw Hill Publishers, New Delhi, 4th edition, 2014.
2. P.S. Bimbhra, *Electrical Machinery*, Khanna Publishers, Delhi, 7th edition, 2011.
3. R.K. Rajput, *Electrical Machines in S.I. Units*, Laxmi Publications (P) Ltd, New Delhi, 15th edition, 2012.
4. B.L. Theraja and A.K. Theraja, *A Text Book of Electrical Technology in S.I. Units*, Vol.2, S.Chand Company Ltd, New Delhi, 2012.

II B.Tech. I Semester
14BT30203: ELECTRIC CIRCUITS

Internal Marks	External Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITE(S): Engineering Mathematics and Engineering Physics

COURSE DESCRIPTION: Fundamentals of electric circuit parameters; nodal and mesh analysis; analysis of single phase and polyphase systems; analysis of coupled circuits; network theorems.

COURSE OUTCOMES: On successful completion of this course, students will be able to

1. demonstrate knowledge on
 - voltage and current relationships for various electric elements.
 - network reduction techniques.
 - concepts of 1-phase and 3-phase electric circuits.
 - concepts of magnetic circuits.
 - various network theorems.
2. analyze electric and magnetic circuits.
3. design series and parallel resonant circuits.
4. solve
 - electric circuits for voltage, current and power using conventional techniques and network theorems.
 - Magnetic circuits.

DETAILED SYLLABUS:

UNIT - I: FUNDAMENTALS OF ELECTRIC CIRCUITS

Introduction to the circuit elements, voltage and current relationship for passive elements, independent and dependent sources, Ohm's law, Kirchhoff's laws, current division and voltage division rules, network reduction techniques-series, parallel, series-parallel circuits, star-delta and source transformation, nodal analysis and super node concept, mesh analysis and super mesh concept, dual and duality - problems.

UNIT - II: SINGLE PHASE CIRCUITS

Introduction, types of waveforms (symmetrical and unsymmetrical), basic definitions of AC quantities, determination of average, RMS value, form factor and peak factor for different alternating waveforms, j-notation, phase and phase difference, sinusoidal response of R, L and C, combination of R, L & C circuits, impedance and power triangle, power factor. Resonance, bandwidth and quality factor for series and parallel networks. Current locus diagrams for series R-L and R-C circuits - problems.

UNIT - III: THREE PHASE CIRCUITS

Introduction to polyphase system and its advantages, generation of 3-phase voltages, phase sequence, star and delta connections, relationship between phase and line quantities, analysis and measurement of power in three phase circuits using wattmeters for balanced and unbalanced loads - problems.

UNIT - IV: MAGNETICALLY COUPLED CIRCUITS

Coupled circuits, self and mutual inductance, DOT convention, coefficient of coupling, analysis of magnetic circuits: series, parallel and composite systems, comparison of electrical and magnetic circuits - problems.

UNIT - V: NETWORK THEOREMS

Superposition, Thevenin's, Norton's, Maximum power transfer, Tellegen's, Millman's, reciprocity and compensation theorems for DC and sinusoidal excitations - applications and problems.

TEXT BOOKS:

- 1.A. Chakrabarthy, *Circuit Theory (analysis and synthesis)*, Dhanpat Rai & Co, New Delhi, 6th edition, 2014.
- 2.Charles K Alexander, Mathew N O Sadiku, *Fundamentals of Electric Circuits*, Tata McGraw hill education Pvt. Ltd, New Delhi, 3rd edition, 2010.

REFERENCE BOOKS:

- 1.M.E. Van Valkenberg, *Network Analysis*, Pearson Publications, New Delhi, 3rd edition, 2006.
- 2.W H Hayt, J E Kemmerly, S M Durbin, *Engineering Circuit Analysis*, Tata Mc GrawHill publishing company Ltd., New Delhi, 6th edition, 2008.
- 3.J.A.Edminister, M.D.Nahvi, *Theory and Problems of Electric Circuits*, Schaum's outline series, Tata McGraw Hill company, New Delhi, 4th edition, 2004.
- 4.A. Sudhakar Shyammohan S Palli, *Electrical circuits*, Tata McGraw Hill Education private limited, New Delhi, 2nd edition, 2011.
- 5.Ravish R. Singh, *Electrical Networks*, Tata McGrawHill publishing company Ltd., New Delhi, 2009.

II B.Tech. I Semester
14BT30402: SEMICONDUCTOR DEVICES AND
CIRCUITS

(Common to ECE, EEE & EIE)

Internal Marks	External Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITE(S): Engineering Physics.

COURSE DESCRIPTION: Characteristics of general and special purpose electronic devices; Rectifiers, filters and regulators; Biasing and small signal analysis of BJT and FET.

COURSE OUTCOMES: On successful completion of this course the students will be able to

1. demonstrate fundamental knowledge in
 - p-n junction diode and its characteristics
 - zener diode and its characteristics
 - rectifiers, Filters and Regulators
 - characteristics of BJT, FET, MOSFET and special purpose electronic devices
2. analyze numerical and analytical problems in
 - rectifiers using Filters
 - regulated Power Supplies
 - transistor biasing circuits and stabilization
 - transistor amplifiers
 - FET biasing circuits and amplifiers
3. design electronic circuits like
 - BJT and FET biasing circuits
 - BJT and FET amplifiers
4. solve engineering problems and arrive at solutions pertaining to electronic circuits.

DETAILED SYLLABUS:

UUNIT - I: PN JUNCTION DIODE, RECTIFIERS AND REGULATORS

PN-Junction Diode:

p-n Junction as a diode, p-n Junction diode equation, Volt-Ampere (V-I) characteristics, temperature dependence of p-n characteristics, diode resistance - static and dynamic resistances, transition and diffusion capacitances, break down mechanisms in semiconductor diodes, Zener diode characteristics.

Rectifiers and Regulators:

Half-Wave rectifier and Full-Wave rectifiers (Qualitative and quantitative analysis), Harmonic components in a rectifier circuit, Inductor filter, Capacitor filter, L - section filter, section filter, comparison of various filter circuits in terms of ripple factors. Simple circuit of a regulator using Zener diode. Problems on rectifier circuits.

UNIT - II: BIPOLAR JUNCTION TRANSISTOR, BIASING AND STABILIZATION

Transistor construction, BJT Operation, Transistor currents and their relations, Input and Output Characteristics of a Transistor in Common Emitter, Common Base and Common Collector Configurations, BJT specifications, Transistor Operating Point, DC and AC Load Lines, Importance of Biasing, Fixed Bias, Emitter Feedback Bias, Collector to Base Feedback Bias, Voltage Divider Bias, Bias Stability, Transistor as an amplifier, Thermal Runaway, Problems on biasing circuits.

UNIT - III: SMALL SIGNAL ANALYSIS OF BJT AMPLIFIERS

BJT Modeling, Hybrid Modeling, Determination of h-Parameters from Transistor Characteristics, Measurement of h-Parameters, Millers Theorem, Analysis of CE, CB and CC configurations using simplified Hybrid Model, Comparison of CB, CE and CC configurations.

UNIT - IV: FIELD EFFECT TRANSISTOR

Construction, Principle of operation and characteristics of JFET and MOSFET (Enhancement & Depletion), Biasing of FET, Small Signal Model of JFET, Common Source and Common Drain Amplifiers using JFET, Generalized FET Amplifier, FET as Voltage Variable Resistor, Comparison of BJT and FET.

UNIT - V: SPECIAL PURPOSE ELECTRONIC DEVICES

Principle of Operation and Characteristics of Tunnel Diode, Uni-Junction Transistor (UJT), Varactor Diode, Silicon Control Rectifier (SCR). Principle of operation of Schottky, Barrier Diode.

TEXT BOOKS:

1.J. Millman, Christos C. Halkias and SatyabrataJit, *Electronic Devices and Circuits*, TMH, 3rd edition, 2010.

REFERENCE BOOKS:

- 1.R.L. Boylestad and Louis Nashelsky, *Electronic Devices and Circuits*, PHI, 10th edition, 2009.
- 2.David A. Bell, *Electronic Devices and Circuits*, Oxford University press, 5th edition, 2014.
- 3.S. Salivahanan, N. Suresh Kumar, *Electronic Devices and Circuits*, Mc-Graw Hill, 3rd edition 2013.

II B.Tech. I Semester
14BT30221: ELECTRIC CIRCUITS LAB

Internal Marks	External Marks	Total Marks	L	T	P	C
25	50	75	--	--	3	2

PREREQUISITE: Electric circuits

COURSE DESCRIPTION: Verification of network theorems; Determination of Two port network parameters; analysis of AC and DC circuits using PSPICE; determination of resonant frequency in series and parallel RLC circuits.

COURSE OUTCOMES:

On successful completion of the course, student will be able to

1. demonstrate knowledge on
 - identification of various circuit elements and their values.
 - concepts of electrical and magnetic circuits.
2. analyze and relate physical observations and measurements in electric circuits to theoretical principles and theorems.
3. design electric circuits and magnetic circuits.
4. demonstrate skills in
 - obtaining the current locus diagrams.
 - determining the parameters of magnetically coupled circuits.
 - measuring of active and reactive powers.
5. apply PSPICE simulation tool to analyze electrical circuits.
6. function effectively as individual and as member in a team.
7. communicate effectively both oral and written.

LIST OF EXPERIMENTS:

Any EIGHT experiments are to be conducted from Part A

Part-A:ELECTRIC CIRCUITS

1. Verification of KVL and KCL.
2. Mesh and Nodal analysis.
3. Series and Parallel resonance.
4. Current locus diagram of R-L and R-C series circuits.
5. Determination of self and mutual inductance and coefficient of coupling.
6. Measurement of three phase active power and reactive power for balanced loads.

- 7.Verification of Superposition and Reciprocity theorems.
- 8.Verification of Thevenin's and Norton's theorem.
- 9.Verification of Maximum Power transfer theorem for DC and AC excitations.
- 10.Verification of Millman's and Compensation theorems.
- 11.Verification of Tellegen's theorem.

Part-B:PSPICE SIMULATION

- 1.Simulation of DC circuits
- 2.Mesh analysis
- 3.Nodal Analysis
- 4.Simulation of AC circuits

II B.Tech. I Semester
14BT30421: SEMI CONDUCTOR DEVICES AND
CIRCUITS LAB

Internal Marks	External Marks	Total Marks	L	T	P	C
25	50	75	--	--	3	2

PREREQUISITE(S): Semiconductor Devices and Circuits

COURSE DESCRIPTION: Identification and testing of active and passive components; RPS, DMM, Function Generator, CRO; Diode characteristics; Rectifiers; Transistor and FET characteristics; UJT and SCR characteristics; BJT and FET amplifiers.

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

1. analyze the characteristics of different electronic devices, like
 - diode
 - zener Diode
 - transistor
 - FET and UJT
2. design and analyze the electronic circuits like transistor and FET amplifiers
3. solve engineering problems and arrive at solutions pertaining to electronics.

LIST OF EXPERIMENTS:

PART A:

Electronic Workshop Practice (in 3 lab sessions):

1. Identification, Specifications, Testing of R, L, C Components (Colour Codes), Potentiometers, Switches (SPDT, DPDT, and DIP), Coils, Gang Condensers, Relays, Bread Boards, PCBs.
2. Identification, Specifications and Testing of Active Devices, Diodes: BJTs, Low-power JFETs, MOSFETs, Power Transistors, LEDs, LCDs, Optoelectronic Devices, SCR, UJT, DIACs, TRIACs, Linear and Digital ICs.
3. study and operation of
 - multimeters (Analog and Digital)
 - Function Generator
 - Regulated Power Supplies
 - CRO.

PART B: (Minimum of 10 experiments to be conducted)

1. Forward and Reverse bias characteristics of PN Junction diode.
2. Zener diode characteristics and Zener as Voltage Regulator.
3. Input and Output characteristics of Transistor in CB Configuration.
4. Input and Output characteristics of Transistor in CE Configuration.
5. Halfwave Rectifier with and without filters.
6. Fullwave Rectifier with and without filters.
7. FET characteristics.
8. Measurement of h-parameters of transistor in CE configurations.
9. Frequency response of CE Amplifier.
10. Frequency response of CC Amplifier.
11. Frequency response of Common Source FET Amplifier.
12. SCR Characteristics.
13. UJT Characteristics.

II B.Tech. II Semester
14BT4HS02: PROFESSIONAL ETHICS

(Common to ECE, EEE & EIE)

Internal Marks	External Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITE(S): Nil

COURSE DESCRIPTION: Engineering Ethics, Moral autonomy and Moral dilemmas - Professional and Ideal Virtues, Professional Responsibility and Moral Leadership - Engineering as Social Experimentation, Conscientiousness and Law of Engineering - Responsibilities and Rights, Whistle Blowing - Global Issues, Managerial Ethics.

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

1. apply the principles of ethics to solve engineering problems
2. analyze the problems in the implementation of moral autonomy and resolve through consensus
3. responsible to follow the codes of ethics
4. practice professionalism in Engineering and assess the issues pertaining to moral dilemmas
5. function as a member, consultant, Manager, Advisor and Leader in multi-disciplinary teams
6. write reports without bias and give instructions to follow ethics

DETAILED SYLLABUS:

UNIT - I: ENGINEERING ETHICS

Scope and Aim of Engineering Ethics - Senses of Engineering Ethics - Variety of Moral Issues - Types of Inquiry - Moral Dilemmas - Moral Autonomy- Kohlberg's Theory, Gilligan's theory, Consensus and Controversy.

UNIT - II: PROFESSIONAL IDEALS AND VIRTUES

Theories about Virtues, Professions, Professionalism - characteristics, expectations, Professional Responsibility, Integrity, Self-respect, Sense of "Responsibility". Self-interest, Customs and Religion - Self-interest and Ethical Egoism, Customs and Ethical Relativism, Religion and Divine Command Ethics. Use of ethical theories - resolving moral dilemmas and moral leadership.

UNIT - III: ENGINEERING AS SOCIAL EXPERIMENTATION

Engineering as experimentation - Similarities to standard experiments, learning from the past and knowledge gained. Engineers as Responsible Experimenters - Conscientiousness, moral autonomy and accountability.

The challenger case, codes of ethics and limitations. Industrial standards, problems with the law of Engineering.

UNIT - IV: RESPONSIBILITIES AND RIGHTS

Collegiality and Loyalty, Respect for authority, collective bargaining, confidentiality, conflict of interests, occupational crime. Rights of Engineers- Professional rights, whistle-blowing, the bart case, employee rights and discrimination.

UNIT - V: GLOBAL ISSUES

Multinational corporations - Professional ethics, environmental ethics, computer ethics, Engineers as Consultants, Witnesses, Advisors and Leaders. Engineers as Managers - Managerial ethics applied to Engineering Profession, moral leadership.

TEXT BOOKS:

1. Mike W. Martin, Roland Schinzinger, *Ethics in Engineering*, 3rd Edition, Tata McGraw-Hill, 2007.
2. Govindarajan M, Nata Govindarajan. M, Natarajan. S, Senthilkumar. V.S, *Engineering Ethics*, Prentice Hall of India, 2004.

REFERENCE BOOKS:

1. Dr. S. Kannan, K. Srilakshmi, *Human Values and Professional Ethics*, Taxmann Allied Services Pvt Ltd., 2009.
2. Edmund G. Seebauer and Robert L. Barry, *Fundamental of Ethics for Scientists and Engineers*, 1st Edition, Oxford University Press, 2001.
3. Charles F. Fledderman, *Engineering Ethics*, Pearson Education, 2004.
4. R. Subramanaian, *Professional Ethics*, Oxford Higher Education, 2013.

II B.Tech. II Semester
14BT40201: SIGNALS AND NETWORKS

Internal Marks	External Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITE(S): Electric circuits

COURSE DESCRIPTION: Overview of signals and linear systems with continuous-time and discrete-time emphasis; different passive filters; transient analysis of DC and AC circuits; two-port networks and network synthesis.

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

1. demonstrate knowledge on
 - different types of signal and systems.
 - parameters of two-port networks.
 - transient behavior of various circuits.
 - synthesis of network functions.
2. analyze
 - time variant & time invariant signals and systems.
 - a Two-port network for various network parameters.
 - the transient behavior of the circuits.
3. design
 - different types of filters based on frequency and impedance.
 - two-port network for the given parameters.
4. demonstrate skills to
 - evaluate the response of various linear time invariant signals.
 - evaluate the transient response of a circuit for different excitations.
 - evaluate different synthesis functions.

DETAILED SYLLABUS:

UNIT - I: SIGNALS AND SYSTEMS

Signals: Definition, classification and representation, test signals - unit step, unit impulse, unit ramp and unit exponential. Operation on signals - shifting, scaling and time reversal. Sampling theorem - problems.

Systems: Definition, classification based on linearity, time variance, causality and stability. Response of continuous time system using differential equation method - problems.

UNIT - II: FILTERS

Classification of filters, filter networks, equations of filter networks, classification of pass band & stop band filters, characteristic impedance in pass band & stop band filters, constant k- low pass filter, k- high pass filter, m-derived T-section, band pass filter and band elimination filter.

UNIT - III: TRANSIENT ANALYSIS

DC Transients: Transient response of R-L, R-C and R-L-C series circuits, initial conditions, solution method using differential equation and Laplace transforms response of R-L, R-C and R-L-C networks to unit step excitation - problems.

AC Transients: Transient response of R-L, R-C and R-L-C series circuits, initial conditions, solution method using differential equation and Laplace transforms response of R-L, R-C and R-L-C networks to sinusoidal excitation - problems.

UNIT - IV: TWO-PORT NETWORKS

Z-parameters, Y-parameters, ABCD parameters and h-parameters, symmetry and reciprocity property in two-port networks, inter-relationships of different parameters, inter-connection of Two-port networks - problems.

UNIT - V: NETWORK SYNTHESIS

Network Functions, Hurwitz polynomials, positive real function, frequency response of reactive one port, synthesis of reactive one port by Foster's and Cauer method, synthesis of R-L and R-C networks by Foster's and Cauer method - problems.

TEXT BOOKS:

1. A Chakrabarthy, *Circuit Theory (Analysis and Synthesis)*, Dhanpat Rai & Co., New Delhi, 1st edition, 2014.
2. A Sudhakar, Shyamohan S Palli, *Circuits and Networks (Analysis and Synthesis)*, McGraw-Hill education Private Limited, New Delhi, 4th edition, 2010.

REFERENCE BOOKS:

1. A. Anand Kumar, signals and systems, *PHI Learning Private Limited*, New Delhi, 2011.
2. Simon Haykin and Barry Van Veen, *Signals and Systems*, John Wiley & Sons Private Limited, New Delhi, 2nd edition, 2008.

II B.Tech. II Semester
14BT40202: GENERATION OF ELECTRIC POWER

Internal Marks	External Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITE(S): DC Machines

COURSE DESCRIPTION: Generation of electric power using hydro, thermal, nuclear, gas, diesel and combined operation of different power stations; economic aspects of power generation.

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

1. demonstrate knowledge on
 - layout of various power plants and their operation.
 - combined operation of power stations.
 - concept of different types of turbines and their usage in different types of power generation stations.
 - economical aspects of power generation.
 - Nonconventional energy sources.
2. analyze
 - the water power equation.
 - load sharing between power stations.
3. develop skills to
 - evaluate Tariffs by different methods.
 - calculate reserve capacity of hydel power plant using mass curve.

DETAILED SYLLABUS:

UNIT - I: HYDRO POWER STATIONS

Selection of site for hydro electric power station, layout, classification of hydro electric power stations- concept of pumped storage plants, available hydro power, mass curve - numerical problems.

Hydraulic turbines - classification, description of various turbines- impulse and reaction turbines, Pelton wheel, Francis turbine and Kaplan turbine- working principles, specific speed, efficiency - numerical problems.

UNIT - II: STEAM POWER STATIONS

Layout of steam power plant -fuel handling, combustion equipment for steam boilers, fluidized bed combustion, ash handling, dust collectors, boilers, condenser, chimney and cooling towers.

Steam turbines - classification of steam turbines, simple impulse turbine, reaction turbine, comparison between impulse and reaction turbine.

UNIT - III: NUCLEAR POWER STATIONS & COMBINED OPERATION OF DIFFERENT POWER PLANTS

Nuclear power stations - Nuclear fission, chain reaction, site selection, layout of nuclear power station, nuclear reactors - classification, essential components and power, PWR, BWR and breeder reactor.

Combined operation of different power plants - Advantage of combined power plants, load division between power stations, hydro electric plant with steam power plant, run-of-river plant with steam power plant, pumped storage plant with steam power plant or nuclear power plant, coordination of hydro electric and gas turbine stations, coordination of different types of power plants.

UNIT - IV: PEAK LOAD POWER PLANTS & RENEWABLE ENERGY RESOURCES

Diesel engine power plant - introduction, applications, site selection, classification of internal combustion engines, essential components, operation of diesel power plant.

Gas turbine Power plants - Gas turbines, site selection, simple gas turbine plant, energy cycle, Layout and essential components of gas turbine power plant.

RENEWABLE ENERGY RESOURCES: Solar, wind, ocean and Biomass (Qualitative treatment only). Impacts of renewable energy generation on environment.

UNIT - V: ECONOMIC ASPECTS OF POWER GENERATION AND TARIFF

Introduction, terms and definitions - connected load, maximum demand, load factor, demand factor, diversity factor, plant capacity factor, utilization factor and Plant use factor. Types of loads, load curve, load duration curve, dump power, firm power, prime power, cold reserve, hot reserve, spinning reserve, cost analysis - initial cost, interest and methods of depreciation. Tariffs - simple, flat rate, block rate, maximum demand, two-part, three-part and power factor tariffs - numerical problems.

TEXT BOOKS:

1. Wadhwa C. L., *Generation, Distribution and Utilization of Electrical Energy*, New Age International, 2005.
2. R.K.Rajput, *A textbook of power system engineering*, Laxmi Publications (P) Ltd, 1st edition, 2006.

REFERENCE BOOKS:

1. V.K.Mehta and Rohith Mehta, *Principles of Power Systems*, Schand & Company Ltd, New Delhi 2013.
2. Dr. P. N. Modi, Dr. S.M. Seth, *Hydraulics And Fluid Mechanics Including Hydraulics Machines*, Standard Book House, 18th edition, 2011.

II B.Tech. II Semester
14BT40203: ELECTRICAL AND ELECTRONIC
MEASUREMENTS

Internal Marks	External Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITE(S): Engineering physics, Engineering Mathematics, Electric circuits

COURSE DESCRIPTION: Measurement of electrical quantities; construction, working, design, calibration and applications of various measuring instruments, their advantages and its limitations.

COURSE OUTCOMES: On successful completion of the course, student will be able to

1. demonstrate knowledge on
 - various errors and compensation
 - construction, working and testing of various measuring instruments.
 - measurement of various electrical parameters and quantities
2. analyze
 - different types of errors and compensations
 - DC and AC bridges.
3. design extension of meter ranges of various measuring instruments.
4. evaluate various electrical circuit parameters/elements using bridges.
5. apply various measuring instruments in domestic and industrial applications.

DETAILED SYLLABUS:

UNIT - I: MEASUREMENT OF VOLTAGE AND CURRENT

Significance of measurements and methods of measurements, static characteristics, limiting and relative limiting errors, combination of quantities with limiting errors, types of errors. Classification of analog instruments, essential operating forces and systems. D'Arsonval galvanometer - construction, working, equation of motion (critically damped case only). PMMC and MI instruments - construction, working, torque equation, extensions, errors and compensations, advantages and disadvantages - numerical problems.

UNIT - II: MEASUREMENT OF POWER AND ENERGY

Measurement of power: Power measurements in DC and AC circuits. EDM type wattmeter - construction, working and torque equation, shape of scale, errors and compensations, LPF wattmeter.

Measurement of energy: Single phase induction type energy meter - theory, driving and braking torques, lag adjustment devices, compensations and errors. Three phase energy meter - numerical problems.

UNIT - III: INSTRUMENT TRANSFORMERS AND POWER FACTOR METERS

Current and Potential transformers - construction, theory, phasor diagram, errors, characteristics. Measurement of power using instrument transformers - numerical problems.

Power Factor meters - single phase and three phase electrodynamicometer (EDM) type.

UNIT - IV: DC AND AC BRIDGES

Measurement of medium resistance - Wheatstone bridge, Measurement of low resistance - Kelvin's double bridge. Measurement of high resistance - loss of charge method - numerical problems.

Measurement of inductance, quality factor - Maxwell's inductance bridge, Hay's bridge, Anderson's bridge, Owens's bridge. Measurement of capacitance and loss angle - Desauty's bridge, Schering bridge, Modified Schering bridge, loss factor. Measurement of frequency - Wien's bridge - numerical problems.

UNIT - V: POTENTIOMETERS, DIGITAL VOLTMETERS AND CRO

POTENTIOMETERS: Basic slide wire potentiometer circuit. D.C Crompton's potentiometer - principle, operation, standardization, applications - numerical Problems. AC Potentiometers: Principle and operation of polar and coordinate types, standardization, applications - numerical Problems.

DIGITAL VOLTMETERS AND CRO: Digital voltmeters and it types (ramp, integrating, successive approximation). Cathode ray oscilloscope, cathode ray tube, time base generator, horizontal and vertical amplifiers, measurement of phase and frequency, lissajous patterns - numerical problems.

TEXT BOOKS:

1. A.K.Sawhney, *Electrical & Electronics Measurements & Instrumentation*, Danpat Rai Publishers, 2014.
2. Golding & F.C.Widdis, *Electrical Measurements and Measuring Instruments*, Wheeler Publishers, 5th edition, 1997.

REFERENCE BOOKS:

1. J.B. Gupta, *Electrical Measurements*, S.K. Kataria publishers, 14th edition, 2014.
2. U.A. Bakshi, A. V. Bakshi, *Electrical measurements and Instrumentation*, Kataria and sons, 13th edition, 2009.
3. H S Kalsi, *Electronic Instrumentation*, Tata Mcgraw-Hill companies, 2nd edition, 2009

II B.Tech. II Semester
14BT40204: TRANSFORMERS AND INDUCTION MACHINES

Internal Marks	External Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITE(S): Electric Circuits, DC Machines.

COURSE DESCRIPTION: Single phase transformers; auto transformer; testing of single phase transformer; three phase transformers; three phase induction motors and their characteristics; circle diagram; starting and speed control methods.

COURSE OUTCOMES: On successful completion of the course, student will be able to

1. demonstrate knowledge on
 - construction and working of transformers, auto transformers and induction machines.
 - testing of transformers and induction machines.
 - speed control of induction motors.
 - parallel operation of transformers.
2. analyze the behavior of transformers and induction machines for various operating conditions.
3. design suitable accessories/techniques for the starting and speed control of induction motors.
4. demonstrate skills in investigating the performance of transformers and induction machines.
5. identify the suitable transformer and induction machine for domestic, agriculture and industrial applications.

DETAILED SYLLABUS:

UNIT - I: SINGLE PHASE TRANSFORMERS

Single phase transformers - working principle, constructional details, types, ideal transformer, EMF equation, operation on no-load and on-load, phasor diagrams, equivalent circuit, losses, efficiency and regulation. Effect of variations of frequency and supply voltage on iron losses - numerical problems.

UNIT - II: TRANSFORMER TESTING AND AUTO TRANSFORMER

OC and SC tests, polarity test, Sumpner's test, predetermination of efficiency and regulation, separation of losses test. All day efficiency. Parallel operation with equal and unequal voltage ratios. Auto transformers - equivalent circuit, comparison with two winding transformers - numerical problems.

UNIT - III: THREE PHASE TRANSFORMERS

Three phase transformers - three-phase connections, star/star, star/delta, delta/star and open delta, third harmonics in phase voltages. Three winding transformers - tertiary windings, determination of Z_p , Z_s and Z_t . OFF-load and ON-load tap changing, Scott connection - numerical problems.

UNIT - IV: THREE PHASE INDUCTION MOTORS

Three phase induction motors - construction details of cage and wound rotor machines, production of rotating magnetic field, principle of operation, rotor EMF and rotor frequency, rotor reactance, rotor current and power factor at standstill and during operation, torque equation, deduction from torque equation - expressions for maximum torque and starting torque, torque-slip characteristics, rotor power input, rotor copper loss and mechanical power developed and their inter relation. Double-cage and deep bar rotors. Equivalent circuit and phasor diagram - numerical problems.

UNIT - V: CIRCLE DIAGRAM, STARTING AND SPEED CONTROL METHODS

No-load and blocked rotor tests, stator resistance test, circle diagram, predetermination of performance. Methods of starting, starting current and torque calculations. Crawling and cogging. Speed control - change of frequency, change of poles, cascade connection, injection of an EMF into rotor circuit (qualitative treatment only). Induction generator - principle of operation - numerical problems.

TEXT BOOKS:

1. JB Gupta, *Theory and performance of Electrical Machines (DC machines, Poly phase circuits & AC machines) in SI Units*, S.K. Kataria & Sons, New Delhi, 14th edition, 2013.
2. P.S. Bimbhra, *Electrical Machinery*, Khanna Publishers, New Delhi, 7th edition, 2011.

REFERENCE BOOKS:

1. A.E. Fitzgerald, C.Kingsley and S.Umans, *Electric Machinery*, Mc Graw-Hill, New Delhi, 6th edition, 2008.
2. R.K.Rajput, *Electrical Machines in S.I. Units*, Laxmi Publications (P) Ltd., New Delhi, 15th edition, 2012.
3. B.L. Theraja, A.K. Theraja, *A text book of Electrical Technology in SI units Vol: 2*, S. Chand, New Delhi, 2012.

II B.Tech. II Semester
14BT40405: SWITCHING THEORY AND LOGIC DESIGN

(Common to ECE, EEE & EIE)

Internal Marks	External Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITE(S): Basic algebra.

COURSE DESCRIPTION: Number system and Boolean algebra; Minimization; Analysis and synthesis of digital circuits; Asynchronous Sequential Logic & Programmable Memories.

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

1. demonstrate knowledge in:
 - conversion of number systems, Binary Codes.
 - basic theorems, properties and postulates of Boolean algebra.
 - minimization of switching functions using Map method and Tabular method.
 - design of combinational and sequential circuits.
 - realization of Boolean functions using PLDs.
2. perform the analysis of reduction of Boolean function and implementation using PLDs.
3. design and develop various combinational and sequential circuits.
4. solve engineering problems and arrive at solutions pertaining to Digital Electronics.

DETAILED SYLLABUS:

UNIT - I: NUMBER SYSTEM & BOOLEAN ALGEBRA

Digital systems, Binary Numbers, Number base conversions, Complements of numbers, Signed binary numbers, Binary codes, Error detection and correction codes. Boolean Algebra - Basic definition, Basic theorems and properties, Boolean Functions, Canonical & Standard forms, logical operations & Logic gates.

UNIT - II: GATE LEVEL MINIMIZATION

The map method, four variable, five variable K-map, POS & SOP Simplification, Don't care conditions, NAND & NOR Implementation, Other two level Implementation, Ex-or Function, Tabular Method- Simplification of Boolean function using tabulation Method.

UNIT - III : ANALYSIS AND SYNTHESIS OF COMBINATIONAL CIRCUITS

Combinational circuits, Analysis & Design procedure, Binary Adder - subtractor, Decimal Adder, Binary Multiplier, Magnitude comparator, Decoder, Encoders, Multiplexers.

UNIT - IV: ANALYSIS AND SYNTHESIS OF SEQUENTIAL CIRCUITS

Sequential Circuits, Latches, Flip-Flops, Analysis of Clocked sequential circuits, State Reduction & Assignment, Design procedure, Registers & Counters - Registers, Shift Registers, Synchronous counters and Asynchronous counters.

UNIT - V: ASYNCHRONOUS SEQUENTIAL LOGIC & PROGRAMMABLE MEMORIES

Introduction, Analysis procedure, Circuits with Latches, Design Procedure, Reduction of State and flow tables, Race-free State Assignment, Hazards. ROM, PLA, PAL.

TEXT BOOKS:

1. M.Morris Mano, *Digital Design*, Pearson, 3rd edition, 2001.

REFERENCE BOOKS:

1. ZviKohavi and NirahK.Jha, *Switching theory and Finite Automata Theory*, Tata McGraw-Hill, 2nd Edition, 1978.
2. Charles H. Roth, *Fundamentals of Logic Design*, Thomson Publications, 5th Edition, 2004.
3. A. Anand Kumar, *Switching Theory and Logic Design*, PHI, 2008.

II B.Tech. II Semester
14BT40431: ANALOG ELECTRONIC CIRCUITS

Internal Marks	External Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITE(S): Semiconductor Devices and Circuits.

COURSE DESCRIPTION: BJT frequency response; Feedback amplifiers and Oscillators; Power amplifiers; Wave-shaping circuits; Multivibrators.

COURSE OUTCOMES: On successful completion of this course the students will be able to

1. demonstrate fundamental knowledge in
 - BJT Frequency Response
 - feedback Amplifiers
 - oscillators
 - power Amplifiers
 - wave-shaping circuits
 - multivibrators
2. perform analysis of any electronic circuit.
3. design and develop different circuits like feedback amplifiers, oscillators, power amplifiers and Multivibrators.
4. solve problems arising due to poor circuit design by choosing the appropriate design.

DETAILED SYLLABUS:

UNIT - I: BJT FREQUENCY RESPONSE

Review of BJT simplified hybrid model, analysis of CE amplifier with emitter resistance, emitter follower and RC coupled amplifier. Frequency response of BJT amplifier, analysis at low and high frequencies, effect of coupling and bypass capacitors, The hybrid-pi common-emitter transistor model, CE short circuit current gain, current gain with resistive load, gain-bandwidth product, emitter follower at high frequencies.

UNIT - II: FEEDBACK AMPLIFIERS AND OSCILLATORS

The feedback concept, The transfer gain with feedback, feedback amplifier topologies, general characteristics of negative feedback amplifiers, effect of feedback on input resistance and output resistance - voltage series, voltage shunt, current series and current shunt feedback configuration. Oscillators: Conditions for oscillations, RC phase shift oscillator, Colpitts, Hartley oscillators, Wein bridge oscillators, crystal oscillator.

UNIT - III: LARGE SIGNAL AMPLIFIERS

Class A amplifiers - series-fed, transformer coupled, efficiency. Second harmonic distortion, higher-order harmonic generation. Class B amplifier, Push pull amplifiers - class A push-pull and class B complementary symmetry push-pull amplifier.

UNIT - IV: WAVE SHAPING CIRCUITS AND SWITCHING CHARACTERISTICS OF DEVICES

Wave-shaping circuits: High pass, low pass RC circuits, their response for sinusoidal, step, pulse, square and ramp inputs. Diode clippers, clipping at two independent levels, clamping operation, clamping circuits taking source and diode resistances into account, practical clamping circuits.

Switching characteristics of Devices: Diode as a switch, diode forward recovery time, reverse recovery time, transistor as a switch, break down voltages, transistor switching times.

UNIT - V: MULTIVIBRATORS

Bistable multivibrator - Stable states of a bistable multivibrator, fixed bias transistor bistable multivibrator, commutating capacitors, unsymmetrical triggering, symmetrical triggering and Schmitt trigger. Monostable Multivibrator - Monostable multivibrator, collector coupled monostable multivibrator, triggering of the monostable multivibrator. Astable multivibrator - Astable collector coupled multivibrator.

TEXT BOOKS:

1. Jacob Milliman, Christors C Halkias, *Integrated Electronics*, Tata McGraw-Hill, 1991.
2. J.Millman and H.Taub, Pulse, *Digital and Switching Waveforms*, McGraw-Hill, 2000.

REFERENCE BOOKS:

1. S.Salivahana, N.Suresh Kumar, *Electronic Devices and Circuits*, Tata McGraw-Hill, 3rd edition, 2012.
2. A.Anand Kumar, *Pulse and Digital Circuits*, Prentice Hall India, 2nd edition, 2008.

II B.Tech. II Semester
14BT40221: ELECTRICAL MEASUREMENTS AND TESTING LAB

Internal Marks	External Marks	Total Marks	L	T	P	C
25	50	75	--	--	3	2

PREREQUISITE(S): Electrical and Electronic Measurements

COURSE DESCRIPTION: Measurement of resistance, inductance, capacitance, power and power factor; Testing of single phase energy meter, reverse power relay and transformer oil.

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

1. demonstrate knowledge on measurement of electrical parameters.
2. identify various bridges for resistance, inductance and capacitance.
3. develop skills and methods in measurement of power and energy.
4. application of different measuring instruments in the field of electrical engineering.
5. function effectively as individual and as member in a team.
6. present a cohesive and detailed laboratory report.

LIST OF EXPERIMENTS:

PART-A:

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 and Wheatstone's bridge
5. C.T testing by Silsbee's method.
6. Schering bridge & Anderson bridge.
7. Measurement of three phase power using one wattmeter with two no. of C.Ts
8. Measurement of parameters of a choke coil using three voltmeter and three ammeter methods.

Any Four of the experiments to be conducted from PART-B.

PART-B:

1. Measurement of 3-phase active and reactive power.
2. Measurement of earth and insulation resistance.
3. Calibration of LPF wattmeter by phantom loading.
4. Dielectric oil testing using HT testing kit.
5. LVDT and capacitance pickup.
6. Resistance strain gauge.
7. Transformer turns ratio measurement using AC Bridge.
8. AC potentiometer - Calibration of AC voltmeter, parameters of choke.

II B.Tech. II Semester
14BT40222: DC MACHINES LAB

Internal Marks	External Marks	Total Marks	L	T	P	C
25	50	75	--	--	3	2

PREREQUISITE(S): DC Machines

COURSE DESCRIPTION: Speed control and performance characteristics of DC Machines; determination of losses in a DC machine.

COURSE OUTCOMES: On successful completion of the course, student will be able to

1. identify various parts of DC machine and different types of starters.
2. analyze the performance of various DC machines.
3. design the experimental circuit based on loading and rating of the DC machine.
4. demonstrate skills in
 - obtaining various characteristics of DC machines.
 - determining the performance of DC machines.
 - determining and separating losses in DC machines.
5. function effectively as individual and as member in a team.
6. communicate effectively both oral and written.

DETAILED SYLLABUS:

1. Magnetization characteristic of DC shunt generator.
2. Load test on DC shunt generator.
3. Load test on DC series generator.
4. Load test on DC compound generator (cumulative and differential connections).
5. Hopkinson's test.
6. Field's test.
7. Swinburne's test.
8. Speed control of DC shunt motor.
9. Brake test on DC compound motor.
10. Brake test on DC shunt motor.
11. Brake test on DC series motor.
12. Separation of losses in DC shunt machine.

III B.Tech. I Semester
14BT4HS01: BUSINESS COMMUNICATION AND
PRESENTATION SKILLS

(Common to ECE, EEE & EIE)

Internal Marks	External Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITE(S): Basic grammar and fundamentals of Listening, Speaking, Reading and Writing skills.

COURSE DESCRIPTION: Nature and Scope of Communication; Non-Verbal Communication; Writing Business Documents; Business Presentations and Public Speaking; Careers and Resume.

COURSE OUTCOMES: On successful completion of the course, student will be able to

1. acquire knowledge in
 - managerial Communication
 - corporate Communication
 - business Writing
 - presentation Skills
 - career Building
2. analyze and judge the situation through non-verbal communication for effective organizational communication.
3. achieve personal excellence and ability to work in groups.
4. develop effective communication to meet professional needs.

DETAILED SYLLABUS:

UNIT - I: NATURE AND SCOPE OF COMMUNICATION

Introduction - Functions of Communication - Roles of a Manager - Communication Basics - Communication Networks - Informal Communication - Tips for Effective Internal Communications - Interpersonal Communication - Communication Barriers - Effective Managerial Communication - Strategies for Improving Organizational Communication.

UNIT - II: NON-VERBAL COMMUNICATION

Introduction - Significance of Non-verbal Communication in Organizations - Forms of Non-verbal Communication - Types of Non-verbal Communication - Cross Cultural Communication: Introduction - Concept of Cross cultural Communication - Different Communication Styles - Cross-

cultural Communication Strategies - Corporate Communication: Introduction - Crisis Management / Communication - Case Study.

UNIT - III: WRITING BUSINESS DOCUMENTS

Business Writing: Introduction - Importance of Written Business Communication - Five Main Stages of Writing Business Messages; Business Letter Writing: Common Components of Business Letters - Strategies for Writing the Body of a Letter - Kinds of Business Letters; Business Reports - Kinds of Reports - Characteristics of Business Reports - Steps in Writing a Routine Business Report - Corporate Reports.

UNIT - IV: BUSINESS PRESENTATIONS AND PUBLIC SPEAKING

Introduction - Business Presentations Speeches - Introduction to a presentation - Main Body - Conclusion - Effective Sales Presentations - Case Study; Group Discussions: Introduction - Work Place GD Guidelines - Functional and Non-functional Roles in Group Discussions; Team Presentations: Benefits of Team Presentations - Purpose of Team Presentations - Case Studies.

UNIT - V: CAREERS AND RESUME

Introduction - Career Building: Understanding Yourself - Setting a Career Goal - Resume Writing: Resume Formats; Interviews: Introduction - Fundamental Principles of Interviewing - General Preparation for an Interview - Success in an Interview - Types of Interviewing Questions - Important Non-verbal Aspects - Types of Interviews - Styles of Interviewing - Case Interviews.

TEXT BOOK:

1. Meenakshi Raman and Prakash Singh, *Business Communication*, Oxford University Press, New Delhi, 2nd Edition, 2012.

REFERENCE BOOKS:

1. M K Sehgal and VandanaKhetarpal, *Business Communication*, Excel Books, New Delhi, 2011.
2. M Ashraf Rizvi, *Effective Technical Communication*, Tata McGraw-Hill, 2009.

III B.Tech. I Semester
14BT5HS01: MANAGERIAL ECONOMICS AND
PRINCIPLES OF ACCOUNTANCY

(Common to EEE, ECE and EIE)

Internal Marks	External Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITE(S): Nil

COURSE DESCRIPTION: Managerial Economics; Demand and Elasticity of Demand; Supply and supply function; Production Functions; Markets and Pricing Policies; Formation of different types of Business Organizations; Basic concepts of Journal, Ledger and Trial balance; Trading Account, Profit and Loss Account and Balance sheet with simple adjustments; Computerized Accounting.

COURSE OUTCOMES: On successful completion of the course, student will be able to

1. acquire Knowledge in

- tools and concepts of Micro Economics.
- basic Principles and concepts of Accountancy.
- provides life skills for effective utilization of scarce resources.
- financial Accounting.
- using advanced tools like tally and SAP.
- significance of Economics and Accountancy

2. develop skills in analyzing problems for

- managerial decisions of an organization.
- demand & Supply, Production & Cost and Markets & Price through Economic theories.

3. develop effective communication in Business and Accounting transactions.

DETAILED SYLLABUS:

UNIT - I: INTRODUCTION TO MANAGERIAL ECONOMICS, DEMAND & SUPPLY ANALYSIS

Definition, Nature and Scope of Managerial Economics. Demand: Determinants of demand - Demand function - Law of demand, assumptions and exceptions - Elasticity of demand - Types of elasticity of demand - Demand forecasting and methods of demand forecasting, Supply- Determinants of Supply and Supply function.

UNIT - II: THEORY OF PRODUCTION AND COST ANALYSIS

Production Function: Isoquants and Isocosts - Input-output relationship - Law of returns. Cost Concepts: Total, Average and Marginal Cost - Fixed vs. Variable costs - Opportunity Costs Vs Outlay Costs - Separable Costs Vs Joint Costs, Urgent Costs Vs Postponable Costs - Avoidable Costs Vs Unavoidable Costs - Break Even Analysis (BEA) - Assumptions, Merits and demerits - Determination of Break Even Point (Simple problems).

UNIT - III: INTRODUCTION TO MARKETS AND PRICING

Market Structure: Types of Markets - Features of perfect competition - Monopoly and monopolistic competition - Price and Output determination in perfect competition and monopoly.

Pricing : Objectives and policies of pricing - Sealed bid pricing - Marginal cost pricing - Cost plus pricing - Going rate pricing - Market penetration - Market skimming - Block pricing - Peak load pricing - Cross subsidization. Capital: Significance - Types of capital - Sources of Capital.

UNIT - IV: INTRODUCTION AND PRINCIPLES OF ACCOUNTING

Accountancy: Introduction - Concepts - Conventions - Accounting Principles - Double Entry Book Keeping - Journal - Ledger - Trial Balance (Simple problems).

UNIT - V : FINAL ACCOUNTS

Introduction to Final Accounts - Trading account - Profit and Loss account and Balance Sheet with simple adjustments (Simple problems). Computerization of Accounting System : Manual Accounting Vs Computerized Accounting - Advantages and Disadvantages of Computerized Accounting.

TEXT BOOKS:

1. A.R. Aryasri, *Managerial Economics and Financial Analysis*, Tata McGraw Hill, New Delhi, 3rd edition, 2007. ISBN 13: 9780070078031
2. R.Cauvery, U.K. Sudhanayak, M. Girija and R. Meenakshi, *Managerial Economics*, S. Chand and Company, New Delhi, 2nd edition, 2010.

REFERENCE BOOKS:

1. Vershaney and Maheswari, *Managerial Economics*, Sultan Chand and Sons, New Delhi, 19th edition, 2005.
2. H. Craig Petersen and W. Cris Levis, *Managerial Economics*, Pearson education, 4th edition, 2009.
3. Lipsy and Chrystel, *Economics*, Oxford University Press, New Delhi, 12th edition, 2011.
4. S.P. Jain and K.L. Narang, *Financial Accounting*, Kalyani Publishers, Ludhiana, 6th edition, 2002.

III B.Tech. I Semester
14BT50201: CONTROL SYSTEMS

Internal Marks	External Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITE(S): Electric Circuits

COURSE DESCRIPTION: Concepts of control system; transfer function of various physical systems; time response analysis; frequency response analysis; compensators; stability analysis; state space analysis

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

1. demonstrate knowledge on
 - modelling of physical systems
 - time and frequency domain specifications used for stability analysis.
 - various methods of determining the stability of the system
 - realization of various compensators
 - concept of controllability and observability.
2. analyze the stability of the system in time and frequency domains.
3. demonstrate problem solving skills in
 - deriving the transfer function using block diagram reduction technique and signal flow graph.
 - determination of steady state error and static error constants.
 - evaluating the system stability in time and frequency domains.
 - solving the state equations of a system.
 - evaluating controllability and observability of a system.

DETAILED SYLLABUS:

UNIT - I: CONTROL SYSTEMS CONCEPTS

Classification of control systems, effects of feedback. Mathematical models - mechanical and electrical systems, analogous systems. Block diagram reduction methods, signal flow graph, Mason's gain formula, transfer function of DC servo motor, AC servo motor, synchros.

UNIT-II: TIME RESPONSE ANALYSIS

Test signals, time response of first and second order systems, transient response of second order systems, time domain specifications, steady state response, steady state error, error constants and generalized error coefficients, response with proportional, integral and derivative controllers.

UNIT - III: STABILITY ANALYSIS IN TIME DOMAIN

The concept of stability, Routh's stability criterion, difficulties in the formation of Routh table, application of R-H criterion. Root locus concept, construction of root loci, effects of adding poles and zeros to $G(s)H(s)$ on the root loci, relative stability analysis.

UNIT - IV: FREQUENCY RESPONSE ANALYSIS

Frequency domain specifications, Bode plots, determination of frequency domain specifications and transfer function from the Bode plot, stability analysis from Bode plots, Polar plots, phase margin and gain margin. Nyquist stability criterion, stability analysis. Compensation techniques - realization of Lag, Lead and Lag-Lead compensators.

UNIT - V: STATE SPACE ANALYSIS OF CONTINUOUS SYSTEMS

Concepts of state, state variables and state model, derivation of state models from physical systems, diagonalization, solution of state equations - state transition matrix and its properties. Concept of controllability and observability, Kalman's test only.

TEXT BOOKS:

1. A. Anand kumar, *Control Systems*, PHI learning Pvt Ltd., 2nd edition, 2014.
2. I. J. Nagrath and M. Gopal, *Control Systems Engineering*, New Age International (P) Limited, 5th edition, 2007.

REFERENCE BOOKS:

1. K. Ogata, *Modern Control Engineering*, Prentice Hall of India, 4th edition, 2006.
2. A. NagoorKani, *Control Systems*, RBA Publications, 2nd edition, 2006.

III B.Tech. I Semester
14BT50202: COMPUTER ORGANIZATION AND ARCHITECTURE

(Common to EEE & EIE)

Internal Marks	External Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITE(S): Switching theory and logic design

COURSE DESCRIPTION: Basic structure of computers; register transfer language and microoperations; microprogrammed control; memory system; architecture, programming and interfacing of 8085 microprocessor.

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

1. demonstrate knowledge on
 - internal details of a computer
 - various memories, their hierarchy and significance in a computer
 - architecture, instruction set, addressing modes and interfacing of 8085 microprocessor
2. critically analyze the requirements to meet the specifications.
3. design and develop hardware to meet the requirements.
4. exhibit programming skills to solve engineering problems.

DETAILED SYLLABUS:

UNIT - I: BASIC STRUCTURE OF COMPUTERS AND COMPUTER ARITHMETIC

Basic structure of computers: Computer types, functional units, basic operational concept, bus structures, software, performance, multiprocessors and multicomputers.

Computer arithmetic: Addition, subtraction, multiplication and division algorithms.

UNIT - II: REGISTER TRANSFER AND MICROOPERATIONS

Register transfer language, register transfer, bus and memory transfers, arithmetic micro operations, logic micro operations, shiftmicro operations, arithmetic logic shift unit, instruction codes, computer registers, computer instructions, instruction cycle, Reduced Instruction Set computer.

UNIT - III: MICROPROGRAMMED CONTROL AND MEMORY SYSTEM

Microprogrammed Control: Control memory, address sequencing, design of control unit, hard wired control, microprogrammed control.

Memory System: Semiconductor RAM memories: Internal organization of memory chips, SRAM, DRAM. Read-only memories, cache memory: mapping functions, replacement algorithms. Performance considerations, virtual memory.

UNIT- IV: 8085 ARCHITECTURE

Microprocessor evolution and types, introduction to 8085 architecture, pin description, register organization, timing diagram - T-state, Machine cycle, instruction cycle, instruction set - data transfer, arithmetic and logic, branch control, I/O and machine control instructions, addressing modes.

UNIT- V: PROGRAMMING, INTERRUPTS AND INTERFACING

Simple programs, interrupts of 8085 - types, response, enabling and disabling, interfacing - memory, I/O devices - memory mapped I/O and I/O mapped I/O.

TEXT BOOKS:

1. M.Moris Mano, *Computer System Architecture*, Pearson Education, 3rd edition, 2006.
2. Ramesh S Goankar, *Microprocessor - Architecture, Programming and Applications with the 8085*, 5th edition, Penram International Publishing Private Limited.

REFERENCES:

1. V.CarlHamacher, Zvonko G. Varanescic and Safat G. Zaky, *Computer Organization*, 6th edition, Mc Graw Hill.

III B.Tech. I Semester
14BT50203: SYNCHRONOUS MACHINES

Internal Marks	External Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITE(S): DC Machines, Transformers and Induction machines

COURSE DESCRIPTION: Construction, operation, characteristics, regulation and parallel operation of alternators; operation and performance characteristics of synchronous motors; construction, operation, characteristics and applications of fractional kilowatt motors.

COURSE OUTCOMES: On successful completion of the course, student will be able to

1. demonstrate knowledge on
 - construction details, working, characteristics and performance of a synchronous machine, fractional kilowatt motors.
 - armature reaction, regulation and synchronization of alternator.
 - starting methods of synchronous motor and its performance evaluation using circlediagrams.
 - Parallel operation of alternators.
2. analyze the operation of synchronous and single phase machines for various operating conditions.
3. evaluate the performance and various parameters of synchronous machine and fractional kW motors.
4. identify a suitable machine for domestic and industrial applications.

DETAILED SYLLABUS:

UNIT - I: SYNCHRONOUS GENERATORS

Constructional features of round rotor and salient pole machines. Armature windings - integral slot and fractional slot, distributed and concentrated, single layer and multi layer, winding factors. EMF equation, harmonics in generated EMF, suppression of harmonics. Armature reaction, leakage reactance, synchronous reactance (X_s) and impedance(Z_s), experimental determination of Z_s , phasor diagrams. Operating characteristics and ratings of alternators - numerical problems.

UNIT - II: REGULATION OF SYNCHRONOUS GENERATOR

Synchronous impedance method (EMF method), ampere turns method (MMF method), ZPF method and new ASA method. Salient pole alternators, two-reaction theory, experimental determination of X_d and X_q (slip test), phasor diagrams, regulation of salient pole alternators. Power flow equations in synchronous generator - numerical problems.

UNIT - III: PARALLEL OPERATION OF SYNCHRONOUS GENERATORS

Methods of synchronizing alternators. Synchronizing current, power and torque. Effect of reactance, change of excitation and mechanical power input, unequal voltages. Load sharing between alternators. Synchronous machines on infinite bus bars. Time period of oscillation - numerical problems.

UNIT - IV: SYNCHRONOUS MOTORS

Principle of operation, phasor diagram, variation of current and power factor with excitation, synchronous condenser, power flow in synchronous motor. Circle diagram - excitation and power circles. Hunting and its suppression. Methods of starting - auxiliary-motor, damper winding, synchronous - induction motor - numerical problems.

UNIT - V: FRACTIONAL KILOWATT MOTORS

Single phase induction motor - constructional features, double revolving field theory, split-phase motors, shaded pole motor. Construction, principle, characteristics and applications of AC series motor, universal motor, reluctance motors, stepper motor (types), AC and DC servo motors.

TEXT BOOKS:

1. P.S. Bimbhra, *Electrical Machinery*, Khanna Publishers, New Delhi, 7th edition, 2011.
2. JB Gupta, *Theory and performance of Electrical Machines*, S.K. KATARIA and Sons, New Delhi, 14th edition, 2011.

REFERENCE BOOKS:

1. M.G. Say, *The Performance and Design of A.C.Machines*, CBS publishers, New Delhi, 3rd edition, 2002.
2. P.S. Bimbhra, *Generalized Theory of Electrical Machines*, Khanna Publishers, Delhi, 7th edition, 2005.
3. R.K.Rajput, *Electrical Machines*, Laxmi Publications (P) Ltd, New Delhi, 15th edition, 2012.

III B.Tech. I Semester
14BT50204: TRANSMISSION OF ELECTRIC
POWER

Internal Marks	External Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITE(S): Electromagnetic Fields, Signals and Networks

COURSE DESCRIPTION: Calculation of Transmission line parameters; classification and performance of transmission lines, corona; travelling wave phenomenon; types of insulators; sag and tension calculations; underground cables.

COURSE OUTCOMES: On successful completion of the course, student will be able to

1. demonstrate knowledge on
 - per unit system.
 - transmission line configurations and their performance.
 - transients in transmission lines.
 - insulation system for transmission system.
 - corona, classification of cables and their performance.
2. analyze
 - the electrical and mechanical aspects of transmission lines.
 - the capacitance of cable for different configurations.
3. design
 - electrical and mechanical systems to improve the overall performance of transmission lines and cables.
 - insulators.
4. demonstrate skills in
 - evaluating the parameters and performance of transmission lines and cables.
 - evaluating the electrical and mechanical aspects of transmission lines, cables and insulators.

DETAILED SYLLABUS:

UNIT - I: TRANSMISSION LINE PARAMETERS

Per unit system representation of different components and networks, numerical problems. Resistance of transmission lines, inductance of single phase, three phase transmission line - single and double circuit lines. Self GMD and mutual GMD. Capacitance of single phase transmission line, three phase transmission line, effect of earth on capacitance - numerical problems.

UNIT - II: PERFORMANCE OF TRANSMISSION LINES

Classification of transmission lines, short transmission lines and their model representations, medium transmission lines - end condenser, nominal-T, nominal-pi methods. Rigorous solution for long transmission lines, surge impedance and surge impedance loading of long lines, ferranti effect, generalized circuit (ABCD) constants, regulation and efficiency of all types of lines - numerical problems.

UNIT - III: POWER SYSTEM TRANSIENTS

Transients in simple circuits, travelling waves on transmission lines - open end line, short circuited line, line terminated through a resistor, line connected to a cable, line connected to a T-junction and lumped reactive junctions. Beweley's Lattice diagram for all the cases mentioned above - numerical problems.

UNIT - IV: CORONA AND OVER HEAD LINE COMPONENTS

Skin effect, Proximity effect. Corona phenomenon - factors affecting corona, critical voltages and power loss, radio interference, advantages and disadvantages - numerical problems.

Over head transmission line: Line supports - wooden poles, RCC poles, steel poles and steel towers. Over head line insulators - types of insulators, string efficiency and methods for improvement - numerical problems.

UNIT - V: SAG, TENSION CALCULATIONS AND UNDERGROUND CABLES

Sag in over head lines - sag and tension calculations with equal and unequal heights of towers, effect of wind and ice on sag, stringing chart, vibration and vibration dampers - numerical problems.

Underground cables - construction, types of insulating materials, classification of cables, laying of cables, insulation resistance, capacitance of single and 3-core belted cables, grading of cables - capacitance and inter sheath grading - numerical problems.

TEXT BOOKS:

1. C.L.Wadhwa, *Electrical Power Systems*, New Age International (P) Limited, publishers, 4th edition, 2006.
2. M.L.Soni, P.V.Gupta, V.S. Bhatnagar, A.Chakravarthy, *A text book on Power System Engineering*, Dhanpat Rai and Co.private Limited, 2009.

REFERENCE BOOKS:

1. V.K.Mehta and Rohith Mehta, *Principles of Power Systems*, S.Chand & Company Ltd, New Delhi,2006.
2. J.B.Gupta, *A Course in Electrical Power*, S.K.Kataria& sons, New Delhi, 11th edition, 2009.
3. R.K.Rajput, *A textbook of Power System Engineering*,Laxmi Publications (P) Ltd, 1st edition, 2006.

III B.Tech. I Semester
14BT51003: LINEAR AND DIGITAL IC
APPLICATIONS

(Common to EEE & EIE)

Internal Marks	External Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITE(S): Semiconductor Devices & Circuits, Switching Theory & Logic Design

COURSE DESCRIPTION: Op-Amps characteristics, Applications of Op-Amp, 555 timer, PLL; Digital logic families and interfacing, Digital IC Applications, Programming of digital IC's in Verilog.

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

1. demonstrate Knowledge on Op-Amps and its Characteristics, Digital logic families, programming in VERILOG.
2. apply analytical skills to determine the op-amp parameters, logic of digital circuits.
3. design Linear and nonlinear systems using op-amps, Digital circuits using logic families.
4. develop skills for programming of digital circuits using VERILOG.

DETAILED SYLLABUS:

UNIT - I: OPERATION AMPLIFIER

Op-amp block diagram, Differential Amplifier, Level Translator, Output stage. Transfer Characteristics, IC 741 op-Amp, Basic information of Op-Amp. Ideal & Practical operational Amplifier - Inverting, non-Inverting & Difference Amplifier, Voltage follower.

DC Characteristics - Input Bias Current, Input Offset Current, Input Offset Voltage, Total Output Offset Voltage. AC Characteristics - Frequency Response, Frequency Compensation, Slew Rate .CMRR, PSRR & Thermal Drift.

UNIT - II: LINEAR & NON LINEAR APPLICATIONS, FILTERS

Linear Applications - Integrator and differentiator, Instrumentation amplifier, AC amplifier, V to I, I to V converters.

Non-Linear Applications - Comparators & its applications, Log and Antilog amplifiers.

Filters: First-Order LPF, HPF, Butterworth Filters, Second Order LPF, HPF.

UNIT - III: IC 555 TIMER, PLL & CONVERTERS

Introduction to 555 timer, functional diagram, monostable and astable operations and applications. PLL - introduction, block schematic, principles and description of individual blocks. Voltage Controlled Oscillator (IC 566). Applications of PLL - frequency multiplication, frequency translation.

D-A Converters: R-2R ladder & Inverted R-2R ladder. A-D converters: Flash type, Successive Approximation type and Dual slope ADC.

UNIT - IV: CMOS & BIPOLAR LOGIC

Introduction to logic families, CMOS logic, CMOS steady state electrical behavior, CMOS dynamic electrical behavior. Bipolar Logic - TTL & ECL, Low voltage CMOS Logic & CMOS/TTL interfacing, Comparison of logic families.

UNIT - V: MODELING & DESIGN OF DIGITAL CIRCUITS USING VERILOG

Introduction To Verilog: HDL based design flow, program structure, language elements, operators, User defined primitives, data flow modeling, behavioral modeling, structural modeling.

Design & Programming using Verilog: 74x283 adder, 74x151 multiplexer, 74x138 decoder, 74x148 encoder, Flip-flops - SR & JK, 74x163 Counter.

TEXTBOOKS:

1. D. Roy Chowdhury, *Linear Integrated Circuits*, 4th edition, New Age International Pvt. Ltd, 2010.
2. John F. Wakerly, *Digital Design Principles & Practices*, 4th edition, Pearson Education, Asia 2009.
3. T. R. Padmanabhan, B. Bala Tripura Sundari, *Design through Verilog HDL*, Wiley India, 2004.

REFERENCE BOOKS:

1. Ramakanth A. Gayakwad, *Op-Amps & Linear ICs*, 3rd edition, PHI, 1987.
2. J. Bhasker, *VERILOG Primer*, 2nd Edition, BS Publications, 2001.
3. Stephen Brown, Zvonko Vranesic, *Fundamentals of Digital Logic with VERILOG Design*, 2nd edition, TMH, 2007.

III B.Tech. I Semester
14BT50423: ANALOG ELECTRONICS AND IC LAB

Internal Marks	External Marks	Total Marks	L	T	P	C
25	50	75	--	--	3	2

PREREQUISITE(S): Semiconductor Devices and Circuits, Analog Electronic Circuits, Linear IC and Digital IC Applications.

COURSE DESCRIPTION: Design and verification of OPAMP applications; Filters; VCO; Multivibrators; Linear and non-linear Wave-shaping circuits; Feedback amplifiers and Oscillators.

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

1. perform analysis of digital and electronic circuits.
2. design and develop different circuits like Multivibrators, Power amplifiers, Feedback amplifiers and oscillators.
3. solve problems arising due to poor circuit design by choosing the appropriate design parameters.

LIST OF EXPERIMENTS: (Minimum Twelve Experiments to be conducted)

PART A: Analog Electronic Circuits (Minimum of six experiments to be conducted)

1. Voltage series Feedback Amplifier
2. Current shunt Feedback Amplifier
3. Class A Power Amplifier (with transformer load).
4. Hartley and Colpitt's Oscillators.
5. Non Linear wave shaping - Clippers and Clampers.
6. Bistable Multivibrator.
7. Monostable Multivibrator.
8. Astable Multivibrator.

PART B: Linear and Digital ICs (Minimum of six experiments to be conducted)

1. OP AMP Applications-Adder, Subtractor, Comparator circuits.
2. Active Filter Applications-LPF, HPF (first and second order).
3. IC 555 Timer - Monostable and Astable Operation circuit.
4. IC 566-VCO Applications.
5. Logic Gates - 74XX.
6. 4 bit Comparator - 74X85.
7. D Flip-Flop 74X74 and JK Flip-Flop 74X109.
8. Universal shift register - 74X194.

III B.Tech. I Semester
14BT50221: AC MACHINES LAB

Internal Marks	External Marks	Total Marks	L	T	P	C
25	50	75	--	--	3	2

PREREQUISITE(S): Transformers and Induction Machines

COURSE DESCRIPTION: Determination of performance of transformers and induction motors; regulation of alternator; V and inverted V curves, determination of X_d and X_q of a salient pole synchronous machine.

COURSE OUTCOMES: On successful completion of the course, student will be able to

1. demonstrate knowledge on identification of parts of transformers and AC machines.
2. analyze the performance of transformers and AC machines.
3. design the experimental circuit based on loading and rating of the transformers and AC machines.
4. demonstrate skills in
 - obtaining the various characteristics of transformers and AC machines.
 - determining the performance characteristics of transformers and AC machines.
 - Determining and separation of losses in transformers and AC machines.
5. function effectively as an individual and as member in a team.
6. communicate effectively both oral and written.

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

1. O.C. and S.C. tests on single phase transformer.
2. Sumpner's test on a pair of single phase transformers.
3. Scott connection of transformers.

4. No-load & blocked rotor tests on three phase induction motor.
5. Regulation of a three phase alternator by E.M.F and 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 X_d and X_q of a salient pole synchronous machine.

In addition to the above eight experiments, at least any FOUR 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. Brake test on three phase induction motor.
4. Separation of no-load losses of three phase induction motor.
5. Brake test on single phase induction motor.
6. Regulation of three phase alternator by Z.P.F. and A.S.A methods.
7. Efficiency of a three phase alternator.
8. Heat run test on a bank of single phase delta connected transformers.
9. Measurement of sequence impedance of a three phase alternator.
10. Performance characteristics of a schrage motor.

III B.Tech. II Semester
14BT5HS02: MANAGEMENT SCIENCE

(Common to EEE & EIE)

Internal Marks	External Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITE(S): Nil

COURSE DESCRIPTION: Concepts of Management, Evolution of thought of Management, Functions of Management, Environmental Scanning, SWOT analysis, Social Responsibility of Management, Operations Management, Forecasting Methods, Work study, Method Study, Work measurement, Statistical Quality Control, Inventory Management, Marketing, Marketing functions, Human Resource Management, Job evaluation, merit rating, Theories of motivation, Project Management, CPM, PERT, Project cost analysis, Project crashing, Entrepreneurship, Entrepreneur vs Manager, Contemporary Management practices, Just-in-time, Enterprise Resource Planning, Business Process Outsourcing, Intellectual property rights and Supply chain management.

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

1. employ fundamental knowledge on 'Management Thought' and 'Management of a business organization'.
2. apply various Managerial concepts & contexts to attain 'Optimum Utilization of available organizational resources'.
3. contribute to the group, as an individual, in accomplishing the stated objective of the business organization.
4. apply gained knowledge on Management to establish and run his/her own organization, if he/she deserve to be an 'Entrepreneur'.
5. imbibe contemporary practices in applying Management and exercise discernment in implementing managerial decisions for ethical, safe and sustainable operations of the business.

DETAILED SYLLABUS:

UNIT - I: INTRODUCTION TO MANAGEMENT AND ORGANIZATION

Concepts of management and organization - Nature and Importance of management - Evolution of management thought - Functions of management - Contributions of F.W. Taylor and Henri Fayol to the management - Systems approach to management - Managerial skills - Elements of corporate planning process - Environmental scanning - SWOT Analysis - Social responsibilities of management. Basic concepts related to organization- Objectives, Procedure and Principles; Types of organizations - Merits, demerits and adoptability to modern firms.

UNIT - II: OPERATIONS MANAGEMENT

Principles and types of plant layout - Methods of production - Forecasting - Forecasting methods - Work study - Basic procedure involved in method study and work measurement - Statistical quality control: Factors affecting quality - Quality control using control charts (simple problems) - Acceptance sampling. Materials management objectives; Inventory - Types of inventory - Classical EOQ model - ABC analysis - Purchase procedure - Stores management. Marketing: Functions of marketing - Marketing mix - Channels of distribution.

UNIT - III: HUMAN RESOURCES MANAGEMENT (HRM)

Nature and scope of HRM - Functions of HRM - Role of HR Manager in an organization, Job evaluation and merit rating - Maslow's theory of human needs - McGregor's theory X and theory Y - Herzberg's two-factor theory.

UNIT - IV: PROJECT MANAGEMENT (PERT/CPM) AND ENTREPRENEURSHIP

Network analysis - Program evaluation and review technique (PERT) - Critical path method (CPM) - Probability of completing the project within given time - Project cost analysis - Project crashing.

Introduction to entrepreneurship - Entrepreneurial traits - Entrepreneur Vs manager - Role of entrepreneurship in economic development - Women as an entrepreneur.

UNIT - V: CONTEMPORARY MANAGEMENT PRACTICES

Basic concepts of Just-In-Time (JIT) system - Total quality management (TQM) - Value chain analysis - Enterprise resource planning (ERP) - Business process outsourcing (BPO) - Globalization - Management challenges - Intellectual property rights - Supply chain management - Role of information technology in managerial decision making.

TEXT BOOKS:

1. O.P. Khanna, *Industrial Engineering and Management*, Dhanpat Rai and Sons, 2010.
2. Stoner, Freeman and Gilbert, *Management*, 6th edition, Pearson education, New Delhi, 2005.

REFERENCE BOOKS:

1. Kotler Philip and Keller Kevin Lane, *Marketing Management*, 12th edition, PHI, New Delhi, 2007.
2. Koontz and Wehrich, *Essentials of Management*, 6th edition, TMH, New Delhi, 2007.
3. N.D. Vohra, *Quantitative Techniques in Management*, 2nd edition, TMH, New Delhi.
4. Heinz Wehrich and Harold Koontz, *Management - A Global Perspective*, 10th edition, Mc Graw-Hill International.

III B.Tech. II Semester
14BT60201: MICROPROCESSORS AND
MICROCONTROLLERS

(Common to EEE, ECE and EIE)

Internal Marks	External Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITE(S): Computer Organization and Architecture.

COURSE DESCRIPTION: Architecture, Instruction set and programming of 8086; Programmable interfacing devices: 8255, 8251, 8259, 8257 - their architecture and programming; Interfacing Memory and I/O devices with 8086; Architecture, programming, interrupts, and applications of 8051 Microcontroller.

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

1. demonstrate potential knowledge in
 - internal hardware details of Intel 8086, 8051 and programmable devices like 8255, 8251, 8259, 8257.
 - interfacing various peripherals to build stand alone systems.
2. critically analyze the requirements to meet the specifications.
3. design suitable interfaces for real time applications.
4. exhibit programming skills, choose suitable hardware and program the devices to solve engineering problems.

DETAILED SYLLABUS:

UNIT - I: 8086 ARCHITECTURE AND PROGRAMMING

Microprocessor Evolution and types, 8086 internal Architecture - register organization, memory segmentation, memory organization. Introduction to programming the 8086 - Assembler directives, addressing modes, instruction set, simple programs, procedures and macros.

UNIT - II: 8086 INTERFACING AND INTERRUPTS

Pin description, minimum & maximum mode operation of 8086, timing diagram. Interfacing memory (RAM and EPROM) to 8086. 8086 Interrupts - types and interrupt responses, Interrupt vector table, priority of interrupts. 8259 priority interrupt controller - architecture, system connections and cascading, initialization of 8259.

UNIT - III: PROGRAMMABLE DATA COMMUNICATION DEVICES

Introduction to serial and parallel communication, methods of parallel data transfer. 8255 PPI - internal architecture and system connections, operational modes and initialization, interfacing stepper motor, ADC, DAC. Methods of serial data transfer, 8251 USART - architecture and its initialization, sending and receiving characters. Serial communication standard RS232C, USB. Architecture and operation of 8257 DMA controller.

UNIT - IV: 8051 MICROCONTROLLER AND PROGRAMMING

Microcontroller Vs general purpose microprocessor. 8051/8052 Microcontroller - architecture, features, register organization, pin diagram, internal and external memories & their interfacing, instruction set, addressing modes, simple programs.

UNIT - V: 8051 INTERFACING

Timer/Counters - Registers, modes and programming. Serial communication - registers, programming 8051 for serial communication. Interrupts - registers, programming. 8051 applications - Interfacing key board, LEDs and LCD.

TEXT BOOKS:

1. Douglas V. Hall, *Microprocessors and Interfacing: Programming and Hardware*, Tata McGraw-Hill, revised 2nd edition, 2006.
2. Mazidi and Mazidi, *The 8051 Microcontroller and Embedded Systems*, Prentice Hall of India, 2000.

REFERENCE BOOKS:

1. A.K. Ray and K.M. Bhurchandi, *Advanced Microprocessors and Peripherals- Architecture, Programming and Interfacing*, Tata McGraw Hill, 2002 reprint.
2. Yu-cheng Liu, Glenn A. Gibson, *Microcomputer systems: The 8086 / 8088 Family architecture, Programming and Design*, Prentice Hall of India, 2006.

III B.Tech. II Semester
14BT60202: POWER ELECTRONICS

Internal Marks	External Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITE(S): Engineering Physics, Electrical Circuits, Semiconductor Devices and Circuits

COURSE DESCRIPTION: Power semiconductor devices; Silicon Controlled Rectifier - Turn-on methods, Triggering and Commutation circuits for SCR; Single phase and three phase Rectifiers; AC voltage controllers; Cycloconverters; Choppers and Inverters.

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

1. demonstrate potential knowledge on
 - the characteristics of various power transistors.
 - operation, switching characteristics, ratings, protection and combinations of SCR.
 - various triggering methods and commutation techniques for SCR.
 - operation of line commutated converters and SCR based force commutated converters.
2. critically analyze the performance of different power converters subjected to various loads.
3. design static and dynamic equalizing circuits, snubber circuits and commutating elements.
4. demonstrate problem solving skills in evaluating
 - number of SCRs required for desired series /parallel operation,
 - electrical parameters and different variables of various power electronic circuits.

DETAILED SYLLABUS:

UNIT - I: POWER SEMI CONDUCTOR DEVICES

Introduction, Power transistors - power BJT, power MOSFET, IGBT and their characteristics. Thyristor - basic theory and operation, static and dynamic characteristics, two transistor analogy, turn-on methods, R, RC and UJT firing circuits, natural commutation technique, series and parallel operation, ratings, protection against dv/dt and di/dt , design of snubber circuit, numerical problems. Other devices in thyristor family - TRIAC, GTO and their characteristics.

UNIT - II: PHASE CONTROLLED RECTIFIERS

Single phase controlled rectifiers - half wave controlled rectifier, midpoint and bridge connections - semi and fully controlled rectifiers with R and RL loads, derivation of average load voltage and current, effect of freewheeling diode, effect of source inductance, numerical problems.

Three phase controlled rectifiers - half and fully controlled rectifiers - midpoint and bridge connections, derivation of average load voltage with R and RL loads, numerical problems.

UNIT - III: DUAL CONVERTERS & AC VOLTAGE CONTROLLERS

Dual converters - circulating and non-circulating current modes of operation of single phase and three phase dual converters with R-Load.

Single phase AC voltage controllers - two SCRs in anti-parallel with R and RL loads, derivation of rms load voltage and load current, numerical problems.

Cycloconverters - single phase midpoint and bridge type (step-up and step-down operations) with R and RL loads.

UNIT - IV: CHOPPERS

Thyristor forced commutation circuits, basic chopper operation, control strategies, step-up chopper, derivation of load voltage and load currents with R and RL loads, chopper configurations (type - A,B,C,D and E), Morgan's chopper, Jones' chopper, AC chopper.

UNIT - V: INVERTERS

Single phase inverters - basic operation, voltage source inverters, basic series and parallel inverters, current source inverter, modified Mc Murray and Mc Murray-Bedford half bridge inverters (operation and waveforms), voltage control by pulse width modulation techniques (single pulse, multiple pulse and sinusoidal), numerical problems. Three phase bridge inverters - 180° and 120° conduction modes of operation.

TEXT BOOKS:

1. Dr. P. S. Bimbhra, *Power Electronics*, 4th edition, Khanna Publishers, Delhi, 2008.
2. K. L. Rao, Ch. Saibabu, *Theory of Power Electronics*, Revised Edition, S. Chand & Co. Ltd, New Delhi, 2009.

REFERENCE BOOKS:

1. Muhammad H. Rashid, *Power Electronics Handbook*, 3rd edition, Butterworth-Heinemann, San Diego, 2010.
2. P.C. Sen, *Power Electronics*, Tata Mc Graw-Hill Education Pvt. Ltd., New Delhi, 2009.
3. Mohan, Undeland, Robbins, *Power Electronics: Converters, Applications and Design*, 3rd edition, Wiley, 2007.

III B.Tech. II Semester
14BT60203: SWITCHGEAR AND PROTECTION

Internal Marks	External Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITE(S): Transformers and Induction Machines, Transmission of Electric Power and Synchronous Machines

COURSE DESCRIPTION: Short circuit studies; Fuses and their ratings; circuit breakers; relays; static and microprocessor based relays; protection schemes for various equipment and over voltage protection.

COURSE OUTCOMES: on successful completion of the course, student will be able to

1. demonstrate knowledge on
 - symmetrical component theory and sequence networks
 - operation of various protective devices.
 - protection principles for power system components.
2. analyze
 - fault levels for different faults
 - operating aspects of protective devices
3. design proper protection scheme for different power system components.
4. demonstrate skills in evaluating
 - operating parameters of various protecting devices
 - settings of protection devices in different protection schemes.

DETAILED SYLLABUS:

UNIT-I: FAULT ANALYSIS

Symmetrical component theory - voltages, currents, power, symmetrical component transformation matrix. Sequence networks -positive, negative and zero sequence networks. Fault analysis - LG, LL, LLG, LLL & LLLG faults with and without fault impedance, short circuit current and MVA calculations, application of reactors - numerical problems.

UNIT - II: RELAYS

Introduction - types of relays, electromagnetic Relays - construction, operation and torque equation of induction type relays, differential relays and biased differential relays. Characteristics of over current, directional and distance relays (R-X).

Static relays - advantages and disadvantages, block diagram of a basic static relay, definite time, inverse and inverse definite minimum time (IDMT) static relays. Comparators - amplitude and phase comparators. Microprocessor based relays - advantages and disadvantages, block diagram for over current (definite, inverse and IDMT) and distance relays with flow charts.

UNIT - III: PROTECTION OF GENERATORS AND TRANSFORMERS

Protection of generators - differential protection, restricted earth fault protection and inter turn fault protection, rotor fault protection, numerical problems on % winding unprotected.

Transformer protection - differential protection, percentage differential protection, protection against internal faults, Buchholz relay, numerical problems on design of CT's ratio.

UNIT- IV: PROTECTION OF FEEDERS AND TRANSMISSION LINES

Protection of feeders (Radial and Ring main) using over current relays. Protection of transmission lines - three-zone protection using distance relays, carrier current protection. Protection of bus bars.

Protection against Over Voltages: Generation of over voltages in power systems, protection against lightning over voltages - Non-Linear (Valve type) and Metal Oxide (Zinc-Oxide) surge arresters. Insulation coordination, basic impulse insulation level (BIIL).

UNIT - V: CIRCUIT BREAKERS

Fuses - Types, characteristics and their ratings. Isolators. Circuit Breakers - elementary principles of arc interruption, recovery, restriking voltage, restriking phenomenon, average and maximum rate of rise of restriking voltage, current chopping and resistance switching. Construction and principle of minimum oil circuit breaker, air blast circuit breaker, vacuum circuit breaker and SF₆ circuit breaker.

TEXT BOOKS:

1. Badri Ram, D.N.Viswakarma, *Power system Protection and Switchgear*, Mc Graw Hill education (India) Private Limited, New Delhi, 2nd edition, 2011.
2. Sunil S. Rao, *Switchgear Protection and Power Systems (Theory, practice and Solved Problems)*, Khanna Publishers, New Delhi, 11th edition, 2005.

REFERENCE BOOKS:

1. C.L.Wadhwa, *Electrical Power systems*, New Age International (P) Limited, Publishers, New Delhi, 5th edition, 2009.
2. T.S.Madhava Rao, *Power System Protection: Static Relays with Microprocessor Applications*, TATA McGraw-Hill Publishing Company Limited, NewDelhi, 2nd edition, 2004.

III B.Tech. II Semester
14BT60204: DISTRIBUTION OF ELECTRIC POWER

Internal Marks	External Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITE(S): Generation of Electric Power and Transmission of Electric Power

COURSE DESCRIPTION: Introduction to Distribution Systems; DC and AC distribution systems; substations; analysis and protection of distribution systems.

COURSE OUTCOMES: On successful completion of the course, student will be able to

1. demonstrate knowledge on
 - distribution system and its configurations.
 - importance of power factor and methods to improve power factor.
 - different types of loads and distribution feeders.
 - different parameters and protection schemes for distribution feeders.
2. analyze
 - different feeder configurations
 - optimal capacitor placement.
 - the criteria for economical power factor.
 - different grounding methods for protection
3. design proper rating of capacitor to improve power factor.
4. demonstrate skills in evaluating
 - load parameters of different types of loads.
 - voltage drop, losses and fault currents in distribution system.
 - optimal capacitor size and location in distribution system.

DETAILED SYLLABUS:

UNIT- I: INTRODUCTION TO DISTRIBUTION SYSTEMS

Introduction to distribution systems, load modeling and characteristics - coincidence factor, contribution factor, loss factor, relationship between the load and loss factors. Classification of loads (residential, commercial, agricultural and industrial) and their characteristics. Classification of distribution systems - radial, loop, ring main. Comparison of DC Vs AC and under-ground Vs over-head distribution systems, features of distribution systems.

UNIT-II: DC AND AC DISTRIBUTION SYSTEMS

Voltage drop calculations (numerical problems) in DC distributors - radial DC distributor fed at one end, at both the ends (equal/unequal voltages) and ring main distributor.

Voltage drop calculations (numerical problems) in AC distributors - power factors referred to receiving end voltage and respective load voltages. High voltage Distribution systems (HVDS)

UNIT - III: SUBSTATIONS

Classification of substations - indoor and outdoor, gas and air insulated substations. Substation layout - different bus bar schemes, location of substations - rating of distribution substations, service area with 'n' primary feeders.

Neutral Grounding - Grounded and ungrounded systems, effects of ungrounded neutral on system performance, methods of neutral grounding - solid, resistance, reactance and Arc suppression coil (Peterson coil) grounding. Arcing grounds and grounding practices.

UNIT- IV: ANALYSIS AND PROTECTION OF DISTRIBUTION SYSTEMS

Analysis of radial networks - voltage drop, power loss calculations, three phase and non-three phase balanced primary lines.

Protection of distribution systems - objectives, coordination of protective devices, circuit reclosures and line sectionalizer, types of common faults, fault current calculations.

UNIT - V: POWER FACTOR CORRECTION

Causes of low power factor, methods of improving power factor - power capacitors, series and shunt capacitors (fixed and switched) for power factor correction, most economical power factor for constant kW load and constant kVA type loads, economic justification for capacitors, procedure to determine the optimum capacitor allocation - numerical problems.

TEXT BOOKS:

1. Turan Gonen, *Electric Power Distribution System Engineering*, Mc Graw-Hill Book Company, 2nd edition, 2012.
2. V.K.Mehta, Rohit Mehta, *Principles of Power System*, S.Chand & Company Ltd, revised edition, 2013.

REFERENCE BOOKS:

1. Wadhwa, C. L., *Generation, Distribution and Utilization of Electrical Energy*, New Age International, 1993.
2. A.S.Pabla, *Electric Power Distribution*, Tata Mc Graw-Hill Publishing Company, 4th edition, 1997.
3. M.L.Soni, P.V.Gupta, V.S. Bhatnagar, A. Chakravarthy, *A Text Book on Power System Engineering*, Dhanpat Rai and Co Private Limited, 2007.

III B.Tech. II Semester
14BT60205: INSTRUMENTATION
(PROFESSIONAL ELECTIVE - I)

Internal Marks	External Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITE(S): Engineering Mathematics, Electrical Circuits and Electrical and Electronic Measurements.

COURSE DESCRIPTION: Various instrumentation systems, performance characteristics; resistive, capacitive and inductive transducers; digital voltmeters, oscilloscopes and storage oscilloscopes data acquisition systems.

COURSE OUTCOMES: On successful completion of the course, student will be able to

- gain knowledge on
 - characteristic parameters of various measuring instruments.
 - various types of digital voltmeters, transducers, signal analyzers, oscilloscopes, storage oscilloscopes and data acquisition systems.
- analyze
 - the performance characteristics of various measuring instruments
 - various digital voltmeters, transducers, signal analyzers, oscilloscopes, storage oscilloscopes and data acquisition systems.
- develop skills to evaluate
 - various non electrical quantities, performance characteristics of measuring instruments
 - magnitude, phase and frequency of signal or spectral with oscilloscopes
- select a suitable instruments to meet the requirements of industrial applications.

DETAILED SYLLABUS:

UNIT - I: CHARACTERISTICS OF MEASURING SYSTEMS

Classification of instruments, elements of a generalized measurement system. Measurement system performance - static and dynamic characteristics. Limiting and relative limiting errors - combination of quantities with limiting errors, types of errors - numerical problems

UNIT - II: DIGITAL METERS Digital voltmeters and its types.

Ramp type DVM and its types, micro processor based ramp type DVM. Digital frequency meter. Time and period measurement. Phase meter, digital phase meter. Q-meter. Vector impedance meter. Peak responding and true RMS voltmeters.

UNIT - III: SIGNAL ANALYZERS & CRO

Analyzers: wave analyzers - frequency selective, logic, heterodyne analyzers, application of wave analyzers and harmonic distortion, spectrum analyzers, basic spectrum analyzers, spectral displays. Oscilloscopes: cathode ray oscilloscope, cathode ray tube, time base generator, horizontal and vertical amplifiers, measurement of phase and frequency, lissajous patterns- numerical problems. Storage oscilloscope: sampling oscilloscope-digital storage oscilloscope.

UNIT - IV: TRANSDUCERS

Definition of transducer, classification of transducers, advantages of electrical transducers, characteristics and choice of transducers- principle operation of resistor, inductor, LVDT and capacitor transducer, LVDT Applications, RVDT. Strain gauge and its principle of operation, gauge sensitivity, gauge factor. Thermistors, thermocouples, Synchros, piezo electric transducers, photo diodes, photo transistors.

UNIT - V: DATA ACQUISITION SYSTEMS

Generalized data acquisition system and its components. Types of multiplexing systems - time division and frequency division multiplexing. Digital data acquisition system, use of data acquisition systems and recorders in digital systems. Digital recording systems -block diagram and its working, modern digital DAS (only block diagram)

TEXT BOOKS:

1. A.K. Sawhney, *A course in Electrical and Electronic Measurements and Instrumentation*, Dhanpat Rai & Co. (Pvt.) limited, New Delhi, 2014.
2. H. S. Kalsi, *Electronic Instrumentation*-by Tata MC Graw Hill Company, 3rd edition, 2010.

REFERENCE BOOKS:

1. D. Helfrick and W. D. Cooper, *Modern Electronic Instrumentation and Measurement Techniques* by Prentice Hall of India, 2nd edition, India.
2. D.V.S Murthy, *Transducers and Instrumentation*, Prentice Hall of India, New Delhi, 2nd edition, 2010.

III B.Tech. II Semester
14BT60206: ADVANCED CONTROL SYSTEMS
(PROFESSIONAL ELECTIVE -I)

Internal Marks	External Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITE(S):Control Systems

COURSE DESCRIPTION: Linear control system design; design of compensators and controllers; non-linear systems; describing function; phase plane and stability analysis; design of controllers and observers; formulation of various optimal control problems; minimization of functional.

COURSE OUTCOMES: On successful completion of this course, student will be able to

1. gain knowledge on
 - need for control system design, tuning of PID controller and Two-degrees-of-Freedom control.
 - non-linear system stability.
 - modal and optimal control.
2. analyze
 - stability of a non-linear system using describing functions and phase plane analysis.
 - non-linear system stability using Lyapunov's stability criterion.
 - Minimization of functional with different cases.
3. demonstrate design skills in
 - compensators and controllers using Root locus and Bode plot
 - controllers, observer and regulators using state space.
4. demonstrate problem solving skills in
 - evaluating stability of systems using describing functions and liapunov stability
 - application of calculus of variations

UNIT – I: LINEAR CONTROL SYSTEM DESIGN

Introduction to control system design, types of compensators, design of compensators using bode plot and root locus technique. Types of controllers, design of PI, PD and PID controllers using bode plot and root locus technique. Tuning rules for PID controllers, two-degrees-of-freedom control.

UNIT - II: ANALYSIS OF NONLINEAR SYSTEMS

Introduction to non-linear systems, different types of physical nonlinearities, describing functions, derivation of describing functions for dead zone, saturation, backlash, relay and hysteresis. Stability analysis of non linear systems through describing functions, Phase-Plane analysis, singular points, methods for constructing trajectories - Isoclines' method, delta method.

UNIT- III: STABILITY ANALYSIS

Stability in the sense of Lyapunov. Lyapunov's stability theorems. Stability analysis of linear time invariant systems by Lyapunov second method. Generation of Lyapunov functions, variable gradient method, Krasovskii's method.

UNIT - IV: DESIGN OF CONTROL SYSTEMS IN STATE SPACE

Necessity of pole placement, design by pole placement, necessary and sufficient conditions for arbitrary pole placement. Determination of feedback gain matrix using direct substitution method and Ackermann's formula. Full order observer and reduced order observer, quadratic optimal regulator systems.

UNIT - V: OPTIMAL CONTROL

Introduction to optimal control, formulation of optimal control problems, calculus of variations, minimization of functional of single function, functional involving n independent functions, constrained minimization.

TEXT BOOKS:

1. M. Gopal, *Modern Control System Theory*, New Age International (P) Ltd., 2nd edition, 2000.
2. K. Ogata, *Modern Control Engineering*, Prentice Hall of India, 4th edition, 2006.

REFERENCE BOOKS:

1. A. Nagoorkani, *Advanced control theory*, RBA publications, 2nd edition, 1999.
2. I.J. Nagrath and M.Gopal, *Control Systems Engineering*, New Age International (P) Ltd., 2007.

III B.Tech. II Semester
14BT60207: HIGH VOLTAGE ENGINEERING
(PROFESSIONAL ELECTIVE- I)

Internal Marks	External Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITE(S): Engineering Mathematics, Electromagnetic fields and Electrical Circuits.

COURSE DESCRIPTION: Breakdown mechanisms in solids, liquids, gases and composite dielectrics materials; conventional methods of generation and measurement of high DC, AC, impulse voltages and currents; test the ability of an electrical apparatus to meet guaranteed test procedures and standards.

COURSE OUTCOMES: On successful completion of the course, student will be able to

1. demonstrate knowledge on
 - behaviour of various insulation materials
 - generation of high voltage and currents
 - measuring techniques for high voltage and currents
 - testing of various electrical apparatus
 - overvoltage phenomena and protection against them
2. analyze the behaviour of insulation systems, circuits for generation and measurement of high voltages, materials used and measuring methods.
3. evaluate various parameters of high voltage generating and measuring circuits.
4. apply a suitable testing method for a high voltage apparatus.

DETAILED SYLLABUS:

UNIT - I: HIGH VOLTAGE TECHNOLOGY AND APPLICATIONS

Electric field stresses, gas/vacuum as insulator, liquid dielectrics, solids and composites, estimation and control of electric stress. Applications of insulating materials - transformers, rotating machines, circuit breakers, cables, power capacitors and bushings.

UNIT - II: BREAKDOWN IN DIELECTRIC MATERIALS

Breakdown in liquids and gases: liquid as insulator, pure and commercial liquids, conduction and breakdown in pure, commercial liquids. Gases as insulating media, ionization process, collision process, Townsend's current growth equation criteria, current growth in the presence of secondary, Townsend's criterion for breakdown in gases, pachen's law - numerical problems.

Breakdown in solids: Intrinsic breakdown, electromechanical breakdown, thermal breakdown, breakdown of solid dielectrics in practice, breakdown in composite dielectrics, solid dielectrics used in practice - numerical problems.

UNIT - III: GENERATION OF HIGH VOLTAGES AND CURRENTS

Generation of high DC voltages: half and full wave rectifier circuits, voltage doubler circuits, voltage multiplier circuits, voltage drop and regulation. Electrostatic machines - basic principle, vande-Graaff generator, electrostatic generator.

Generation of high alternating voltages: cascade transformers, resonant transformers, generation of high frequency AC high voltages - numerical problems

Generation of impulse voltages: standard impulse waveshapes, theoretical representation of impulse wave shapes, circuits for producing impulse waves, waveshape control, multistage impulse generators Marx circuit - components of multi stage impulse generator - numerical problems.

Generation of impulse currents: definition of impulse current waveforms, circuit for producing impulse current waves, generation of high impulse currents, tripping and control of impulse generator - numerical problems.

UNIT - IV: MEASUREMENT OF HIGH VOLTAGES AND CURRENTS

Classification, measurement of high DC voltages, measurement of high AC voltages and impulse voltages, electrostatic voltmeters for measurement of high voltages.

Measurement of high DC, AC and impulse currents, cathode ray oscillographs for impulse voltage and current measurements - numerical problems

UNIT-V:NON-DESTRUCTIVE TESTING OF MATERIAL AND APPARATUS

Measurement of dc resistivity, measurement of dielectric constant and loss factor. Partial discharge measurements. Testing of devices - insulators and bushings, isolators and circuit breakers, cables, transformers and surge arresters. Radio interference measurements.

TEXT BOOKS

1. M. S. Naidu and V. Kamaraju, *High Voltage Engineering*, TMH Publications, 4th edition, 2008.
2. E. Kuffel, W. S. Zaengl, J. Kuffel, *High Voltage Engineering: Fundamentals*, Elsevier, 2nd edition, 2005.

REFERENCE BOOKS

1. C. L. Wadhwa, *High Voltage Engineering*, New Age Internationals(P) Limited, New Delhi, 2007.
2. Ravindra Arora, Wolfgang Mosch, *High Voltage Insulation Engineering*, New Age International (P) Limited, 1995.

III B.Tech. II Semester
10BT60208: COMPUTER AIDED ELECTRICAL
MACHINE DESIGN

(PROFESSIONAL ELECTIVE - I)

Internal Marks	External Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITE(S): DC Machines, Transformers and Induction Machines, DC Machines Lab, Synchronous Machines and AC Machines Lab.

COURSE DESCRIPTION: Design concepts, optimal design of transformers, DC machines, induction machines and alternators.

COURSE OUTCOMES: On successful completion of the course, student will be able to

1. demonstrate knowledge on optimal design concepts of various electrical machines and transformers.
2. analyze the specific electrical and magnetic loadings and performance using design values of electrical machines.
3. evaluate the design parameters of various electrical machines and static devices.

DETAILED SYLLABUS:

UNIT - I: INTRODUCTION

Major considerations in electrical machine design, electrical engineering materials, space factor, choice of specific electrical and magnetic loadings. Thermal considerations, heat flow, temperature rise, rating of machines, standard specifications. Mathematical formulation of the problem, programming techniques (LP & NLP only) - numerical problems.

UNIT - II: DC MACHINES

Output equations, main dimensions, magnetic circuit calculations, Carter's coefficient, net length of iron, real & apparent flux densities, selection of number of poles, design of armature, design of commutator and brushes, selection of variables for optimal design, formulation of design equations, objective function, constraint functions, algorithms for optimal design - numerical problems.

UNIT - III: TRANSFORMERS

Output equations, main dimensions, kVA output for single and three phase transformers, window space factor, overall dimensions, operating characteristics, regulation, no load current, temperature rise in transformers, design of tank, methods of cooling of transformers, selection of variables for optimal design, formulation of design equations, objective function, constraint functions, algorithms for optimal design - numerical problems.

UNIT - IV: INDUCTION MOTORS

Output equation of induction motor, main dimensions, length of air gap, rules for selecting rotor slots of squirrel cage machines, design of rotor bars & slots, design of end rings, design of wound rotor, magnetic leakage calculations, leakage reactance of poly phase machines, magnetizing current, short circuit current, selection of variables for optimal design, formulation of design equations, objective function, constraint functions, algorithms for optimal design - numerical problems.

UNIT - V: SYNCHRONOUS MACHINES

Output equations, choice of loadings, design of salient pole machines, short circuit ratio, shape of pole face, armature design, armature parameters, estimation of air gap length, design of rotor, design of damper winding, determination of full load field mmf, design of field winding, design of turbo alternators, rotor design, selection of variables for optimal design, formulation of design equations, objective function, constraint functions, algorithms for optimal design - numerical problems.

TEXT BOOKS:

1. A.K. Sawhney, A. Chakrabarthy, *A Course in Electrical Machine Design*, Dhanpat Rai & Co, Delhi, 6th edition, 2010.
2. M. Ramamoorthy, *Computer - Aided Design of Electrical Equipment*, Affiliated East-West press Pvt. Ltd. New Delhi, 1st edition, 2008.

REFERENCE BOOKS:

1. Albert E Clayton & N.N. Hancock, *Performance and Design of Direct Current Machines*, CBS Publishers and distributors, New Delhi, 3rd edition, 2012.
2. M.G. Say, *The Performance and Design of Alternating Current Machines*, CBS Publishers and distributors Pvt. Ltd, New Delhi, 3rd edition, 2002.
3. R.K. Agarwal, *Principles of Electrical Machine Design*, S.K. Kataria & Sons, New Delhi, 5th edition, 2014.
4. V.N. Mittle, Arvind Mittal, *Design of Electrical Machines*, Standard Publications, New Delhi, 5th edition, 2013.
5. M.V. Deshpande, *Design and Testing of Electrical Machines*, PHI learning Pvt. Ltd, New Delhi, 3rd edition, May 2010.

III B.Tech. II Semester
14BT51201: COMPUTER NETWORKS
(PROFESSIONAL ELECTIVE - I)

Internal Marks	External Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITE(S): Nil

COURSE DESCRIPTION: Introduction to Computer Networks; The Physical Layer; The Data Link Layer; The Medium Access Sub layer; The Network Layer; The Transport Layer; The Application Layer; Network Security.

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

1. demonstrate knowledge on
 - concepts of computer networks
 - functionality of reference models layers
 - 3G Mobile Phone Networks, 802.11
2. analyze the issues in data link layer by using error detection and correction techniques, medium access sub layer by channel allocation schemes and transport layer by connection management schemes.
3. acquire problem solving skills to assess the routing of the packet by selecting the appropriate routing algorithms.

DETAILED SYLLABUS:

UNIT-I: INTRODUCTION AND PHYSICAL LAYER

Uses of Computer Networks, Network Hardware, Network Software, Reference Models: OSI, TCP/IP, Example Networks: Internet, 3G Mobile Phone Networks, 802.11. Guided Transmission Media, Wireless Transmission.

UNIT-II: DATA LINK LAYER AND MEDIUM ACCESS SUBLAYER

Data Link Layer Design Issues, Error detection and correction - CRC, Hamming codes, Elementary Data Link Protocols, Sliding Window Protocols. Channel Allocation problem, Multiple Access protocols: ALOHA, CSMA, CSMA/CD protocols, Collision free protocol, Limited contention protocol, Ethernet, DLL Switching.

UNIT-III: NETWORK LAYER

Network Layer Design Issues, Routing Algorithms: Shortest path, Flooding, Distance vector, Hierarchical, Broadcast, Multicast and Any cast, Congestion Control Algorithms, Quality of Service, Internetworking, The Network Layer in the Internet.

UNIT-IV: TRANSPORT LAYER

Transport Service, Elements of transport protocol, Internet Transport layer protocols: UDP, TCP;

UDP - Introduction, Remote Procedure Call, Real-Time Transport Protocol

TCP - Introduction, Service Model, Protocol, Segment Header, Connection Establishment, Connection Release, Connection Management Modeling, Sliding Window, Timer Management, Congestion Control, The Future of TCP.

UNIT-V: APPLICATION LAYER AND NETWORK SECURITY

Domain name system (DNS), Electronic Mail, World Wide Web: Architectural Overview, Dynamic Web Document, HTTP.

Introduction to Network Security: Cryptography - Substitution Techniques, Transposition Techniques, One-Time Pads.

TEXT BOOK:

1. Andrew S. Tanenbaum and David J. Wetherall, *Computer Networks*, Pearson education, 5th edition, 2012.

REFERENCE BOOKS:

1. Behrouz A. Forouzan, *Data communication and Networking*, Tata McGraw-Hill, 4th edition, 2006.
2. James F. Kurose and Keith W. Ross, *Computer Networking A Top-Down Approach Featuring the Internet*, Pearson Education, 2nd edition, 2003.

III B.Tech. II Semester
14BT60221: ELECTRICAL SYSTEMS AND
SIMULATION LAB

Internal Marks	External Marks	Total Marks	L	T	P	C
25	50	75	--	--	3	2

PREREQUISITE(S):Control Systems, Power Electronics, Electric Circuits

COURSE DESCRIPTION: Time response of second order system, application of PLC's, effect of feedback, effect of PID controller on second order system; characteristics of AC servo motor; simulation of physical systems using PSPICE, stability analysis and time domain specifications of a given transfer function using MATLAB; Simulation of single phase full-converter, resonant pulse commutation, buck chopper, inverter and cycloconverter using PSPICE.

COURSE OUTCOMES: On successful completion of the course, student will be able to

1. demonstrate knowledge on
 - the effect of feedback and different controllers
 - operation of power semiconductor devices such as SCR, BJT, MOSPET and IGBT
 - gate firing circuits
2. analyze
 - characteristics of servomotors
 - physical variations of various power converters
3. design
 - ladder network for PLC to verify Boolean expressions
 - power electronic circuits and validate using PSPICE
4. develop skills to evaluate stability and time domain specifications of second order system using MATLAB
5. apply
 - control engineering concepts in DC position control and temperature control systems
 - power converters for speed control of DC motor
6. exhibit personal excellence and ability to work in group.
7. develop skills to communicate effectively through preparation of laboratory records and viva-voce.

Any SIX of the following experiments are to be conducted from part A

PART A:

1. Time response of second order system
2. Programmable logic controller- study and verification of truth tables of logic gates, simple Boolean expressions and application of speed control of motor.
3. Effect of feedback on DC servomotor.
4. Transfer function of DC machine.
5. Effect of P, PD, PI and PID controllers on a second order systems.
6. Temperature control using PID controller.
7. Characteristics of AC servomotor.

Any SIX of the following experiments are to be conducted from part B

PART B

1. Unit step response of given second order transfer function using MATLAB. Determination of peak overshoots, peak time, rise time and delay time.
2. Stability analysis (Bode, Root Locus and Nyquist) of linear time invariant system using MATLAB.
3. Design a PID controller for a given system to meet the desired response using MATLAB.
4. Analysis of three phase circuit using PSPICE.
5. Simulation of single phase Full-converter for RLE load using PSPICE.
6. Simulation of resonant pulse commutation circuit and Buck chopper using PSPICE.
7. Simulation of single phase inverter with PWM control using PSPICE.
8. Simulation of AC Voltage controller using PSPICE.
9. Simulation of cycloconverter using PSPICE.

III B.Tech. II Semester
14BT60222: MICROPROCESSORS AND
MICROCONTROLLERS LAB

Internal Marks	External Marks	Total Marks	L	T	P	C
25	50	75	--	--	3	2

PREREQUISITES: Switching Theory & Logic Design, Computer Organization and Architecture, Microprocessors and Microcontrollers

COURSE DESCRIPTION: Assembly language Programming for Intel 8086 & 8051; Interfacing standard peripherals & Programming - DAC, Stepper Motor, ADC, Logic Controller, Keyboard, Seven Segment Display.

COURSE OUTCOMES: On successful completion of the course, student will be able to

1. analyze various programming alternatives & interfacing methods to build a typical microcomputerbased system.
2. design and develop microcomputer based system to solve various problems.

LIST OF EXPERIMENTS:

Any TWELVE experiments to be conducted

I Programs using 8086

1. Introduction to MASM/TASM
2. Arithmetic operations
3. Logic operations
4. String operations
5. Modular program: use procedure

II Interfacing with 8086

1. Stepper motor
2. Logic controller
3. A/D converter
4. Seven segment display
5. Keyboard interfacing

III Programs using 8051

1. Arithmetic operations
2. Addition operation using external memory
3. Programs using special instructions like SWAP, bit/byte, set/ reset etc.

IV Interfacing with 8051

1. Stepper Motor
2. Digital to Analog Converter
3. Square wave generation using Timers in Mode 0 and Mode 1

IV B.Tech. I Semester
14BT70201: POWER SEMICONDUCTOR DRIVES

Internal Marks	External Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITE(S): DC machines, Transformers and Induction machines, Synchronous machines, Control systems and Power Electronics.

COURSE DESCRIPTION: Electrical drives - classification, dynamics, load torque components and closed loop control; DC motor drives - single and three phase full, half and dual converter control; Chopper fed DC drives-single and multi-quadrant control; Control of induction motors - with AC voltage controllers, VSI, CSI and Cycloconverters, Static Scherbius and Kramer drives; Control of synchronous motors - fed by VSI, CSI and Cycloconverters, stepper motor and switched reluctance motor drives.

COURSE OUTCOMES: On successful completion of course the student will be able to

- 1.demonstrate knowledge on
 - dynamics of electrical drives.
 - operation and speed control of various DC and AC drives in open loop.
 - closed loop control of converter fed motors.
2. analyze single and multi-quadrant operations of DC and AC drives with speed - torque characteristics.
3. evaluate control parameters for speed control of electrical motors fed by power electronics modulators.

DETAILED SYLLABUS:

UNIT - I: INTRODUCTION TO ELECTRICAL DRIVES

Concept of electrical drives - advantages and parts. Dynamics of electrical drives - fundamental torque equations, speed torque conventions and multi quadrant operation, load torques - components, nature and classification. Steady state stability. Electric braking methods - regenerative, dynamic and plugging. Modes of operation of electrical drive. Speed control and drive classifications, closed loop control of drives.

UNIT - II: SINGLE PHASE AND THREE PHASE DC DRIVES

Control of DC separately excited and series motors by single-phase and three-phase half and full converters - voltage and current waveforms for continuous and discontinuous motor currents, speed-torque equations and characteristics. Dual converter control of DC separately excited motor. Numerical problems.

UNIT - III: DC CHOPPER DRIVES AND CLOSED LOOP OPERATION

Control of DC separately excited motor by one, two and four quadrant choppers, control of DC series motor by one quadrant chopper including electric braking (Regenerative and Dynamic) - voltage and current waveforms for continuous motor currents. Numerical problems. Closed loop model of separately excited DC motor, closed loop speed control scheme.

UNIT - IV: INDUCTION MOTOR DRIVES

Stator voltage control by AC voltage controllers. Variable frequency control from voltage sources - slip speed control, torque and power limitations, modes of operation. Variable frequency control by voltage source inverters, current source inverters and cycloconverters. Static rotor resistance control. Slip power recovery schemes - static Scherbius drive, static Kramer drive - Numerical problems.

UNIT - V: SYNCHRONOUS AND SPECIAL MOTOR DRIVES

Modes of variable frequency control. Operation of self-controlled synchronous motors by VSI, CSI and Cycloconverters. Load commutated CSI fed synchronous motor drive - operation and waveforms. Stepper motor drives - torque vs stepping rate characteristics, drive circuits. Switched reluctance motor drives - converter circuits, modes of operation and closed loop speed control.

TEXT BOOKS:

1. Gopal K. Dubey, *Fundamentals of Electric Drives*, Narosa Publications, 2nd edition, 2004.
2. M.D. Singh, K.B. Khanchandani, *Power Electronics*, Tata McGraw Hill, 2nd edition, 2013.

REFERENCE BOOKS:

1. Gopal K. Dubey, *Power Semiconductor controlled drives*, Prentice-Hall International, 1989.
2. Paresh C. Sen, *Thyristor DC Drives*, Wiley-Interscience, 1981.

IV B.Tech. I Semester
14BT70202: POWER SYSTEM OPERATION AND CONTROL

Internal Marks	External Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITE(S): Generation of Electric Power and Control Systems

COURSE DESCRIPTION: Optimal operation of generators in thermal power stations; optimum generation allocation; optimal scheduling of hydrothermal system; unit commitment; modelling of turbine, generator and governor; analysis load frequency control in a single and two area systems.

COURSE OUTCOMES: On successful completion of this course, a successful student will be able to

- gain knowledge on
 - characteristics of thermal and hydro units
 - optimal operation and unit commitment of thermal units.
 - scheduling of hydrothermal power plants.
 - modeling of power system components for LFC studies.
 - load frequency control of single area and two area systems.
- analyze
 - the economic operation criteria for thermal and hydrothermal units with and without losses.
 - unit commitment of thermal units.
 - LFC parameters in single and two area power system.
- design suitable controllers to improve LFC dynamics in a single area and two area power system.
- acquire skills in
 - economic scheduling of thermal and hydrothermal units for optimal operation.
 - planning of generators operating schedule using unit commitment methods.
 - evaluating the steady state frequency deviations for a load disturbance in single and two area power system.

DETAILED SYLLABUS:

UNIT - I: ECONOMIC OPERATION OF POWER SYSTEM

Optimal allocation neglecting line losses: Characteristics of thermal plants - heat rate curve, incremental fuel and production costs, input-output characteristics. Optimum allocation with line losses neglected - numerical problems.

Optimal allocation with line losses: Optimal allocation with line losses (with and without generating limits), Penalty factor. Loss coefficients, general transmission line loss formula - numerical problems.

UNIT-II: HYDROTHERMAL SCHEDULING

Introduction - classification of hydro plants, scheduling of hydro plants - long-term, short-term, scheduling energy. Hydrothermal scheduling problem - formulation objective function, operational constraints. Short term scheduling - lagrange function, iteration method, penalty factor method - numerical problems.

UNIT-III: UNIT COMMITMENT

Unit commitment Vs economic dispatch. Constraints in unit commitment start-up and shut-down costs, up time and down time constraints. Unit commitment solution methods - Priority-List method, Dynamic Programming method - simple problems (maximum of three plants for three operating hours only).

UNIT-IV: MODELING OF POWER PLANT COMPONENTS

Modeling of speed governor, modeling of turbine - reheat and non-reheat, generator-load model. Block diagram representation of an isolated power system. Excitation systems - classification, components of excitation systems, block diagram representation of IEEE type-1 excitation system.

UNIT-V: LOAD FREQUENCY CONTROL IN POWER SYSTEM

Load frequency control of single area system: Necessity of keeping frequency constant, definition of control area, steady state response (controlled and uncontrolled case), dynamic response (uncontrolled case), proportional plus integral control. Load frequency control and economic dispatch control - numerical problems.

Load frequency control of two area system: Block diagram representation, uncontrolled and controlled case, tie-line bias control - numerical problems. State space representation and optimal controller.

TEXT BOOKS

- 1.K. Uma Rao, *Power system operation and control*, Wiley India Pvt. Ltd, 1st edition, 2013.
- 2.C.L.Wadhwa, *Electrical Power Systems*, New age International, New Delhi, 5th edition, 2009.

REFERENCE BOOKS:

- 1.I.J. Nagrath and D.P. Kothari, *Modern Power System Analysis*, Tata McGraw Hill, 4th edition, 2003.
- 2.A. Chakravarthi and S. Halder, *Power System Analysis Operation and Control*, Prentice Hall India, 3rd edition, 2006.

IV B.Tech. I Semester
14BT70203: POWER SYSTEM ANALYSIS

Internal Marks	External Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITE(S): Electric Circuits and Transmission of Electric Power

COURSE DESCRIPTION: Review of basic concepts of power system component and their representation; formation of bus admittance matrix; computation of power flows in a power system network using various numerical techniques; power system stability analysis.

COURSE OUTCOMES: On successful completion of the course, student will be able

1. demonstrate knowledge on
 - the formation of network matrices.
 - load flow studies.
 - power system stability.
2. analyze
 - the power flows and losses in the power system network using load flow analysis for different conditions.
 - the stability of the power system for different loading and faulted conditions.
3. demonstrate skills in evaluating
 - bus impedance and bus admittance matrices.
 - the load flow solution for a power system network for different conditions.
 - the various stability limits for various operating conditions.
4. apply the load flow and stability concepts to investigate various power system problems.

DETAILED SYLLABUS:

UNIT-I: POWER SYSTEM NETWORK MATRICES

Representation of power system elements. Graph theory - formation of incidence matrices, primitive network matrices, numerical problems. Formation of network matrices by singular transformation, numerical problems.

UNIT-II: ALGORITHM FOR BUILDING OF ZBus

Formation of ZBus for partial network, algorithm for the modification of ZBus matrix, 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 buses - numerical Problems. Representation of transformer - fixed tap settings and phase shifting transformers. Introduction to Clarke's transformation and Park's transformation.

UNIT-III: POWER FLOW STUDIES - I

YBus formation by direct and singular transformation methods - numerical problems. Power flow studies - Introduction, necessity, classification of buses, derivation of static load flow equations. Load flow solution using Gauss-Seidel method - with and without PV buses, acceleration factor, determination of bus voltage, line flows and losses, injected active, reactive powers, algorithm and flowchart - numerical problems (maximum of 3-buses for one iteration only).

UNIT-IV: POWER FLOW STUDIES - II

Newton-Raphson method in rectangular and polar co-ordinates - derivation of Jacobian elements, load flow solution with and without PV bus algorithm and flowchart, decoupled and fast decoupled methods - numerical problems (maximum of 3-buses for one iteration only). Comparison of different load flow methods.

UNIT-V: POWER SYSTEM STABILITY

Elementary concepts of stability. Steady state stability - description of steady state stability power limit, transfer reactance, power angle curve, Derivation of swing equation. Transient stability - equal area criterion - applications, critical clearing angle, critical clearing time. Solution of swing equation by point-by-point method, methods to improve stability - numerical problems. Applications of auto re-closure and fast operating circuit breakers

TEXT BOOKS:

- 1.G. W. Stagg and A.H. El-Abiad, *Computer Methods in Power System Analysis*, Mc Graw-Hill, New Delhi, 1968.
- 2.C. L. Wadhwa, *Electrical Power Systems*, New Age International (P)Limited publishers, New Delhi, 5th edition, 2009.

REFERENCE BOOKS:

- 1.P. Venkatesh, B.V. Manikandan, S. Charles Raja and A. Srinivasan, *Electrical power systems analysis, Security and deregulation*, PHI learning private limited, Delhi, 2014.
- 2.Abhijit Chakrabarthy, Sunitahalder, *Power System analysis operation and control*, PHI learning private limited, Delhi, 2012.
- 3.Dr. S. Sivanagaraju, B. V. Rami Reddy, *Electrical Power System Analysis*, Laxmi Publications, revised edition, 2011.

IV B.Tech. I Semester
14BT60401: DIGITAL SIGNAL PROCESSING

Internal Marks	External Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITE(S): Signals and Networks

COURSE DESCRIPTION: Continuous and discrete signals and sequences; systems; DFT and FFT algorithms for the analysis of discrete sequences; design and realization of Digital IIR and FIR filters; Multirate systems and some of the Signal processing applications.

COURSE OUTCOMES: On successful completion of this course, students will be able to

- 1.demonstrate knowledge in
 - digital signals, sequences and systems.
 - DFT and FFT transforms.
 - analog & Digital Filter Design.
 - digital Filter Realization.
 - DSP Processors.
- 2.perform Frequency analysis of discrete time signals in suppressing un necessary frequency components.
- 3.design and develop digital filters to optimize system performance and their realization.
- 4.solve problems in processing of signals through digital systems and applying them in signal processing.

DETAILED SYLLABUS:

UNIT - I: INTRODUCTION TO DIGITAL SIGNAL PROCESSING

Review of Discrete-time signals, systems and their classification. Discrete-Time systems described by difference equations.

Frequency analysis of Discrete Time signals:

Fourier series for DT periodic signal and power density spectrum, the Fourier transform of DT aperiodic signals and energy density spectrum, convergence of Fourier transforms. Review of Z-transforms, Applications, solution for difference equations of digital filters.

UNIT - II: DISCRETE AND FAST FOURIER TRANSFORMS

DFS representation of periodic sequences, properties of Discrete Fourier Series.

Discrete Fourier Transforms(DFT): Properties of DFT, linear filtering methods based on DFT, Relationship of FT to Z Transform, frequency analysis of signals using DFT.

Fast Fourier transforms (FFT): Radix-2 Decimation in time (DIT) and Decimation in frequency (DIF) FFT algorithms, Inverse FFT.

UNIT - III: IIR DIGITAL FILTERS

Design of IIR digital filters from analog filters - IIR filter design by approximation of derivatives, impulse invariance and bilinear transformation. Characteristics of commonly used analog filters, Frequency transformations. Structural realization of IIR systems-direct, cascade and parallel form structures, Transposed form.

UNIT - IV: FIR DIGITAL FILTERS

Symmetric and anti-symmetric FIR filters, Design of linear phase FIR digital filters using windowing techniques, Frequency sampling technique, Comparison of IIR and FIR filters. Structural realization of FIR filters-direct, cascade-form structures and linear phase structures.

UNIT - V: INTRODUCTION TO DSP PROCESSORS

Introduction to programmable DSPs: Multiplier and Multiplier Accumulator (MAC), Modified Bus Structures and Memory Access schemes in P-DSPs, Multiple access memory, multiported memory, VLIW Architecture, Pipelining, Special addressing modes, On-Chip Peripherals.

Architecture of TMS 320C6X: Introduction, Features of 'C6X Processors, Internal Architecture, CPU, General-Purpose Register Files, Functional Units and Operation, Data Paths, Control Register File.

TEXT BOOKS:

1. John G. Proakis, Dimitris G. Manolakis, *Digital Signal Processing, Principles, Algorithms and Applications*, Pearson Education/PHI, 4th edition, 2007.
2. Alan.V. Oppenheim, Ronald.W. Schaffer, John R Buck, *Discrete Time Signal Processing*, Prentice Hall, 2nd edition, 2006.
3. B.Venkataramani, M. Bhaskar, *Digital Signal Processors - Architecture, Programming and Applications*, TATA McGraw Hill, 2nd edition, 2010

REFERENCE BOOKS:

1. Tarun Kumar Rawat, *Digital Signal Processing*, Oxford University Press, 1st edition, 2015.

IV B.Tech. I Semester
14BT6HS01: BANKING AND INSURANCE

(OPEN ELECTIVE)

(Common to ECE, EEE, EIE & CE)

Internal Marks	External Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITE(S): Managerial Economics and Principles of Accountancy

COURSE DESCRIPTION: Origin and growth of Banking, functions and importance, RBI; Debtor and Creditor relationship, Types of Accounts, Loans and Advances; e-payment, e-cash, NEFT, RTGS, Credit and Debit cards; Insurance elements and risk; LIC, GIC, IRDA.

COURSE OUTCOMES: On successful completion of the course a student will be able to

1. acquire Knowledge in
 - tools and concepts of Banking and Insurance.
 - basic Principles and concepts of Insurance and Banking.
 - provides life skills for effective utilization of Banking and Insurance facilities.
 - e-fund transfers, e-payments and e-business models.
2. develop analytical skills in understanding problems pertaining to
 - online banking and e-payments.
 - risk Management through insurance benefits the society at large.
 - money management by leveraging on technology, banking and insurance services.

DETAILED SYLLABUS:

UNIT - I: INTRODUCTION TO BANKING

Origin and growth of banking, meaning and functions of banking, importance of banking, Reserve Bank of India; functions, monetary policy, open market operations.

UNIT - II: BANK-CUSTOMER RELATIONSHIP

Debtor-creditor relationship, antimoney laundering, products or services, payment and collection of cheques and other negotiable instruments. Accounts - Types of accounts, procedure for opening and closing an account. Loans and Advances - principles of lending, types of loans.

UNIT - III : BUSINESS MODELS AND ELECTRONIC PAYMENT SYSTEM

Features, types of e-payment system, e-cash, NEFT, RTGS, Electronic purses, Credit and Debit cards. Business models - B2B, B2C, C2C, and B2G.

UNIT - IV: INTRODUCTION TO INSURANCE

Introduction - Insurance definition, elements of insurance concept of risk, risk Vs uncertainty.

UNIT - V: INSURANCE OVERVIEW

Principles of insurance, insurance types, LIC & GIC insurance contract - nature, elements, functions, IRDA, Insurance Players in India.

TEXT BOOKS:

- 1.A.V. Ranganadha Chary, R.R. Paul, *Banking and Financial system*, Kalyani Publisher, New Delhi, 2nd edition.
- 2.P.K.Gupta, *Insurance and Risk Management*, Himalaya Publishing House, New Delhi, ISBN: 9789350516676.

REFERENCE BOOKS:

- 1.Diwan, Praq and Sunil Sharma, *Electronic Commerce- A Manager's Guide to E-Business*, Vanity Books International, Delhi, 2002.
- 2.Kalakota Ravi and Whinston Andrew B, *Frontiers of Electronic Commerce*, Pearson education India, New Delhi, 1996.
- 3.Schneider, Grey P, *Electronic Commerce, Course Technology*, Cengage Learning, 8thedition, New Delhi, 2008.

IV B.Tech. I Semester
14BT6HS02: COST ACCOUNTING AND
FINANCIAL MANAGEMENT
(OPEN ELETIVE)

(Common to ECE, EEE, EIE & CE)

Internal Marks	External Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITE(S): Nil

COURSE DESCRIPTION: Scope, Objectives and Elements of cost Accounting; Cost Sheet and Tender quotations; Variance Analysis: Material variances, Labor variances; Meaning and Scope, Liquidity, Profitability Ratios: concept of Risk and Returns on Investment.

COURSE OUTCOMES: On successful completion of the course a student will be able to

1. acquire Knowledge in
 - elements of Costing.
 - basic concepts of Financial Management.
 - risk and Return
 - financial Accounting.
 - using advanced tools like tally and SAP.
 - significance of Economics and Accountancy
2. do cost, risk and return of investment analysis.
3. develop skills in providing solutions for
 - material, Labor, Overheads control.
 - excellence and ability to minimize the cost of the organization
 - effective investment decisions
4. prepare cost sheets pertaining to manufacturing of products.

DETAILED SYLLABUS:

UNIT -I: INTRODUCTION TO COST ACCOUNTING

Cost and Cost Accounting, Scope, Objectives, Advantages and disadvantages - Cost Accounting Vs Management Accounting - Elements of Costing - Installation of costing system - Material Control, Labor Control, Overhead Control, Fixed and Variable, Direct and Indirect Costs.

UNIT - II: COST ANALYSIS

Analysis of Cost - Preparation of cost sheet, estimate, tender and quotation (Simple problems) - Importance of Costing while pricing the products.

UNIT - III: STANDARD COSTING

Introduction to Standard Costing & Variances - Variance Analysis: Material variances, Labor variances (Simple Problems).

UNIT -IV : FINANCIAL MANAGEMENT

Financial Management - Meaning and Scope, Liquidity, Profitability, Financial Statement Analysis through ratios (Simple Problems).

UNIT -V: RISK AND RETURNS ON INVESTMENT

Investment - Meaning and Definition - concept of risk and returns- Investment Alternatives - Introduction to Behavioral Finance - Anomalies - Key Concepts - Anchoring - Mental Anchoring - Confirmation and Hindsight Bias - Gambler's Fallacy- Herd Behavior - Over Confidence - Overreaction and Availability Bias-Prospect Theory.

TEXT BOOKS:

- 1.S.P. Jain and K.L. Narang, *Cost Accounting*, Kalyani Publishers, Ludhiana, 6th edition, 2002.
- 2.James C Van Horne, *Financial Management and Policy*, Prentice-Hall of India/Pearson, 12th edition, 2001.

REFERENCE BOOKS:

- 1.The Institute of Company Secretaries of India, *Cost and Management Study Material*, New Delhi.
- 2.I.M. Pandey, *Financial Management*, Vikas Publishing House Pvt. Ltd., 10th edition, 2010.

IV B.Tech. I Semester
14BT6HS03: ENTREPRENEURSHIP FOR MICRO,
SMALL AND MEDIUM ENTERPRISES

(Open Elective)

(Common to ECE, EEE, EIE & CE)

Internal Marks	External Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITE(S): Nil

COURSE DESCRIPTION: Introduction to Entrepreneur Development; Idea generation and formation of Business Plan; Micro and Small Enterprises; Institutional Finance and Support to Entrepreneur; Woman Entrepreneurship.

COURSE OUTCOMES: On successful completion of the course a student will be able to

1. acquire Knowledge in
 - schemes and institutions encouraging entrepreneurship.
 - basic Principles and concepts of Accountancy.
 - significance of entrepreneurship.
2. (i) develop analytical skills in understanding problems pertaining to
 - personal excellence through financial and professional freedom.
 - women entrepreneurship acts as contrivance in the societal development(ii) develop Critical thinking and evaluation ability.
3. generate ideas for formulating business plans.

DETAILED SYLLABUS:

UNIT - I: INTRODUCTION TO ENTREPRENEURSHIP DEVELOPMENT

Concept of Entrepreneurship - Growth of Entrepreneurship in India - Factors affecting entrepreneurship growth - Characteristics of an Entrepreneur - Functions of Entrepreneur - Need for an Entrepreneur - Entrepreneurial Decision Process - Types of Entrepreneurs - Distinction between an Entrepreneur and a manager - Intrapreneur - Entrepreneur Vs Intrapreneur

UNIT - II: IDEA GENERATION AND FORMULATION OF BUSINESS PLANS

Sources of Ideas - Methods of idea generation - Product Identification - Opportunity Selection - Steps in Setting up of a Small Business Enterprise - Contents Of Business Plans - Significance - Formulation of Business Plan - Business Opportunities in Various Sectors - Common Errors in Business Plan Formulation - Project Report Preparation

UNIT - III: MICRO AND SMALL ENTERPRISES

Meaning and Definition - Micro and Macro units - Essentials - Features - Characteristics - relationship between Micro and Macro Enterprises - Rationale behind Micro and Small Enterprises - Scope of Micro and Small Enterprises - Objectives of Micro Enterprises - Problems of Micro and Small Enterprises

UNIT - IV: INSTITUTIONAL FINANCE AND SUPPORT TO ENTREPRENEUR

Need for Institutional Finance - Commercial Banks - Industrial Development Bank of India (IDBI) - Industrial Finance Corporation of India Ltd. (IFCI) - Industrial Credit Investment Corporation of India Ltd. (ICICI)- State Financial Corporations (SFCs) - State Industrial Development Corporations (SIDCs) - Small Industries Development of Bank of India (SIDBI) - Need For Institutional Support - National Small Industries Corporation Ltd (NSIC) - Small Industries Development Organisation (SIDO) - Small Industries Service Institutes (SISIs) - District Industries Centres (DICs) - National Institute of Entrepreneurship and Small Business Development (NIESBUD) - Technical Consultancy Organizations (TCOS)(Origin, Mission, and credit facility/support).

UNIT -V: WOMEN ENTREPRENEURSHIP

Concept of Women entrepreneur - Functions of Women entrepreneurs - Growth of women entrepreneurship in India - Challenges of Women entrepreneurs- Programmes supporting women entrepreneurship - Rural Entrepreneurship - Meaning, Need for Rural entrepreneurship, Problems of rural entrepreneurship, Role of NGOs.

TEXT BOOKS:

1. Dr. S.S.Khanka, *Entrepreneurial Development*, S. Chand and Company Ltd, Revised edition, 2012.
2. Madhurima Lall & Shikha Sahai, *Entrepreneurship*, Excel Books India, 2nd edition, 2008.

REFERENCE BOOKS:

1. Nandan, H., *Fundamentals of Entrepreneurship*, PHI Learning Pvt. Ltd., New Delhi, 3rd edition 2013.
2. Vasanth Desai, *The Dynamics of Entrepreneurial Development and Management*, Himalaya Publishing House, 4th edition 2009.
3. Bholanath Dutta, *Entrepreneurship Management - Text and Cases*, Excel Books, 1st edition 2009.

IV B.Tech. I Semester
14BT70105: DISASTER MITIGATION AND
MANAGEMENT

(Open Elective)

(Common to ECE, EEE, EIE & CE)

Internal Marks	External Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITE(S): Environmental Sciences

COURSE DESCRIPTION: Natural disasters and hazards - Earthquakes - Floods and cyclones, droughts - Landslides - Disaster management.

COURSE OUTCOMES: On successful completion of the course a student will be able to

1. explain various types of disasters and mitigation strategies
2. analyze and interpret the Guidelines for hazard assessment and vulnerability analysis
3. use historical data of disaster losses and inform the people over preparedness
4. address the issues due to disasters and provide conclusions over post disaster events for the benefit of the society
5. function in multidisciplinary teams for the effective displacement of people during disasters

DETAILED SYLLABUS:

UNIT - I: INTRODUCTION

Types of disasters - Natural disasters - Impact of disasters on environment - Infrastructure and development - Concepts of hazards and vulnerability analysis - Hazard Assessment - Guidelines for hazard assessment and vulnerability analysis - Basic principles and elements of disaster mitigation.

UNIT - II: EARTHQUAKES

Introduction to earthquakes - Intensity scale (MSK-64) - Seismic activity in India - Seismic zones of India - Earthquakes in AP - Action plan for earthquake disaster preparedness - Elements at risk, recovery and rehabilitation after earthquake - Earthquake resistant design and construction of buildings. Tsunami - Onset, types and causes - Warning - Element at risk - Typical effects - Specific preparedness and mitigation strategies.

UNIT - III: FLOODS AND CYCLONES

Onset, types, warnings - Elements at risk - Typical effects - Indian floods and cyclones - Hazard zones - Potential for reducing hazards - Mitigation strategies and community based mitigation.

DROUGHTS: Onset, types and warning - Kinds of droughts - Causes of droughts - Impact of droughts - Early warning and response mechanisms - Mitigation strategies - Droughts in India.

UNIT - IV: LANDSLIDES

Onset, types and warning - Causes of landslides - Elements at risk - Indian land slides - Hazards zones - Typical effects - Mitigation strategies and community based mitigation.

UNIT - V: DISASTER MANAGEMENT

Disaster management Organization and Methodology - Disaster management cycle - Disaster management in India - Typical cases - Cost-benefit analysis with respect to various disaster management programmes implemented by NGOs and Government of India.

TEXT BOOKS

- 1.V.K. Sharma, *Disaster Management*, National Centre for Disaster Management, IPE, 1999.
- 2.A.S. Arya, AnupKaranth, and Ankush Agarwal, *Hazards, Disasters and Your Community: A Primer for Parliamentarians*, GOI-UNDP Disaster Risk Management Programme, 2005.

REFERENCE BOOKS

1. Disaster Management in India, *A Status Report Publication of the Govt. of India*, Ministry of Home Affairs, National Disaster Management Division, August 2004.
- 2.R. B. Singh, *Natural Hazards and Disaster Management*, Rawat Publications, 2009.
- 3.Pardeepsahni, AlkaDhameja, Uma Medury, *Disaster Mitigation*, 4th edition, PHI Learning Pvt. Ltd., 2011.
- 4.Sanjay K. Sharma, *Environment Engineering and Disaster Management*, 1st edition, USP Publishers, 2011.

IV B.Tech. I Semester
14BT70106: ENVIRONMENTAL POLLUTION AND CONTROL

(Open Elective)
(Common to ECE, EEE, EIE & CE)

Internal Marks	External Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITE(S): Environmental Science

COURSE DESCRIPTION: Introduction; Sources and Effects of Air Pollution; Dispersion of Pollutants and their control; Surface and Ground Water Pollution and control; Soil Pollution and remediation; Management of Municipal Solid Wastes.

COURSE OUTCOMES: On successful completion of the course, student will be able to

1. explain various pollutants, characteristics and their dispersion
2. analyze the major pollutants that causes environmental pollution.
3. conduct research and select suitable techniques to control pollution.
4. understand the effects of environmental pollutions on human beings and vegetation
5. communicate the methods of management and control of environmental pollution

DETAILED SYLLABUS:

UNIT - I: INTRODUCTION TO AIR POLLUTION AND DISPERSION OF POLLUTANTS

Scope - Air Pollutants - Classifications - Natural and Artificial - Primary and Secondary, Point and Non- Point, Line and Area Sources of Air Pollution - Stationary and Mobile Sources - Dispersion of Pollutants - Dispersion Models - Applications.

UNIT - II: EFFECTS AND CONTROL OF PARTICULATES

Effects of Air Pollutants on Man, Material and Vegetation - Global Effects of Air Pollution - Green House Effect, Heat Island, Acid Rains, Ozone Holes - Control of Particulates - Control at Sources - Process Changes - Equipment Modifications - Design and Operation of Control Equipment - Settling Chambers - Centrifugal Separators - Bag Filters, Dry and Wet Scrubbers - Electrostatic Precipitators.

UNIT - III: WATER POLLUTION

Introduction - Water Quality in Surface Waters - Nutrients - Controlling Factors in Eutrophication - Effects of Eutrophication - Ground Water Pollution - Thermal Pollution - Marine Pollution - Sewage Disposal in Ocean - Types of Marine Oil Pollution - Cleanup of Marine Oil Pollution - Control of Water Pollution - Case Study on Tanneries - Drinking Water Quality Standards.

UNIT - IV: SOIL POLLUTION

Soil Pollutants - Sources of Soil Pollution - Causes of Soil Pollution and their Control - Effects of Soil Pollution - Diseases Caused by Soil Pollution - Methods to Minimize Soil Pollution - Effective Measures to Control Soil Pollution - Case Study on Fertilizer.

UNIT - V: MUNICIPAL SOLID WASTE MANAGEMENT

Introduction - Types of Solid Wastes - Principles of Excreta Disposal - Domestic Solid Waste Production - Collection of Solid Wastes - Transport of Solid Wastes - Management of Solid Wastes - Methods of Land Disposal - Sanitary Landfill - Composting - Incineration.

TEXT BOOKS

- 1.C.S.Rao, *Environmental Pollution Control Engineering*, 2nd edition, New Age International Pvt Ltd., 2007.
- 2.Y.Anjaneyulu, *Introduction to Environmental Science*, 1st edition, BS Publications., 2009.

REFERENCE BOOKS

- 1.M.N. Rao and H.V.N. Rao, *Air Pollution*, 19th edition, Tata McGraw-Hill Education Pvt. Ltd., 2010.
- 2.Daniel Vallero, *Fundamentals of Air Pollution*, 5th edition, Academic Press (Elsevier), 2014.
- 3.S.M.Khopkar, *Environmental Pollution Monitoring and Control*, 2nd edition, New Age International Pvt Ltd., 2007.
- 4.S.Deswal and K.Deswal, *Environmental Science*, 2nd edition, Dhanpat Rai & Co, 2011.

IV B.Tech. I Semester
14BT70107: CONTRACT LAWS AND
REGULATIONS

(Open Elective)
(Common to ECE, EEE, EIE & CE)

Internal Marks	External Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITE(S): Nil

COURSE DESCRIPTION: Construction Contracts - Tenders - Arbitration - Legal Requirements - Labour Regulations.

COURSE OUTCOMES: On successful completion of the course, a student will be able to

1. explain contract documents and tendering processes.
2. analyze the legal issues in arbitration and in contracts documents.
3. address the legal issues in collecting taxes.
4. follow ethics while bidding, sale and purchase of property.
5. develop and Prepare tender documents as per the standards.

DETAILED SYLLABUS:

UNIT - I: CONSTRUCTION CONTRACTS

Indian Contracts Act - Elements of Contracts - Types of Contracts - Features - Suitability - Design of Contract Documents - International Contract Document and laws - Standard Contract Document - Law of Torts.

UNIT - II: TENDERS

Prequalification - Bidding - Accepting - Evaluation of Tender from Technical, Contractual and Financial Points of View - Two Cover System - Preparation of the Documentation - Contract Formation and Interpretation - Potential Contractual Problems - Price Variation Clause - Comparison of Actions and Laws - Subject Matter - Violations.

UNIT - III: ARBITRATION

Arbitration - Comparison of Actions and Laws - Agreements - Appointment of Arbitrators - Conditions of Arbitration - Powers and Duties of Arbitrator - Rules of Evidence - Enforcement of Award - Arbitration Disputes - Dispute Review Board.

UNIT - IV: LEGAL REQUIREMENTS

Legal Requirements for Planning - Property Law - Agency Law - Tax Laws - Income Tax, Sales Tax, Excise and Custom Duties - Local Government Approval - Statutory Regulations - Insurance and Bonding - Laws Governing Purchase and Sale - Use of Urban and Rural Land - Land Revenue Codes - EMD - Security Deposits - Liquidated Damages.

UNIT - V: LABOUR REGULATIONS

Social Security - Welfare Legislation - Laws Relating to Wages, Bonus and Industrial Disputes - Labour Administration - Insurance and Safety Regulations - Workmen's Compensation Act - Maternity Benefit Act - Child Labour Act - Other Labour Laws.

TEXT BOOKS

- 1.G.C.V. Subba Rao, *Law of Contracts I & II*, 11th edition, S. Gogia& Co., 2011.
- 2.Jimmie Hinze, *Construction Contracts*, 2nd edition, Mc Graw Hill, 2001.

REFERENCE BOOKS

- 1.Gajaria G.T, Kishore Gajaria, *Laws Relating to Building and Engineering Contracts in India*, 4th edition, Lexis NexisButterworths India, 2000.
- 2.B. S. Patil, *Civil Engineering Contracts and Estimates*, 3rd edition, University Press (India) Private Ltd., 2013.
- 3.Joseph T. Bockrath, *Contracts and the Legal Environment for Engineers and Architects*, 7th edition, McGraw Hill Education, 2010.
- 4.Akhileshwar Pathak, *Contract Law*, 1st edition, Oxford University Press, 2011.

IV B.Tech. I Semester
14BT70108: PLANNING FOR SUSTAINABLE
DEVELOPMENT

(Open Elective)
(Common to ECE, EEE, EIE & CE)

Internal Marks	External Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITE(S): Nil

COURSE DESCRIPTION: Introduction to Sustainable Development - Environment, Sciences and Sustainability - Sustainable Development Politics and Governance - Tools, Systems and Innovations for Sustainability - Communication and Learning for Sustainability.

COURSE OUTCOMES: On successful completion of the course a student will be able to

- 1.demonstrate the knowledge of planning, environment, tools and systems for sustainable development
- 2.analyze the current challenges to sustainability
- 3.use theoretical frameworks and provide solutions to the real world sustainability issues
- 4.conduct awareness of contemporary issues on globalization in terms of sustainability
- 5.give recommendations for the sustainability issues and solutions using a holistic approach
- 6.explain a sense of civic responsibility, including reflection on the student's own role in developing and nurturing sustainable communities
- 7.participate in decision making as individual and responsible for collective decision

DETAILED SYLLABUS:

UNIT - I: INTRODUCTION TO SUSTAINABLE DEVELOPMENT

Definition and Concepts of Sustainable Development - Capitalization of Sustainability - National and Global Context - The Millennium Development Goals - Emergence and Evolution of Sustainability and Sustainable Development - Theories of Sustainability - Case Studies.

UNIT - II: ENVIRONMENT, SCIENCES AND SUSTAINABILITY

Climate Change - Science, Knowledge and Sustainability - Unforeseen Environmental Impacts on Development - Challenges of Sustainable Development - Centrality of Resources in Sustainable Development - Case Studies.

UNIT - III: SUSTAINABLE DEVELOPMENT POLITICS AND GOVERNANCE

Governance and Democracy and Eco-Welfare - Global Civil Society and World Civil Politics - Civic Environmentalism - Policy Responses to Sustainable Development - Economics of Sustainability - Social Responsibility in Sustainability - National Action.

UNIT - IV: TOOLS, SYSTEMS AND INNOVATION FOR SUSTAINABILITY

Need for System Innovation - Transition and Co-Evolution - Theories and Methods for Sustainable Development - Strategies for Eco-Innovation - Ecological Foot Print Analysis - Socio Ecological Indicators - Eco Labels- Policy Programmes for System Innovation - Case Studies.

UNIT - V: COMMUNICATION AND LEARNING FOR SUSTAINABILITY

Role of Emerging Media - Remarkable Design and Communication Art, Activism and the Public Interest - Education for Sustainability - Participation in Decision Making - Critical Thinking and Reflection - Case Studies.

TEXT BOOKS

1. John Blewitt, *Understanding Sustainable Development*, Earth Scan Publications Ltd., 2nd edition, 2008.
2. Jennifer A. Elliot, *An introduction to sustainable development*, Earth Scan Publications Ltd., 4th edition, 2006.

REFERENCE BOOKS

1. Peter Rogers, Kazi F Jalal , John A Boyd, *An introduction to sustainable development*, Earth Scan Publications Ltd., 1st edition, 2006.
2. Simon Dresner, *The Principles of Sustainability*, Earth Scan Publications Ltd., 2nd edition, 2008.
3. Peter Bartelmus, *Environment growth and development: The concepts and strategies of sustainability*, Routledge, 3rd edition, 2003.
4. Gabriel Moser, Enric Pol, Yvonne Bernard, Mirilia Bonnes, Jose Antonio Corraliza, Maria Vittoria Giuliani, *People places and sustainability*, Hogrefe & Huber Publishers, 2nd edition, 2003.

IV B.Tech. I Semester
14BT70109: RURAL TECHNOLOGY
 (Open Elective)
 (Common to ECE, EEE, EIE & CE)

Internal Marks	External Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITE(S): Nil

COURSE DESCRIPTION: Research and Development - Non Conventional Energy - Community Development - IT Management

COURSE OUTCOMES: On successful completion of the course a student will be able to

- 1.acquire the knowledge of various nonconventional energy systems and technologies for rural development.
- 2.apply the principles of IT for the rural development
- 3.responsible for the development of technologies in rural areas
- 4.understand the impact of technologies in societal and environmental aspects

DETAILED SYLLABUS:

UNIT - I : RESEARCH and DEVELOPMENT

India - Ancient Indian Technologies - Rural India Life - Indian Farmer - Role of Science and Technology in Rural Development - Rural Technology and Poverty Eradication - Rural Business Hubs - Technology in improving rural infrastructure - Various organizations related to innovation - Issues of technology transfer: CAPART, NABARD, CSIR, NIF.

UNIT - II : NON CONVENTIONAL ENERGY

Definition of Energy, Types of alternative sources of energy, Sources of non conventional energy - Solar energy - Solar Cooker - Solar Heater - Biogas - Recycling and Management and Wastes Conservation - Assessment & Production of biomass products & their utilization.

UNIT - III : TECHNOLOGIES FOR RURAL DEVELOPMENT

Food & Agro based technologies - Tissue culture - Building and Construction technologies - Cultivation and processing of economic plants - Cottage and social Industries.

UNIT - IV : COMMUNITY DEVELOPMENT

Water conservation - Rain water Harvesting - Drinking water - Environment and Sanitation - Bio fertilizers - Medical and Aromatic plants - Employment generating technologies - Apiculture - Piciculture - Aquaculture.

UNIT - V: IT IN RURAL DEVELOPMENT

The Role of Information Technology in Rural Areas - Impact of Information Technology in Rural development - Need and Necessity of Technology - Corporate Social Responsibilities - Private sector participation (Activities in different spheres: Employment, Education, Health, Agriculture and Service Sectors) and SaansadAdarsh Gram Yojana (SAGY) - village adoptions schemes.

TEXT BOOKS:

- 1.M.S Virdi, *Sustainable Rural Technologies*, Daya Publishing House, New Delhi, 1st edition, 2009.
- 2.S.V. Prabhath& P. Ch. Sita Devi, *Technology and Rural India*, Serials Publications, New Delhi, 1st edition, 2012.

REFERENCE BOOKS

- 1.P. R. S. Murthy, R.C. Chackravathy, *Information Technology & Rural Development*, Pacific Books International, 1st edition, 2011.
- 2.Shivakanth Singh, *Rural Development Policies and Programmes*, Northern book centre, New Delhi, 1st edition, 2002.
- 3.L.M.Prasad, *Principles and Practice of Management*, Sultan Chand & Sons, New Delhi, 8th edition, 2014.
- 4.Venkata Reddy. K, *Agriculture and Rural Development Gandhian Perspective*, Himalaya Publishing House, 1st edition, 2001.

IV B. Tech. I Semester
14BT60305: ARTIFICIAL INTELLIGENCE AND
ROBOTICS

(Open Elective)
(Common to ECE, EEE, EIE & CE)

Internal Marks	External Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITE(S): Nil

COURSE DESCRIPTION: Artificial Intelligence; Problem solving strategies; Heuristic search, Production systems; Simple facts in logic, Forward and Backward Reasoning; Fuzzy logic and Neural Nets; Concept of learning; Classification and specification of robots; Different Sensing and Vision techniques; Direct and Inverse Kinematics; Dynamics; Programming Languages, VAL-II programming; Applications of Artificial Intelligence in Robotics, Task Planning.

COURSE OUTCOMES: On successful completion of the course a student will be able to

1. impart knowledge on forward, backward and plausible reasoning inherent in them for developing Artificial intelligence and expert systems.
2. employ effective methods to analyze a robot motion control while executing a specific task.
3. design and Implement appropriate solutions for search Problems such as playing two person games and for planning problems which involve defining a sequence of actions of a robot.
4. apply various AI techniques to different robotic sub-problems involving task planning and obstacle avoidance.

DETAILED SYLLABUS:

UNIT - I: ARTIFICIAL INTELLIGENCE & PROBLEM SOLVING

The Underlying assumption of AI; AI Technique: simple Tic-Tac-Toe program; Problem solving: State space search; Production systems: control strategies, search space control: depth-first, breadth-first search; Heuristic search: Hill climbing, best-first search, branch and bound. Problem Reduction, Constraint Satisfaction End, Means-End Analysis.

UNIT - II: KNOWLEDGE REPRESENTATION & LEARNING

Knowledge Representation; Predicate Logic: Simple facts in logic, resolution, Natural deduction; Procedural versus Declarative Knowledge; Forward reasoning versus Backward reasoning; Semantic Nets; Frames; slots; conceptual dependency; scripts; Non-Monotonic Reasoning, Probabilistic reasoning, use of certainty factors, fuzzy logic systems & Neural nets: Basic concepts; Concept of learning.

UNIT - III: ROBOTICS -VISION & SENSING

Robotics: Robot Classification, Robot Specification, notation; Sensing: Range sensing: Triangulation; proximity sensing: Inductive, Capacitive and Ultrasonic sensing; touch sensing: tactile sensing, artificial skins; Force and torque sensing: Wrist force sensors; Vision: low-level vision, high-level vision.

UNIT - IV: ROBOT PROGRAMMING & CONTROL

Direct and Inverse Kinematics: Co-ordinate reference Frames, Rotations, Homogeneous Coordinates; Introduction to arm dynamics; Control: Types of control schemes: Resolved motion control, Adaptive control; Programming: Robot level languages: characteristics, specifications; Task level languages; Language structure: VAL II.

UNIT - V: ROBOT INTELLIGENCE & TASK PLANNING

Artificial intelligence in Robotics: Goals of AI research; Applications of state space search in robotics; graph search technique; Problem solving and problem reduction; robot learning; Task planning: Modelling, task specification, obstacle avoidance, grasp planning; Expert system.

TEXT BOOKS:

- 1.E. Rich and K. Knight, *Artificial intelligence*, Tata Mc Graw Hill, 2nd edition, 1992.
- 2.K.S. Fu, R.C. Gonzalez, C.S.G. Lee, *Robotics: Control, Sensing, Vision, and Intelligence*, Mc Graw Hill, International edition, 1987.

REFERENCE BOOKS:

- 1.Mikell P. Groover, *Industrial Robotics, Technology, Programming, and Applications*, Tata Mc Graw Hill, 9th reprint 2011.
- 2.D.W. Patterson, *Introduction to AI and Expert Systems*, PHI, 1992.
- 3.N.J. Nilsson, *Principles of AI*, Narosa Publ. House, 2000.
- 4.George Luger, *AI-Structures and Strategies for and Strategies for Complex Problem solving*, Pearson Educations, 4th edition, 2002.

IV B.Tech. I Semester
14BT60306: GLOBAL STRATEGY AND TECHNOLOGY

(Open Elective)
(Common to ECE, EEE, EIE & CE)

Internal Marks	External Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITE(S): Nil

COURSE DESCRIPTION: Introduction to strategic management, strategic management process, principles of good strategy, globalisation, globalisation strategies, research & development strategies, technology management and transfer, significance, elements of transfer process, corporate governance: the Indian scenario.

COURSE OUTCOMES: On successful completion of the course a student will be able to

1. identify the impact of globalization in a given engineering scenario. Participate in elementary discussions on corporate governance.
2. analyse an industrial Engineering problem and layout research plan to meet the needs. Identify the crucial stages needed to ensure smooth transfer of technology from concept stage.
3. decide upon a macroscopic management strategy to optimize the impact of decisions with limited resources.

DETAILED SYLLABUS:

UNIT - I: INTRODUCTION TO STRATEGIC MANAGEMENT

Definitions; Classes of decisions; Levels of strategy; Core competence; Strategic intent and stretch; Approaches to strategy making; Roles of different strategists; strategic management process; Benefits and relevance of strategic management; limitations and misgivings; Principles of good strategy growing relevance of strategic management in India, TQM and strategic management.

UNIT - II: GLOBALISATION

Meaning and dimensions; Stages of globalisation; Essential conditions for globalisation; Competitive advantage of Nations; Globalisation of Indian business; Factors favouring Globalisation; Globalisation strategies.

UNIT - III: RESEARCH & DEVELOPMENT STRATEGIES

Introduction, Concept, Evolution of R & D Management, R & D as a business, R & D and competitive advantage, Integration of R & D, Elements of R & D strategies, Selection of R & D strategies, Implementation strategies, R & D trends, Responses to changes.

UNIT - IV: TECHNOLOGY MANAGEMENT AND TRANSFER

Technology Management: Introduction, Definition of Technology, Components, Features, Classification of technology, Concept of technology management, Nature of technology management, Drivers of MOT, Significance, Scope of MOT, Responding to technology challenge.

Technology Transfer: Introduction, Definition, Classification, Significance, Elements of transfer process, Types of technology transfer, package, Modes of transfer, Channels of technology flow, Routes of technology transfer, Effectiveness of technology transfer.

UNIT - V: CORPORATE GOVERNANCE: THE INDIAN SCENARIO

Emergence of corporate governance in India and the landmarks, corporate governance models, Codes and status in India, Indian corporate governance - Role and Responsibilities of Regulators and the Board of Directors, Corporate Governance: Specific issues in India, Corporate Governance issues in Family - owned business in India, Corporate Governance and the Indian ethos,

TEXT BOOKS:

1. Francis Cherunilam, *Strategic Management*, Himalaya Publishing House, 3rd edition, 2002.
2. C.S.G. Krishnamacharyulu and Lalitha Ramakrishnan, *Management of Technology*, Strategic Management, Himalaya Publishing House, 2nd edition, 2012.

REFERENCE BOOKS:

1. White and Bruton, *The management of Technology and innovation; a strategic approach*, Cengage Learning, 1st edition, 2007.
2. S.K. Mandak, *Ethics in business and Corporate Governance*, TMH, 2nd edition, 2012.

IV B.Tech. I Semester
14BT60307: INTELLECTUAL PROPERTY
RIGHTS AND MANAGEMENT

(Open Elective)
(Common to ECE, EEE, EIE & CE)

Internal Marks	External Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITE(S): Nil

COURSE DESCRIPTION:

Protection of ideas, innovation and artistic endeavors; Acts and procedure related to patents, trademarks, passing off, copy right, design registration, trade secrets and cyber laws, case studies in each.

COURSE OUTCOMES: On successful completion of the course, a student will be able to

- 1.prepare documents and fill applications needed for filing a patent, design, copy right and trade mark
- 2.ensure smooth transition from concept to final product.
- 3.exercise discretion in following ethical aspects in dealing with intellectual property rights.

DETAILED SYLLABUS:

UNIT - I: OVERVIEW OF INTELLECTUAL PROPERTY RIGHTS

Introduction and importance of intellectual property rights (IPRs), types of intellectual property, International scenario in IPR: WIPO, WTO, TRIPS, international and national patent acts: United States of America patent act, United Kingdom patent act, India patent act, recent amendments in India patent act 1972.

UNIT - II: PATENTS

Introduction, Basic concepts, object and value of patent law, advantages of patent to inventor, patentable inventions, Not patentable inventions, overview of patent procedure, Bio technology patents, patents on computer program, patent rights on micro organism, plant breeding and breeders right, protection of bio diversity, protection of traditional knowledge, infringement of patents and remedy for infringement.

UNIT - III: TRADEMARKS

Trade Marks: Basic concepts, definition, functions, kinds of trademarks: service trademarks, collective trademarks, certification trademarks, textile trade marks, registrable and non registrable trademarks, registration of trademarks, examination process, establishing trade mark right, good will, infringement and action for trademarks, passing off, trade mark and eco label, comparison with patents industrial design and copy right.

UNIT - IV: INDUSTRIAL DESIGN, TRADE SECRETS & CYBER LAWS

Industrial Design: Basic concepts, scope and nature of rights, process of registration rights, rights after registration, transfer of interest or rights, reliefs and remedies and action for infringement of rights, appeals.

Trade Secrets: Definition, significance, tools to protect trade secrets in India

Cyber laws: Co relation to intellectual property

UNIT - V: COPY RIGHTS

Copy Rights: Introduction, nature and scope, subject matter, related or allied rights, works in which copy rights subsists, registration of copy rights, conferred by copy right, copy right protection in India, transfer of copy rights, right of broad casing organizations and of performer, computer software.

TEXT BOOKS:

- 1.P.Narayan, *Intellectual Property Law*, Eastern Law House, New Delhi and Kolkata, 2005,
- 2.Deborah E. Bouchoux, *Intellectual Property Rights*, Cengage Learning, India edition, 2011.

REFERENCE BOOKS:

- 1.Bainbridge David, *Intellectual Property Rights: Key to New Wealth*, National Research Development Corporation, Pearson Education, New Delhi.
- 2.W.R. Cornesh, *Intellectual Property Rights: Patent, Copy Right, Trade Mark, Allied Rights*, Universal law publishing private limited, Delhi, 2001.
- 3.S.R. Myneni, *Law of Intellectual Property*, Asia law house, Hyderabad 2001.
- 4.Prabuddha Ganguly, *Intellectual Property Rights: Unleashing Knowledge Economy*, TMH New Delhi, 1st edition, 2001.

IV B.Tech. I Semester
14BT60308: MANAGING INNOVATION AND
ENTREPRENEURSHIP

(Open Elective)
(Common to ECE, EEE, EIE & CE)

Internal Marks	External Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITE(S): Nil

COURSE DESCRIPTION: Evolution of entrepreneurship from economic theory Managerial and entrepreneurial competencies; Concepts Shifting Composition of the Economy Purposeful Innovation and 7 Sources of Innovative Opportunity The Innovation Process; Innovative Strategies; Entrepreneurial Motivation; Entrepreneurs versus inventors; Ethics and International Entrepreneurship; Strategic Issues in International Entrepreneurship; Problem solving Innovation and Diversification.

COURSE OUTCOMES: On successful completion of the course a student will be able to

- 1.define, explain and illustrate theories of business innovation and entrepreneurship, the evolution of industries and economies, and the roles of Entrepreneurs.
- 2.work effectively in multidisciplinary, cross-cultural teams, towards the development of a Team Project.
- 3.develop a comprehensive and well-structured business plan for a new venture.
- 4.present a persuasive business plan to potential investors or to internal stakeholders and effectively answer probing questions on the substance of the plan.

DETAILED SYLLABUS:

UNIT - I: ENTREPRENEURSHIP

Introduction to Entrepreneurship: Evolution of entrepreneurship from economic theory; Managerial and entrepreneurial competencies, entrepreneurial growth and development.

UNIT - II: CREATIVITY AND INNOVATION

Creativity and Innovation: Concepts Shifting Composition of the Economy; Purposeful Innovation & the 7 Sources of Innovative Opportunity; The Innovation Process; Innovative Strategies: Strategies that aim at introducing an innovation, innovation & entrepreneurship, planning - incompatible with Innovation & entrepreneurship.

UNIT - III: THE INDIVIDUAL ENTREPRENEUR

Entrepreneurial Motivation: Need for continuous learning & relearning;
Acquiring Technological Innovation Entrepreneurial motivation (nAch story);
Achievement Motivation in Real life - Case Study. Entrepreneurs versus inventors.

UNIT - IV: INTERNATIONAL ENTREPRENEURSHIP OPPORTUNITIES

International Entrepreneurship: Concepts and Nature of International Entrepreneurship. The changing International environment. Ethics and International Entrepreneurship. Entrepreneurial entry in to international business, strategic Issues in International Entrepreneurship.

UNIT - V: CREATIVE PROBLEM SOLVING

Problem Identification and Problem Solving: Problem Identification.
Problem solving Innovation and Diversification.

TEXT BOOKS:

1. Martin, M.J., *Managing Innovation and Entrepreneurship in Technology based Firm*, John Wiley Interscience, 1994.
2. Ettl, J.E., *Managing Technology Innovation*, John Wiley & Sons, 2000.
3. Robert D Hisrich., Michael P Peters., Dean A Shepherd, *Entrepreneurship*, Mc Graw-Hill Companies, 6th Edition, 2011

REFERENCE BOOKS:

1. Christensen, C. M. and Raynor, M. E. *The Innovators Solution: Creating and Sustaining Successful Growth*, Boston, MA: Harvard Business School Press, (2003).
2. Drucker, P. F., *Innovation and Entrepreneurship*, New York: Harper, 1985.
3. *Harvard Business Review on Innovation (Collection of articles)*, Harvard Business School Press (2001).
4. *Harvard Business Review on Entrepreneurship (Collection of articles)*, Harvard Business School Press (1999)
5. Rogers, E.M., *Diffusion of Innovations*, New York: Simon and Schuster, 5th edition, 2003.
6. Drucker, P. F. *The Discipline of Innovation*, Harvard Business Review, May 2000. (Originally published 1985, May-June)

IV B.Tech. I Semester
14BT60309: MATERIALS SCIENCE

(Open Elective)

(Common to ECE, EEE, EIE & CE)

Internal Marks	External Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITE(S): Engineering Physics, Engineering Chemistry.

COURSE DESCRIPTION: Structure and Bonding in metals; Steels, Cast Irons and Non Ferrous alloys; Material Selection for conductors, Insulators and semiconductors; Strengthening mechanisms of metals; Plastics and Ceramics as Insulators; AC and DC properties of Insulators; Semiconductors and Magnetic materials; Composite materials in Electrical and Electronics engineering, Material Selection and manufacturing of Optical fibers

COURSE OUTCOMES: On successful completion of the course a student will be able to

1. understand how materials are formed and their classification based on atomic arrangement.
2. illustrate how the design of the various types of steels, cast Irons and Non ferrous alloys influence various engineering applications.
3. understand the basic difference in properties of various conductors, Insulators and Semiconductors and application of various advanced materials for different branches of Engineering.

DETAILED SYLLABUS:

UNIT - I: INTRODUCTION TO MATERIALS SCIENCE

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 - determination of grain size.

Constitution of alloys: Necessity of alloying, types of solid solutions, Hume Rotherys rules, intermediate alloy phases and electron compounds.

UNIT - II: CAST IRONS, STEELS & NON-FERROUS METALS

Structure and properties of White Cast iron, Malleable Cast iron, grey cast iron, Spheroidal graphite cast iron, Alloy cast irons. Classification of steels, structure and properties of plain carbon steels. Structure and properties of Copper and its alloys, Aluminum and its alloys.

UNIT - III: ELECTRIC CONDUCTORS & INSULATORS

Type of materials selected for conductors, Insulators and semi conductors. Introduction to ceramics - Bonding and microstructure - DC properties of ceramic materials - AC properties - mechanical properties - Ceramics as Conductors, Insulators and capacitors, introduction to Plastics - DC properties - AC properties - mechanical properties.

UNIT - IV: SEMI CONDUCTORS AND MAGNETIC MATERIALS

Fabrication of Semiconductors - Producing a silicon wafer - Lithography and Deposition - Packaging of semiconductors materials - Types of magnetic materials - Measuring magnetic properties - Application of soft magnetic materials in Electromagnets and relays, AC transformers, Generators and motors.

UNIT -V: ADVANCED MATERIALS AND APPLICATIONS

Composites - Fiber reinforced, Metal Matrix, Ceramic Matrix - properties and applications; Ceramics - Alumina, Zirconia, Silicon Carbide, Sialons, Reaction Bonded Silicon Nitride(RBSN), Glasses - properties and applications, manufacturing of Optical fibers.

TEXT BOOKS:

- 1.Kodigre V D, *Material Science and Metallurgy*, Everest Publishing House, Pune, 31st edition, 2011.
- 2.Ian. P. Jones, *Material Science for Electrical and Electronic Engineers*, Oxford University Press, New Delhi,2000

REFERENCE BOOKS:

- 1.V. Raghavan, *Physical Metallurgy: Principles and Practices*, PHI, New Delhi, 2nd edition, 2006.
- 2.William. D. Callister, *Materials Science & Engineering - An Introduction*, John Wiley and sons, New Delhi, 6th edition, 2002.
- 3.A.J. Dekkar, *Electrical Engineering Materials*, PHI, New Delhi, 1970.

IV B. Tech. I Semester
14BT60502: ENGINEERING SYSTEMS ANALYSIS
AND DESIGN

(Open-Elective)
(Common to ECE, EEE, EIE & CE)

Internal Marks	External Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITE(S): Nil

COURSE DESCRIPTION: Overview of the Systems Process, Technologies for systems, System Development Life Cycle, system Analysis and Modeling, levels of management, Project Management, Systems Implementation and importance of UML Prototyping, Maintaining and Managing the Systems output Process.

COURSE OUTCOMES: On successful completion of the course a student will be able to

- gain knowledge on
 - systems Process and System Design
 - systems Analysis and Modeling
 - system Development Life Cycle
 - design Management and Maintenance Tools.
- design, Develop and implement new Techniques for modeling the systems.
- apply the CASE Tools for System Process and estimation the given models.
- work effectively as team member on projects
- manage and Maintain the System Process.

DETAILED SYLLABUS:

UNIT - I: INTRODUCTION

Introduction - Systems, Types of systems, integrating technologies for systems, Need for system analysis and design, Roll of the systems analyst, the system development life cycle, CASE tools for analysis and design.

UNIT - II: ANALYSIS AND MODELING ORGANIZATIONAL SYSTEMS

Organization as system, System Analysis, Depicting systems graphically, Use case Modeling, levels of management, organizational culture.

UNIT - III: PROJECT MANAGEMENT

Project initiation, Problem in organization, Determining feasibilities, ascertaining hardware and software needs, identifying, forecasting, comparing costs and benefits, activity planning and control, managing the project.

UNIT - IV: OBJECT ORIENTED ANALYSIS AND DESIGN USING UML

Object oriented analysis and design- Introduction, Object modeling, Dynamic modeling, functional modeling, packages and other UML artifacts, the importance of using UML for modeling.

UNIT - V: DESIGNING EFFECTIVE OUTPUT

Output design objectives, relating output content to output method, realizing how output bias affects users, designing output for display, Case studies - Designing a web site management, online exam management.

TEXT BOOKS:

- 1.Kenneth E.Kendall and Julie E.Kendall, *System analysis and Design*, 8th edition, Pearson Education, India, 2011.

REFERENCE BOOKS:

- 1.Dennis, Wixom, and Roth, *Systems Analysis and Design*, 5th edition, John Wiley, 2012.
- 2.Shelly and Rosenblatt, *Systems Analysis and Design*, 9th edition, Cengage Learning, 2012.

IV B. Tech. I Semester
14BT71005: MICROELECTROMECHANICAL
SYSTEMS

(Open-Elective)
(Common to ECE, EEE, EIE & CE)

Internal Marks	External Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITE(S): Basic knowledge in Physics.

COURSE DESCRIPTION: Overview of Micro Electro Mechanical Systems (MEMS), scaling laws, working principles of microsensors and microactuators, materials, microfabrication processes, packaging of Microsystems.

Course Outcomes: On successful completion of the course, a student will be able to

- 1.demonstrate knowledge on MEMS devices, scaling laws, microsensors and microactuators.
- 2.identify the suitable materials, fabrication techniques, packaging methodologies to develop MEMS devices.

DETAILED SYLLABUS:

UNIT - I: OVERVIEW OF MEMS AND SCALING LAWS

Introduction, MEMS and microelectronics, miniaturization, applications of MEMS in the automotive industry and in other industries.

Scaling laws of miniaturization: Introduction to scaling, scaling in: geometry, rigid - body dynamics, electrostatic forces, electromagnetic forces, Electricity, Fluid mechanics, Heat transfer.

UNIT - II: WORKING PRINCIPLES OF MICROSYSTEMS

Microsensors, acoustic wave sensors, biomedical and biosensors, chemical sensors, pressure sensors, thermal sensors. Microactuation: actuation using thermal forces, shape-memory alloys, piezoelectric crystals, electrostatic forces. MEMS with microactuators, microgrippers, micromotors, microvalves, micropumps.Microaccelerometers, microfluidics.

UNIT - III: MATERIALS FOR MEMS AND MICROSYSTEMS

Substrate and wafers, silicon as a substrate material, silicon compounds, silicon piezoresistors, gallium arsenide, quartz, piezoelectric crystals, polymers, carbon nano tube (CNT), development of CNTs, application of CNTs.

UNIT - IV: MEMS FABRICATION PROCESS AND MICROMANUFACTURING

Photolithography, ion implantation, diffusion, oxidation, chemical vapor deposition, physical vapor deposition, deposition by epitaxy, etching, bulk micromanufacturing, surface micromanufacturing, LIGA process.

UNIT - V: MEMS PACKAGING

Introduction to microsystem packaging, objectives and general considerations in packaging design, three levels of microsystem packaging, interfaces in microsystem packaging, packaging technologies, three-dimensional packaging, selection of packaging materials, signal mapping and transduction, Design case: Pressure sensor packaging.

TEXT BOOKS:

1. Tai-Ran Hsu, *MEMS & Microsystems, Design and Manufacture*, McGraw Hill Education (India) Pvt. Ltd., 2002.

REFERENCE BOOKS:

1. G.K. Ananthasuresh, K.J. Vinoy, *Micro and Smart Systems*, Wiley India, 1st edition, 2010
2. Nitaigour Premchand Mahalik, *MEMS*, McGraw Hill Education (India) Pvt. Ltd., 8th reprint, 2013.

IV B.Tech. I Semester
14BT61203: BIO INFORMATICS

(Open Elective)
(Common to ECE, EEE, EIE & CE)

Internal Marks	External Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITE(S): Nil

COURSE DESCRIPTION:

Introduction to Bioinformatics; Biology and Information; Sequence alignment and dynamic programming; Primary databases, Secondary databases and their use in Bioinformatics.

COURSE OUTCOMES: On successful completion of the course, a student will be able to

- 1.demonstrate knowledge on concepts of biological databases, Genome and proteome.
- 2.analyze biological database management system.
- 3.create, select and apply appropriate techniques and tools to manage the biological data.

DETAILED SYLLABUS:

UNIT - I: INTRODUCTION TO BIOINFORMATICS

Internet basics, Scope of bioinformatics, elementary commands and protocols, ftp, telnet, http, primer on information theory, introduction to perl and bioperl.

UNIT - II: BIOLOGY AND INFORMATION

Bioinformatics, Computers in Biology and Medicine, The Virtual Doctor, Biological Macromolecules as Information Carriers.

UNIT - III: SEQUENCE ALIGNMENT AND DYNAMIC PROGRAMMING

Heuristic alignment algorithms, global sequence alignments - Needleman-Wunsch algorithm, local sequence alignments - smith-waterman algorithm, amino acid substitution matrices - PAM and BLOSUM, Multiple sequence alignment and phylogenetic analysis.

UNIT - IV: PRIMARY DATABASES AND THEIR USE

Introduction to biological databases - organization and management, searching and retrieval of information from the World Wide Web, Structure databases - PDB (Protein Data Bank), Molecular Modeling Databases (MMDB), primary databases NCBI, EMBL, DDBJ.

UNIT-V: SECONDARY DATABASES

Introduction to secondary databases - organization and management of databases Swiss-Prot, Uniprot and PIR, Introduction to biochemical databases - organization and Management of databases, KEGG, ExpASy, BRENDA.

TEXT BOOKS:

1. David W. Mount, *Bioinformatics: Sequence and Genome Analysis*, CSHL Press, 2nd edition, 2005.

REFERENCE BOOKS:

1. Hooman H. Rashidi and Lukas K. Buehler, *Bioinformatics Basics, Applications in Biological Science and Medicine*, CRC Press, Taylor & Francis Group, 2nd edition, 2005.
2. Rastogi S. C., Namita Mendiratta, Parag Rastogi, *Bioinformatics: Methods and Applications: Genomics, Proteomics and Drug Discovery*, PHI Learning Pvt. Ltd., 3rd edition, 2011.

IV B.Tech. I Semester
14BT61204: CYBER SECURITY AND LAWS
(Open Elective)
(Common to ECE, EEE, EIE & CE)

Internal Marks	External Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITE(S): Nil

COURSE DESCRIPTION:

Cyber Crimes and Indian IT Act; Cyber Offenses; Tools and Methods used in Cyber Crime; Phishing and Identity Theft; Indian and Global Perspective on Cyber Crimes and Cyber Security; Organizational Implications on Cyber Security; IPR Issues; Cyber Crime and Terrorism; Cyber Crime Illustrations.

COURSE OUTCOMES: On successful completion of the course, a student will be able to

- 1.demonstrate knowledge in Cyber security, Cyber crimes and its related laws in Indian and Global Act.
- 2.analyze the legal perspectives and laws related to cyber crimes in Indian context.
- 3.apply security and privacy methods in development of modern applications and in organizations to protect people and to prevent cyber crimes.

DETAILED SYLLABUS:

UNIT-I : INTRODUCTION TO CYBER CRIMES

Introduction, Definition, Origin, Cyber Crime and Information Security, Cyber Criminals, Classifications of Cyber Crimes, The Legal Perspectives and Indian Perspective, Cyber Crime and Indian ITA 2000, Global Perspective on Cyber Crimes.

Cyber Offenses: Introduction, Criminals Planning on Attacks, Social Engineering, Cyber Stalking, Cyber Cafe and Crimes, Botnets.

UNIT-II : TOOLS AND METHODS USED IN CYBER CRIME

Introduction, Proxy Servers and Anonymizers, Phishing, Password Cracking, Key loggers and Spywares, Virus and Worms, Trojan horses and Backdoors, Steganography, DoS and DDoS attacks.

Phishing and Identity Theft: Introduction, Phishing, Identity Theft (ID Theft).

UNIT - III: CYBER CRIMES AND CYBER SECURITY - LEGAL PERSPECTIVES

Introduction, Cyber Crime and the legal landscape around the world. Cyber Laws in Indian Context, The Indian IT Act, Challenges to Indian Law and Cyber Crime Scenario in India, Consequences of not addressing the weakness in IT Act, Digital Signatures and the Indian IT Act, Cyber Crime and Punishment, Cyberlaw, Technology and Students in India Scenario.

UNIT - IV: CYBER SECURITY - ORGANIZATIONAL IMPLICATIONS

Introduction, Cost of Cyber Crimes and IPR issues, Web Threats for Organizations - Evils and Perils, Security and Privacy Implications from Cloud Computing, Social Media Marketing - Security Risks and Perils for Organizations, Social Computing and Associated Challenges for Organizations, Protecting People's Privacy in Organization, Organizational Guidelines for Internet Usage, Safe Computing and Usage Policy, Incident Handling and Best Practices, Media and Asset Protection.

UNIT - V: CYBER TERRORISM AND INFORMATION WARFARE

Introduction, Intellectual Property in the Cyber Space, the Ethical Dimension of Cyber Crimes, the Psychology, Mindset and Skills of Hackers and Cyber Criminals, Sociology of Cyber Criminals, Information Warfare.

Cyber Crime Illustrations: Indian Banks lose Millions of Rupees, Justice vs. Justice, Parliament Attack, The Indian case of online Gambling, Bank and Credit card related frauds, Purchasing goods and services scam, Nigerian 419 scam.

TEXT BOOK:

1.Nina Gobole, SunitBelapure, *Cyber Security: Understanding Cyber Crimes, Computer Forensics and Legal Perspectives*, Wiley India, 1st edition, 2011.

REFERENCE BOOKS:

- 1.Ferrara et al., *Cyber Law: Text and Cases*, Cengage Learning, 3rd edition, 2012.
- 2.VivekSood, *Cyber Law Simplified*, Tata McGraw-Hill, 1st edition, 2012.
- 3.Prashant Mali, *Cyber Law and Cyber Crimes*, Snow White Publications Pvt. Ltd., 1st edition, 2013.

IV B.Tech. I Semester
14BT70204: REACTIVE POWER COMPENSATION
AND MANAGEMENT
 (PROFESSIONAL ELECTIVE - II)

Internal Marks	External Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITE(S): Generation of electric power, Transmission of electric power, Power electronics, Power system operation and control.

COURSE DESCRIPTION: Need for reactive power compensation; reactive power compensation in transmission systems; reactive power coordination; quality of supply; demand side and distribution side management; reactive power management in domestic and industrial sectors.

COURSE OUTCOMES: On successful completion of the course, student will be able to

1. demonstrate knowledge on
 - different methods of load and line compensations.
 - types of load patterns and loss reduction methods in distribution system.
2. analyze different types of compensations.
3. design compensators for reactive power management in domestic , commercial and industrial applications.
4. apply the concepts of compensation for various real time applications.

DETAILED SYLLABUS:

UNIT - I: REACTIVE POWER COMPENSATION

The requirement for reactive power compensation, objectives in load compensation, ideal compensator, practical considerations, reactive power characteristics, power factor correction and voltage regulation. Load compensator as a voltage regulator, phase balancing and power factor correction of unsymmetrical loads - examples.

UNIT - II: REACTIVE POWER COMPENSATION IN TRANSMISSION SYSTEM

Steady state reactive power compensation - uncompensated line. Compensated transmission lines - types of compensation, passive compensation - shunt, series and dynamic shunt - examples. Transient state reactive power compensation - four characteristic time periods, passive shunt compensation. Static compensators - series capacitor compensation. Synchronous condensers - examples.

UNIT - III: REACTIVE POWER COORDINATION

Reactive power coordination - utility objectives, mathematical modeling, operation planning, transmission benefits. Quality in electric power supply - disturbances, steady state variations, effects of under voltages, frequency, harmonics, radio frequency and electromagnetic interferences. IEEE and IEC standards on power quality.

UNIT - IV: REACTIVE POWER MANAGEMENT

Demand side management - load patterns, load shaping, power tariffs, kVAR based tariffs, penalties for voltage flickers and harmonic voltage levels.

Distribution side management - system losses, loss reduction methods - examples. Reactive power planning in distribution systems - objectives, economics planning for capacitor placement and retrofitting of capacitor banks.

UNIT - V: REACTIVE POWER MANAGEMENT IN DOMESTIC AND INDUSTRIAL SECTORS

kVAR requirements for domestic appliance - purpose of using capacitors, selection of capacitors, deciding factors, types of available capacitors, characteristics and limitations. Typical layout of traction systems - reactive power control requirements. Electric arc furnaces. Textile and plastic industries. Furnace transformer. Filter requirements, remedial measures and power factor of an arc furnace.

TEXT BOOKS:

1. T.J.E. Miller, *Reactive power control in Electric power systems*, A Wiley-Interscience publications, New York, 1982.
2. D.M. Tagare, *Reactive power Management*, Tata McGraw-hill publishing company Ltd., New Delhi, 2004.

IV B.Tech. I Semester
14BT70205: SOFT COMPUTING TECHNIQUES
 (PROFESSIONAL ELECTIVE - II)

Internal Marks	External Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITE(S): Nil

COURSE DESCRIPTION: Architectures of artificial neural networks: feed forward and feedback networks, Learning strategies: Supervised; Un-supervised and reinforced; Fuzzy set theory; Fuzzy systems design; applications of neural networks and fuzzy systems, Terminologies and Operators of Genetic Algorithm; Encoding; Selection; Crossover; Mutation; Replacement.

COURSE OUTCOMES: On successful completion of the course, student will be able to

1. demonstrate the knowledge on learning strategies of an artificial neural network, components of fuzzy logic system and operators of genetic algorithm.
2. design fuzzy systems, neural networks and genetic algorithm for real time problems.
3. exhibit problem solving skills in fuzzy set theory and learning methods of neural networks.
4. apply various configurations of neural networks, fuzzy systems and genetic algorithms to different engineering applications.

DETAILED SYLLABUS:

UNIT - I: FUNDAMENTALS OF ARTIFICIAL NEURAL NETWORKS

Neural networks - introduction, artificial neural network, advantages, biological neural network, architectures of artificial neural networks - activation functions, important terminologies of ANN, Mcculloch - pitts neuron model, learning strategies - supervised, unsupervised, reinforced, learning rules - Hebbian learning rule, perceptron learning rule, delta learning rule, widrow - hoff learning rule, correlation learning rule, winner - take - all learning rule, out star learning rule, concept of linear separability with AND & XOR examples.

UNIT - II: SUPERVISED, UNSUPERVISED NETWORKS & ASSOCIATIVE MEMORIES

Supervised networks: back propagation neural network-architecture, training algorithm, learning factors - initial weights, steepness of the activation function, learning constant, momentum method and necessary number of hidden neurons. Un-supervised networks: Kohonen self-organizing map- competitive process, cooperation process, adaptive process, training algorithm. Counter propagation Networks-full counter propagation network - architecture, training algorithm.

Associative memories: concepts, Bidirectional Associative Memory (BAM) - architecture, discrete BAM - testing algorithm, analysis of hamming distance, energy function and storage capacity. Discrete Hopfield network-architecture and training algorithm.

Applications of artificial neural networks-short term electrical load forecasting, process identification.

UNIT - III: CLASSICAL AND FUZZY SETS

Introduction - classical sets - operations, properties. Fuzzy sets - operations, properties. Crisp relations - cardinality, operations, properties, cartesian product, composition. Fuzzy relations - cardinality, operations, properties, fuzzy cartesian product, composition. Linguistic hedges, membership functions - features, methods of membership value assignments - intuition, inference, rank ordering, neural networks, inductive reasoning.

UNIT - IV: FUZZY LOGIC SYSTEMS

Defuzzification: λ - cuts for fuzzy sets and fuzzy relations, defuzzification methods - max membership principle, weighted average, centroid, center of sums. Fuzzy rule base - formation of rules, decomposition of rules, aggregation of rules, - design procedure.

Applications of fuzzy logic- speed control of a dc motor, air conditioner control.

UNIT - V: GENETIC ALGORITHM

Introduction to evolutionary computing - GA, biological back ground of GA, terminologies and operators of GA - search space, individuals, genes, fitness function, population, encoding - binary encoding, breeding, selection - roulette wheel, rank selection, tournament, crossover - single point and two point crossovers, mutation - flipping, interchanging, reversing. Probabilities of cross over & mutation. Replacement - random, weak parent replacement. Termination criteria, flow chart, advantages, limitations and applications.

TEXTBOOKS:

- 1.S.N. Sivanandam, S.N. Deepa, *Principles of Soft computing*, Wiley India private Ltd., 2nd edition, 2013.
- 2.Timothy J Ross, *Fuzzy Logic with Engineering Application*, McGraw Hill Inc.1997.

REFERENCES BOOKS:

- 1.Jacek M. Zurada, *Introduction to Artificial Neural Networks*, Jaico Publishing House.
- 2.Simon Haykin, *Neural Networks - A Comprehensive Foundation*, Prentice-Hall Inc, 1999.

IV B.Tech. I Semester
14BT70206: ADVANCED MICROCONTROLLERS
(PROFESSIONAL ELECTIVE - II)

Internal Marks	External Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITE(S): Microprocessors and Microcontrollers

COURSE DESCRIPTION: Architecture, Instruction set and programming of ARM processor, PIC microcontroller

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

1. demonstrate knowledge on architecture of ARM and PIC microcontrollers.
2. critically analyze and develop a suitable interface with an appropriate microcontroller for control operations.
3. develop programs and design suitable hardware for stand-alone systems.
4. identify a suitable microcontroller for solving complex electrical engineering problems.

DETAILED SYLLABUS:

UNIT - I: ARM PROCESSOR

ARM processor fundamentals, registers, current program status register, pipeline, exceptions, core extensions, instruction set, thumb instruction set.

UNIT - II: ARM EXCEPTION AND INTERRUPT HANDLING, MEMORY MANAGEMENT

Exception handling, interrupts, interrupt handling schemes, memory protection unit, protected regions, memory management unit, virtual memory, details of ARM MMU.

UNIT - III: PIC MICROCONTROLLERS

PIC18F architecture and features. Memory organization - program memory, data memory. PIC Register file - General purpose registers and SFRs. Introduction to PIC Assembly Programming, PIC Data Format and Directives. PIC programming tools. Instruction set - data transfer, arithmetic, logical, bit manipulation, branch Instructions. I/O Port Programming. Addressing modes - Immediate, Direct, Register Indirect Addressing Modes. Macros and Modules.

UNIT - IV: SERIAL, INTERRUPT, I/O PORTS AND TIMER PROGRAMMING

I/O ports.Timer modules. Compare mode, capture mode. PIC Serial Port programming, PIC Interrupts, Programming Timer Interrupts, Programming the Serial Communication Interrupts, Port-B - Change Interrupt, Interrupt Priority in the PIC.

UNIT - V: PIC INTERFACING

ADC Characteristics, ADC Programming in the PIC, DAC Interfacing, Sensor Interfacing and Signal Conditioning, Standard and Enhanced CCP Modules, Compare Mode Programming, Capture Mode Programming, PWM Programming, ECCP Programming, Relays and Opto-isolators, Stepper Motor Interfacing, DC Motor Interfacing and PWM, PWM Motor Control with CCP, DC Motor Control with ECCP.

TEXT BOOKS:

1. Andrew N.Sloss, Dominic Symes, Chris Wright, *ARM system Developer's Guide, Designing and Optimizing Software*, Morgan Kaufmann Publishers, 2004.
2. M. Rafiquzzaman, *Microcontroller Theory and Applications with the PIC18F*, Wiley India Pvt. Ltd., 1st edition, 2014.

REFERENCE BOOKS:

1. John B.Peatman, *Design with PIC Microcontrollers*, Pearson Education, 2007.

IV B.Tech. I Semester
14BT60431: PRINCIPLES OF COMMUNICATION
(PROFESSIONAL ELECTIVE - II)

Internal Marks	External Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITE(S): Signals and Networks

COURSE DESCRIPTION: Fundamentals of Communications; Analog and digital communications - modulation and Demodulation Techniques; Information theory and coding.

COURSE OUTCOMES: On successful completion of the course students will be able to:

- 1.demonstrate fundamental knowledge in
 - Elements of communication systems.
 - Amplitude, Frequency, and Phase Modulators and De-Modulators
 - Data transmission and detection of digital signals
 - Information theory and coding techniques
- 2.perform analysis of different modulations and calculate total power & bandwidth in the modulated wave.
- 3.design and develop modulators and demodulators for communication systems
- 4.solve engineering problems for feasible and optimal solutions in the core area of Analog and Digital Communication Systems

DETAILED SYLLABUS:

UNIT - I: INTRODUCTION

Block diagram of Electrical Communication System, Types of Communications, Analog, Pulse and Digital types of Signals, Fourier Transform for various Signals, Fourier Spectrum, Power Spectral Density, Autocorrelation, Cross Correlation and Convolution.

UNIT - II: ANALOG MODULATION TECHNIQUES

Need for Modulation, Types of Amplitude Modulation, AM, DSBSC, SSBSC, Power and BW requirements, generation of AM, DSBSC, SSBSC, demodulation of AM: Diode detector, Product demodulation for DSBSC & SSBSC. Frequency & Phase Modulations, Advantages of FM over AM, Bandwidth consideration, Narrow band and Wide band FM, generation and demodulation of FM, Comparison of FM & PM.

UNIT - III: PULSE MODULATIONS

Sampling, Nyquist Rate of Sampling, Sampling theorem for Band limited Signals, PAM, Regeneration of Base band Signal, PWM and PPM, Time Division Multiplexing, Frequency Division Multiplexing, Asynchronous Multiplexing.

UNIT - IV: DIGITAL TRANSMISSION

Pulse Code Modulation: Advantages, Block diagram of PCM, Quantization, effect of Quantization, Quantization error, DM, ADM and Comparison.
Digital Modulation: ASK, FSK, PSK, QPSK, DPSK, Modulation and Demodulation, Coherent and Incoherent, Modems.

UNIT - V: INFORMATION THEORY AND CODING

Concept of Information, Entropy and Rate of Information, Coding efficiency, Shannon-Fano and Huffman Coding, Error Control Coding, Error Detection and Correction Codes, Block Codes, Convolutional Codes.

TEXT BOOKS:

- 1.R.P. Singh and S D Sapre, *Communication Systems - Analog and Digital*, TMH, 2nd edition 2007.
- 2.Simon Haykin, *Communication Systems*, John Wiley, 2nd edition 2007.

REFERENCE BOOKS:

- 1.H. Taub and D. Schilling, *Principles of Communication Systems*, TMH, 2nd edition, 1991.
- 2.Sam Shanmugam, *Digital and Analog Communication Systems*, John Wiley, 2006.

IV B.TECH. I SEMESTER
14BT70531: ADVANCED DATA STRUCTURES
(PROFESSIONAL ELECTIVE - II)

Internal Marks	External Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITE(S): Programming in C and Data Structures

COURSE DESCRIPTION: Concepts of Data Structure, Hashing, Linked List, Stacks, Queues, Trees and Graphs.

COURSE OUTCOMES: On successful completion of the course students will be able to:

- 1.gain Knowledge in
 - principles of Data Structures.
 - abstract Data Type.
 - linear and Non-linear Data Structures.
- 2.analyze and Identify suitable data structure design techniques for problem solving.
- 3.develop programs to implement linear and non liner data structures.

DETAILED SYLLABUS:

UNIT - I: LINKED LISTS

Introduction, Single Linked List, Circular Linked List, Doubly Linked List, Multiply Linked List, Applications.

UNIT - II: STACKS AND QUEUES

STACKS: Introduction, Stack Operations, Applications,

QUEUES: Introduction, Operations on Queues, Circular Queues, Applications.

LINKED STACKS AND LINKED QUEUES: Introduction, Operations on Linked Stack and Linked Queues, Dynamic Memory Management and Linked Stacks.

UNIT - III: BINARY TREES AND SEARCH TREES

BINARY TREES: Basic Terminology and Types, Representation of Binary Trees, Binary Tree Traversal, Applications.

SEARCH TREES: Introduction, Binary Search Trees, AVL Trees, Applications.

UNIT - IV: GRAPHS AND B TREES

GRAPHS: Introduction, Definitions and Basic Terminology, Representation of Graphs, Graph Traversals, Applications.

B TREES: Introduction, m-way Search Trees, B Trees, Applications.

UNIT - V: HASH TABLES

Introduction, Hash Table Structure, Hash Functions, Linear Open Addressing, Chaining, Applications.

TEXT BOOKS:

1. G.A.V. Pai, *Data Structures and Algorithms*, Tata McGraw Hill, 2nd edition, 2009.

REFERENCE BOOKS:

1. Richard Gileberg, Behrouz A. Forouzan, *Data Structures: A Pseudo code Approach with C*, 2nd edition, 2007.

2. Reema Thareja, *Data Structures Using C*, 2nd edition, Oxford University Press, 2014.

IV B.Tech. I Semester
14BT70221: POWER ELECTRONICS AND
DRIVES LAB

Internal Marks	External Marks	Total Marks	L	T	P	C
25	50	75	--	--	3	2

PREREQUISITE(S): DC Machines, Transformers and Induction Machines and Power Electronics

COURSE DESCRIPTION: Operation and characteristics of power devices like SCR, MOSFET and IGBT, working of various power electronic converters, AC and DC drives.

COURSE OUTCOMES: On successful completion of course the student will be able to

- 1.demonstrate knowledge on characteristics of power devices, converters and AC and DC drives.
- 2.analyze different power electronic devices and their characteristics.
- 3.design different triggering and commutation circuits for SCR.
- 4.evaluate and compare various parameters from the operation of converters and drives.
- 5.solve problems arising in motor control and converters using power devices.
- 6.function effectively as individual and as member in a team.
- 7.prepare a report that clearly communicate experimental observations/ findings.

DETAILED SYLLABUS:

Any eight of the experiments to be conducted from PART-A.

PART-A:

- 1.Characteristics of SCR, MOSFET & IGBT.
- 2.Gate firing circuits for SCR.
- 3.Forced commutation circuits for SCR.
- 4.Single phase half controlled bridge converter with R and RL loads.
- 5.Single phase fully controlled bridge converter with R and RL loads.

6. Single phase dual converter with RL loads.
7. DC Jones chopper with R and RL Loads.
8. Single phase AC voltage controller with R and RL Loads.
9. Single phase cycloconverter with R and RL loads.
10. Single phase parallel inverter with R and RL loads.
11. Single phase series inverter with R and RL loads.

Any Four of the experiments to be conducted from PART-B.

PART-B:

1. Speed control of separately excited DC motor using single phase semi converter.
2. Speed control of separately excited DC motor using single phase full converter.
3. Four quadrant chopper fed DC drive.
4. Speed control of single phase induction motor using cycloconverter.
5. Three phase fully controlled rectifier fed separately excited DC motor.
6. Speed control of single phase induction motor using IGBT based PWM inverter.

IV B.Tech. I Semester
14BT70222: POWER SYSTEMS AND
SIMULATION LAB

Internal Marks	External Marks	Total Marks	L	T	P	C
25	50	75	--	--	3	2

PREREQUISITE(S): Electric circuits lab, Electrical Systems and Simulation lab, Power System Operation and Control and Power System Analysis

COURSE DESCRIPTION: Relay testing; fault analysis; determination of sub-transient reactance; sequence impedances; sequence components and power angle characteristics of synchronous machine; determination of load flows, simulation of synchronous machine and load frequency problem using MATLAB software

COURSE OUTCOMES: On successful completion of the course, student will be able to

1. demonstrate knowledge on
 - determination of sequence parameters for synchronous machine and transformer.
 - power system protection and testing of relays.
 - The usage of MATLAB/SIMULINK.
 - various load flow methods and load frequency problem
2. analyze
 - faults on synchronous generator
 - the power flow in power system network using various load flow methods
 - protective schemes and testing of relays.
3. demonstrate skills in
 - obtaining the power angle characteristics of salient pole machine
 - obtaining various relay characteristics
 - determining phase sequence components of salient pole machine synchronous machine and transformer
 - identifying, selecting and developing suitable protection schemes for reliable operation of power system.
4. apply MATLAB
 - to determine Y-bus, Z-bus and power flow in power system network
 - to investigate load frequency problem using SIMULINK
5. execute real time projects in the field of power system operation and control.
6. function effectively as individual and as member in a team
7. communicate effectively both oral and written

LIST OF EXPERIMENTS:

PART A

Conduct any 6 experiments from the following:

1. Determination of sub-transient reactance's for salient pole synchronous machine.
2. Determination of sequence impedances for cylindrical rotor synchronous machine.
3. Fault analysis for LG, LL and LLG faults.
4. Reactive power compensation using tap changing transformer.
5. Power angle characteristic of three-phase salient pole synchronous machine.
6. Determination of sequence components for three phase transformer.
7. Characteristics of over current relay.
8. Characteristics of over voltage relay.
9. Testing of frequency relay.
10. Testing of reverse power relay.

PART B

Conduct any 6 experiments from the following:

1. Formation of bus admittance matrix with and without off-nominal ratios of transformer of a power system network using MATLAB
2. Formation of bus impedance matrix with and without mutual coupling of a power system network using MATLAB
3. Load flow solution by using MATLAB
4. Transient stability analysis using MATLAB
5. Economic dispatch using MATLAB
6. Modeling of standard test system with generator excitation and governor action using SIMULINK
7. Modeling and analysis of automatic load frequency control of multi-area power system using SIMULINK
8. Analysis of Transmission line parameters using PSCAD
9. Simulation of Capacitor switching transient using PSCAD
10. Transformer inrush currents measurement using PSCAD

IV B.Tech. I Semester 14BT70223: SEMINAR

Internal Marks	External Marks	Total Marks	L	T	P	C
-	50	50	-	-	-	2

PREREQUISITES: All the courses of the program up to III B. Tech. - II Semester.

COURSE DESCRIPTION:

Identification of topic for the seminar; Literature survey; Performing critical study and analysis of the topic identified; Preparation of report and presentation.

COURSE OUTCOMES:

On successful completion of seminar work, the student will be able to

1. demonstrate in-depth knowledge on the seminar topic.
2. analyze critically, chosen seminar topic for substantiated conclusions.
3. undertake investigation of issues related to seminar topic providing valid conclusions.
4. function effectively as individual on the chosen seminar topic.
5. develop communication skills, both oral and written for preparing and presenting seminar report.
6. engage in lifelong learning to improve knowledge and competence in the chosen field of seminar.

IV B.Tech. II Semester
14BT80201: UTILIZATION OF ELECTRICAL ENERGY

Internal Marks	External Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITE(S): DC Machines, Transformers and Induction Machines, Synchronous Machines

COURSE DESCRIPTION: Types of electric drives; types of industrial loads; load equalization concepts; Methods of electric heating, welding and their applications; Laws of illumination; different types of lamps; types of lighting scheme and their control; traction motor and its characteristics; electrification; electric braking; speed time curves for different services; specific energy consumption calculations.

COURSE OUTCOMES: On successful completion of the course, student will be able to

- 1.demonstrate knowledge on
 - different types of electric drives.
 - methods of electric heating, welding and illumination.
 - control of traction motors
 - mechanics of traction system
- 2.analyze
 - appropriate drive for the industrial purpose.
 - proper illumination strategy for good lighting system.
 - the traction system for better performance
- 3.design illumination system for proper lighting.
- 4.demonstrate skills in evaluating the illumination levels, performance of various electrical drives and traction effort.
- 5.apply suitable drive, heating, welding and illumination techniques for various purposes.

DETAILED SYLLABUS:

UNIT - I: LOAD CHARACTERISTICS OF ELECTRIC DRIVES

Types of electric drives,choice of motor, starting and running characteristics of motors, speed control. Temperature rise, types of industrial loads - continuous, intermittent and variable loads, load equalization. Industrial applications.

UNIT-II: ILLUMINATION

Introduction, terms used in illumination, laws of illumination, polar curves, photometry - integrating sphere. Sources of light - arc lamps, discharge lamps, mercury vapor and sodium vapor lamps, compact fluorescent lamp, comparison between tungsten filament lamps and fluorescent tubes. Basic principles of light control, types and design of good lighting schemes and practices, factory lighting, street lighting, flood lighting - problems.

UNIT- III: ELECTRIC HEATING AND ELECTRIC WELDING

ELECTRIC HEATING: Design of heating element, Advantages, methods and applications - resistance, induction and dielectric heating.

ELECTRIC WELDING: Classification, resistance and arc welding, electric welding equipment, comparison between AC and DC welding.

UNIT- IV: ELECTRIC TRACTION - I

Traction systems: 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, rheostatic and regenerative braking - numerical problems.

UNIT-V: ELECTRIC TRACTION - II

Speed-time curves for different services, trapezoidal and quadrilateral speed-time curves, train movement and energy consumption, mechanics of train movement - calculations of tractive effort, power output, specific energy consumption, effect of varying acceleration and braking retardation, dead weight, accelerating weight, adhesive weight, coefficient of adhesion - problems.

TEXT BOOKS:

1. J.B. Gupta, *Utilization of Electric Power and Electric Traction*, S.K. Kataria and Sons, 10th edition, 2013.
2. H. Partab, *Art and Science of Utilisation of Electrical Energy*, Dhanpat Rai & Co., 3rd edition, 2010.

REFERENCE BOOKS:

1. N.V. Suryanarayana, *Utilization of Electrical Power including Electric drives and Electric traction*, New Age International (P) Limited, Publishers, 1996.
2. C.L. Wadhwa, *Generation, Distribution utilization of Electrical Energy*, New Age International Pvt. Ltd, 2003.

IV B.Tech. II Semester
14BT80202: HVDC AND FACTS

Internal Marks	External Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITE(S): Power Electronics, Transmission of electric power, Power system operation and control.

COURSE DESCRIPTION: Introduction to high voltage transmission; converter and HVDC system control; harmonics and filters; FACTS concepts; static shunt, series compensators and combined compensators.

COURSE OUTCOMES: On successful completion of the course, student will be able to

1. demonstrate knowledge on
 - different conventional and modern methods for real and reactive power control in transmission system.
 - importance and operation of various HVDC and FACTS controllers in transmission system.
 - Various transformer and converter configurations used for HVDC and FACTS controllers.
2. analyze different converters and compensators for improving overall performance of the transmission system.
3. extend the applications of HVDC and FACTS devices to improve the overall performance of the transmission system.

DETAILED SYLLABUS:

UNIT - I: INTRODUCTION TO HIGH VOLTAGE DC TRANSMISSION

HVDC transmission system - Introduction, comparison of AC and DC transmission systems, application of DC transmission, types of DC links, typical layout of a HVDC converter station, introduction to HVDC converters, effect of pulse number, analysis of phase bridge circuit with and without overlap, converter bridge characteristics, equivalent circuit for rectifier and inverter configurations. Twelve pulse converters.

UNIT - II: CONVERTER AND HVDC SYSTEM CONTROL

Principles of DC link control, converter control characteristics, system control hierarchy. Firing angle control - current and extinction angle control, starting and stopping of DC link. Harmonics- Introduction, generation. AC and DC filters, reactive power requirements at steady state. Sources of reactive power, static VAR systems.

UNIT - III: FACTS CONCEPTS

Reactive power control in electrical power transmission, principles of conventional reactive power compensators. Introduction to FACTS, flow of power in AC parallel paths, meshed systems, basic types of FACTS controllers, definitions of FACTS controllers, brief description of FACTS controllers.

UNIT - IV: STATIC SHUNT AND SERIES COMPENSATORS

Shunt compensation - objectives of shunt compensation, methods of controllable VAR generation, static VAR compensators - SVC, STATCOM, SVC and STATCOM comparison. Series compensation - objectives of series compensation, thyristor switched series capacitors (TCSC), static series synchronous compensator (SSSC), power angle characteristics, basic operating control schemes.

UNIT - V: COMBINED COMPENSATORS

Unified power flow controller (UPFC) - Introduction, operating principle, independent real and reactive power flow controller and control structure. Interline power flow controller (IPFC), generalized and multidimensional FACTS controller.

TEXT BOOKS:

- 1.K.R. Padiyar, *High Voltage Power Transmission Systems Technology and System Interactions*, New age international Publishers, New Delhi, 2005.
- 2.Narain G.Hingorani, LasziGyugyi, *Understanding FACTS: Concepts and Technology of Flexible AC Transmission Systems*, IEEE press, Delhi, 2001.

REFERENCE BOOKS:

- 1.S Rao, *EHVAC, HVDC Transmission & Distribution Engineering*, Khanna Publishers, Delhi, 3rd edition, 2006.
- 2.Mohan Mathur, Rajiv K.Varma, *Thyristor - based FACTS controllers for Electrical Transmission Systems*, A John Wiley and Sons Publications, 2002.

IV B.Tech. II Semester
14BT80203: POWER QUALITY
(PROFESSIONAL ELECTIVE - III)

Internal Marks	External Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITE(S): Transmission of Electric Power

COURSE DESCRIPTION: Power quality terminology, power quality issues, classification; interruptions; different sources of power quality disturbances; harmonic distortion; harmonic indices; principles for controlling harmonics; power quality measuring equipment; power quality monitoring standards; power quality enhancement devices.

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

- 1.gain knowledge on various sources of power quality disturbances, power quality issues, standards, measuring equipment and power quality enhancement devices.
- 2.analyze the voltage sag, harmonic distortion due to commercial and industrial loads
- 3.design a suitable harmonic filter for industrial application.
- 4.apply suitable custom power devices for enhancement of power quality
- 5.practice the power quality standards for enhancement of efficiency and life of electric systems.

DETAILED SYLLABUS:

UNIT- I: INTRODUCTION TO POWER QUALITY

Power Quality - definition, terminology, issues, evaluation procedure, responsibilities of the suppliers and users of electric power, power quality standards, CBEMA and ITIC curves.

UNIT- II: POWER QUALITY DISTURBANCES

General classes of power quality problems - Impulsive and oscillatory transients, long duration voltage variations - over voltage, under voltage, sustained interruption, short duration voltage variations - interruption, sag, swell and outage. Sources of sags and interruptions, estimating voltage sag performance - overview of mitigation methods.

UNIT -III : FUNDAMENTALS OF HARMONICS

Harmonic distortion, voltage Vs current distortion, harmonics Vs transients, power system quantities under non - sinusoidal conditions, harmonic indices. Harmonic sources from commercial and industrial loads. Effects of harmonic distortion. Applied harmonics - harmonic distortion evaluation, principles of controlling harmonics, devices for controlling harmonic distortion. Harmonic filter design and standards on harmonics.

UNIT -IV: POWER QUALITY MONITORING

Power quality benchmarking, monitoring considerations, choosing monitoring locations, permanent power quality monitoring equipment, historical perspective of power quality measuring instruments, power quality measurement equipment - types of instruments, assessment of power quality measurement data, power quality monitoring standards.

UNIT- V: POWER QUALITY ENHANCEMENT USING CUSTOM POWER DEVICES

Custom power devices(principle of operation only) - introduction, network reconfiguring type - solid state current limiter(SSCL), solid state breaker(SSB), solid state transfer switch(SSTS). Compensating type - distribution static compensator (DSTATCOM), dynamic voltage restorer (DVR), unified power quality conditioner(UPOC).

TEXT BOOKS:

- 1.Roger C. Dugan, Mark F. Mc Granaghan, Surya Santoso, H.WayneBeaty, *Electrical Power Systems Quality*, 3rd edition, TMH Education Pvt. Ltd., 2012.
- 2.C. Sankaran, *Power quality*, CRC Press, 2002.

REFERENCE BOOKS:

- 1.Math H. J. Bollen, *Understanding Power quality problems*, IEEE Press, 2007.
- 2.Arindam Ghosh, Gerard Ledwich, *Power quality enhancement using custom power devices*, Kluwer academic publishers, 2002.

IV B.Tech. II Semester
14BT80204: RELIABILITY ENGINEERING AND
APPLICATIONS TO POWER SYSTEMS
 (PROFESSIONAL ELECTIVE - III)

Internal Marks	External Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITE(S): Power System Analysis

COURSE DESCRIPTION: Basic probability concepts, elements of probability theory; definition of reliability and component reliability, reliability functions; reliability evaluation of simple and complex system configurations; Markov chain & Markov process; frequency and duration concept; generation system model; transmission system model; basic reliability indices.

COURSE OUTCOMES: On successful completion of the course, student will be able to

1. demonstrate knowledge on
 - elements of probability theory and probability distributions
 - types of failures, reliability block diagram reductions
 - network reduction techniques and markov modelling
 - generation and load modelling
 - frequency and duration techniques
 - distribution system reliability indices
2. analyze
 - the failure rate distributions
 - the network reduction techniques
 - methods for identifying critical components
 - cumulative probability cumulative frequencies
 - generation system, customer, load and energy oriented indices
3. evaluate the power system networks using reliability concepts for adequacy and security

DETAILED SYLLABUS:

UNIT-I: PROBABILITY THEORY

Introduction - rules for combining probabilities of events - bernoulli's trials, probability density and distribution functions - examples.
 Probability Distributions - discrete distributions - binomial distribution, poisson distribution. Continuous distributions - exponential distribution, weibull distribution and normal distribution - mean, standard deviation, variance - examples.

UNIT - II: NETWORK MODELLING AND RELIABILITY FUNCTIONS

Reliability block diagrams - series, parallel systems and combined series-parallel systems - examples.
 Reliability evaluation of non series-parallel systems - decomposition method, cut-set method - deduction of the minimal cut-sets from the minimal paths, tie-set method - examples

Concept of redundancy - stand by redundant systems, perfect switching, imperfect switching.

Reliability analysis of series parallel networks using exponential distribution. Reliability functions $f(t)$, $F(T)$, $R(T)$, $H(T)$ and their relationships, bath tub curve, reliability measures - MTTF, MTTR, MTBF.

UNIT - III: MARKOV MODELLING AND FREQUENCY AND DURATION TECHNIQUES

Markov chain - concept of stochastic transitional probability matrix (STPM), evaluation of limiting state probabilities. Markov processes - time dependent probability evaluation - evaluation of limiting state probabilities using STPM - one, two component repairable models. Frequency and duration concept - evaluation of frequency of encountering state for one, two component repairable models - evaluation of cumulative probability and cumulative frequency of encountering of merged states.

UNIT - IV: GENERATION SYSTEM RELIABILITY ANALYSIS

Generation system reliability analysis - reliability model of a generation system - recursive relation for unit addition and removal. Load modelling - merging of generation load model - evaluation of transition rates for merged state model - cumulative probability, cumulative frequency of failure evaluation - LOLP, LOLE, LOEE - numerical problems.

UNIT - V: COMPOSITE SYSTEM AND DISTRIBUTION SYSTEM RELIABILITY ANALYSIS

Transmission system reliability analysis - system and load point reliability indices weather effects on transmission lines, weighted average rate and Markov model.

Distribution system reliability analysis - radial networks - evaluation of basic reliability indices, performance indices - load point and system reliability indices - customer oriented, loss and energy oriented indices - numerical problems.

TEXT BOOKS:

1. Roy Billinton and Ronald N Allen, *Reliability Evaluation of Engineering Systems*, Springer, 2nd edition, 2007.
2. Roy Billinton and Ronald N Allen, *Reliability Evaluation of Power Systems*, Springer, 2nd edition, 2007.

REFERENCE BOOKS:

1. V. Sankar, *System Reliability Concepts*, Himalaya Publishing House, 2015.
2. Charles E. Ebeling, *An Introduction to Reliability and Maintainability Engineering*, Tata McGraw-Hill, 2000.
3. E. Balagurusamy, *Reliability Engineering*, Tata McGraw Hill, 2003.

IV B.Tech. II Semester
14BT80205: EHVAC TRANSMISSION
(PROFESSIONAL ELECTIVE - III)

Internal Marks	External Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITE(S): Electromagnetic Fields, Transmission of Electric Power, Distribution of Electric Power, Power System Analysis

COURSE DESCRIPTION: Concept of EHVAC transmission; analysis and design of EHVAC lines; effects of EHVAC; Corona Effects; voltage control and compensation.

COURSE OUTCOMES: On successful completion of the course, student will be able to

- 1.demonstrate knowledge in
 - EHVAC conductor parameters, configurations, electrical and mechanical aspects for design and analysis.
 - corona interference, effects and relevant parameters in EHVAC systems.
 - electrostatic field interference and effects.
 - voltage control methods in EHVAC system.
- 2.analyze
 - various electrical parameters of different conductor configurations.
 - various parameters of corona phenomenon in EHVAC system.
- 3.demonstrate skills in design of EHV lines based on steady state and transient limits
- 4.demonstrate skills in evaluating various electrical and relevant parameters of different conductor configurations in EHVAC system

DETAILED SYLLABUS:

UNIT - I: TRANSMISSION LINE TRENDS AND PRELIMINARIES

Role of EHV AC transmission. Power handling capacity and line loss, costs of transmission lines and equipment. Mechanical considerations in line performance - numerical problems.

Line and Ground parameters:

Calculation of resistance of conductors. Properties of bundled conductors - bundle spacing, bundle radius and geometric mean radius of bundle. Inductance of EHV line configurations - Inductance of two conductors, multi-conductor lines (Maxwell's co-efficient) and bundled conductor lines. Line Capacitance calculation - sequence inductances and capacitances - line parameters for modes of propagation, ground return - numerical problems.

UNIT-II : VOLTAGE GRADIENTS OF CONDUCTORS

Electrostatics, field of sphere gap, field of line charges and their properties, charge - potential relations for multi-conductors. Surface voltage gradient on conductors - distribution of voltage gradient on sub conductors of bundle - numerical problems.

UNIT-III: CORONA EFFECTS

Power loss: corona loss formulae, charge-voltage (Q-V) diagram.

Audible noise (AN): generation, characteristics, limits and measurements of AN, relation between 1-phase and 3-phase AN levels - numerical problems.

Radio interference (RI): Corona pulses - generation, properties and frequency spectrum. Limits for radio interference fields. Lateral profiles of RI and modes of propagation, excitation function, measurement of RI, RIV and excitation functions - numerical problems.

UNIT-IV: ELECTROSTATIC FIELDS

Electrostatic field: calculation of electrostatic field of EHV lines, effect on humans, animals and plants - electrostatic induction in un-energized circuit of double-circuit line - electromagnetic interference - numerical problems.

UNIT-V: POWER-FREQUENCY VOLTAGE CONTROL AND OVER VOLTAGES

No-load voltage conditions and charging currents, voltage control - synchronous condenser, shunt and series compensation. StaticVAR compensation - numerical problems.

TEXT BOOKS:

1. Rakosh Das Begamudre, *Extra High Voltage AC Transmission Engineering*, New Age International Pvt. Ltd, 3rd edition, 2006.

REFERENCE BOOKS:

1. S. Rao, *EHVAC, HVDC Transmission and Distribution Engineering*, Khanna Publications, 2001.
2. Edison Electric Institution (GEC), *EHV Transmission line reference Book*, Edison House, 1968.

IV B.Tech. II Semester
14BT80206: SMART GRID TECHNOLOGY
(PROFESSIONAL ELECTIVE - III)

Internal Marks	External Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITE(S): Transmission of Electric Power and Power system Analysis

COURSE DESCRIPTION: Concept of smart grid; various information and communication technologies for smart grid; information security for smart grid; smart metering; energy management systems.

COURSE OUTCOMES: On successful completion of the course, student will be able to

- gain knowledge on:
 - Smart grid initiatives and technologies
 - Information and communication technologies, information security for the smart grid.
 - Sensing, measurement, control and automation.
- analyze various communication technologies required for real time smart grid applications.
- estimate fault currents and power flows in transmission and distribution systems.
- follow IEEE and IEC standards for Communication and Information technologies used for smart grid.

DETAILED SYLLABUS:

UNIT - I: SMART GRID

Introduction, ageing assets and lack of circuit capacity, thermal constraints, operational constraints, security of supply, national initiatives, early smart grid initiatives, active distribution networks, virtual power plant, other initiatives and demonstrations, overview of the technologies required for the smart grid.

UNIT - II: COMMUNICATION TECHNOLOGIES FOR THE SMART GRID

Data communications: Introduction, dedicated and shared communication channels, switching techniques, circuit switching, message switching, packet switching, communication channels, wired communication, optical fiber, radio communication, cellular mobile communication, layered architecture and protocols, the ISO/OSI model, TCP/IP.

Communication technologies: IEEE 802 series, mobile communications, multi-protocol label switching, power line communication, standards for information exchange, standards for smart metering, MODBUS, DNP3, IEC61850.

UNIT - III: INFORMATION SECURITY FOR THE SMART GRID

Introduction, encryption and decryption, symmetric key encryption, public key encryption, authentication, authentication based on shared secret key, authentication based on key distribution center, digital signatures, secret key signature, public key signature, message digest, IEC 62351: power systems management and association information exchange - data and communication security.

UNIT - IV: SMART METERING

Introduction, smart metering - evolution of electricity metering, key components of smart metering, smart meters: an overview of the hardware used - signal acquisition, signal conditioning, analogue to digital conversion, computation, input/output and communication.

Communication infrastructure and protocols for smart metering - Home area network, Neighborhood Area Network, Data Concentrator, meter data management system, Protocols for communication.

UNIT - V: TRANSMISSION AND DISTRIBUTION MANAGEMENT SYSTEMS

Data sources, energy management system, wide area applications, visualization techniques, data sources and associated external systems, SCADA, customer information system, modelling and analysis tools, distribution system modelling, topology analysis, load forecasting, power flow analysis, fault calculations, state estimation, applications, system monitoring, operation, management, outage management system.

TEXT BOOKS:

1. Janaka Ekanayake, Liyanage, Wu, Akihiko Yokoyama, Jenkins - *Smart Grid Technology and Applications*, Wiley Publications, 2012.
2. James Momoh, *Smart Grid: Fundamentals of Design and Analysis*, Wiley, IEEE Press, 2012.

REFERENCE BOOKS:

1. Raj Samani, *Applied Cyber Security and the Smart Grid*, Syngress Publishers, 2012.

IV B.Tech. II Semester
14BT60403: VLSI DESIGN
(PROFESSIONAL ELECTIVE - III)

Internal Marks	External Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITE(S): Switching Theory and Logic Design and Linear and Digital IC Applications.

COURSE DESCRIPTION: Introduction to the design and implementation of VLSI circuits for complex digital systems; CMOS technology; submicron design; clocking; subsystem design; CAD tools and algorithms; simulation; verification; testing and design methodology.

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

1. demonstrate knowledge in
 - understanding the Fabrication of MOS Transistors.
 - electrical properties of CMOS and BiCMOS Circuits
 - designing Static Combinational and Sequential logic at transistor level, including Mask layout.
 - estimating and optimizing combinational RC Circuit delay using RC delay models and logical effort.
 - design methodology and tools.
 - testing the chip at various abstraction levels.
2. perform analysis of Circuit Characterization and Performance Estimation of CMOS device and Create models of moderately sized CMOS circuits that realize specified digital functions.
3. formulate and solve technology specific problems in developing an IC circuit using EDA tools.
4. use modern design tools to IC devices to create system on - chip (SOC) designs in FPGAs.

DETAILED SYLLABUS:

UNIT - I: FABRICATION & ELECTRICAL PROPERTIES OF MOS

Introduction to MOS, CMOS and Bi-CMOS technology, Fabrication of NMOS and CMOS, basic Electrical Properties of MOS & BiCMOS Circuits: $I_{ds} - V_{ds}$ relationships, Threshold Voltage V_T , g_m , g_{ds} and Pass Transistor, nMOS inverter, Pull up to pull down ratio for an NMOS inverter, CMOS & Bi-CMOS Inverters.

UNIT - II: CMOS CIRCUIT DESIGN PROCESS

VLSI design flow, MOS layers, stick diagrams, n-MOS design style, CMOS design style, lambda based design rules, layouts for inverters, sheet resistance, capacitances of layers, Gate delays, Delay estimation, Driving large capacitive loads, Fan-in and Fan-out, choice of layers, Scaling and limitation of scaling.

UNIT - III: SUBSYSTEM DESIGN - I

Adders - Transmission based Adder, Carry look-ahead adder, Manchester carry chain adder, Carry Bypass Adder, Carry Skip Adder, Carry Select Adder , Shifters- Barrel Shifter, Logarithmic Shifter, Multipliers - Array Multiplier, Carry Save multiplier, Booth Multiplier, ALUs, Parity generators, Comparators, Zero/One Detectors

UNIT - IV: SUBSYSTEM DESIGN - II

Counters- Synchronous & Asynchronous Counter, High Density Memory Elements.

Design Approach, PLA, PAL - 22V10 PAL architecture, Programming of PALs, FPGAs, CPLDs, Cell based Design Methodology.

UNIT - V: SYNTHESIS AND CMOS TESTING

Types of Simulation, VHDL Synthesis, Layout Synthesis, Design capture tools, Design Verification Tools.

CMOS Testing: CMOS Testing, Need for testing, Test Principles, Chip level Test Techniques, System-level Test Techniques, Layout Design for improved Testability.

TEXT BOOKS:

- 1.Kamran Eshraghian, Eshraghian Douglas and A. Pucknell, *Essentials of VLSI Circuits and Systems*, PHI, 2005 Edition.
- 2.Weste and EShraghian, *Principles of CMOS VLSI Design*, Pearson Ed, 1999.

REFERENCE BOOKS:

- 1.John M. Rabaey, *Digital Integrated Circuits: A Design Perspective*, 2nd edition, PHI, 1997.
- 2.John. P. Uyemura, *Introduction to VLSI Circuits and Systems* - John Wiley, 2003.
- 3.Eugene D. Fabricius, *Introduction to Very Large Scale Integration Design* Paperback, Aug 1990, McGraw-Hill Education (ISE Editions).
- 4.Stephen Brown, ZvonkoVranesic, *Fundamentals of Digital Logic with VHDL Design*, TMH 2007.

IV B.Tech. II Semester
14BT80207: ENERGY AUDIT AND DEMAND SIDE
MANAGEMENT
 (PROFESSIONAL ELECTIVE - IV)

Internal Marks	External Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITE(S): Distribution of Electric Power, Electrical and Electronic Measurements, Transmission of Electric Power, Utilization of Electrical Energy, Power System Operation and Control.

COURSE DESCRIPTION: Energy Audit and energy management; energy efficient motors; lighting and energy instruments; demand side management and significance of energy economics.

COURSE OUTCOMES: On successful completion of the course, student will be able to

- 1.demonstrate knowledge on
 - energy auditing practices, energy conservation schemes
 - energy indices, graphical representations
 - energy management concepts
 - characteristics of energy efficient motors, good lighting
- 2.analyze
 - various energy instruments such as wattmeter, data loggers, thermocouples, pyrometers, lux meters, tongue testers
 - payback analysis, depreciation, taxes and tax credit
- 3.demonstrate skills in design for good lighting system
- 4.familiarize demand side management practices

DETAILED SYLLABUS:

UNIT - I: PRINCIPLES OF ENERGY AUDIT

Energy audit - definitions, concept, types of audit, energy index, cost index, pie charts, Sankey diagrams, load profiles, energy conservation schemes - energy audit of industries - energy saving potential, energy audit of process industry, thermal power station, building energy audit.

UNIT - II: ENERGY MANAGEMENT

Principles of energy management, organizing energy management program, initiating, planning, controlling, promoting, monitoring, reporting. Energy manger, Qualities and functions, language, Questionnaire - check list for top management.

UNIT - III: ENERGY EFFICIENT MOTORS AND LIGHTING

Energy efficient motors - factors affecting efficiency, loss distribution, constructional details, characteristics, variable speed, variable duty cycle systems, motor energy audit.

Lighting: Good lighting system design and practice, lighting control, lighting energy audit.

UNIT - IV: ENERGY INSTRUMENTS AND ECONOMIC ANALYSIS

Energy Instruments - watt meter, data loggers, thermocouples, pyrometers, lux meters, tongue testers. PLCs and applications.

Energy Economic Analysis - The time value of money concept.cash flow models, payback analysis, depreciation, taxes and tax credit - numerical problems.

UNIT - V: DEMAND SIDE MANAGEMENT

Introduction to DSM, concept of DSM, benefits of DSM, different techniques of DSM - time of day pricing, multi-utility power exchange model, and time of day models for planning. Load management, load priority technique, peak clipping, peak shifting, valley filling, strategic conservation, energy efficient equipment. Management and organization of energy conservation awareness programs.

TEXT BOOKS:

- 1.W.R. Murphy & G. Mckay Butter worth, *Energy management*, Heinemann publications, 2001
- 2.A S. Pabla, *Electrical Power distribution*,TMH, 5th edition, 2004.
- 3.Umesh Rathore, *Energy management*, S.K.Kataria& Sons, 2nd edition, 2014.

REFERENCES:

- 1.W.C.Turner, *Energy management hand book*, John wiley and sons.
- 2.D.P.Sen, K.R.Padiyar, IndraneSen, M.A.Pai, *Recent Advances in Control and Management of Energy Systems*, Interline Publisher, Bangalore, 1993.
- 3.Ashok V. Desai, Wiley Eastern, *Energy Demand - Analysis, Management and Conservation Hand book on energy auditing - TERI* (Tata Energy Research Institute), 2005

IV B.Tech. II Semester
14BT80208: POWER SYSTEM DEREGULATION
(PROFESSIONAL ELECTIVE - IV)

Internal Marks	External Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITE(S): Power System Operation and Control

COURSE DESCRIPTION: Various entities and their operational aspects in deregulated power system; types of electricity markets and trading arrangements; transmission cost allocation methods and their comparison; different types of ancillary services and their management; calculation of available transfer capabilities and electricity pricing & forecasting methods.

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

- 1.demonstrate knowledge on:
 - operation of deregulated power systems.
 - key issues of electricity markets models and their functions in different scenarios.
 - electricity pricing methods and ancillary service management in competitive market.
- 2.develop skills to envisage market models to provide power exchange among various entities of deregulated power system.
3. implement the forecasting methods for minimizing the energy price, transmission losses and to regulate congestion in tie-lines of interconnected deregulated power system.

DETAILED SYLLABUS:

UNIT - I: DEREGULATION OF ELECTRIC UTILITIES

Introduction - Traditional central utility model, reform motivations, separation of ownership and operation, competition and direct access in the electricity market, independent system operator (ISO), retail electric providers, different experiences.

UNIT - II: COMPETITIVE WHOLESALE ELECTRICITY MARKETS & TRANSMISSION OPEN ACCESS

Introduction, ISO, wholesale electricity market characteristics, market model, challenges. Transmission open access: Trading arrangements - the pool and bilateral trade - multilateral trades, congestion management.

UNIT - III: TRANSMISSION COST ALLOCATION METHODS

Introduction, Postage Stamp Rate Method - Contract Path Method - MW - Mile Method - Unused Transmission Capacity Method - MVA - Mile method - Comparison of cost allocation methods.

UNIT - IV: MARKET POWER & ANCILLARY SERVICES MANAGEMENT

Market power: Introduction - different types of market Power, mitigation of market power - Examples.

Ancillary services: Introduction, reactive power as an Ancillary Service - a review, synchronous generators as ancillary service providers.

UNIT - V: TRANSFER CAPABILITY CALCULATIONS AND ELECTRICITY PRICING

Transfer Capability calculations: definitions, transfer capability calculations - ATC, TTC, TRM, CBM calculations. Calculation of ATC based on power flow.

Electricity Pricing: Introduction, electricity price volatility, electricity price indexes, challenges to electricity pricing, construction of forward price curves, short-time price forecasting.

TEXT BOOKS:

1. Loi Lei Lai, *Power System Restructuring and Deregulation*, John Wiley & Sons Ltd., England, 2001.

REFERENCE BOOKS:

1. Kankar Bhattacharya, Math H.J. Boller and Jaap E. Daalder, *Operation of Restructured Power System*, Kulwer Academic Publishers, 2001.

2. Mohammad Shahidepour and Muwaffaq Alomoush, *Restructured Electrical Power Systems*, Marcel Dekker, Inc., New York, 2001.

IV B.Tech. II Semester
14BT80209: SOLAR AND WIND ENERGY
CONVERSION SYSTEMS

(PROFESSIONAL ELECTIVE - IV)

Internal Marks	External Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITE(S): Generation of Electric Power and Power Electronics

COURSE DESCRIPTION: Non-Conventional energy resources; Wind and Solar energy systems: design and operation; Power Conditioning Schemes for Solar and Wind Energy systems; Electrical Performance

COURSE OUTCOMES: on successful completion of the course, the student will be able to

- 1.gain advanced knowledge on role of power electronics for renewable energy.
- 2.analyze the power conditioning schemes for grid connected systems.
- 3.develop skills in designing wind, solar systems and their integration.

DETAILED SYLLABUS:

UNIT - I: DESIGN AND OPERATION OF WIND POWER SYSTEM

Wind Power System: Components, Turbine Rating, Electrical Load Matching, Variable-Speed Operation, System Design Features, Maximum Power Operation, System Control Requirements, Speed Control, Rate Control and Environmental Aspects. Wind Energy Conversion Systems and their Classification.

UNIT - II: DESIGN AND OPERATION OF PV SYSTEM

Solar Photovoltaic Power System: The PV Cell, Module and Array, Equivalent Electrical Circuit, Open Circuit Voltage and Short Circuit Current, I-V and P-V Curves, Array Design, Peak Power Point Operation, PV System Components.

Solar Thermal System: Energy Collection, Synchronous Generator, Equivalent Electrical circuit, Excitation Methods, Electrical Power Output, Transient Stability Limit, Commercial Power Plants.

UNIT - III: POWER CONDITIONING SCHEMES FOR SOLAR ENERGY SYSTEMS

Switching devices for solar energy conversion: DC power conditioning converters, maximum power point tracking algorithms, AC Power conditioners, Line commutated inverters, synchronized operation with grid supply, Harmonic reduction.

UNIT - IV: WIND ENERGY CONVERSION SYSTEMS

Wind energy Conversion system (WECS): Performance of Induction generators for WECS, Self - excited induction generator (SEIG) for isolated power generators. Controllable DC power from SEIGs, system performance, Grid related problems, generator control, AC voltage controllers, Harmonic reduction and Power factor improvement.

UNIT - V: POWER QUALITY ISSUES IN INTEGRATION OF RENEWABLE ENERGY RESOURCES

Stand alone and Grid connected systems, Power Quality issues, Impact of power quality problems on DG, Mitigation of power quality problems, Role of custom power devices in Distributed Generation.

TEXT BOOKS:

1. Mukund. R. Patel, *Wind and Solar Power Systems*, CRC Press, 1999.
2. G.D. Rai, *Non-Conventional Energy Resources*, Khanna Publishers, 2002.

REFERENCES:

1. Daniel, Hunt. V, *Wind Power - A Hand Book of WECS*, Van Nostrend Co., Newyork, 1998.
2. Arindam Ghosh, Gerard Ledwich, *Power Quality Enhancement Using Custom Power Devices*, Springer, 2002.
3. Roger C. Dugan, Mark E. Mc. Granaghan, Surya Santosoh and H. Wayne Beaty, *Electrical Power Systems Quality*, TATA Mc Graw Hill, 2nd edition, 2010.

IV B.Tech. II Semester
14BT70402: EMBEDDED SYSTEMS
(PROFESSIONAL ELECTIVE - IV)

Internal Marks	External Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITE(S): Microprocessors and Microcontrollers.

COURSE DESCRIPTION: Introduction to Embedded System; State Machines and Concurrent Process Models; Various Communication interfacing Models; RTOS Concepts; Target Architectures.

COURSE OUTCOMES: On successful completion of this course the students will be able to:

- 1.demonstrate knowledge on Communication Interfacing Models, Processor Technology, State Machines, Kernel Objects, ARM and SHARC Controllers.
- 2.analyze Various problems in Optimization of Single Purpose Processor, synchronization among the Processes, Clock Driven and Event Driven scheduling and Debugging Techniques
- 3.design and develop embedded system to suit a particular Application.
- 4.choose suitable Hardware and software components of a system that Work together to solve engineering problems to exhibit a specific behavior.

DETAILED SYLLABUS:

UNIT - I: INTRODUCTION

Embedded systems overview, classification, applications, design challenge, processor technology, IC technology, Design Technology, Trade-offs. Single purpose processors RT-level combinational logic, sequential logic (RT-level), custom single purpose processor design (RT-level), optimizing custom single purpose processors, Basic architecture, operation, Pipelining, Programmer's view, development environment.

UNIT - II: STATE MACHINE AND CONCURRENT PROCESS MODELS

Introduction, models versus languages, finite state machines with data path model (FSMD), using state machines, program state machine model (PSM), concurrent process model, concurrent processes, communication among processes, synchronization among processes, implementation, data flow model.

UNIT - III: COMMUNICATION INTERFACE

Need for communication interfaces, RS232 / UART, RS422 / RS485, USB, Infrared, IEEE 1394 Fire wire, Ethernet, I2C bus and CAN.

UNIT - IV: RTOS CONCEPTS

CONCEPTS 1: Architecture of the Kernel, Tasks and Task scheduler, Types of real-time tasks, Task periodicity, Task scheduling, Classification of scheduling algorithms, Clock driven Scheduling, Event driven Scheduling, resource sharing, Commercial RTOs.

CONCEPTS 2: Interrupt service routines, Semaphores, Mutex, Mailboxes, Message Queues, Event Registers, Pipes, Signals, Timers, Memory Management, Priority inversion problem.

UNIT - V: TARGET ARCHITECTURES

Host and target machines, linkers, loading software into target machine, debugging techniques, ARM microcontroller, ARM pipeline, Instruction set architecture, THUMB instructions, Exceptions in ARM, salient features of SHARC microcontroller and comparison with ARM microcontroller.

TEXT BOOKS:

1. Frank Vahid, Tony D. Givargis, *Embedded System Design - A Unified Hardware/Software Introduction*, John Wiley, 2002.
2. KVKK Prasad, *Embedded/Real Time Systems*, Dramatic Press, 2005.

REFERENCE BOOKS:

1. Raj Kamal, *Embedded System Architectures Programming & Design*, Tata MC Graw-Hill Publishing, 2003.
2. David E. Simons, *An Embedded Software Premier*, Pearson Educational, 2004.

IV B.Tech. II Semester
14BT40502: DATABASE MANAGEMENT
SYSTEMS
(PROFESSIONAL ELECTIVE - IV)

Internal Marks	External Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITE(S): -

COURSE DESCRIPTION: Introduction to Database Systems; Database Design; Relational Model; SQL Queries, Constraints and Triggers; Schema Refinement and Normal Forms; Transaction Management; Concurrency Control; Overview of Storage and Indexing.

COURSE OUTCOMES: On successful completion of this course the students will be able to:

- 1.gain knowledge on
 - fundamentals of DBMS
 - database design
 - normal forms
 - storage and Indexing
- 2.apply Structured Query Language (SQL) in retrieval and management of data in real time applications.
- 3.develop skills in designing, managing databases and its security.

DETAILED SYLLABUS:

UNIT- I: INTRODUCTION TO DATABASE SYSTEMS & DATABASE DESIGN

Introduction to Database Systems: Database System Applications, Purpose of Database Systems, View of Data-Data Abstraction, Instances and Schemas, Data Models, Database Languages - DDL, DML, Database Architecture, Database Users and Administrators.

Introduction to Database design: ER diagrams, Beyond ER design, Entities, Attributes and Entity Sets, Relationships and Relationship sets, Additional features of ER model, Conceptual Design with ER model

UNIT - II : THE RELATIONAL MODEL & RELATIONAL ALGEBRA AND CALCULUS

Relational Model: Integrity Constraints over Relations, Enforcing Integrity constraints, Querying relational data, Logical database Design, Introduction to Views-Destroying/altering Tables and Views.

Relational Algebra and Calculus: Preliminaries, Relational Algebra Operators, Relational Calculus - Tuple and Domain Relational Calculus, Expressive Power of Algebra and calculus

UNIT - III : SQL & SCHEMA REFINEMENT

SQL: Form of Basic SQL Query- Examples of Basic SQL Queries, Introduction to Nested Queries, correlated Nested Queries, Set- Comparison Operators, Aggregate Operators, NULL values - Comparison using Null values - Logical connectives - AND, OR and NOT - Impact on SQL Constructs, Outer Joins, Disallowing NULL values, Complex Integrity Constraints in SQL, Triggers and Active Databases.

Schema Refinement: Problems Caused by redundancy Decompositions - Problem related to decomposition, Functional Dependencies - Reasoning about FDS, Normal Forms - FIRST, SECOND, THIRD Normal forms - BCNF, Multi valued Dependencies - FOURTH Normal Form, Join Dependencies, FIFTH Normal form.

UNIT IV: TRANSACTIONS AND CONCURRENCY CONTROL

Transactions: 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, Deadlock Handling.

UNIT V: STORAGE AND INDEXING

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.

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

TEXT BOOKS:

- 1.Raghu Ramakrishnan, Johannes Gehrke, *Database Management Systems*, Tata McGraw Hill, 3rd edition, 2007.
- 2.A. Silberschatz, H.F.Korth, S.Sudarshan, *Database System Concepts*, Tata McGraw hill , 5th edition, 2005.

REFERENCE BOOKS:

- 1.RamezElmasri, ShamkantB.Navathe, *Database Systems*, 6th edition, Pearson Education, 2013
- 2.Peter Rob and Carlos Coronel, *Database Systems Design, Implementation and Management*, Cengage Learning, 7th edition, 2009

IV B.Tech. II Semester
14BT80221: COMPREHENSIVE VIVA-VOCE

Internal Marks	External Marks	Total Marks	L	T	P	C
--	100	100	-	-	-	2

PREREQUISITES: All courses of B. Tech. EEE

COURSE DESCRIPTION: Assessment of student learning outcomes.

COURSE OUTCOMES: Comprehensive Viva-Voce enables a successful student to

1. demonstrate knowledge in the program domain.
2. exhibit professional etiquette suitable for career progression
3. present views cogently and precisely.

IV B.Tech. II Semester
14BT80222: PROJECT WORK

Internal Marks	External Marks	Total Marks	L	T	P	C
60	140	200	-	-	20	10

PREREQUISITES: --

COURSE DESCRIPTION: Identification of topic for the project work; Literature survey; Collection of preliminary data; Identification of implementation tools and methodologies; Performing critical study and analysis of the topic identified; Time and cost analysis; Implementation of the project work; Preparation of thesis and presentation.

COURSE OUTCOMES: On completion of project work, the student will be able to

1. demonstrate in-depth knowledge on the project topic.
2. identify, analyze and formulate complex problem chosen for project work to attain substantiated conclusions.
3. design solutions to the chosen project problem.
4. undertake investigation of project problem to provide valid conclusions.
5. use the appropriate techniques, resources and modern engineering tools necessary for project work.
6. understand professional and ethical responsibilities while executing the project work.
7. function effectively as individual and a member in the project team.
8. develop communication skills, both oral and written for preparing and presenting project report.
9. demonstrate knowledge and understanding of cost and time analysis required for carrying out the project.
10. engage in lifelong learning to improve knowledge and competence in the chosen area of the project.