VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

(Permanently Affiliated to JNTUH, Approved by AICTE, New Delhi and Accredited by NBA)

Shamshabad – 501 218, Hyderabad

BACHELOR OF TECHNOLOGY
ELECTRICAL AND ELECTRONICS ENGINEERING

ACADEMIC REGULATIONS, COURSE STRUCTURE AND SYLLABI
UNDER AUTONOMOUS STATUS
FOR THE BATCHES ADMITTED FROM THE ACADEMIC YEAR 2011 - 12

B.Tech. Regular Four Year Degree Programme
(For the batches admitted from the academic year 2011–12)
&
B.Tech. (Lateral Entry Scheme)
(For the batches admitted from the academic year 2012 - 13)

Note: The regulations hereunder are subject to amendments as may be made by the Academic Council of the College from time to time. Any or all such amendments will be effective from such date and to such batches of candidates (including those already undergoing the program) as may be decided by the Academic Council.

PRELIMINARY DEFINITIONS AND NOMENCLATURES

- "Autonomous Institute / College" means an institute / college designated as autonomous institute / college by the Jawaharlal Nehru Technological University, Hyderabad (JNTUH), as per the JNTUH Autonomous College Statutes, 2011.

- "Academic Autonomy" means freedom to a College in all aspects of conducting its academic programs, granted by the University for promoting excellence.

- "Commission" means University Grants Commission.

- "AICTE" means All India Council for Technical Education.

- "University" the Jawaharlal Nehru Technological University, Hyderabad.

- "College" means Vardhaman College of Engineering, Hyderabad unless indicated otherwise by the context.

- "Program" means:
  Bachelor of Technology (B.Tech) degree program
  UG Degree Program: B.Tech

- "Branch" means specialization in a program like B.Tech degree program in Civil Engineering, B.Tech degree program in Computer Science and Engineering etc.

- "Course" or "Subject" means a theory or practical subject, identified by its course – number and course-title, which is normally studied in a semester. For example, ABS11T01: Mathematics - I, ACS11T02: Data Structures through C, etc.

- T – Tutorial, P – Practical, D – Drawing, L - Theory, C - Credits

FOREWORD

The autonomy is conferred on Vardhaman College of Engineering by J N T University, Hyderabad based on its performance as well as future commitment and competency to impart quality education. It is a mark of its ability to function independently in accordance with the set norms of the monitoring bodies like UGC and AICTE. It reflects the confidence of the affiliating University in the autonomous institution to uphold and maintain standards it expects to deliver on its own behalf and thus awards degrees on behalf of the college. Thus, an autonomous institution is given the freedom to have its own **curriculum, examination system** and **monitoring mechanism**, independent of the affiliating University but under its observance.

Vardhaman College of Engineering is proud to win the credence of all the above bodies monitoring the quality in education and has gladly accepted the responsibility of sustaining, if not improving upon the standards and ethics for which it has been striving for more than a decade in reaching its present standing in the arena of contemporary technical education. As a follow up, statutory bodies like Academic Council and Boards of Studies are constituted with the guidance of the Governing Body of the College and recommendations of the JNTU Hyderabad to frame the regulations, course structure and syllabi under autonomous status.

The autonomous regulations, course structure and syllabi have been prepared after prolonged and detailed interaction with several expertise solicited from academics, industry and research, in accordance with the vision and mission of the college to order to produce a quality engineering graduate to the society.

All the faculty, parents and students are requested to go through all the rules and regulations carefully. Any clarifications needed are to be sought at appropriate time and with principal of the college, without presumptions, to avoid unwanted subsequent inconveniences and embarrassments. The Cooperation of all the stake holders is sought for the successful implementation of the autonomous system in the larger interests of the college and brighter prospects of engineering graduates.

PRINCIPAL

VARDHAMAN COLLEGE OF ENGINEERING

(Autonomous)

(Permanent Affiliation with JNTUH, Approved by AICTE, New Delhi and Accredited by NBA)

ACADEMIC REGULATIONS

B.Tech. Regular Four Year Degree Programme
(for the batches admitted from the academic year 2011 - 12)
&
B.Tech. (Lateral Entry Scheme)
(for the batches admitted from the academic year 2012 - 13)

For pursuing four year undergraduate Bachelor Degree programme of study in Engineering (B.Tech) offered by Vardhaman College of Engineering under Autonomous status and herein after referred to as VCE:

1. APPLICABILITY

All the rules specified herein, approved by the Academic Council, will be in force and applicable to students admitted from the academic year 2011-2012 onwards. Any reference to "College" in these rules and regulations stands for Vardhaman College of Engineering.

2. EXTENT

All the rules and regulations, specified herein after 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, Vardhaman College of Engineering shall be the Chairman, Academic Council.

3. ADMISSION

3.1. Admission into first year of four year B.Tech degree programme of study in engineering:

3.1.1. Eligibility:

A candidate seeking admission into the first year of four year B.Tech degree programme 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 subjects or any equivalent examination recognized by Board of Intermediate Education, Andhra Pradesh or a Diploma in Engineering in the relevant branch conducted by the Board of Technical Education, Andhra Pradesh or equivalent Diploma recognized by Board of Technical Education for admission as per the guidelines of APSCHE.

(ii) Secured a rank in the EAMCET examination conducted by A.P. State Council for Higher Education for allotment of a seat by the Convener, EAMCET, for admission.

3.1.2. Admission Procedure:

Admissions are made into the first year of four year B.Tech. Degree programme as per the stipulations of A.P State Council of Higher Education (APSCHE), Government of Andhra Pradesh.

(a) Category A seats are filled by the Convener, EAMCET.

(b) Category B seats are filled by the Management.

3.2. Admission into the second year of four year B.Tech degree programme in engineering

3.2.1. Eligibility:
A candidate seeking admission under lateral entry into the III semester B.Tech degree Programme should have passed the qualifying exam (B.Sc. Mathematics & Diploma holders), based on the rank secured by the candidate at Engineering Common Entrance Test ECET (FDH) in accordance with the instructions received from the Convener, ECET and Government of Andhra Pradesh.

3.2.2. Admission Procedure:
Admissions are made into the III semester of four year B.Tech degree programme through Convener, ECET (FDH) against the sanctioned strength in each programme of study as lateral entry students.

4. PROGRAMS OFFERED

Vardhaman College of Engineering, an autonomous college affiliated to JNTUH, offers the following B.Tech programmes of study leading to the award of B.Tech degree under the autonomous scheme.

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

5. DURATION OF THE PROGRAMS

5.1 Normal Duration

5.1.1 B.Tech degree program extends over a period of four academic years leading to the Degree of Bachelor of Technology (B.Tech) of the Jawaharlal Nehru Technology University, Hyderabad.

5.1.2 For students admitted under lateral entry scheme, B.Tech degree program extends over a period of three academic years leading to the Degree of Bachelor of Technology (B.Tech) of the Jawaharlal Nehru Technology University, Hyderabad.

5.2 Maximum Duration

5.2.1 The maximum period within which a student must complete a full-time academic program is 8 years for B.Tech. If a student fails to complete the academic program within the maximum duration as specified above, he / she will be required to withdraw from the program.

5.2.2 For students admitted under lateral entry scheme in B.Tech degree program, the maximum period within which a student must complete a full-time academic program is 6 years. If a student fails to complete the academic program within the maximum duration as specified above, he / she will be required to withdraw from the program.

5.2.3 The period is reckoned from the academic year in which the student is admitted first time in to the degree programme.

6. SEMESTER STRUCTURE

The College shall follow semester pattern. An academic year shall consist of a first semester and a second semester and the summer term follows in sequence. Each semester shall be of 23 weeks duration and this period includes time for course work, examination preparation, and conduct of examinations. Each semester shall have a minimum of 90 working days. The academic calendar is shown in Table 1 is declared at the start of the semester.

The first and second semesters shall have the duration to accommodate a minimum of 17 instructional weeks per semester.

Table 1: Academic Calendar

FIRST SEMESTER (23 weeks)	I Spell Instruction Period	: 9 weeks	19 weeks
	I Mid Examinations	: 1 week	
	II Spell Instruction Period	: 8 weeks	
	II Mid Examinations	: 1 Week	
	Preparation & Practical Examinations		2 weeks
	External Examinations		2 weeks
Semester Break			2 weeks
SECOND SEMESTER (23 weeks)	I Spell Instruction Period	: 9 weeks	19 weeks
	I Mid Examinations	: 1 week	
	II Spell Instruction Period	: 8 weeks	
	II Mid Examinations	: 1 Week	
	Preparation & Practical Examinations		2 weeks
	External Examinations		2 weeks
Summer Vacation			4 weeks

7. COURSE STRUCTURE

Every programme of study shall be designed to have 42 - 45 theory courses and 14 - 16 laboratory courses.

The Programme of instruction consists of:

(i) A general core programme comprising Basic Sciences, Mathematics, Basic Engineering, Humanities, Social Sciences and Management.

(ii) An Engineering Core programme imparting to the student the fundamentals of engineering in the branch concerned.

(iii) An elective programme enabling the students to take up a group of departmental and interdepartmental courses of interest to him / her.

In addition, a student has to carry out a mini project, project work, technical seminar and comprehensive viva.

Every course of the B Tech programme will be placed in one of the ten groups of courses with minimum credits as listed in the Table 2.

Note: All components prescribed in the curriculum of any programme of study shall be conducted and evaluated.

Contact Periods: Depending on the complexity and volume of the course the number of contact periods per week will be assigned.

Table 2: Group of Courses

S. NO	GROUP OF COURSES	CATEGORY	MINIMUM CREDITS
1	Humanities, Social Sciences and Management	HS	18
2	Basic Sciences	BS	30
3	Basic Engineering	BE	26
4	Core Engineering	CE	114
5	Professional Elective	PE	12
6	Inter Departmental Elective	IE	04
7	Mini Project	MP	02
8	Technical Seminar	TS	02
9	Comprehensive Viva	CV	02
10	Project Work	PW	10
TOTAL			**220**

8. CREDIT BASED SYSTEM

All the academic programs under autonomy are based on credit system. Credits are assigned based on the following norms:

8.1. The duration of each semester will normally be 23 weeks with 6 days a week (the second and fourth Saturdays will be observed as holidays in a month). A working day shall have 6 periods each of 60 minutes duration.

Each course is normally assigned a certain number of credits as follows:

- 1 credit per lecture / tutorial period per week.
- 2 credits for three (or more) period hours of practicals.
- 2 credits for mini project.
- 2 credits for technical seminar with 6 periods per week.
- 2 credits for comprehensive viva examination.
- 10 credits for project work with 12 periods per week.

8.2. The four year curriculum of any B.Tech programme of study shall have total of 220 credits. The exact requirements of credits for each course will be as recommended by the Board of Studies concerned and approved by the Academic Council.

In the case of lateral entry students, B.Tech programme for III, IV, V, VI VII and VIII semesters of study shall have a total 168 credits.

8.3. For courses like mini project / project work / technical seminar / comprehensive viva, where formal contact hours are not specified, credits are assigned based on the complexity of the work to be carried out.

9. METHOD OF EVALUATION

The performance of a student in each semester shall be evaluated subject-wise with a maximum of 100 marks each for theory and 75 marks for practical / computer aided engineering drawing lab. In addition, mini-project, technical seminar, comprehensive viva and project work shall be evaluated for 50, 50, 50 and 200 marks respectively.

9.1 THEORY

For all lecture based theory courses, the evaluation shall be for 25 marks through internal evaluation and 75 marks through external end semester examination of three hours duration.

9.1.1. Internal evaluation

The 25 internal marks are divided as shown in Table 3:

Table 3: Internal marks distribution

Subjective Type Test	20 marks
Assignment / Tutorial	05 marks

For theory subjects, during the semester there shall be 2 midterm examinations. Each midterm examination consists of subjective test. The subjective test is for 20 marks, with duration of 2 hours. Subjective test of each semester shall contain 5 one mark compulsory questions in part-A and part-B contains 5 questions, the student has to answer 3 questions, each carrying 5 marks.

First midterm examination shall be conducted for the first two and half units of syllabus and second midterm examination shall be conducted for the remaining portion.

The internal marks shall be computed as the average of the two internal evaluations, of two subjective tests.

Five marks are earmarked for assignments. There shall be two assignments in every theory course. Marks shall be awarded considering the average of two assignments in each course.

9.1.2. External Evaluation

The question paper shall be set externally and valued both internally and externally. The external end semester examination question paper in theory subjects will be for a maximum of 75 marks to be answered in three hours duration. There shall be two questions of descriptive type from each unit with internal choice. Each question carries 15 marks. Each theory course shall consist of five units of syllabus.

9.2 PRACTICALS

Practicals shall be evaluated for 75 marks, out of which 50 marks are for external examination and 25 marks are for internal evaluation. The 25 internal marks are distributed as 15 marks for day-to-day work and 10 marks for internal examination. The external end - examination shall be conducted by the teacher concerned and an external examiner from outside the college.

12 out of 14 to 16 experiments / exercises recommended are to be completed in a semester.

9.3. For Engineering Drawing, Advanced Engineering Drawing and Machine Drawing the distribution shall be 25 marks for internal evaluation (15 marks for day-to-day work and 10 marks for internal tests) and 75 marks for end examination. There shall be two internal evaluations in a semester and the average of the two internal evaluations is considered for the award of marks for internal marks.

9.4. The Computer Aided Engineering Drawing Lab, Computer Aided Aircraft Engineering Drawing Lab wherever offered is to be treated as a practical subject. Evaluation method adopted for practical subjects shall be followed here as well.

9.3 Mini Project

The mini project in an industry shall be carried out during the summer break for a minimum of 4 weeks after the VI Semester and completed before the start of the VII semester. A report has to be submitted for assessment to an internal evaluation committee comprising Head of the Department or his / her nominee and two faculty of the department including the project supervisor for 50 marks. A minimum of 40% of maximum marks shall be obtained to earn the corresponding credits. The mini project and its report shall be evaluated in VIII semester.

9.4 Technical Seminar

The seminar shall have two components, one chosen by the student from the course-work without repetition and approved by the faculty supervisor. The other component is suggested by the supervisor and can be a reproduction of the concept in any standard research paper or an extension of concept from earlier course work. A hard copy of the information on seminar topic in the form of a report is to be submitted for evaluation along with presentation. The presentation of the seminar topics shall be made before an internal evaluation committee comprising the Head of the Department or his/her nominee, seminar supervisor and a senior faculty of the department. The two components of the seminar are distributed between two halves of the semester and are evaluated for 50 marks each. The average of the two components shall be taken as the final score. A minimum of 40% of maximum marks shall be obtained to earn the corresponding credits.

9.5 Comprehensive Viva

The comprehensive Viva will be conducted by a committee comprising Head of the Department or his/her nominee, two senior faculty of the respective department and an external examiner from outside the college. This is aimed at assessing the student's understanding of various subjects studied during the entire program of 4 years. The comprehensive viva shall be evaluated for 50 marks at the end of VIII semester. A minimum of 40% of maximum marks shall be obtained to earn the corresponding credits.

9.6 Project Work

The project work shall be evaluated for 200 marks out of which 50 marks for internal evaluation and 150 marks for end-semester evaluation. The project work shall be spread over in VII semester and in VIII semester. The project work shall be somewhat innovative in nature, exploring the research bent of mind of the student. A project batch shall comprise of not more than four students.

At the end of VII semester, students should submit synopsis summarizing the work done in VII semester. The project is expected to be completed by the end of VIII semester.

In VIII semester a mid-course review is conducted by Head of the Department and the project supervisor on the progress for 25 marks. On completion of the project a second evaluation is conducted for award of internal marks of another 25 marks before the report is submitted making the total internal marks 50. The end semester examination shall be based on the report submitted and a viva-voce exam for 150 marks by committee comprising of the Head of the Department, project supervisor and an external examiner. A minimum of 40% of maximum marks shall be obtained to earn the corresponding credits.

10. ATTENDANCE REQUIREMENTS TO APPEAR FOR THE SEMESTER-END EXAMINATION

10.1. A student shall be eligible to appear for semester-end examinations if he acquires a minimum of 75% of attendance in aggregate of all the subjects in a semester.

10.2. Condonation of shortage of attendance in aggregate upto 10% (65% and above and below 75%) in each semester may be granted by the College Academic Committee.

10.3. Shortage of attendance below 65% in aggregate shall in no case be condoned.

10.4. The shortage of attendance shall not be condoned more than twice during the entire course.

10.5. Students whose shortage of attendance is not condoned in any semester are not eligible to take their semester-end examination of that class and their registration shall stand cancelled.

10.6. A student will not be promoted to the next semester unless he satisfies the attendance requirements of the current semester. The student may seek readmission for the semester when offered next. He will not be allowed to register for the subjects of the semester while he is in detention. A student detained due to shortage of attendance, will have to repeat that semester when offered next.

10.7. A stipulated fee shall be payable towards condonation of shortage of attendance to the College.

10.8. Attendance may also be condoned as per the recommendations of academic council for those who participate in prestigious sports, co-curricular and extra-curricular activities provided as per the Govt. of AP norms in vogue.

11. EVALUATION

Following procedure governs the evaluation.

11.1. Marks for components evaluated internally by the faculty should be submitted to the Controller of Examinations one week before the commencement of the semester-end examinations. The marks for the internal evaluation components will be added to the external evaluation marks secured in the semester-end examinations, to arrive at total marks for any subject in that semester.

11.2. Performance in all the courses is tabulated course-wise and will be scrutinized by the Examination Committee and moderation is applied if needed, based on the recommendations of moderation committee and course-wise marks lists are finalized.

11.3. Student-wise tabulation is done and student-wise memorandum of marks is generated which is issued to the student.

12. PERSONAL VERIFICATION

Students shall be permitted for personal verification of the semester-end examination answer scripts within a stipulated period after payment of prescribed fee.

13. SUPPLEMENTARY EXAMINATION

Supplementary examinations for the odd semester shall be conducted with the regular examinations of even semester and vice versa, for those who appeared and failed in regular examinations. Such of the candidates writing supplementary examinations may have to write more than one examination per day.

14. ACADEMIC REQUIREMENTS FOR PROMOTION / COMPLETION OF REGULAR B.TECH PROGRAMME OF STUDY

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

FOR STUDENTS ADMITTED INTO B.TECH. (REGULAR) PROGRAMME

i. A student shall be deemed to have satisfied the minimum academic requirements for each theory, practical, design, drawing subject or project, if he secures not less than 35% of marks in the

semester-end examination and a minimum of 40% of marks in the sum of the internal evaluation and semester - end examination taken together.

ii. In case of mini project, technical seminar and comprehensive viva a student shall be deemed to have satisfied the minimum academic requirements and earned the credits allotted to each of them if he/she secures not less than 40% of marks.

iii. In case of project work, a student shall be deemed to have satisfied the minimum academic requirements and earned the credits allotted if he/she secures not less than 40% of marks on the aggregate in the internal evaluation and external end-evaluation taken together.

iv. A student shall be promoted from IV semester to V semester of programme of study only if he fulfils the academic requirement of securing 40 credits from the examinations held up to end of III semester including supplementary examinations.

v. A student shall be promoted from VI semester to VII semester of programme of study only if he fulfils the academic requirements of securing 68 credits out of which all 52 from I and II semesters shell be completed, from the examinations held up to V semester including supplementary examinations.

vi. A student shall register for all the 220 credits and earn all the 220 credits. Marks obtained in all the 220 credits shall be considered for the award of the class based on aggregate of marks.

vii. A student who fails to earn 220 credits as indicated in the course structure within **eight** academic years from the year of their admission shall forfeit their seat in B.Tech programme and their admission stands cancelled.

viii. Students who are detained for want of attendance (or) who have not fulfilled academic requirements (or) who have failed after having undergone the course in earlier regulations (or) have discontinued and wish to continue the course are eligible for admission into the unfinished semester from the date of commencement of class work with the same (or) equivalent subjects as and when subjects are offered, and pursue the remaining course work with the academic regulations of the batch into which such students are readmitted. However, all such readmitted students shall earn all the credits of subjects they have pursued for completion of the course.

FOR LATERAL ENTRY STUDENTS (BATCHES ADMITTED FROM 2012–2013)

i. A student shall be deemed to have satisfied the minimum academic requirements for each theory, practical, design, drawing subject or project if he secures not less than 35% 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.

ii. In case of mini project, technical seminar and comprehensive viva a student shall be deemed to have satisfied the minimum academic requirements and earned the credits allotted to each of them if he/she secures not less than 40% of marks.

iii. In case of project work, a student shall be deemed to have satisfied the minimum academic requirements and earned the credits allotted if he/she secures not less than 40% of marks on the aggregate in the internal evaluation and external end-evaluation taken together.

iv. A student shall be promoted from VI semester to VII semester only if he fulfils the academic requirements of securing 42 credits from the examinations held up to V semester including supplementary examinations.

v. A student shall register for all 168 credits and earn all the 168 credits. Marks obtained in all 168 credits shall be considered for the award of the class based on aggregate of marks.

vi. A student who fails to earn 168 credits as indicated in the course structure within **six** academic years from the year of their admission shall forfeit their seat in B.Tech programme and their admission stands cancelled.

vii. Students who are detained for want of attendance (or) who have not fulfilled academic requirements (or) who have failed after having undergone the course in earlier regulations (or) have discontinued and wish to continue the course are eligible for admission into the unfinished semester from the date of commencement of class work with the same (or) equivalent subjects as and when subjects are offered, and pursue the remaining course work with the academic regulations of the batch into which such students are readmitted. However, all such readmitted students shall earn all the credits of subjects they have pursued for completion of the course.

15. TRANSITORY REGULATIONS

Students who are detained for want of attendance (or) who have not fulfilled academic requirements (or) who have failed after having undergone the course in earlier regulations (or) have discontinued and wish to continue the course are eligible for admission into the unfinished semester from the date of commencement of class work with the same (or) equivalent subjects as and when subjects are offered, and pursue the remaining course work with the academic regulations of the batch into which such students are 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.

16. TRANSCRIPTS

After successful completion of the entire programme of study, a transcript containing performance of all academic years will be issued as a final record. 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, after payment of requisite fee.

17. AWARD OF DEGREE

The degree will be conferred and awarded by Jawaharlal Nehru Technological University, Hyderabad on the recommendations of the Chairman, Academic Council.

17.1. 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 programme 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 not less than 40% of marks (minimum requirement for declaring as passed).
- Has no dues to the college, hostel, and library etc. and to any other amenities provided by the College.
- No disciplinary action is pending against him.

17.2. AWARD OF CLASS

Declaration of Class is based on percentage of marks to be secured.

After a student has satisfied the requirement prescribed for the completion of the programme and is eligible for the award of B.Tech. Degree he shall be placed in one of the following four classes Shown in Table 4:

Table 4: Declaration of Class is based on percentage of marks to be secured

Class Awarded	% of marks to be secured	
First Class with Distinction	70% and above	From the aggregate marks secured for the 220 Credits.
First Class	Below 70% but not less than 60%	
Second Class	Below 60% but not less than 50%	
Pass Class	Below 50% but not less than 40%	
Fail	Below 40%	

Sometimes, it is necessary to provide equivalence of percentages and/or *Class* awarded with *Grade Point Average (GPA).* This shall be done by prescribing certain specific thresholds in averages for *Distinction, First Class and Second Class,* as in Table 5.

Table 5: Percentage Equivalence of *Grade Points* (For a 10-Point Scale)

Grade Point	Percentage of Marks / Class
4.75	40 (Pass Class)
5.25	45
5.75	50 (Second Class)
6.25	55
6.75	60 *(First Class)*
7.25	65
7.75	70 *(First Class with Distinction)*
8.25	75

18. ADDITIONAL ACADEMIC REGULATIONS

i. Courses like projects / mini projects / seminars can be repeated only by re-registering for all the components in that semester.

ii. When a student is absent for any examination (internal or external) he is treated as to have obtained absent in that component (course) and aggregate of marks is done accordingly.

iv. When a component is cancelled as a penalty, he is awarded zero marks in that component.

19. REGISTRATION

Each student has to compulsorily register for course work at the beginning of each semester as per the schedule mentioned in the Academic Calendar. It is absolutely compulsory for the student to register for courses in time.

20. TERMINATION FROM THE PROGRAM

The admission of a student to the program may be terminated and the student is asked to leave the college in the following circumstances:

i. The student fails to satisfy the requirements of the program within the maximum period stipulated for that program.

11. The student fails to satisfy the norms of discipline specified by the institute from time to time.

21. CURRICULUM

21.1 For each program being offered by the Institute, a Board of Studies (BOS) is constituted in accordance with AICTE / UGC / JNTUH statutes.

21.2. The BOS for a program is completely responsible for designing the curriculum once in three years for that program.

22. WITH-HOLDING OF RESULTS

If the candidate has not paid any dues to the college / if any case of indiscipline / malpractice is pending against him, the results of the candidate will be withheld. The issue of the degree is liable to be withheld in such cases.

23. GRIEVANCES REDRESSAL COMMITTEE

"Grievance and Redressal Committee" (General) constituted by the principal shall deal with all grievances pertaining to the academic / administrative / disciplinary matters. The composition of the complaints cum redressal committee shall be:

Headed by Senior Faculty member
Heads of all departments
A senior lady staff member from each department (if available)

The committee constituted shall submit a report to the principal of the college, the penalty to be imposed. The Principal upon receipt of the report from the committee shall, after giving an opportunity of being heard to the person complained against, submit the case with the committee's recommendation to the Governing Body of the college. The Governing Body shall confirm with or without modification the penalty recommended after duly following the prescribed procedure.

24. MALPRACTICE PREVENTION COMMITTEE

A malpractice prevention committee shall be constituted to examine and punish the students who does malpractice / behaves indiscipline in examinations. The committee shall consist of:

Principal.
Subject expert of which the subject belongs to.
Head of the department of which the student belongs to.
The invigilator concerned.
In-charge Examination branch of the college.

The committee constituted shall conduct the meeting on the same day of examination or latest by next working day to the incidence and punish the student as per the guidelines prescribed by the J N T University, Hyderabad from time to time.

Any action on the part of candidate at the examination like trying to get undue advantage in the performance at examinations or trying to help another, or derive the same through unfair means is punishable according to the provisions contained hereunder. The involvement of the Staff, who are in charge of conducting examinations, valuing examination papers and preparing / keeping records of documents relating to the examinations in such acts (inclusive of providing incorrect or misleading information) that infringe upon the course of natural justice to one and all concerned at the examination shall be viewed seriously and recommended for award of appropriate punishment after thorough enquiry.

25. AMENDMENTS TO REGULATIONS

The Academic Council of Vardhaman College of Engineering 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.

26. STUDENTS' FEEDBACK

It is necessary for the Colleges to obtain feedback from students on their course work and various academic activities conducted. For this purpose, suitable feedback forms shall be devised by the College and the feedback obtained from the students regularly in confidence, by administering the feedback form in print or on-line in electronic form.

The feedback received from the students shall be discussed at various levels of decision making at the College and the changes/ improvements, if any, suggested shall be given due consideration for implementation.

27. GRADUATION DAY

The College shall have its own annual *Graduation Day* for the award of Degrees to students completing the prescribed academic requirements in each case, in consultation with the University and by following the provisions in the Statute.

The College shall institute Prizes and Awards to meritorious students, for being given away annually at the *Graduation Day.* This will greatly encourage the students to strive for excellence in their academic work.

28. AWARD OF A RANK UNDER AUTONOMOUS SCHEME

28.1. Merit Rank will be declared only for those students who have been directly admitted in VCE under Autonomous Regulations and complete the entire course in VCE only within the minimum possible prescribed time limit, i.e., 4 years for B.Tech, 3 years for B.Tech under lateral entry scheme.

28.2. A student shall be eligible for a merit rank at the time of award of degree in each branch of Bachelor of Technology, provided the student has passed all subjects prescribed for the particular degree program in first attempt only.

28.3. Academic performance will be the sole criteria for awarding the merit rank and will be based only on performance of the student from the first to the eighth semester of the course.

28.4. The number of Merit Ranks to be announced for any course / program / branch / specialisation will be as follows:

- **3** (Three) Merit Ranks if the AICTE sanctioned intake is less than or up to 60.
- **4** (Four) Merit Ranks if the AICTE sanctioned intake is greater than 60.
- **5** (Five) Merit Ranks if the AICTE sanctioned intake is greater than 120.

28.5. Award of prizes, scholarships, or any other Honours shall be based on the rank secured by a candidate, consistent with the guidelines of the Donor, wherever applicable.

29. CONDUCT AND DISCIPLINE

29.1 Each student shall conduct himself / herself in a manner befitting his / her association with VCE.

29.2 He / she is expected not to indulge in any activity, which is likely to bring disrepute to the college.

29.3 He / she should show due respect and courtesy to the teachers, administrators, officers and employees of the college and maintain cordial relationships with fellow students.

29.4 Lack of courtesy and decorum unbecoming of a student (both inside and outside the college), wilful damage or removal of Institute's property or belongings of fellow students, disturbing others in their studies, adoption of unfair means during examinations, breach of rules and regulations of the Institute, noisy and unruly behaviour and similar other undesirable activities shall constitute violation of code of conduct for the student.

29.5 **Ragging in any form is strictly prohibited and is considered a serious offence. It will lead to the expulsion of the offender from the college.**

29.6 Violation of code of conduct shall invite disciplinary action which may include punishment such as reprimand, disciplinary probation, debarring from the examination, withdrawal of placement services, withholding of grades / degrees, cancellation of registration, etc., and even expulsion from the college.

29.7 Principal, based on the reports of the warden of Institute hostel, can reprimand, impose fine or take any other suitable measures against an inmate who violates either the code of conduct or rules and regulations pertaining to college hostel.

29.8 A student may be denied the award of degree / certificate even though he / she has satisfactorily completed all the academic requirements if the student is found guilty of offences warranting such an action.

29.9 Attendance is not given to the student during the suspension period.

30. OTHER ISSUES

The quality and standard of engineering professionals are closely linked with the level of the technical education system. As it is now recognized that these features are essential to develop the intellectual skills and knowledge of these professionals for being able to contribute to the society through productive and satisfying careers as *innovators, decision makers and/or leaders* in the global economy of the 21st century, it becomes necessary that certain improvements are introduced at different stages of their education system. These include:

a. Selective admission of students to a programme, so that merit and aptitude for the chosen technical branch or specialization are given due consideration.

b. Faculty recruitment and orientation, so that qualified teachers trained in good teaching methods, technical leadership and students' motivation are available.

c. Instructional/Laboratory facilities and related physical infrastructure, so that they are adequate and are at the contemporary level.

d. Access to good library resources and Information & Communication Technology **(ICT)** facilities, to develop the student's *mind* effectively.

These requirements make it necessary for the College to introduce improvements like:

a. Teaching-learning process on modern lines, to provide *Add-On* Courses for *audit*/credit in a number of peripheral areas useful for students' self development.

b. Life-long learning opportunities for faculty, students and alumni, to facilitate their dynamic interaction with the society, industries and the world of work.

c. Generous use of ICT and other modern technologies in everyday activities.

31. GENERAL

Where the words "he", "him", "his", "himself" occur in the regulations, they include "she", "her", "herself".

Note: Failure to read and understand the regulations is not an excuse.

COURSE STRUCTURE

B. TECH – ELECTRICAL AND ELECTRONICS ENGINEERING

REGULATIONS: VCE-R11

I SEMESTER

Code	Subject	Category	Periods per Week			Credits	Scheme of Examination Maximum Marks		
			L	T	P		Internal	External	Total
A1001	Mathematics – I	BS	3	1	-	4	25	75	100
A1002	Engineering Physics	BS	4	-	-	4	25	75	100
A1003	Engineering Chemistry	BS	4	-	-	4	25	75	100
A1501	Computer Programming	BE	4	-	-	4	25	75	100
A1201	Basic Electrical Engineering	BE	3	1	-	4	25	75	100
A1010	Engineering Physics and Engineering Chemistry Lab	BS	-	-	3	2	25	50	75
A1502	Computer Programming Lab	BE	-	-	3	2	25	50	75
A1601	PC Software Lab	BE	-	2	3	2	25	50	75
TOTAL			**18**	**04**	**09**	**26**	**200**	**525**	**725**

II SEMESTER

Code	Subject	Category	Periods per Week			Credits	Scheme of Examination Maximum Marks		
			L	T	P		Internal	External	Total
A1008	Technical English	HS	4	-	-	4	25	75	100
A1007	Mathematics-II	BS	3	1	-	4	25	75	100
A1005	Probability, Statistics and Computational Techniques	BS	3	1	-	4	25	75	100
A1004	Environmental Science	BS	4	-	-	4	25	75	100
A1503	Data Structures through C	BE	4	-	-	4	25	75	100
A1009	English Language Communication Skills Lab	HS	-	-	3	2	25	50	75
A1504	Data Structures through C Lab	BE	-	-	3	2	25	50	75
A1305	Computer Aided Engineering Drawing Lab	BE	-	2	3	2	25	50	75
TOTAL			**18**	**04**	**09**	**26**	**200**	**525**	**725**

III SEMESTER

Code	Subject	Category	Periods per Week			Credits	Scheme of Examination Maximum Marks		
			L	T	P		Internal	External	Total
A1011	Mathematics – III	BS	3	1	-	4	25	75	100
A1401	Electronic Devices	BE	4	-	-	4	25	75	100
A1013	Managerial Economics and Financial Analysis	CE	4	-	-	4	25	75	100
A1404	Digital Logic Design	CE	3	1	-	4	25	75	100
A1203	Network Analysis	CE	4	-	-	4	25	75	100
A1204	DC Machines	CE	3	1	-	4	25	75	100
A1406	Electronic Devices Lab	BE	-	-	3	2	25	50	75
A1207	Electric Circuits and Simulation Lab	CE	-	-	3	2	25	50	75
TOTAL			**21**	**03**	**06**	**28**	**200**	**550**	**750**

B. TECH – ELECTRICAL AND ELECTRONICS ENGINEERING

REGULATIONS: VCE-R11

IV SEMESTER

Code	Subject	Category	Periods per Week			Credits	Scheme of Examination Maximum Marks		
			L	T	P		Internal	External	Total
A1509	Computer Architecture and Organization	CE	4	-	-	4	25	75	100
A1411	Electronic Circuits	CE	3	1	-	4	25	75	100
A1209	Power System Generation	CE	4	-	-	4	25	75	100
A1210	AC Machines - I	CE	3	1	-	4	25	75	100
A1211	Electro Magnetic Fields	CE	3	1	-	4	25	75	100
A1212	Control Systems	CE	4	-	-	4	25	75	100
A1213	DC Machines Lab	CE	-	-	3	2	25	50	75
A1214	Control Systems and Simulation Lab	CE	-	-	3	2	25	50	75
TOTAL			**21**	**03**	**06**	**28**	**200**	**550**	**750**

V SEMESTER

Code	Subject	Category	Periods per Week			Credits	Scheme of Examination Maximum Marks		
			L	T	P		Internal	External	Total
A1506	Object Oriented Programming through JAVA	CE	4	-	-	4	25	75	100
A1415	Integrated Circuits Applications	CE	4	-	-	4	25	75	100
A1419	Signal Analysis and Transform Techniques	CE	3	1	-	4	25	75	100
A1217	Power System Transmission and Distribution	CE	4	-	-	4	25	75	100
A1218	AC Machines - II	CE	3	1	-	4	25	75	100
A1541	Soft Computing	CE	3	1	-	4	25	75	100
A1219	AC Machines Lab	CE	-	-	3	2	25	50	75
A1422	Electronic Circuits & Integrated Circuits Lab	CE	-	-	3	2	25	50	75
TOTAL			**21**	**03**	**06**	**28**	**200**	**550**	**750**

VI SEMESTER

Code	Subject	Category	Periods per Week			Credits	Scheme of Examination Maximum Marks		
			L	T	P		Internal	External	Total
A1015	Industrial Management and Psychology	HS	4	-	-	4	25	75	100
A1423	Micro Processors and Interfacing	CE	3	1	-	4	25	75	100
A1220	Computer Methods in Power Systems	CE	4	-	-	4	25	75	100
A1221	Electrical Measurements	CE	3	1	-	4	25	75	100
A1222	Power Electronics	CE	3	1	-	4	25	75	100
INTERDEPARTMENTAL ELECTIVE – I		HS	4	-	-	4	25	75	100
A1427	Micro Processors and Interfacing Lab	CE	-	-	3	2	25	50	75
A1223	Power Electronics and Simulation Lab	CE	-	-	3	2	25	50	75
TOTAL			**21**	**03**	**06**	**28**	**200**	**550**	**750**

B. TECH – ELECTRICAL AND ELECTRONICS ENGINEERING

REGULATIONS: VCE-R11

VII SEMESTER

Code	Subject	Category	Periods per Week			Credits	Scheme of Examination Maximum Marks		
			L	T	P		Internal	External	Total
A1430	Embedded Systems	CE	4	-	-	4	25	75	100
A1224	Power System Switchgear and Protection	CE	4	-	-	4	25	75	100
A1225	Power System Operation and Control	CE	3	1	-	4	25	75	100
A1226	Power Semiconductor Drives	CE	4	-	-	4	25	75	100
INTERDEPARTMENTAL ELECTIVE – II		IE	4	-	-	4	25	75	100
PROFESSIONAL ELECTIVE – I		PE	3	1	-	4	25	75	100
A1233	Electrical Measurements Lab	CE	-	-	3	2	25	50	75
A1234	Power Systems and Simulation Lab - I	CE	-	-	3	2	25	50	75
A1235	Project Work (Stage - I)	PW	-	2	-	-	-	-	-
TOTAL			**22**	**04**	**06**	**28**	**200**	**550**	**750**

VIII SEMESTER

Code	Subject	Category	Periods per Week			Credits	Scheme of Examination Maximum Marks		
			L	T	P		Internal	External	Total
A1236	Utilization of Electrical Energy	CE	3	1	-	4	25	75	100
PROFESSIONAL ELECTIVE – II		PE	3	1	-	4	25	75	100
PROFESSIONAL ELECTIVE – III		PE	3	1	-	4	25	75	100
A1249	Power Systems and Simulation Lab - II	CE	-	-	6	2	25	50	75
A1250	Technical Seminar	TS	-	-	6	2	50	-	50
A1251	Comprehensive Viva	CV	-	-	-	2	-	75	75
A1252	Mini Project	MP	-	-	-	2	50	-	50
A1235	Project Work (Stage - II)	PW	-	-	12	8	50	150	200
TOTAL			**09**	**03**	**24**	**28**	**250**	**500**	**750**

B. TECH – ELECTRICAL AND ELECTRONICS ENGINEERING

REGULATIONS: VCE-R11

ELECTIVES	
INTERDEPARTMENTAL ELECTIVE - I	
Code	**Subject**
A1511	Database Management Systems
A1605	Wireless and Mobile Computing
A1429	VLSI Design
A1337	Robotics
A1701	Introduction to Aircraft Industry
A1148	Air pollution and Control Methodologies
INTERDEPARTMENTAL ELECTIVE - II	
A1016	Human Values and Ethics
A1017	Human Resource Management
A1018	Entrepreneurship
A1019	Business Communication
A1020	Intellectual Property and Patent Rights
A1021	Project Planning and Management
PROFESSIONAL ELECTIVE - I	
A1227	High Voltage Engineering
A1228	Energy Management
A1229	Linear System Analysis
A1230	Instrumentation
A1231	Special Electrical Machines
A1232	Power System Transients
PROFESSIONAL ELECTIVE - II	
A1237	Electrical Distribution Systems
A1238	High Voltage DC Transmission and FACTS
A1239	Power Quality
A1240	Advanced Control Systems
A1241	Dynamics of Electrical Machines
A1242	Advanced Power System Protection
PROFESSIONAL ELECTIVE - III	
A1243	Reliability Engineering
A1244	Digital Control Systems
A1245	Extra High Voltage AC Transmission
A1246	Machine Modeling and Analysis
A1247	Solar Energy and its Applications
A1248	Programmable Logic Controllers

SYLLABI FOR I SEMESTER

B. Tech. EEE I SEMESTER

MATHEMATICS - I
(Common to all Branches)

Course Code: **A1001**

L	T	P	C
3	1	-	4

UNIT - I

DIFFERENTIAL EQUATIONS OF FIRST ORDER AND THEIR APPLICATIONS: Overview of differential equations, exact, linear and Bernoulli. Applications to Newton's law of cooling, law of natural growth and decay and orthogonal trajectories.

UNIT - II

HIGHER ORDER LINEAR DIFFERENTIAL EQUATIONS AND THEIR APPLICATIONS: Linear differential equations of second and higher order with constant coefficients, RHS term of the type $Q(x)= e^{ax}$, sinax, cosax, and x^n, $e^{ax}V(x)$, $x^nV(x)$, method of variation of parameters. Applications to electrical circuits, simple harmonic motion.

UNIT - III

FUNCTIONS OF SINGLE VARIABLE AND THEIR APPLICATIONS AND MULTIPLE INTEGRALS: Rolle's Theorem, Lagrange's mean value theorem, Cauchy's mean value theorem, generalized mean value theorem (all theorems without proof), functions of several variables, functional dependence, Jacobian - maxima and minima of functions of two variables with and without constraints. Radius, centre and circle of curvature – evolutes and envelopes. Multiple integrals, double and triple integrals, change of order of integration, change of variables

UNIT - IV

LAPLACE TRANSFORMS: Laplace transform of standard functions, inverse transform, first shifting theorem, transforms of derivatives and integrals, unit step function, second shifting theorem, Dirac's delta function, convolution theorem, periodic function, differentiation and integration of transforms, application of Laplace transforms to ordinary differential equations.

UNIT - V

VECTOR CALCULUS: Gradient, divergence, curl and their related properties, potential function, Laplacian and second order operators. Line integral, work done, surface integrals, flux of a vector valued function. Vector integrals theorems: Green's - Stoke's and Gauss's divergence theorems (statement & their verification).

TEXT BOOKS:

1. Grewal B.S (2007), *Higher Engineering Mathematics*, 40th Edition, Khanna Publishers, New Delhi.
2. Iyengar T.K.V., Krishna Gandhi B. & Others (2011), *Engineering Mathematics Vol - I*, 10th Revised Edition, S. Chand & Company Limited, New Delhi.

REFERENCE BOOKS:

1. Jain R. K, Iyengar S. R. K (2008), *Advanced Engineering Mathematics,* 3rd edition, Narosa Publication House, New Delhi.
2. Shahanaz Bathul (2007), *Engineering Mathematics-I*, 3rd Edition, Right Publishers, Hyderabad.
3. Ramana B.V (2010), *Engineering Mathematics*, Tata McGraw Hill Publishing Co. Limited, New Delhi.

B. Tech. EEE I SEMESTER

ENGINEERING PHYSICS
(Common to EEE, ME, AE & CE)

Course Code: **A1002**

L	T	P	C
4	-	-	4

UNIT - I

BONDING IN SOLIDS: Ionic bond, Covalent bond, Metallic bond, Hydrogen bond, Vander-Waal's bond, calculation of cohesive energy.

CRYSTALLOGRAPHY AND CRYSTAL STRUCTURES: Space lattice, Unit cell lattice parameters, Crystal systems, Bravais lattices, Atomic radius, co-ordination number and packing factor of SC, BCC, FCC, diamond and HCP structures, structures of NaCl, ZnS, CsCl.

UNIT - II

CRYSTAL PLANES AND X-RAY DIFFRACTION: Miller indices, Crystal planes and directions, Inter planar spacing of orthogonal crystal systems, Basic principles of X-ray diffraction, Bragg's law, Laue method, Powder method, applications of X- ray diffraction.

NANOTECHNOLOGY: Origin of Nanotechnology, Nano scale, surface to volume ratio, bottom-up fabrication: Sol-gel, precipitation, Combustion methods; Top-down fabrication: Chemical vapour deposition, physical vapour deposition, pulsed laser vapour deposition methods and applications.

UNIT - III

PRINCIPLES OF QUANTUM MECHANICS: Waves and particles, De Broglie hypothesis , matter waves, Davisson and Germer's experiment, g. P. Thomson experiment, Schrödinger's time independent wave equation, physical significance of the wave function - particle in one dimensional potential box.

BAND THEORY OF SOLIDS: Electron in a periodic potential, Bloch theorem, Kronig-penny model(qualitative treatment), origin of energy band formation in solids, classification of materials into conductors, semi conductors & insulators, concept of effective mass of an electron.

UNIT - IV

DIELECTRIC PROPERTIES: Electric dipole moment, dielectric constant, polarization, electric susceptibility internal fields in solids, Clausius - Mossotti equation and its derivation, Piezo-electricity and Ferro- electricity.

MAGNETIC PROPERTIES: Origin of magnetic moment, classification of magnetic materials on the basis of magnetic moment, domain theory of Ferro magnetism, hysteresis curve, soft and hard magnetic materials.

SUPERCONDUCTIVITY: Introduction to superconductivity, Meissner effect, BCS theory, applications of superconductors.

UNIT- V

LASERS: Characteristics of lasers, spontaneous and stimulated emission of radiation, meta-stable state, population inversion, lasing action, Einstein's coefficients, ruby laser, Helium-neon laser, semiconductor diode laser, applications of lasers.

FIBER OPTICS: Principle of optical fiber, acceptance angle, numerical aperture, types of optical fibers, attenuation of signal in optical fibers, application of optical fibers.

TEXT BOOKS:

1. S. O. Pillai, Sivakami (2009), *Engineering Physics,* 2nd edition, New Age International (P) Ltd, Delhi.

REFERENCE BOOKS:

1. C. Kittel (2009), *Introduction to Solid State Physics*, 8th edition, Wiley Eastern Publications, India.
2. A. J. Dekker (1999), *Solid State Physics*, Macmillan India Ltd, Chennai.
3. M. Ratner, D. Ratner (2003), *Nanotechnology*, Pearson Edition, India.
4. P. Sarah (2008), *Lasers & Optical Fiber communications*, IK International (P) Ltd, New Delhi.

B. Tech. EEE II SEMESTER

ENGINEERING CHEMISTRY
((Common to EEE, ME, AE & CE))

Course Code: **A1003**

L	T	P	C
4	-	-	4

UNIT - I

ELECTROCHEMISTRY AND BATTERIES: Concept of Electrochemistry, Conductance Electrolyte in solution, Conductance specific, Equivalent and molar conductance, Ionic Mobilities, Kolrausch's law & applications. *EMF:* Galvanic cells, Nernst equation, Galvanic series, Numerical problems.

BATTERIES: Primary and secondary cells, Lead-acid cell, NI-CD cell, Lithium cells. Applications of batteries, *Fuel cells:* Hydrogen – Oxygen fuel cells, advantages of fuel cells.

UNIT - II

WATER: Introduction, *Hardness:* causes, expression of hardness units, types of hardness, estimation of temporary and permanent hardness of water, numerical problems. Softening of water internal and external treatment, Zeolite, ion exchange process and numerical problems, reverse osmosis, electro dialysis.

UNIT - III

POLYMERS: Types of polymerization, *Plastics:* Thermoplastic resins & thermo set resins. Compounding & fabrication of plastics, preparation, properties, engineering applications of: polyethylene, PVC, PS, Teflon, Nylon. *Rubber:* vulcanization. *Elastomers:* Buna-s, Buna-n, Thiokol rubbers, fibers polyester, applications.

SURFACE CHEMISTRY: Solid surfaces, types of adsorption, Longmuir adsorption isotherm, application adsorption, classification of colloids, electrical & optical properties of colloids, applications of colloids in industry. *Nano materials*: Introduction, preparation and applications of nano materials.

UNIT - IV

ENERGY SOURCES: Fuels, classification, conventional fuels (solid, liquid, gaseous) solid fuels, coal analysis proximate and ultimate analysis and their significance liquid fuels, primary petroleum, refining of petroleum. *Gaseous Fuels:* natural gas, analysis of flue gas by Orsat's method combustion, problems.

UNIT - V

PHASE RULE: Definitions, phase, component, degree of freedom and phase rule equation. Phase diagrams, one component system: Water system. Two component system: Lead silver system.

MATERIAL CHEMISTRY: *Cement:* Composition of Portland cement, manufacture of Port land cement. *Lubricants:* Criteria of a good lubricant. *Refractories:* Classification, characteristics of good refractory. *Insulators & conductors:* Classification of insulators, characteristics of thermal & electrical insulators and applications of superconductors.

TEXT BOOKS:

1. Dara S. S., Mukkanti (2006), *Engineering Chemistry,* S. Chand & Company Limited, New Delhi.

REFERENCE BOOKS:

1. Jain. P. C. and Monica Jain (2008), *Engineering Chemistry,* Dhanpat Rai Publishing Company, New Delhi.
2. Mishra. K. N., Mani R.P. and Rama Devi. B (2009), *Chemistry of Engineering Materials,* Cengage learning.
3. Kuriacase J. C and Rajaram. J (2004), *Engineering Chemistry,* Tata Mc Graw Hill Co., New Delhi.

B. Tech. EEE I SEMESTER

COMPUTER PROGRAMMING
(Common to ECE, CSE, IT & EEE)

Course Code: **A1501**

L	T	P	C
4	-	-	4

UNIT - I

INTRODUCTION TO COMPUTERS: Introduction to computers, computer systems, computing environments, computer languages, creating and running programmes, software development method, algorithms, pseudo code, flow charts, applying the software development method.

INTRODUCTION TO C LANGUAGE: Basic structures of C language, C tokens, data types and sizes, declaration of variables, assigning values

OPERATORS AND EXPRESSIONS: Statements, arithmetic, relational and logical operators, increment and decrement operators, conditional operator, bitwise operators, type conversions, expressions and evaluation, input and output statements, sample programs.

UNIT - II

CONTROL STATEMENTS: If and switch statements, while, do while and for statements, sample programs.

FUNCTIONS: Defining and accessing, passing arguments, function prototypes, library functions, static functions, user defined functions, recursive functions, variables and storage classes, scope rules, block structure, header files, C preprocessor, example C programs.

ARRAYS: Defining and processing, one dimensional and two dimensional arrays, initialization, passing arrays to a function, multi dimensional arrays, command line arguments.

UNIT - III

STRINGS: Defining and operations on strings, string variables declaration, reading, writing. Basics of functions, parameter passing, string handling functions.

POINTERS: Basic Concepts, pointer to pointer, passing pointers to a function, operations on pointers, pointer arithmetic, pointers and arrays, arrays of pointers, function pointers, dynamic memory allocation.

UNIT - IV

STRUCTURES AND UNIONS: Structure definition, initializing, assigning values, passing of structures as arguments, arrays of structures, pointers to structures, self reference to structures, unions, typedef, bit fields, sample programs.

UNIT - V

CONSOLE AND FILE I/O: File, types of files, file vs. console, file structure, file attributes, file operations, standard I/O, formatted I/O, sample programs.

TEXT BOOKS:

1. B. A. Fouruzan and R. F. Gilberg (2006), *Computer Science: A structured programming approach using C,* 3rd edition, Thomson Publications, New Delhi.
2. Yashawanth Kanethkar (2008), *Let us C*, 8th edition, Jones & Bartlett Publishers, India.

REFERENCE BOOKS:

1. Herbert Schildt (2000), *C: The Complete Reference*, 4th Edition, New Delhi, Osborne Mc Graw Hill.
2. B. W. Kerninghan, Dennis M. Ritche (1988), *The C Programming Language*, 2nd edition, Prentice Hall Software Series, India.
3. Stephen G.Kochan (2004), *Programming in C*, 3rd Edition, Pearson Education Private Limited.

B. Tech. EEE I SEMESTER

BASIC ELECTRICAL ENGINEERING
(Common to ECE & EEE)

Course Code: **A1201**

L	T	P	C
3	1	-	4

UNIT - I

INTRODUCTION TO ELECTRICAL CIRCUITS: Concept of Circuit, R-L-C parameters, voltage and current sources, Independent and dependent sources, source transformation, voltage - current relationship for passive elements, Kirchhoff's laws, network reduction techniques, series, parallel and compound circuits.

UNIT - II

ANALYSIS OF ELCTRICAL CIRCUITS: mesh analysis: mesh equations by inspection method, super mesh analysis, nodal analysis: nodal equations by inspection method, supernode analysis, star-to-delta or delta-to-star transformation.

UNIT - III

SINGLE PHASE AC CIRCUITS: R.M.S, average values and form factor for different periodic wave forms, steady state analysis of R, L and C (in series, parallel and series parallel combinations) with sinusoidal excitation, concept of reactance, impedance, susceptance and admittance phase and phase difference.

POWER AND POWER FACTOR: Concept of power factor, real and reactive powers, J notation, complex and polar forms of representation, complex power. Resonance for series and parallel circuits, concept of band width and Q factor.

UNIT - IV

MAGNETIC CIRCUITS: *Magnetic Circuits*: Faraday's laws of electromagnetic induction, concept of self and mutual inductance, dot convention, coefficient of coupling, composite magnetic circuit, analysis of series and parallel magnetic circuits.

UNIT - V

NETWORK TOPOLOGY: Definitions, Graph, Tree, basic Tieset and basic Cutset matrices for planar networks duality & dual networks.

NETWORK PARAMETERS: Two port network parameters, Z, Y, ABCD and hybrid parameters and their relations.

TEXT BOOKS:

1. William H. Hayt, Jack E. Kemmerly, Steven M. Durbin (2006), *Engineering Circuits Analysis*, 7th edition, Mc Graw Hill, New Delhi.
2. A. Chakrabarthy (2005), *Circuit Theory*, 4th edition, Dhanpat Rai & Sons Publications, New Delhi.

REFERENCE BOOKS:

1. Van Valkenburg, M. E. (1974), *Network Analysis*, 3rd edition, Prentice Hall of India, New Delhi.
2. Wadhwa C. L (2009), *Electric Circuits Analysis,* New Age International Publications, New Delhi.
3. A. Sudhakar, Shyammohan S. Palli (2003), *Electrical Circuits*, 2nd edition, Tata Mc Graw Hill, New Delhi.
4. Joseph Edminister (2001), *Electric Circuits*, 6th edition, Schaum's Outlines, Tata Mc Graw Hill, New Delhi.

B. Tech. EEE I SEMESTER

ENGINEERING PHYSICS AND ENGINEERING CHEMISTRY LAB
(Common to EEE, ME, AE & CE)

Course Code: **A1010**

L	T	P	C
-	-	3	2

ENGINEERING PHYSICS LAB

1. Study of I-V characteristics of an LED.
2. Determination of numerical aperture - optical Fibers.
3. Determination of time constant – R-C circuit.
4. Determination of energy gap of a given semiconductor material.
5. Determination of rigidity modulus of the material of a given wire– Torsional pendulum.
6. Determination of frequency of vibrating tuning fork – Melde's experiment.
7. Determination of wavelength and angular divergence of given laser source.
8. Determination of frequency of AC supply – Sonometer.
9. Determination of dispersive power of the material of the given prism – spectrometer.
10. Study of variation of magnetic field along a circular current carrying conductor – Stewart & Gee apparatus.

ENGINEERING CHEMISTRY LAB

1. **TITRIMETRY:** Estimation of hardness of water by EDTA method (or) Estimation of calcium in limestone by Permanganometry.
2. **MINERAL ANALYSIS:** Determination of percentage of copper in brass

INSTRUMENTAL METHODS:

3. **COLORIMETRY:** Determination of ferrous ion in cement by colorimetric method (Or) Estimation of copper by colorimetric method.
4. **CONDUCTOMETRY:** Conductometric titration of strong acid vs strong base (or) Conductometric titration of mixture of acids vs strong base.
5. **POTENTIOMETRY:** Titration of strong acid vs strong base by Potentiometry (or) Titration of weak acid vs strong base by Potentiometry.

PHYSICAL PROPERTIES:

6. Determination of viscosity of sample oil by redwood/ Ostwald's viscometer.
7. Determination surface tension of lubricants.
8. **IDENTIFICATION AND PREPARATIONS:** preparation of organic compounds: aspirin (or) Benzimidazole.

KINETICS:

9. To determine the rate constant of hydrolysis of methyl acetate Catalysed by an acid and also the energy of Activation (or) to study the kinetics of reaction between $K_2S_2O_8$ and KI.
10. **DEMONSTRATION EXPERIMENTS (ANY ONE OF THE FOLLOWING)**:
    a. Preparation of Thiokol rubber
    b. Adsorption on charcoal

B. Tech. EEE I SEMESTER

COMPUTER PROGRAMMING LAB
(Common to ECE, CSE, IT & EEE)

Course Code: **A1502**

L	T	P	C
-	-	3	2

LIST OF EXPERIMENTS:

1. To write C programs for the following:
   a) Sum of individual digits of a positive integer.
   b) A Fibonacci sequence is defined as follows: the first and second terms in the sequence are 0 and 1. Subsequent terms are found by adding the preceding two terms in the sequence.
   Write a C program to generate to generate the first n terms of the Fibonacci sequence.

2. a) To write a C program to generate all the prime numbers between 1 and n, where n is a value supplied by the user
   b) To write a C program to calculate the following sum:
   Sum=1+x2/2!+X4/4! ————— upto given 'n' terms.
   c) To write a C program to find the roots of a quadratic equation.

3. To write C programs that uses both recursive and non-recursive functions
   a) To find the factorial of a given number.
   b) To find the GCD (greatest common divisor) of two given integers.
   c) To solve Towers of Hanoi problem.

4. The total distance traveled by vehicle in 't' seconds is given by distance=ut+1/2at2 where 'u' and 'a are the initial velocity (m/sec) and acceleration (m/sec2). Write a C program to find the distance traveled at regular intervals of time given values of 'u' and 'a'. The program should provide the flexibility to the user to select his own time intervals and repeat the calculations for different values of 'u' and 'a'.

5. Using switch-case statement, write a C program that takes two operands and one operator from the user, performs the operation and then prints the answer. (consider operators +, -, *, and %).

6. Write a C program to find the largest and smallest number in a list of integers.

7. Write a C program that uses functions to perform the following
   a. Addition of Two Matrices
   b. Multiplication of Two Matrices

8. Write a C program that uses functions to perform the following operations
   a. To insert a sub-string in to given main string from a given position
   b. To delete n characters from a given position in given string.

9. Write a C program to determine if the given string is a palindrome or not.

10. a) Write a C program that displays the position or index in the string S where the string T begins, or -1 if S does not contain T.
    b) Write a C program to count the lines, words and characters in a given text.

11. To write a C program
    a) To generate Pascal's triangle
    b) To construct a pyramid of numbers

12. To write a C program to read in two numbers, x and n, and then compute the sum of this geometric progression 1+x+x2+x3+…xn
    For example: if n is 3 and x is 5, then the program computes 1+5+25+125. Print x, n, the sum. Perform error checking. For example the formula does not make sense for negative
    Exponents – if n is less than 0. Have your program print an error message if n<0, then go back and read in the nest pair of numbers of without computing the sum. Are any values of x also illegal? If so, test for them too.

13. To write a C program
    a) To find the 2's compliments of a binary number.
    b) To convert a Roman numeral to its decimal equivalent

14. To write a C program that uses functions to perform the following operations
    a. Reading a complex number
    b. Writing a complex number
    c. Addition of 2 complex numbers
    d. Multiplication of 2 complex numbers
    (Note: represent complex number using a structure)

15. To write a C program
    a) To copy the contents from one file to another.
    b) To reverse the first n characters in a file.
    (Note: the file name and n are specified on the command line)
    c) To fine the no. of characters, no. of words, no. of lines in a given file.

REFERENCE BOOKS:

1. Pradip Dey, Ghosh Manas (2009), *Programming in C,* Oxford University Press, USA.
2. E. Balaguruswamy (2009), *C and Data Structures,* 5th Edition, TMH publications, India.
3. M.K. Jain, S.R.K. Iyengar & R.K. Jain (2007), *Numerical Methods for Scientific and Engineering Computation,* 5th edition, New Age International Publishers, New Delhi.
4. Aitkinson, Han (2006), *Elementary Numerical Analysis*, 3rd Edition, John Wiley & Sons (Asia) Private Ltd., India.

B. Tech. EEE I SEMESTER

PC SOFTWARE LAB
(Common to CSE, IT & EEE)

Course Code: **A1601**

L	T	P	C
-	2	3	2

LIST OF EXPERIMENTS:

1. PC Hardware:

Task 1 and 2 - Draw the block diagram of the CPU along with the configuration of each peripheral and submit to your instructor based on your observation:

1. Check and measure various supply voltages of PC.
2. Make comparative study of motherboards.
3. Observe and study various cables, connections and parts used in computer communication.
4. Study various cards used in a system viz. display card, LAN card etc.
5. Study on floppy disk drive.
6. Study on hard disk.
7. To remove, study and replace CD ROM drive.
8. To study monitor, its circuitry and various presents and some elementary fault detection.
9. To study printer assembly and elementary fault detection of DMP and laser printers.
10. To observe various cables and connectors used in networking.
11. To study parts of keyboard and mouse.
12. To assemble a PC.
13. Troubleshooting exercises related to various components of computer like monitor, drives, memory and printers etc.
14. Study on operating systems: Microsoft Windows, Linux and Macintosh

Task 3 - Several mini tasks would be that covers Basic commands in Linux and Basic system administration in Linux which includes: Basic Linux commands in bash, Create hard and symbolic links, Text processing, Using wildcards

2. Net Working:

Task 4 and 5 - Importance of Networking:

1. Communication and Transmission Devices such as Modems, hubs, switches, routers , gateways, twisted pair cables, optic fiber, radio wave communication
2. Associated software Communication modes

Features of Networking, Communication Protocols
Topology: Ring, Star, Bus, etc
Types of Networks: Local Area, Metropolitan Area, Wide Area Networking
Wireless Network: Wide Area Networking, Value added Networking

Network Administration:

1. Holding & protecting Supervisor password
2. Protecting access to sensitive files
3. Allocation of user login, password and access rights
4. Control on unauthorised user activities
5. Day to day management of user requirements
6. Vigilance over unauthorised programs, failed attempts to access
7. Steps to prevent hacking & wiretapping
8. Password control
9. Maintenance of Audit trail logs
10. Physical control on access to servers & console

3. Internet & World Wide Web:

Task 6 - Orientation & Connectivity Boot Camp: Students should get connected to their Local Area Network and access the Internet. In the process they configure the TCP/IP setting. Finally students should demonstrate, to the instructor, how to access the websites and email. If there is no internet connectivity preparations need to be made by the instructors to simulate the WWW on the LAN.

Task 7 - Web Browsers, Surfing the Web: Students customize their web browsers with the LAN proxy settings, bookmarks, search toolbars and pop up blockers. Also, plug-ins like Macromedia Flash and JRE for applets should be configured.

Task 8 - Search Engines & Netiquette: Students should know what search engines are and how to use the search engines. A few topics would be given to the students for which they need to search on Google. This should be demonstrated to the instructors.

Task 9 - Cyber Hygiene: Students would be exposed to the various threats on the internet and would be asked to configure their computer to be safe on the internet. They need to first install an antivirus software, configure their personal firewall and windows update on their computer. Then they need to customize their browsers to block pop ups, block active x downloads to avoid viruses and/or worms.

4. MICROSOFT OFFICE/ Equivalent (FOSS) tools

MS/equivalent (FOSS) tool Word

Task 10 and 11 – Word Orientation: Word– Accessing, overview of toolbars, saving files, Using help and resources, rulers, format painter in word, Formatting Fonts in word, Drop Cap in word, Applying Text effects, Using Character Spacing, Borders and Colors, Inserting Header and Footer, Using Date and Time option in both and Word, Formatting Styles, Inserting table, Bullets and Numbering, Changing Text Direction, Cell alignment, Footnote, Hyperlink, Symbols, Spell Check , Track Changes , Table of Content, Newspaper columns, Images from files and clipart, Drawing toolbar and Word Art, Formatting Images, Textboxes and Paragraphs, Forms, Text Fields, Inserting objects, Mail Merge in Word.

MS/equivalent (FOSS) tool Excel

Task 12 and 13 - Excel Orientation : Excel –Accessing, overview of toolbars, saving excel files, Using help and resources, Gridlines, Format Cells, Summation, auto fill, Formatting Text, Cell Referencing, Formulae in excel – average, standard deviation, Charts, Renaming and Inserting worksheets, Hyper linking, Count function, LOOKUP/VLOOKUP, Split cells, freeze panes, group and outline, Sorting, Boolean and logical operators, Conditional formatting, Pivot Tables, Interactive Buttons, Importing Data, Data Protection, Data Validation

MS/equivalent (FOSS) tool Power Point

Task 14 and 15 - PPT Orientation, Slide Layouts, Inserting Text, Word Art, Formatting Text, Bullets and Numbering, Auto Shapes, Lines and Arrows, Hyperlinks, Inserting –Images, Clip Art, Audio, Video, Objects, Tables and Charts, Master Layouts (slide, template, and notes), Types of views (basic, presentation, slide slotter, notes etc), Inserting – Background, textures, Design Templates, Hidden slides, Auto content wizard, Slide Transition, Custom Animation, Auto Rehearsing.

MS/equivalent (FOSS) tool Publisher

Task 16 - Using Templates, Layouts, Inserting text objects, Editing text objects, Inserting Tables, Working with menu objects, Inserting pages, Hyper linking, Renaming, deleting, modifying pages, Hosting website.

REFERENCE BOOKS:

1. Vikas Gupta (2008), Comdex *Hardware and Networking Course Kit*, DreamTech press, New Delhi, India.
2. Sumitabha Das (2008), *UNIX concepts and applications*, 4th Edition, Tata McGraw Hill, New Delhi, India.

SYLLABI FOR II SEMESTER

B. Tech. EEE II SEMESTER

TECHNICAL ENGLISH
(Common to EEE, ME, AE & CE)

Course Code: **A1008**

L	T	P	C
4	-	-	4

UNIT - I

1. ***Sir CV Raman: A Path breaker in the Saga of Indian Science*** from E*njoying Every Day English*
2. ***Mother Teresa*** from *Inspiring Speeches and Lives*

FOCUSING ON Word formation with prefixes and suffixes, synonyms and antonyms, noun phrases, infinitive and gerund, subject-verb agreement (concord), tenses, impersonal passive conditional sentences, adjectives and degrees of comparison, conjunctions and prepositions.

UNIT - II

1. ***The Connoisseur*** from E*njoying Every Day English*
2. ***Sam Pitroda*** from *Inspiring Speeches and Lives*

FOCUSING ON Word formation with prefixes and suffixes, synonyms and antonyms, noun phrases, infinitive and gerund, subject-verb agreement (concord), tenses, impersonal passive conditional sentences, adjectives and degrees of comparison, conjunctions and prepositions.

UNIT - III

1. ***Bubbling Well Road*** from E*njoying Every Day English*
2. ***I Have a Dream*** **- by Martin Luther King** from *Inspiring Speeches and Lives*

FOCUSING ON Word formation with prefixes and suffixes, synonyms and antonyms, noun phrases, infinitive and gerund, subject-verb agreement (concord), tenses, impersonal passive conditional sentences, adjectives and degrees of comparison, conjunctions and prepositions.

UNIT - IV

LETTERS, MEMOS AND E-MAIL: Letters, business letters, significance, structure and layout, principles, types and samples, claim letters, adjustment letters, sales letters, job application letters, memos, classification and purpose style, E-mails, E-mail etiquettes, sample E- mail messages, effectiveness and security.

UNIT - V

REPORTS: Objectives, characteristics of a report, types of reports, importance of reports, formats, rewriting structure of reports, writing the report, visual aids, revising, editing and proof reading, proof reading symbols.

TEXT BOOKS:

1. Ramakrishna Rao. A (2009), *Enjoying Every Day English,* Sangam Books, Hyderabad.
2. Yadava Raju. B and Muralikrishna. C (2009), *Inspiring Speeches and Lives,* Maruthi Publications, Guntur.
3. Meenakshi Raman, Sangeeta Sharma (2009), *Technical Communication,* Oxford University Press, New Delhi.

REFERENCE BOOKS:

1. Edgar Thorpe and Showick Thorpe (2008), Basic *Vocabulary for Competitive Examination,* Pearson Education, New Delhi, India.
2. Ashraf Rizvi M (2005), *Effective Technical Communication,* Tata Mc Graw Hill, New Delhi.
3. Raymond Murphy (2004), *Murphy's English Grammar with CD,* 3rd Edition, Cambridge University Press, USA.

B. Tech. EEE II SEMESTER

MATHEMATICS - II
(Common to all Branches)

Course Code: **A1007**

L	T	P	C
3	1	-	4

UNIT - I

SOLUTION FOR LINEAR SYSTEMS AND EIGEN VALUES & EIGEN VECTORS: *Matrices and linear systems of equations*: Elementary row transformations - rank - echelon form, normal form, solution of linear systems, direct methods**.** Eigen values, Eigen vectors - properties. Cayley-Hamilton theorem (without proof) - inverse and powers of a matrix by Cayley-Hamilton theorem, diagonlization of matrix, calculation of powers of a matrix, modal and spectral matrices.

UNIT - II

LINEAR TRANSFORMATIONS: Real matrices, symmetric, skew symmetric, orthogonal, linear transformation, orthogonal transformation. *Complex matrices*: Hermitian, Skew Hermitian and unitary, Eigen values and Eigen vectors of complex matrices and their properties. Quadratic forms- reduction of quadratic form to canonical form -rank - positive, negative definite - semi definite - index - signature.

UNIT - III

PARTIAL DIFFERENTIAL EQUATIONS: Formation of partial differential equation by elimination of arbitrary constants and arbitrary functions - solutions of first order linear (Lagrange) equation and nonlinear (standard type) equations. Method of separation of variables for second order equations -two dimensional wave equation.

UNIT - IV

FOURIER SERIES: Determination of Fourier coefficients, Fourier series, even and odd functions, Fourier series in an arbitrary interval, even and odd periodic continuation. Half-range Fourier sine and cosine expansions. Fourier integral theorem, Fourier sine and cosine integral.

UNIT - V

FOURIER TRANSFORMS AND Z - TRANSFORMS: Fourier transform, Fourier sine and cosine transforms, properties, inverse transforms, finite Fourier transforms. Z-transforms, inverse Z-transforms, properties, Damping rule, Shifting rule, initial and final value theorems, Convolution theorem, Solution of difference equations by Z-transforms.

TEXT BOOKS:

1. Grewal B. S (2007), *Higher Engineering Mathematics*, 40th edition, Khanna Publishers, New Delhi.
2. Iyengar T.K.V., Krishna Gandhi B. & Others (2011), *Mathematical Methods*, 10th revised edition, S. Chand & Company Limited, New Delhi.

REFERENCE BOOKS:

1. Shahanaz Bathul (2007), *Mathematical Methods*, 3rd edition, Right Publishers, Hyderabad.
2. Jain R. K., Iyengar S. R. K (2008), *Advanced Engineering Mathematics,* 3rd edition, Narosa Publication House, New Delhi.
3. Dass H. K ,Rajnish Verma Er (2007), *Higher Engineering Mathematics*, First Edition, S. Chand & Company Limited, New Delhi.

B. Tech. EEE II SEMESTER

PROBABILITY, STATISTICS AND COMPUTATIONAL TECHNIQUES

Course Code: **A1005**

L	T	P	C
3	1	-	4

UNIT - I

PROBABILITY, RANDOM VARIABLES AND DISTRIBUTIONS: Sample space and events, probability, the axioms of probability. Random variables, Discrete distribution, Continuous distribution, Binomial distribution, Poisson distribution, Normal distribution, Normal approximation to Binomial distribution.

UNIT - II

TESTING OF HYPOTHESIS: Tests of hypothesis point estimations, interval estimations. Large samples, null hypothesis, alternative hypothesis type i & type ii errors, critical region, confidence interval for mean, difference between the means, single proportion and difference of proportions. Confidence interval for the T-distribution, tests of hypothesis - T-distributions, F-distribution and Chi-square distribution.

UNIT - III

SOLUTIONS OF ALGEBRAIC AND TRANSCENDENTAL EQUATIONS: Bisection method, Regular Falsi method, Iteration method, Newton Raphson method.

INTERPOLATION: Newton's forward interpolation, Newton's backward interpolation, interpolation with unequal intervals, Lagrange's interpolation, Newton's divided difference interpolation. Derivatives using Newton's forward formula, derivatives using Newton's backward formula.

UNIT - IV

CURVE FITTING AND NUMERICAL INTEGRATION: *Curve fitting*: Fitting a straight line, second degree curve, exponential curve, power curve by method of least squares. Numerical integration, Newton cote's formula, Trapezoidal rule, Simpson's 1/3 rule, Simpson's 3/8 rule.

UNIT - V

NUMERICAL SOLUTION OF ORDINARY DIFFERENTIAL EQUATIONS: Single step methods: Taylor's series method - Euler's and modified Euler's methods - fourth order Runge-Kutta method for solving first and second order equations- multistep methods: Milne's and Adam's, predictor and corrector methods.

TEXT BOOKS:

1. Grewal B.S (2007), *Higher Engineering Mathematics*, 40th edition, Khanna Publishers, New Delhi.
2. Iyengar T. K. V., Krishna Gandhi B. & Others (2011), *Probability and Statistics*, 3rd Revised Edition, S. Chand & Company Limited, New Delhi.

REFERENCE BOOKS:

1. Iyengar T. K. V., Krishna Gandhi B. & Others (2011), *Mathematical Methods*, 6th Revised Edition, S. Chand & Company Limited, New Delhi.
2. Bali N. P, Narayana Iyengar N. Ch (2004), *A Textbook of Engineering Mathematics*, 6th edition, Laxmi Publications, New Delhi.
3. Sastry S. S (2005), *Introductory Methods of Numerical Analysis*, 4th Edition, Prentice Hall of India Learning Pvt. Ltd, New Delhi

B. Tech. EEE II SEMESTER

ENVIRONMENTAL SCIENCE
(Common to EEE, ME, AE & CE)

Subject Code: **A1004**

L	T	P	C
4	-	-	4

UNIT - I

ENVIRONMENTAL SCIENCE INTRODUCTION AND NATURAL RESOURCES: *Introduction:* Multidisciplinary nature of environmental studies: definition, scope and importance, need for public awareness. *Natural Resources:* Renewable and non-renewable resources .Natural resources and associated problems. *Forest Resources:* Use and over - exploitation, deforestation, timber extraction, mining, dams and other effects on forest and tribal people. *Water Resources:* Use and over utilization of surface and ground water, floods, drought, conflicts over water, dams-benefits and problems. *Mineral Resources:* Use and exploitation, environmental effects of extracting and using mineral resources. *Food Resources:* World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, Organic farming and Food miles. *Energy Resources:* Growing energy needs, renewable and non-renewable energy sources, use of alternate energy sources, Case studies. *Land Resources:* Land as a resource, land degradation, man induced landslides, soil erosion and desertification. Role of an individual in conservation of natural resources. Equitable use of resources for sustainable lifestyles.

UNIT - II

ECOSYSTEM AND BIODIVERSITY: *Ecosystems:* Concept of an ecosystem, structure and function of an ecosystem, producers, consumers and decomposers. Energy flow in the ecosystem - ecological succession, food chains, food webs and ecological pyramids. Introduction, types, characteristic features, structure and function of the following ecosystem: forest ecosystem, grassland ecosystem, desert ecosystem, aquatic ecosystems (ponds, streams, lakes, rivers, oceans and estuaries). *Biodiversity and Its Conservation:* Introduction - definition: genetic, species and ecosystem diversity, value of biodiversity- consumptive use, productive use, social, ethical, aesthetic and option values. Biodiversity at global, national and local levels. India as mega diversity nation, hot-sports of biodiversity, threats to biodiversity- habitat loss, poaching of wildlife, man -wildlife conflicts. Endangered and endemic species of India. Conservation of biodiversity- in-situ and ex-situ conservation of biodiversity.

UNIT - III

ENVIRONMENTAL POLLUTION, GLOBAL ENVIRONMENTAL ISSUES AND CONTROL MEASURES: *Environmental Pollution:* definition, cause, effects and control measures of air pollution, water pollution, soil pollution, marine pollution, noise pollution, thermal pollution and nuclear hazards. *Solid Waste Management*: Causes, effects and control measures of urban and industrial wastes. Role of an individual in prevention of pollution, pollution case studies. *Disaster Management*: Floods, earthquake, cyclone and landslides. E-waste and plastic waste - recycling and reuse. *Social Issues and the Environment*: From unsustainable to sustainable development, urban problems related to energy. *Water Conservation*: Rain water harvesting, watershed management, resettlement and rehabilitation of people; its problems and concerns, case studies, climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust, case Studies, wasteland reclamation.

UNIT - IV

GREEN ENVIRONMENTAL ISSUES: Introduction, Clean development mechanism, Carbon foot printing, Carbon credits, Carbon sequestration, Polluter pay principle. Green building, practices, approaches to green computing, Nanotechnology IS014000. Role of Information Technology in environment and human health, case studies.

UNIT - V

ENVIRONMENTAL ETHICS, ENVIRONMENTAL IMPACT ASSESMENT & ROLE OF NGOs: *Environmental Ethics:* 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 awareness. *Environmental Impact Assesment*: Conceptual facts of EIA, baseline date acquisition, planning and management of impact studies, operational aspects of EIA, methods for impact identification, prediction of impacts(air, water, noise, soil, biological and socio-economics), environmental management plan, role of NGOs in creating awareness among people regarding environmental issues.

TEXT BOOKS:

1. Benny Joseph (2005), *Environmental Studies*, Tata McGraw Hill Publishing Company Limited, New Delhi.
2. Erach Bharucha (2005), *Textbook of Environmental Studies for Undergraduate Courses*, Universities Press, Hyderabad.

REFERENCE BOOKS:

1. Anji Reddy. M (2007), Textbook of Environmental Sciences and Technology, BS Publications, Hyderabad.
2. Rajagopalan. R (2009), Environmental Studies, Oxford University Press, New Delhi.
3. Anubha Kaushik (2006), Perspectives in Environmental Science, 3rd Edition, New age international, New Delhi.

B. Tech. EEE II SEMESTER

DATA STRUCTURES THROUGH C
(Common to EEE, CSE, IT & ECE)

Course Code: **A1503**

L	T	P	C
4	-	-	4

UNIT - I

RECURSION AND LINEAR SEARCH: Preliminaries of algorithm, algorithm analysis and complexity. Recursion definition, design methodology and implementation of recursive algorithms, linear and binary recursion, recursive algorithms for factorial function, GCD computation, Fibonacci sequence, Towers of Hanoi, tail recursion. List searches using linear search, binary search, Fibonacci search, analyzing search algorithms.

UNIT - II

SORTING TECHNIQUES: Basic concepts, Sorting by: Insertion (insertion sort), Selection (heap sort), Exchange (bubble sort, quick sort), Distribution (radix sort) and Merging (merge sort) algorithms.

UNIT - III

STACKS: Basic stack operations, representation of a stack using arrays, *Stack Applications*: Reversing list, factorial calculation, in-fix- to postfix transformation, evaluating arithmetic expressions.

QUEUES: Basic queues operations, representation of a queue using array, implementation of Queue operations using Stack, applications of Queues-Round Robin Algorithm, Enqueue, Dequeue, Circular queues, Priority queues.

UNIT - IV

LINKED LISTS: Introduction, single linked list, representation of a linked list in memory, operations on a single linked list, merging two single linked lists into one list, reversing a single linked list, applications of single linked list to represent polynomial expressions and sparse matrix manipulation, advantages and disadvantages of single linked list, circular linked list, double linked list.

UNIT - V

TREES: Basic tree concepts, *Binary Trees:* Properties, representation of binary trees using arrays and linked lists, operations on a binary tree, binary tree traversals, creation of binary tree from in-order and pre (post) order traversals, tree travels using stack, threaded binary trees.

GRAPHS: Basic concepts, *Representations of Graphs:* Using Linked list and adjacency matrix, graph algorithms, graph traversals (BFS & DFS)

TEXT BOOKS:

1. Horowitz, Ellis, Sahni, Sartaj, Anderson-Freed, Susan (2008), *Fundamentals of Data Structure in C*, 2nd Edition, University Press, India.
2. Richard F. Gilberg, Behrouz A. Forouzan (2005), *Data Structures: A Pseudo code approach with C*, 2nd Edition, Thomson, India.

REFERENCE BOOKS:

1. Seymour, Lipschutz (2005), *Data Structures*, Schaum's Outlines Series, Tata McGraw-Hill, India.
2. Debasis, Samanta (2009), *Classic Data Structures*, 2nd Edition, Prentice Hall of India, India.
3. G. A. V. Pai (2008), *Data Structures and Algorithms: Concepts, Techniques and Applications*, Tata McGraw-Hill Education, India.
4. A. M. Tanenbaum, Y. Langsam, M. J. Augustein (1991), *Data Structures using C*, Prentice Hall of India, New Delhi, India.

B. Tech. EEE II SEMESTER

ENGLISH LANGUAGE COMMUNICATION SKILLS LAB
(Common to EEE, ME, AE & CE)

Course Code: **A1009**

L	T	P	C
-	-	3	2

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

SYLLABUS:

The following course content is prescribed for the English Language Laboratory sessions:

1. Introduction to phonetics
2. Sounds of English- vowels, diphthongs & consonants
3. Introduction to stress and intonation
4. Oral presentations- prepared
5. Oral Presentations- Extempore
6. Situational dialogues / role play
7. 'Just A Minute' sessions (JAM)
8. Information transfer
9. Telephoning skills
10. Describing objects, situations and people
11. Giving directions
12. Listening for specific information
13. Listening to record telephone conversations
14. Debate

SUGGESTED SOFTWARE:

- Cambridge advanced learners' English dictionary with cd.
- The Rosetta stone English library.
- Clarity pronunciation power – part I.
- Oxford advanced learner's compass, 7th Edition.
- Learning to speak English - 4 CDs.
- Vocabulary in use, Michael McCarthy, felicity o'den, Cambridge.
- Murphy's English grammar, Cambridge with CD.

REFERENCE BOOKS:

1. Suresh Kumar. E. & Sreehari P.A *(*2007), *Handbook for English Language Laboratories,* Cambridge University Press India Pvt. Ltd, New Delhi.
2. Mandal S. K (2006), *Effective Communication & Public Speaking*, Jaico Publishing House, New Delhi.
3. Grant Taylor (2004), *English Conversation Practice,* Tata McGraw Hill, New Delhi.
4. Balasubramanian .T (2000), *A text book of English Phonetics for Indian Student, Mac* Millan Publishers, India.
5. Kamalesh Sadanand, Susheela Punitha (2008), *Spoken English: A foundation Course: Parts 1 & 2,* New Delhi, Orient Longman Pvt. Ltd.

B. Tech. EEE II SEMESTER

DATA STRUCTURES THROUGH C LAB
(Common to ECE, CSE, IT & EEE)

Course Code: **A1504**

L	T	P	C
-	-	3	2

Exercise 1:
Write recursive programme which computes the n^{th} Fibonacci number, for appropriate values of n.

Exercise 2:
Write recursive programme for the following
a) Write recursive C programme for calculation of Factorial of an integer
b) Write recursive C programme for calculation of GCD (n, m)
c) Write recursive C programme for Towers of Hanoi : N disks are to be transferred from peg S to peg D with Peg I as the intermediate peg.

Exercise 3:
a) Write C programs that use both recursive and non recursive functions to perform linear search for a Key value in a given list.
b) Write C programs that use both recursive and non recursive functions to perform binary search for a Key value in a given list.
c) Write C programs that use both recursive and non recursive functions to perform Fibonacci search for a Key value in a given list.

Exercise 4:
a) Write C programs that implement Bubble sort, to sort a given list of integers in ascending order
b) Write C programs that implement Quick sort, to sort a given list of integers in ascending order
c) Write C programs that implement Insertion sort, to sort a given list of integers in ascending order

Exercise 5:
a) Write C programs that implement heap sort, to sort a given list of integers in ascending order
b) Write C programs that implement radix sort, to sort a given list of integers in ascending order
c) Write C programs that implement merge sort, to sort a given list of integers in ascending order

Exercise 6:
a) Write C programs that implement stack (its operations) using arrays
b) Write C programs that implement stack (its operations) using Linked list

Exercise 7:
a) Write a C program that uses Stack operations to Convert infix expression into postfix expression
a) Write C programs that implement Queue (its operations) using arrays.
b) Write C programs that implement Queue (its operations) using linked lists

Exercise 8:
a) Write a C program that uses functions to create a singly linked list
b) Write a C program that uses functions to perform insertion operation on a singly linked list
c) Write a C program that uses functions to perform deletion operation on a singly linked list

Exercise 9:
a) Adding two large integers which are represented in linked list fashion.
b) Write a C programme to reverse elements of a single linked list.
c) Write a C programme to store a polynomial expression in memory using linked list
d) Write a C programme to representation the given Sparse matrix using arrays.
e) Write a C programme to representation the given sparse matrix using linked list

Exercise10:
a) Write a C program to create a Binary Tree of integers
b) Write a recursive C program, for traversing a binary tree in preorder, inorder and postorder.
c) Write a non recursive C program, for traversing a binary tree in preorder, inorder and postorder.
d) Program to check balance property of a tree.

B. Tech. EEE II SEMESTER

COMPUTER AIDED ENGINEERING DRAWING LAB
(Common to EEE, CSE & IT)

Course Code: **A1305**

L	T	P	C
-	2	3	2

UNIT - I

Introduction to computer aided drafting, auto CAD commands, theory of projection – elements of projection, planes of projection, methods of projection.

ORTHOGRAPHIC PROJECTION: Lines used in general engineering drawing, types of surfaces, invisible lines, precedence of lines, selection of views, principles of multi view drawing, steps to draw orthographic views, orthographic projection of different objects.

UNIT - II

PROJECTION OF POINTS AND STRAIGHT LINES: Projection of points, various positions of straight lines w.r.t. reference planes, skew line, traces of line, projection of straight lines and traces.

UNIT - III

PROJECTION OF PLANES: Types of planes, projection of planes, traces of planes.

UNIT - IV

PROJECTION OF SOLIDS: Divisions of solids, polyhedra, solids of revolution, projection of solids in simple position, projection of solids with axis inclined to one reference plane and parallel to other.

UNIT - V

ISOMETRIC PROJECTIONS: Divisions of pictorial projection, divisions of axenometric projection, theory of isometric projection, isometric drawing, non-isometric drawing, isometric drawing from orthographic views for simple objects.

TEXT BOOKS:

1. D. M. Kulkarni, A. P. Rastogi, and A. K. Sarkar (2009), *Engineering Graphics with AutoCAD*, PHI Learning Private Limited, New Delhi.
2. Arshad Noor Siddiquee, Zahid Akhtar Khan, Mukhtar Ahmad (2006), *Engineering Drawing with a Primer on Autocad,* 2nd Edition, Prentice Hall, India.
3. Jolhe, Dhananjay (2006), *Engineering Drawing: With an Introduction to CAD*, Tata Mc Graw Hill, India.

REFERENCE BOOKS:

1. N. D. Bhatt & V.M. Panchal (2005), *Engineering Drawing***,** 48th Edition, Charotar Publishing House, Gujarat.
2. K. R. Gopalakrishna (2005), *Engineering Graphics*, 32nd Edition, Subash Publishers, Bangalore.

SYLLABI FOR III SEMESTER

B. Tech. EEE III SEMESTER

MATHEMATICS - III
(Common to EEE & ECE)

Course Code: **A1011**

L	T	P	C
3	1	-	4

UNIT - I

SPECIAL FUNCTIONS: Gamma and Beta functions and their properties, evaluation of improper integrals. *Bessel's functions:* properties, recurrence relations, orthogonality of Bessel functions. *Legendre functions:* Legendre Polynomials, properties, recurrence relations, orthogonality of Legendre polynomials, Rodrigue's formula.

UNIT - II

FUNCTIONS OF A COMPLEX VARIABLE: Continuity, differentiability, analyticity and properties of analytic functions. Cauchy - Riemann equations in Cartesian and Polar co-ordinates, Harmonic and conjugate harmonic functions, Milne - Thomson method.

ELEMENTARY FUNCTIONS: Exponential, trigonometric, hyperbolic functions and their properties, general power of z^a (a is complex), Principal value.

UNIT - III

COMPLEX INTEGRATION: Line integral, evaluation of Line Integral along a path and by indefinite integration, Cauchy's integral theorem, Cauchy's integral formula and generalized Cauchy's integral formula.

COMPLEX POWER SERIES: Radius of convergence, expansion in Taylor's series, Maclaurin's series and Laurent's series. Zeros, singular points and poles of an analytic function.

UNIT - IV

CALCULUS OF RESIDUES: *Residue:* Evaluation of residues by formula and by Laurent's series, Residue theorem, Evaluation of Integrals of the type:

(a) Improper real integrals $\int_{-\infty}^{\infty} f(x)dx$ (b) $\int_{0}^{2\pi} f(\cos\theta, \sin\theta)d\theta$

(c) $\int_{-\infty}^{\infty} e^{imx} f(x)dx$ (d) Integration by indentation

UNIT - V

CONFORMAL MAPPING: Transformation by $z+\frac{1}{z},\ z^2,\ z^n (n \in z^+),\ e^z, \log z,\ \sin z,\ \cos z$.*Bilinear transformation*: Translation, rotation, inversion, fixed points, properties and invariance of cross ratio under bilinear transformation. Determination of bilinear transformation mapping three given points.

ELEMENTARY GRAPH THEORY: *Graphs*: Simple, Multiple, Regular, Complete, Bipartite and Planar Graphs. *Trees:* Introduction, Spanning Tree and Minimal Spanning Tree.

TEXT BOOKS:

1. Dr T. K. V Iyengar, Dr B. Krishna Gandhi & Others (2011), *Engineering Mathematics Volume - III*, 9th Revised Edition, S. Chand & Co. Ltd, New Delhi.
2. B. S. Grewal (2007), *Higher Engineering Mathematics*, 41st edition, Khanna Publishers, New Delhi.

REFERENCE BOOKS:

1. Shahnaz Bathul (2011), *Special Functions & Complex variables (Engineering Mathematics - III)*, Prentice Hall of India, New Delhi.
2. Ruel Churchill, James Brown (2010), *Complex Variables and Applications,* 7th edition, Tata McGraw Hill Publishing Co. Ltd, New Delhi.

B. Tech. EEE III SEMESTER

ELECTRONIC DEVICES
(Common to EEE & ECE)

Course Code: **A1401**

L	T	P	C
4	-	-	4

UNIT - I

CATHODE RAY OSCILLOSCOPE: Motion of a charged particle in electric and magnetic fields, simple problems involving electric and magnetic fields only, electrostatic and magnetostatic deflection sensitivities, constituents of cathode ray oscilloscope, cathode ray tube, the electron gun, focusing, deflection system, uses of cathode ray oscilloscope.

CONDUCTION IN SEMICONDUCTORS: Electrons and holes in an Intrinsic semiconductor, conductivity of a semiconductor, carrier concentrations in an intrinsic semiconductor, donor and acceptor impurities, charge densities in a semiconductor, Fermi level in a semiconductor having impurities, diffusion, carrier lifetime, the continuity equation, the hall effect.

UNIT - II

SEMICONDUCTOR DIODE CHARACTERISTICS: Qualitative theory of the p-n Junction, the p-n junction as a diode, band structure of an open circuited p-n junction, the current components in a p-n diode, quantitative theory of the p-n diode currents, the volt ampere characteristics, the temperature dependence of p-n characteristics, diode resistance, ideal versus practical diodes, diode equivalent circuits, space charge or transition capacitance C_T, diffusion capacitance, breakdown mechanism in diode, Zener diode**,** V-I characteristics of Zener diode.

UNIT - III

DIODE APPLICATIONS: Introduction, load line analysis, series diode configurations, parallel and series-parallel configuration, half-wave rectification, full-wave rectification, general filter considerations, Inductive, Capacitive, LC and CLC filters, Zener diode as voltage regulator.

SPECIAL SEMICONDUCTOR DEVICES: Principle of operation, Characteristics and applications of Tunnel diode, Varactor diode, UJT, Photo Diode, LED, LCD, SCR.

UNIT - IV

BIPOLAR JUNCTION TRANSISTORS: Introduction, transistor construction, transistor operation, transistor current components, transistor as an amplifier, common base configuration, common emitter configuration, common collector configuration, limits of operation, transistor specifications.

FIELD EFFECT TRANSISTORS: Junction Field Effect Transistor (JFET) - Principle of operation, volt ampere characteristics, advantages of JFET over BJT. Introduction to MOSFETs - depletion and enhancement type MOSFETs, operation and volt-ampere characteristics.

UNIT - V

BJT BIASING: Need for biasing, Operating point, load line analysis, bias stabilization techniques: fixed bias, collector to base bias, self-bias, Stabilization against variations in I_{co}, V_{BE} and β for the self bias circuit, bias compensation techniques, thermal runaway and thermal stability.

FET BIASING: Biasing techniques: Fixed bias, Source self-bias, Voltage divider bias.

TEXT BOOKS:

1. Jacob Milliman, Christos C .Halkias & Satyabrata Jit (2011), *Electronic Devices and Circuits*, 3rd Edition, Tata McGraw Hill, New Delhi.
2. G.K. Mittal (1999), *Electronic Devices and Circuits*, 22nd Edition, Khanna Publications, New Delhi.
3. Robert Boylestad & Lowis Nashelsky (1993), *Electronic Devices and Circuit Theory*, 5th Edition, Prentice Hall of India, New Delhi, India.

REFERENCE BOOKS:

1. David. A. Bell (1986), *Electronic Devices and Circuits,* 4th Edition, Prentice Hall of India, New Delhi.
2. S. Shalivahanan, N.Suresh Kumar, A. Vallavaraj (2007), *Electronic Devices and Circuits*, 3rd Edition, McGraw Hill, New Delhi, India.
3. Theodore. F. Bogart Jr, Jeffrey S. Beasley, Guillermo Rico (2004), *Electronic Devices and Circuits*, 6th Edition Pearson Education, India.

B. Tech. EEE III SEMESTER

MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS
(Common to EEE, CSE, IT, AE & CE)

Course Code: **A1013**

L	T	P	C
4	-	-	4

UNIT - I

INTRODUCTION TO MANAGERIAL ECONOMICS: Definition, Nature and Scope Managerial Economics, *Demand Analysis:* Demand Determinants, Law of Demand and its exceptions.

ELASTICITY OF DEMAND: Definition, Types, Measurement and Significance of Elasticity of Demand. Demand Forecasting, Factors governing demand forecasting, methods of demand forecasting (survey methods, statistical methods, expert opinion method, test marketing, controlled experiments, judgmental approach to demand forecasting)**.**

UNIT - II

THEORY OF PRODUCTION AND COST ANALYSIS: Production Function, Isoquants and Isocosts, MRTS, Least Cost Combination of Inputs, Production function, Laws of Returns, Internal and External Economies of Scale.

COST ANALYSIS: Cost concepts, Opportunity cost, fixed vs. variable costs, explicit costs vs. Implicit costs, Out of pocket costs vs. Imputed costs. Break Even Analysis (BEA), termination of Break Even Point (simple problems), Managerial Significance and limitations of BEA.

UNIT - III

INTRODUCTION TO MARKETS AND PRICING STRATEGIES: *Market structures*: Types of competition, Features of Perfect competition, Monopoly and Monopolistic Competition.

PRICE DETERMINATION AND PRICE STATISTICS: Price-Output Determination in case of Perfect Competition and Monopoly, Pricing Strategies.

UNIT - IV

BUSINESS AND NEW ECONOMIC ENVIRONMENT: Characteristic features of Business, Features and evaluation of Sole Proprietorship, Partnership, Joint Stock Company, Public Enterprises and their types, Changing Business Environment in Post-liberalization scenario.

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

UNIT - V

INTRODUCTION TO FINANCIAL ACCOUNTING: Double-Entry Book Keeping, Journal, Ledger, Trial Balance- Final Accounts (Trading Account, Profit and Loss Account and Balance Sheet with simple adjustments).

FINANCIAL ANALYSIS THROUGH RATIOS: Computation, Analysis and Interpretation of Liquidity Ratios (Current Ratio and quick ratio), Activity Ratios (Inventory turnover ratio and Debtor Turnover ratio), Capital structure Ratios (Debt-Equity ratio, Interest Coverage ratio), and Profitability ratios (Gross Profit Ratio, Net Profit ratio, Operating Ratio, P/E Ratio and EPS).

TEXT BOOKS:

1. Aryasri (2005), *Managerial Economics and Financial Analysis,* 2nd edition, Tata McGraw Hill, New Delhi, India.
2. Varshney, Maheswari (2003), *Managerial Economics,* Sultan Chand, New Delhi, India.

REFERENCE BOOKS:

1. Ambrish Gupta (2004), *Financial Accounting for Management,* Pearson Education, New Delhi, India.
2. Domnick Salvatore (2011), *Managerial Economics in a Global Economy,* 7th edition, Oxford University Press, United States of America.
3. Narayanaswamy (2005), *Financial Accounting, A Managerial Perspective,* Prentice Hall of India private Ltd, New Delhi, India.

B. Tech. EEE III SEMESTER

DIGITAL LOGIC DESIGN
(Common to EEE, ECE, CSE & IT)

Course Code: **A1404**

L	T	P	C
3	1	-	4

UNIT - I

DIGITAL SYSTEMS AND BINARY NUMBERS: Digital systems, binary numbers, number base conversions, octal and hexadecimal numbers, complements, signed binary numbers, binary codes, binary storage and registers, binary logic.

BOOLEAN ALGEBRA AND LOGIC GATES: Basic definitions, axiomatic definition of Boolean algebra, basic theorems and properties of Boolean algebra, Boolean functions, canonical and standard forms, other logic operations, digital logic gates.

UNIT - II

GATE LEVEL MINIMIZATION: The k-map method, four-variable map, five-variable map, product of sums simplification, don't-care conditions, NAND and NOR implementation, AND-OR-INVERT, OR-AND-INVERT implementations, exclusive - OR function, Variable entered mapping, the tabulation (Quine - Mccluskey) technique, determination and selection of Prime Implicants.

COMBINATIONAL LOGIC: Combinational circuits, analysis procedure, design procedure, binary adder, binary subtractor, decimal adder, binary multiplier, magnitude comparator, decoders, encoders, multiplexers.

UNIT - III

SYNCHRONOUS SEQUENTIAL LOGIC: Sequential circuits, latches, flip-flops, analysis of clocked sequential circuits, State reduction and assignment, design procedure.

REGISTERS AND COUNTERS: Registers, shift registers, ripple counters, synchronous counters, counters with unused states, ring counter, Johnson counter.

UNIT - IV

MEMORY AND PROGRAMMABLE LOGIC: Introduction**,** Random access memory, memory decoding, error detection and correction, read only memory, programmable logic array, programmable array logic, sequential programmable devices.

UNIT - V

ALGORTHMIC STATE MACHINES (ASM): Introduction, ASM chart, timing considerations, design with multiplexers.

ASYNCHRONOUS SEQUENTIAL LOGIC: Introduction, analysis procedure, circuits with latches, design procedure, reduction of state and flow tables, race-free state assignment hazards, design example.

TEXT BOOKS:

1. M. Morris Mano, Michael D. Ciletti (2008), *Digital Design*, 4th edition, Pearson Education Inc, India.

REFERENCE BOOKS:

1. Zvi. Kohavi (2004), *Switching and Finite Automata Theory*, Tata McGraw Hill, India.
2. C. V. S. Rao (2009), *Switching and Logic Design*, 3rd Edition, Pearson Education, India.
3. Donald D. Givone (2002), *Digital Principles and Design*, Tata McGraw Hill, India
4. Roth (2004), *Fundamentals of Logic Design*, 5th Edition, Thomson, India.

B. Tech. EEE III SEMESTER

NETWORK ANALYSIS

Course Code: **A1203**

L	T	P	C
4	-	-	4

UNIT - I

NETWORK THEOREMS: Tellegen's, Superposition, Reciprocity, Thevenin's, Norton's, Maximum Power Transfer, Millman's and Compensation theorems for DC excitations. Tellegen's, Superposition, Reciprocity, Thevenin's, Norton's, Maximum Power Transfer, Millman's and Compensation theorems for AC excitations.

UNIT - II

THREE PHASE CIRCUITS: Phase sequence, Star and delta connection, Relation between line and phase voltages and currents in balanced systems, Analysis of balanced and Unbalanced three phase circuits, Measurement of active and reactive power**.**

UNIT - III

D.C TRANSIENT ANALYSIS: Transient response of R-L, R-C, R-L-C circuits (Series and parallel combinations) for D.C. excitations, Initial conditions, Solution using differential equation and Laplace transform method.

A.C TRANSIENT ANALYSIS: Transient response of R-L, R-C, R-L-C circuits (Series and parallel combinations) for sinusoidal excitations, Initial conditions, Solution using differential equation and Laplace transform method.

UNIT - IV

FILTERS: Classification of filters, filter networks, classification of pass band and stop band, characteristic impedance in the pass and stop bands, constant-k low pass filter, high pass filter, m-derived filter, band pass filter and band elimination filter.

ATTENUATORS: Symmetrical Attenuators, T-Attenuator, π-Attenuator, Bridged T type Attenuator, Lattice Attenuator

UNIT - V

LOCUS DIAGRAMS: Series and Parallel combination of R-L, R-C and R-L-C circuits with variation of various parameters.

FOURIER ANALYSIS OF A.C CIRCUITS: The Fourier theorem, consideration of symmetry, exponential form of Fourier series, line spectra and properties of Fourier transforms.

TEXT BOOKS:

1. A. Sudhakar, Shyammohan S Palli (2008), Circuit & Networks, 4th edition, Tata McGraw Hill Publications, New Delhi, India.
2. Joseph A. Edminister (2002), Schaum's outline of Electrical Circuits, 4th edition, Tata McGraw Hill Publications, New Delhi, India.

REFERENCE BOOKS:

1. C. L. Wadhwa (2008), Electric Circuits Analysis, 2nd edition, New Age International Publications, New Delhi.
2. A. Chakrabarthy (2004), Electrical Circuits, 3rd edition, Dhanpat Rai & Sons Publications, New Delhi.

B. Tech. EEE III SEMESTER

DC MACHINES

Course Code: **A1204**

L	T	P	C
3	1	-	4

UNIT - I

ELECTROMECHANICAL ENERGY CONVERSION: Electromechanical Energy conversion, forces and torque in magnetic field systems, energy balance, energy and force in a singly excited magnetic field system, determination of magnetic force - co-energy, multi excited magnetic field systems.

UNIT - II

D.C. GENERATORS, CONSTRUCTION & OPERATION: D.C. Generators - Principle of operation ,Action of commutator, constructional features ,armature windings - lap and wave windings , simplex and multiplex windings , use of laminated armature. E.M.F. Equation , Armature reaction - Cross magnetizing and de-magnetizing AT/pole. compensating winding - commutation , reactance voltage , methods of improving commutation.

UNIT - III

TYPES OF D.C. GENERATORS: Methods of Excitation - separately excited and self excited generators, build-up of E.M.F, critical field resistance and critical speed, causes for failure to self excite and remedial measures.

LOAD CHARACTERISTICS OF D.C GENERATORS: Shunt, series and compound generators - parallel operation of D.C series generators , use of equalizer bar and cross connection of field windings, load sharing.

UNIT - IV

D.C. MOTORS & SPEED CONTROL OF D.C. MOTORS: D.C Motors - Principle of operation - Back E.M.F., Torque equation . characteristics and application of shunt, series and compound motors . Speed control of D.C. Motors- Armature voltage and field flux control methods. Ward- Leonard system. Principle of 3- point and 4 - point starters, protective devices.

UNIT - V

TESTING OF D.C. MACHINES: Testing of d.c. machines- Losses - Constant & Variable losses , calculation of efficiency, condition for maximum efficiency. Methods of Testing , direct, indirect and regenerative testing. Brake test, Swinburne's test, Hopkinson's test , Field's test , Retardation test. Separation of stray losses in a d.c. motor test.

TEXT BOOKS:

1. J. B. Gupta (2006), *Theory and Performance of Electrical Machines*, 14th edition, S. K. Kataria & Sons, New Delhi.
2. P. S .Bimbra (2000), *Electrical Machinery*, 7th edition, Khanna Publishers, New Delhi.

REFERENCE BOOKS:

1. A. E. Fritzgerald, C. Kingsley, S. Umans (2002*), Electric Machinery*, 5th edition, Tata McGraw Hill Companies, New Delhi.
2. B. L. Theraja, A. K. Theraja (2002), *A text book of Electrical Technology,* 2nd edition, S. Chand Publishers, New Delhi, India.

B. Tech. EEE III SEMESTER

ELECTRONIC DEVICES LAB
(Common to EEE & ECE)

Course Code: **A1406**

L	T	P	C
-	-	3	2

LIST OF EXPERIMENTS:

PART A: **ELECTRONIC WORKSHOP PRACTICE**

1. Identification, Specifications, Testing of R, L, C Components (Color Codes), Potentiometers, Switches (SPDT, DPDT, and DIP), Coils, Relays, Bread Boards, PCB's.

2. Identification, Specifications and Testing of Active Devices: Diodes, BJTs, JFETs, MOSFETs, Power Transistors, LED's, LCD's, SCR, UJT.

3. Study and operation of

    - Multimeters (Analog and Digital)
    - Function Generator
    - Regulated Power Supply (RPS)
    - CRO

4. Soldering Practice.

PART B:

1. Forward and Reverse Bias Characteristics of PN junction diode.
2. Zener Diode Characteristics and Zener diode as voltage regulator.
3. Half wave rectifier with and without filters.
4. Full wave rectifier with and without filters.
5. Input & output characteristics of transistor in CB configuration.
6. Input & output characteristics of transistor in CE configuration.
7. Input & output characteristics of transistor in CC configuration
8. Drain and Transfer characteristics of JFET.
9. Voltage divider bias using BJT.
10. UJT characteristics.
11. SCR characteristics.

B. Tech. EEE III SEMESTER

ELECTRIC CIRCUITS AND SIMULATION LAB

Course Code: **A1207**

L	T	P	C
-	-	3	2

LIST OF EXPERIMENTS:

1. Determination of Z and Y Parameters.
2. Series and Parallel Resonance.
3. Verification of Compensation and MIlliman's Theorems.
4. Verification of Thevenin's, Norton's and Maximum Power Transfer theorems.
5. Verification of Super Position and Reciprocity theorems.
6. Determination of Self Inductance, Mutual Inductance and Coefficient of coupling .
7. Design of Constant –K Low Pass and High Pass Filters.
8. Simulation of DC Circuits.
9. Simulation of DC Transient response.
10. Simulation of Mesh and Nodal Analysis.
11. Simulation of 3 Phase Analysis.
12. Simulation of Thevenin's and Norton's Theorems.

SYLLABI FOR IV SEMESTER

B. Tech. EEE IV SEMESTER

COMPUTER ARCHITECTURE AND ORGANIZATION
(Common to EEE, CSE, IT & ECE)

Course Code: **A1509**

L	T	P	C
4	-	-	4

UNIT - I

STRUCTURE OF COMPUTERS: Computer types, functional units, basic operational concepts, Von-Neumann architecture, bus structures, software, performance, multiprocessors and multicomputer, data representation, fixed and floating point and error detecting codes.

REGISTER TRANSFER AND MICRO-OPERATIONS: Register transfer language, register transfer, bus and memory transfers, arithmetic micro-operations, logic micro-operations, shift micro-operations, arithmetic logic shift unit.

UNIT - II

BASIC COMPUTER ORGANIZATION AND DESIGN: Instruction codes, computer registers, computer instructions, instruction cycle, timing and control, memory-reference instructions, input-output and interrupt. Central processing unit: stack organization, instruction formats, addressing modes, data transfer and manipulation, program control, reduced instruction set computer (RISC).

UNIT - III

MICRO-PROGRAMMED CONTROL: Control memory, address sequencing, micro-program example, design of control unit.

COMPUTER ARITHMETIC: Addition and subtraction, multiplication and division algorithms, floating-point arithmetic operation, decimal arithmetic unit, decimal arithmetic operations.

UNIT - IV

THE MEMORY SYSTEM: Basic concepts, semiconductor RAM types of read - only memory (ROM), cache memory, performance considerations, virtual memory, secondary storage, raid, direct memory access (DMA).

UNIT - V

MULTIPROCESSORS: Characteristics of multiprocessors, interconnection structures, interprocessor arbitration, interprocessor communication and synchronization, cache coherence, shared memory multiprocessors.

TEXT BOOKS:

1. M. Moris Mano (2006), *Computer System Architecture*, 3rd edition, Pearson/PHI, India.
2. Carl Hamacher, Zvonks Vranesic, SafeaZaky (2002), *Computer Organization*, 5th edition, McGraw Hill, New Delhi, India.

REFERENCE BOOKS:

1. William Stallings (2010), *Computer Organization and Architecture- designing for performance*, 8th edition, Prentice Hall, New Jersy.
2. Andrew S. Tanenbaum (2006), *Structured Computer Organization*, 5th edition, Pearson Education Inc, New Jersy.
3. Sivarama P. Dandamudi (2003), *Fundamentals of Computer Organization and Design*, Springer Int. Edition, USA.
4. John P. Hayes (1998), *Computer Architecture and Organization*, 3rd edition, Tata McGraw Hill, New Delhi, India.

B. Tech. EEE IV SEMESTER

ELECTRONIC CIRCUITS

Course Code: **A1411**

L	T	P	C
3	1	-	4

UNIT - I

SMALL SIGNAL SINGLE STAGE AMPLIFIERS: Transistor as an amplifier, Classification of amplifiers, Transistor hybrid model, the h-parameters, analysis of a transistor amplifier circuit (CE, CB, CC) using h-parameters, simplified Common Emitter hybrid model, frequency response of amplifier. Small signal JFET model, common source amplifier, common drain amplifier, common gate amplifier.

UNIT - II

LARGE SIGNAL AMPLIFIERS: Introduction, class A large signal amplifier, harmonic distortion, transformer coupled audio power amplifier, collector dissipation and conversion efficiency, push-pull amplifier, class B power amplifier, class B push pull amplifier without output transformer, push pull amplifiers using transistors having complementary symmetry, class AB push pull amplifier, thermal stability, heat sink.

UNIT - III

FEEDBACK AMPLIFIERS: Feedback concept and types, transfer gain with feedback, general characteristics of negative feedback amplifiers, effect of negative feedback on input and output resistances, method of analysis of feedback amplifiers, voltage series, current series, current shunt, and voltage shunt feedback amplifiers.

OSCILLATORS: Constituents of an oscillator, Barkhausen criterion, classification of oscillators, sine wave feedback oscillators of LC type-general form of oscillator circuit, Hartley oscillator, Colpitts oscillator, sine wave feedback oscillator of RC type- RC phase shift oscillator, Wein bridge oscillator, Crystal oscillator, frequency stability.

UNIT - IV

LINEAR WAVE SHAPING: High pass, low pass RC circuits, their response for sinusoidal, step, pulse, square, ramp and exponential inputs, high pass RC circuit as differentiator and low pass RC circuit as integrator circuit.

NON-LINEAR WAVE SHAPING: Diode clippers, transistor clippers, clipping at two independent levels, clamping operation, clamping circuits using diode with different inputs, clamping circuit theorem, practical clamping circuits.

UNIT - V

MULTIVIBRATORS: The stable state of a Bistable multivibrator, design and analysis of fixed bias and self biased Bistable multivibrator, Schmitt trigger circuit using transistors, Monostable multivibrator, design and analysis of collector coupled and emitter coupled Monostable multivibrator, Astable multivibrator, design and analysis of collector coupled and emitter coupled Astable multivibrator.

TEXT BOOKS:

1. Jacob Milliman, Christos C. Halkias, Chetan D. Parikh (2011), *Integrated Electronics-Analog and Digital Circuits and Systems,* 2nd edition, Tata McGraw Hill Education Private Limited, New Delhi.
2. Jacob Millman, Herbert Taub, Mothiki S. Prakash Rao (2008), *Pulse, Digital and Switching Waveforms*, 3rd edition, Tata McGraw Hill, New Delhi.

REFERENCE BOOKS:

1. Robert L. Boylestad, Louis Nashelsky (2006), *Electronic Devices and Circuits Theory*, 9th edition, Pearson/Prentice Hall, India.
2. Jacob Millman, Arvin Grabel (2003), *Microelectronics*, 2nd edition, Tata McGraw Hill, New Delhi.
3. A. Anand Kumar (2005), *Pulse and Digital Circuits*, Prentice Hall of India, India.
4. G. K. Mithall (1998), *Electronic Devices and Circuits*, Khanna Publishers, New Delhi.

B. Tech. EEE IV SEMESTER

POWER SYSTEM GENERATION

Course Code: **A1209**

L	T	P	C
4	-	-	4

UNIT - I

STRUCTURE OF POWER SYSTEM: Components of an electric power system - Overview of conventional and non-conventional sources of energy, Single line diagram of electrical power system, important terms & factors. Base load and peak load on power station. Interconnected grid system, different types of energy sources and efficiency in their use.

HYDROELECTRIC POWER STATIONS: Elements of hydro electric power station-types-concept of pumped storage plants, storage requirements, mass curve, estimation of power developed from a given catchment area, heads and efficiencies.

UNIT - II

THERMAL POWER STATIONS: Line diagram of Thermal Power Station (TPS) showing paths of coal, steam, water, air, ash and flue gasses. Brief description of TPS components: Economizers, Boilers, Super heaters, Turbines, Condensers, Chimney and cooling towers.

UNIT - III

NUCLEAR POWER STATIONS: Nuclear Power Stations: Nuclear Fission and Chain reaction. Nuclear fuels- Principle of operation of Nuclear reactor. Reactor Components: Moderators, Control rods, Reflectors and Coolants. Radiation hazards: Shielding and Safety precautions. Types of Nuclear reactors and brief description of PWR, BWR and FBR.

GAS POWER STATIONS: Principle of Operation and Components.

UNIT - IV

SUBSTATIONS: Classification of substations: Air insulated substations, Indoor & Outdoor substations, substations layout showing the location of all the substation equipment. Bus bar arrangements in the Sub-Stations, Simple arrangements like single bus bar, sectionalized single bus bar, main and transfer bus bar system with relevant diagrams. Gas insulated substations (GIS): Advantages of Gas insulated substations, single line diagram of gas insulated substations, Comparison of Air insulated substations and Gas insulated substations.

UNIT - V

ECONOMIC ASPECTS OF POWER GENERATION AND TARIFF METHODS: Load curve, load duration and integrated load duration curves, demand, diversity, capacity, utilization and plant use factors. Numerical Problems. Costs of Generation and their division into Fixed, Semi-fixed and Running Costs. Desirable characteristics of a Tariff Method. Tariff Methods: Flat Rate, Block-Rate, two-part, three-part, and power factor tariff methods.

POWER FACTOR IMPROVEMENT: Causes of low power factor, Methods of Improving power factor, Phase advancing and generation of reactive KVAR using static Capacitors, Most economical power factor for constant KW load and constant KVA type loads.

TEXT BOOKS:

1. M. L. Soni, P. V. Gupta, U. S. Bhatnagar, A. Chakrabarti (2010), *A Text Book on Power System Engineering*, 2nd edition, Dhanpat Rai & Co. Pvt. Ltd, New Delhi.
2. C. L. Wadhawa (2010), *Generation, Distribution and Utilization of Electrical Energy*, 3rd edition, New Age International (P) Limited, New Delhi.

REFERENCE BOOKS:

1. M. V. Deshpande (2010), *Elements of Power Station design*, 1st edition, Prentice Hall India Learning Private Limited, New Delhi.
2. J. B. Gupta (2010), *A Course In Power Systems,* 10th edition, S. K. Kataria & Sons, New Delhi.

B. Tech. EEE IV SEMESTER

AC MACHINES - I

Course Code: **A1210**

L	T	P	C
3	1	-	4

UNIT - I

CONSTRUCTION, OPERATION AND PERFORMANCE OF SINGLE PHASE TRANSFORMERS: *Single phase transformers:* types, constructional details, minimization of hysteresis and eddy current losses. EMF equation, operation on no load and on load, Phasor diagrams. Equivalent circuit losses and efficiency,regulation. All-day efficiency, effect of variations of frequency & supply voltage on iron losses.

UNIT - II

TESTING OF SINGLE PHASE TRANSFORMER AND AUTOTRANSFORMER: OC and SC tests, Sumpner's test - predetermination of efficiency and regulation-separation of losses test-parallel operation with equal and unequal voltage ratios - auto transformers-equivalent circuit - comparison with two winding transformers.

UNIT - III

POLYPHASE TRANSFORMERS: Polyphase transformers - Polyphase connections - Y/Y, Y/Δ, Δ/Y, Δ/Δ and open Δ, Third harmonics in phase voltages

THREE WINDING TRANSFORMERS: Tertiary windings-determination of Zp, Zs and Zt transients in switching - off load and on load tap changing; Scott connection.

UNIT - IV

POLYPHASE INDUCTION MOTORS: Polyphase induction motors-construction details of cage and wound rotor machines-production of a rotating magnetic field - principle of operation - rotor emf and rotor frequency - rotor reactance, rotor current and pf at standstill and during operation. Rotor power input, rotor copper loss and mechanical power developed and their inter relation-torque equation-deduction from torque equation - expressions for maximum torque and starting torque - torque slip characteristic - double cage and deep bar rotors - equivalent circuit - phasor diagram - crawling and cogging

UNIT - V

CIRCLE DIAGRAM AND SPEED CONTROL METHODS OF INDUCTION MOTORS: Circle diagram-no load and blocked rotor tests-predetermination of performance-methods of starting and starting current and torque calculations. Speed control-change of frequency; change of poles and methods of consequent poles; cascade connection. Injection of an emf into rotor circuit (qualitative treatment only)-induction generator-principle of operation.

TEXT BOOKS:

1. J. B. Gupta (2006), *Theory & Performance of Electrical Machines*, 14th edition, S. K. Kataria & Sons, New Delhi.
2. P. S. Bimbra (2000), *Electrical Machinery*, 7th edition, Khanna Publishers, New Delhi.

REFERENCE BOOKS:

1. A. E. Fritzgerald, C. Kingsley, S. Umans (2002*), Electric Machinery*, 5th edition, Tata McGraw Hill Companies, New Delhi.
2. I. J. Nagrath, D. P .Kothari (2001), *Electric Machines*, 3rd edition, Tata McGraw Hill Publishers, New Delhi.

B. Tech. EEE IV SEMESTER

ELECTRO MAGNETIC FIELDS

Course Code: **A1211**

L	T	P	C
3	1	-	4

UNIT - I

STATIC ELECTRIC FIELDS: Introduction to Co-ordinate Systems – Rectangular – Cylindrical and Spherical Co-ordinate System – Introduction to line, Surface and Volume Integrals. Electrostatic Fields – Coulomb's Law – Definition of Electric Field Intensity (EFI) – EFI due to a line and a surface charge – Work done in moving a point charge in an electrostatic field-Electric Potential – Properties of potential function – Potential due to an infinite uniformly charged line – Electric dipole – Dipole moment -Potential due to electrical dipole- Torque on an Electric dipole in an electric field- Potential gradient. Gauss's law – Applications of Gauss's Law – Maxwell's first law, div (D) =ρv Electromagnetic Field Theory Applications and Differences between Circuit theory and Field Theory

UNIT - II

STATIC MAGNETIC FIELDS: Biot-Savart's law in vector form – Magnetic Field intensity(MFI) due to a finite and infinite wire carrying a current I- MFI due to circular and rectangular loop carrying a current I- Relation between magnetic flux, magnetic flux density and MFI – Maxwell's second Equation, div(B)=0.

AMPERE'S LAW AND ITS APPLICATIONS: Ampere's circuital law and its applications viz. MFI due to an infinite sheet of current and a long current carrying filament-Point form of Ampere's circuital law

UNIT - III

ELECTRIC AND MAGNETIC FIELDS IN MATERIALS: Laplace's and Poison's equations – Solution of Laplace's equation in one variable – Behavior of conductors in an electric field – Conductors and Insulators. Capacitance - Capacitance of parallel plate, spherical and co-axial capacitors with composite dielectrics – Energy stored and energy density in a static electric field- Electric field inside dielectric material – polarization – Boundary conditions for electric fields- Electric Current-Current density – conduction and Convection current densities – Ohm's law in point form – Equation of continuity.

INDUCTANCE: Self and Mutual inductance – Neumann's formulae – determination of self-inductance of a solenoid and toroid and mutual inductance between a straight long wire and a square loop wire in the same plane – energy stored and density in a magnetic field.

UNIT - IV

FORCE IN MAGNETIC FIELDS: Magnetic force - Moving charges in a Magnetic field - Lorentz force equation – force on a current element in a magnetic field -Force on a straight and a long current carrying conductor in a magnetic field – Force between two straight long and parallel current carrying conductors – Magnetic dipole and dipole moment – a differential current loop as a magnetic dipole - Torque on a current loop placed in a magnetic field-Scalar Magnetic Potential and its limitations- Magnetic Vector Potential.

UNIT - V

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

TEXT BOOKS:

1. William H. Hayt, John. A. Buck (2006), *Engineering Electromagnetics,* 7th edition, Tata McGraw Hill Companies, New Delhi.
2. Sadiku (2005), *Electro Magnetic Fields*, 4th edition, Oxford Publications India, New Delhi.

REFERENCE BOOKS:

1. David J. Griffiths (2007), *Introduction to Electro Dynamics,* 3rd edition, Prentice Hall of India, New Delhi.
2. John. D. Kraus, D. A. Fleish (1997), *Electromagnetics with Applications*, 5th edition, Tata McGraw Hill Inc., New Delhi, India.

B. Tech. EEE IV SEMESTER

CONTROL SYSTEMS
(Common to EEE & ECE)

Course Code: **A1212**

L	T	P	C
4	-	-	4

UNIT - I

BASICS IN CONTROL SYSTEM AND TRANSFER FUNCTION: Introduction of Control Systems , Various types of systems (Open Loop and closed loop) and their differences- Classification and Feed-Back Characteristics of control system- Effects of feedback. Mathematical models – Differential equations, Translational and Rotational mechanical systems. Transfer Function of DC Servo motor - AC Servo motor- Synchro transmitter and Receiver.

UNIT - II

REPRESENTATION OF TRANSFER FUNCTION AND CONTROL DESIGN TECHNIQUES: Block diagram representation of systems considering electrical systems as examples. Block diagram algebra – Representation by Signal flow graph - Reduction using Mason's gain formula. Compensation techniques – Lag, Lead, Lead-Lag Controllers design, PID Controllers.

UNIT - III

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

STABILITY ANALYSIS: The concept of stability – Routh's stability criterion – qualitative stability and conditional stability – limitations of Routh's stability. The root locus concept - construction of root loci-effects of adding poles and zeros to G(s)H(s) on the root loci.

UNIT - IV

FREQUENCY RESPONSE ANALYSIS: Introduction, Frequency domain specifications-Bode diagrams-Determination of Frequency domain specifications and transfer function from the Bode Diagram-Phase margin and Gain margin-Stability Analysis from Bode Plots.

STABILITY ANALYSIS IN FREQUENCY DOMAIN: Polar Plots-Nyquist Plots-Stability Analysis

UNIT - V

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

TEXT BOOKS:

1. I. J. Nagrath, M .Gopal (2011), Control Systems Engineering, 5th edition, New Age International (P) Limited, New Delhi, India.
2. Benjamin. C. Kuo (2003), Automatic Control Systems, 8th edition, John Wiley and Son's, USA.

REFERENCE BOOKS:

1. K. Ogata (2008), Modern Control Engineering, 4th edition, Prentice Hall of India Pvt. Ltd, New Delhi.
2. N. K. Sinha (2008), Control Systems, 3rd edition, New Age International Limited Publishers, New Delhi.

B. Tech. EEE IV SEMESTER

DC MACHINES LAB

Course Code: **A1213**

L	T	P	C
-	-	3	2

LIST OF EXPERIMENTS:

1. Magnetization characteristics 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.
5. Brake test on DC compound motor.
6. Brake test on DC series motor.
7. Brake test on DC shunt motor.
8. Hopkinson's test on DC shunt machines.
9. Fields test on DC series machines.
10. Predetermination of efficiency of a DC machine (Swinburne's test) and Speed control of DC shunt motor.
11. Retardation test on DC Shunt motor.
12. Speed control of DC shunt motor by Ward Leonard method.

B. Tech. EEE IV SEMESTER

CONTROL SYSTEMS AND SIMULATION LAB

Course Code: **A1214**

L	T	P	C
-	-	3	2

LIST OF EXPERIMENTS:

1. Time response of Second order system.
2. Characteristics of Synchros.
3. Programmable logic controller – Study and verification of truth tables of logic gates, simple Boolean expressions and application of speed control of motor.
4. Transfer function of DC motor.
5. Effect of P, PD, PI, PID Controller on a second order systems.
6. Characteristics of magnetic amplifiers.
7. Characteristics of AC servo motor.
8. Simulation of Op-Amp based Integrator and Differentiator circuits.
9. Time domain analysis using MATLAB.
10. Stability analysis (Bode, Root Locus, Nyquist) of Linear Time Invariant system using MATLAB.
11. State space model for classical transfer function using MATLAB.
12. Simulink model for speed control of DC motor.

SYLLABI FOR V SEMESTER

B. Tech. EEE V SEMESTER

OBJECT ORIENTED PROGRAMMING THROUGH JAVA
(Common to EEE & ECE)

Course Code: **A1506**

L	T	P	C
4	-	-	4

UNIT - I

OBJECT ORIENTED THINKING: Need for object oriented programming paradigm, a way of viewing world agents and Communities, messages, methods, responsibilities, Classes and Instances, Class Hierarchies-Inheritance ,Method Binding, Overriding and Exceptions.

JAVA BASICS: History of Java, Java buzzwords, JVM architecture, data types, variables, scope and life time of variables, arrays, operators, control statements, type conversion and casting, simple java program, constructors, methods, string and String Buffer handling functions.

UNIT - II

INHERITANCE AND POLYMORPHISM: Basic concepts, types of inheritance, member access rules, usage of this and super key word, method overloading, method overriding, abstract classes, dynamic method dispatch, usage of final keyword, static import.

PACKAGES AND INTERFACES: Defining package, access protection, importing packages, defining and implementing interface, and variables in interface and extending interfaces.

I / O STREAMS: Concepts of streams, stream classes- byte and character stream, reading console input and writing console output, File: introduction to file, reading and writing to a file.

UNIT - III

EXCEPTION HANDLING: Exception handling fundamentals, exception types, uncaught exceptions, usage of try, catch, throw, throws and finally keywords, built-in exceptions, creating own exception sub classes.

MULTI THREADING: Concepts of thread, thread life cycle, creating threads using thread class and runnable interface, synchronization, thread priorities, inter thread communication.

UNIT - IV

AWT CONTROLS: The AWT class hierarchy, user interface components- labels, button, text components, check box, check box groups, choices, list box, panels - scroll pane, menu, scrollbars. Working with frame windows, color, font and layout managers.

EVENT HANDLING: Events, event sources, event listeners, relationship between event sources and listeners, delegation event model, handling mouse and keyboard events, adapter classes, inner classes.

UNIT - V

SWINGS: Introduction to swings, hierarchy of swing components. Containers, top level containers - JFrame, JWindow, JDialog, light weight containers - JPanel, swing components - JButton, JToggleButton, JCheckBox, JRadioButton, JLabel, JTextField, JTextArea, JList, JComboBox, JTable, JTree, JTabbedPanes, JScrollPane.

APPLETS: Life cycle of an applet, inheritance hierarchy for applets, differences between applets and applications, developing applets, simple applet display methods, passing parameters to applets.

TEXT BOOKS:

1. Herbert schildt (2010), *The complete reference*, 7th edition, Tata Mc graw Hill, New Delhi

REFERENCE BOOKS:

1. T. Budd (2009), *An Introduction to Object Oriented Programming*, 3rd edition, Pearson Education, India.
2. J. Nino, F. A. Hosch (2002), *An Introduction to programming and OO design using Java*, John Wiley & sons.
3. Y. Daniel Liang (2010), *In*troduction *to Java programming*, 7th edition, Pearson education, India.
4. R. A. Johnson (2009), *An introduction to Java programming and object oriented application development*, 1st edition, Course Technology, India.

B. Tech. EEE V SEMESTER

INTEGRATED CIRCUITS APPLICATIONS
(Common to EEE & ECE)

Course Code: **A1415**

L	T	P	C
4	-	-	4

UNIT - I

INTEGRATED CIRCUITS AND OPERATIONAL AMPLIFIER: Introduction, Classification of IC's, IC chip size and circuit complexity, basic information of Op-Amp IC741 Op-Amp and its features, the ideal Operational amplifier, Op-Amp internal circuit, Op-Amp characteristics - DC and AC.

UNIT - II

LINEAR APPLICATIONS OF OP-AMP: Inverting and non-inverting amplifiers, adder, subtractor, Instrumentation amplifier, AC amplifier, V to I and I to V converters, Integrator and differentiator.

NON-LINEAR APPLICATIONS OF OP-AMP: Sample and Hold circuit, Log and Antilog amplifier, multiplier and divider, Comparators, Schmitt trigger, Multivibrators, Triangular and Square waveform generators, Oscillators.

UNIT - III

ACTIVE FILTERS: Introduction, Butterworth filters – 1st order, 2nd order low pass and high pass filters, band pass, band reject and allpass filters.

TIMER AND PHASE LOCKED LOOPS: Introduction to IC 555 timer, description of functional diagram, monostable and astable operations and applications, schmitt trigger, PLL - introduction, basic principle, phase detector/comparator, voltage controlled oscillator (IC 566), low pass filter, monolithic PLL and applications of PLL.

UNIT - IV

VOLTAGE REGULATOR: Introduction, Series Op-Amp regulator, IC Voltage Regulators, IC 723 general purpose regulators, Switching Regulator.

D to A AND A to D CONVERTERS: Introduction, basic DAC techniques - weighted resistor DAC, R-2R ladder DAC, inverted R-2R DAC, A to D converters - parallel comparator type ADC, counter type ADC, successive approximation ADC and dual slope ADC, DAC and ADC Specifications.

UNIT - V

CMOS LOGIC: CMOS logic levels, MOS transistors, Basic CMOS Inverter, NAND and NOR gates, CMOS AND-OR-INVERT and OR-AND-INVERT gates, implementation of any function using cmos logic.

COMBINATIONAL CIRCUITS USING TTL *74XX* ICS: Study of logic gates using *74XX* ICs, Four-bit parallel adder(IC 7483), Comparator(IC 7485), Decoder(IC 74138, IC 74154), BCD-to-7-segment decoder(IC 7447), Encoder(IC 74147), Multiplexer(IC 74151), Demultiplexer (IC 74154).

SEQUNTIAL CIRCUITS USING TTL *74XX* ICS: Flip Flops (IC 7474, IC 7473), Shift Registers, Universal Shift Register(IC 74194), 4- bit asynchronous binary counter(IC 7493).

TEXT BOOKS:

1. D. Roy Choudhury, Shail B. Jain (2012), *Linear Integrated Circuit*, 4th edition, New Age International Pvt. Ltd., New Delhi, India.
2. Ramakant A. Gayakwad, (2012), *OP-AMP and Linear Integrated Circuits*, 4th edition, Prentice Hall / Pearson Education, New Delhi.
3. Floyd, Jain (2009), *Digital Fundamentals,* 8th edition, Pearson Education, New Delhi.

REFERENCE BOOKS:

1. Sergio Franco (1997), *Design with operational amplifiers and analog integrated circuits*, McGraw Hill, New Delhi, India.
2. Gray, Meyer (1995), *Analysis and Design of Analog Integrated Circuits*, Wiley International, New Delhi.
3. John F. Wakerly (2007), *Digital Design Principles and practices*, Prentice Hall / Pearson Education, New Delhi.

B. Tech. EEE V SEMESTER

SIGNAL ANALYSIS AND TRANSFORM TECHNIQUES

Course Code: **A1419**

L	T	P	C
3	1	-	4

UNIT - I

CLASSIFICATION OF SIGNALS: Continuous time (CT) and Discrete time (DT) signals, Elementary signals: Unit, Step, Impulse, Ramp signals. Singularity Functions and Operations on signals.

FOURIER SERIES: Orthogonal functions, Relationship between Trigonometric Fourier series and Exponential Fourier series, Representation of periodic function by Fourier series over the entire interval, Convergence of Fourier series, Complex Fourier Spectrum, DFS representation of Periodic sequences, Computation of DFS, Properties of DFS.

UNIT - II

FOURIER TRANSFORMS: Fourier transform(FT), Fourier transform of standard signals, Properties of continuous Fourier transforms, Fourier transforms involving impulse function, Fourier transform of periodic signals, Fourier transform for discrete signals, discrete Fourier transforms: properties of DFT, linear convolution of sequences using DFT, computation of DFT.

UNIT - III

SIGNAL TRANSMISSION THROUGH LTI SYSTEMS: Classification of systems, discrete time LTI systems, Continuous time LTI systems, Properties of LTI system. Impulse response of a linear system, Filter Characteristics of LTI system, Distortion less transmission.

CONVOLUTION AND CORRELATION OF SIGNALS: System analysis by convolution, Graphical interpretation of convolution, Signal comparison, Relationship between Correlation and Convolution, Some properties of correlation function.

UNIT - IV

LAPLACE TRANSFORMS: The Laplace transform (LT), The Region of convergence (ROC) for Laplace transforms, Properties of Laplace transforms, Some Laplace transform pairs, Analysis and characterization of LTI system using Laplace transform. Inverse Laplace transforms. Laplace transforms methods in circuit analysis, The Transfer function.

UNIT - V

SAMPLING: Sampling of continuous time signals, sampling theorem, Reconstruction of signal from its samples, The Effect of under sampling: Aliasing.

Z -TRANSFORMS: The Z-Transform, The Region of Convergence(ROC) for Z transform and its properties, Properties of Z transform, Constraints on ROC for various classes of signals, Transfer function, Causality and stability, Inverse Z Transform using various methods, Relation between Z transform and DFS.

TEXT BOOKS:

1. A. V. Oppenheim, A. S. Willsky(2009), *Signals and Systems*, 2nd Edition, Prentice Hall of India, New Delhi.
2. B. P. Lathi(2001), *Signals, Systems & Communications,* BS Publications, New Delhi.
3. John G. Proakis, Dimitris G. Manolakis, D. Sharma (2010), *Digital Signal Processing Principles, Algorithms and Applications*, 3rd edition, Pearson education, India.

REFERENCE BOOKS:

1. Simon Haykin, Van Veen(2007), *Signals & Systems*, 2nd edition, Wiley Student Edition, New Delhi.
2. Hwei Piao Hsu (2003), *Schaum's Outline of Theory Problems of Signals and Systems*, McGraw-Hill professional, New Delhi, India.
3. Charles L. Phillips, John M. Parr, Eve A. Riskin(2007), *Signals, Systems and transforms,* Prentice Hall of India, New Delhi, India.

B. Tech. EEE V SEMESTER

POWER SYSTEM TRANSMISSION AND DISTRIBUTION

Course Code: **A1217**

L	T	P	C
4	-	-	4

UNIT - I

TRANSMISSION LINE PARAMETERS: Types of conductors - calculation of resistance for solid conductors - Calculation of inductance for single phase and three phase, single and double circuit lines, concept of GMR & GMD, symmetrical and asymmetrical conductor configuration with and without transposition, Numerical Problems. Calculation of capacitance for 2 wire and 3 wire systems, effect of ground on capacitance, capacitance calculations for symmetrical and asymmetrical single and three phase, single and double circuit lines, Numerical Problems.

UNIT - II

PERFORMANCE OF SHORT, MEDIUM AND LONG LENGTH TRANSMISSION LINES: Classification of Transmission Lines - Short, medium and long line and their model representations - Nominal-T, Nominal-Pie and A, B, C, D Constants for symmetrical & Asymmetrical Networks, Numerical Problems. Mathematical Solutions to estimate regulation and efficiency of all types of lines - Numerical Problems. Long Transmission Line-Rigorous Solution, evaluation of A,B,C,D Constants, Interpretation of the Long Line Equations, Incident, Reflected and Refracted Waves -Surge Impedance and SIL of Long Lines, Wave Length and Velocity of Propagation of Waves - Representation of Long Lines - Equivalent-T and Equivalent Pie network models (numerical problems).

UNIT - III

VARIOUS FACTORS GOVERNING THE PERFORMANCE OF TRANSMISSION LINE: Skin and Proximity effects - Description and effect on Resistance of Solid Conductors-Ferranti effect - Charging Current - Effect on Regulation of the Transmission Line, Shunt Compensation. Corona - Description of the phenomenon, factors affecting corona, critical voltages and power loss, Radio Interference.

SAG AND TENSION CALCULATIONS: Sag and Tension Calculations with equal and unequal heights of towers, Effect of Wind and Ice on weight of Conductor, Numerical Problems - Stringing chart and sag template and its applications.

UNIT - IV

OVERHEAD LINE INSULATORS AND UNDERGROUND CABLES: Types of Insulators, String efficiency and Methods for improvement, Numerical Problems - voltage distribution, calculation of string efficiency, Capacitance grading and Static Shielding. Types of Cables, Construction, Types of Insulating materials, Calculations of Insulation resistance and stress in insulation, Numerical Problems. Capacitance of Single and 3-Core belted cables, Numerical Problems. Grading of Cables - Capacitance grading, Numerical Problems, Description of Inter-sheath grading.

UNIT - V

GENERAL ASPECTS OF AC & DC DISTRIBUTION SYSTEMS : Classification of Distribution Systems - Comparison of DC vs AC and Under-Ground vs Over - Head Distribution Systems- Requirements and Design features of Distribution Systems-Voltage Drop Calculations (Numerical Problems) in D.C Distributors for the following cases: Radial D.C Distributor fed one end and at the both the ends (equal/unequal Voltages) and Ring Main Distributor. Voltage Drop Calculations (Numerical Problems) in A.C. Distributors for the following cases: Power Factors referred to receiving end voltage and with respect to respective load voltages.

TEXT BOOKS:

1. C. L. Wadhwa (2011), *Electrical Power Systems*, 6th edition, New Age International (P) Limited, New Delhi.
2. M. L. Soni, P. V. Gupta, U. S. Bhatnagar, A. Chakrabarti (2011), *A Text Book on Electrical Engineering*, 2nd edition, Dhanpat Rai & Co. Pvt. Ltd, New Delhi.

REFERENCE BOOKS:

1. B. R. Gupta (2008), *Power System Analysis and Design*, Revised Edition, S. Chand & Company Limited, New Delhi, India.
2. Hadi Saadat (2010), *Power System Analysis*, 3rd edition, Public Affairs Information Service, New Delhi.
3. I. J. Nagarat, D. P .Kothari(2006), *Modern Power System Analysis,* 3rd edition, Tata McGraw Hill Higher Education, New Delhi.

B. Tech. EEE V SEMESTER

AC MACHINES - II

Course Code: **A1218**

L	T	P	C
3	1	-	4

UNIT - I

CONSTRUCTION AND PRINCIPLE OF OPERATION: Constructional Features of round rotor and salient pole machines, Armature windings, Integral slot and fractional slot windings; Distributed and concentrated windings, pitch and winding factors E.M.F Equation. Synchronous Generator Characteristics, Harmonics in generated E.M.F., suppression of harmonics, armature reaction, leakage reactance, synchronous reactance and impedance, experimental determination, phasor diagram, load characteristics.

UNIT - II

REGULATION OF SYNCHRONOUS GENERATOR: Regulation by synchronous impedance method, M.M.F. method, Z.P.F. method and A.S.A. methods. Salient pole alternators, two reaction analysis, experimental determination of X_d and X_q (Slip test) Phasor diagrams, Regulation of salient pole alternators**.**

UNIT - III

PARALLEL OPERATION OF SYNCHRONOUS GENERATOR: Synchronizing alternators with infinite bus bars, synchronizing power torque, parallel operation and load sharing. Effect of change of excitation and mechanical power input, Analysis of short circuit current wave form. Determination of sub-transient, transient and steady state reactance's.

UNIT - IV

SYNCHRONOUS MOTORS: Theory of operation, phasor diagram, Variation of current and power factor with excitation, synchronous condenser, Mathematical analysis for power developed.

POWER CIRCLES: Excitation and power circles, hunting and its suppression, Methods of starting, synchronous induction motor.

UNIT - V

SINGLE PHASE MOTORS: Single phase Motors: Single phase induction motor, Constructional features-Double revolving field theory – Elementary idea of cross-field theory, split-phase motors, shaded pole motor.

SPECIAL MOTORS: Principle & performance of A.C. Series motor, Universal motor. Principle of permanent magnet and reluctance motors.

TEXT BOOKS:

1. I. J. Nagrath,D. P. Kothari (2005), Electric Machines, 7th edition, Tata Mc Graw Hill Education, New Delhi.
2. P. S. Bimbra (2011), Electrical Machinery, 7th edition, Khanna Publishers, New Delhi.

REFERENCE BOOKS:

1. M. G. Say (2006), Performance and Design of AC Machines, 3rd edition, BPB Publishers, New Delhi.
2. A. E. Fritzgerald, C. Kingsley, S. Umans (2002), Electric Machinery, 5th edition, Tata McGraw Hill Companies, New Delhi.
3. Langsdorf (2008), Theory of Alternating Current Machinery, 2nd edition, Tata McGraw Hill Companies, New Delhi.

B. Tech. EEE V SEMESTER

SOFT COMPUTING

Course Code: **A1541**

L	T	P	C
3	1	-	4

UNIT - I

BASICS OF ARTIFICIAL NEURAL NETWORK: Characteristics of Neural Networks, Structure and working of a biological neural network, artificial neural network: terminology, models of neurons: McCulloch Pitts model, Perceptron model, Adaline model, topology, Basic learning laws.

FUNCTIONAL UNITS FOR ANN FOR PATTERN RECOGNITION TASK: Pattern recognition problem, Basic functional units, PR by functional units.

UNIT - II

FEEDFORWARD NEURAL NETWORKS:

SUPERVISED LEARNING - I: Perceptrons - Learning and memory, Learning algorithms, Error correction and gradient decent rules, Perceptron learning algorithms.

SUPERVISED LEARNING - II: Backpropogation, Multilayered network architectures, Back propagation learning algorithm, Example applications of feed forward neural networks.

UNIT - III

FEEDBACK NEURAL NETWORKS & SELF ORGANIZING FEATURE MAP: Introduction, Associative learning, Hopfield network, Error performance in Hopfield networks, simulated annealing, Boltzmann machine and Boltzmann learning, state transition diagram and false minima problem, stochastic update, simulated annealing, Boltzmann machine, bidirectional associative memory, bam stability analysis. Self organization, generalized learning laws, competitive learning, vector quantization, self organizing feature map, applications of self organizing feature map.

UNIT - IV

FUZZY LOGIC: Fuzzy set theory, crisp sets, operations on crisp set, fuzzy sets, fuzzy versus crisp, operations, fuzzy relations, crisp relations, properties. Fuzzy logic Application: Fuzzy Control of Blood Pressure.

UNIT - V

FUZZY LOGIC IN DATABASE AND INFORMATION SYSTEMS: Fuzzy Information, Fuzzy Logic in database Systems, Fuzzy Relational data Models, operations in Fuzzy Relational data Models, Design theory for Fuzzy Relational databases, Fuzzy information Retrieval and Web search, Fuzzy Object Oriented databases.

GENETIC ALGORITHMS: Introduction to Genetic Algorithms, Evolutionary Algorithms.

TEXT BOOKS:

1. Satish Kumar (2004), *Neural Networks A classroom Approach*, Tata McGraw Hill Publication, New Delhi.
2. Lotfi A. Zadeh(1997), *Soft computing and Fuzzy Logic*, World Scientific Publishing Co., Inc. River Edge, NJ, USA.

REFERENCE BOOKS:

1. B. Yegnanarayana (2006), *Artificial Neural Networks*, Prentice Hall of India, New Delhi, India.
2. John Yen, Reza Langari(2006), *Fuzzy Logic*, Pearson Education, New Delhi, India.
3. S. Rajasekaran, Vijaylakshmi Pari (2003), *Neural networks, Fuzzy Logic and Genetic Algorithms Synthesis and Applications*, Prentice Hall of India, New Delhi, India.

B. Tech. EEE V SEMESTER

AC MACHINES LAB

Course Code: **A1219**

L	T	P	C
-	-	3	2

LIST OF EXPERIMENTS:

1. O.C. & 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 synchronous impedance method.
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.
9. Separation of core losses of a single phase transformer.
10. Brake test on a three phase induction motor.
11. Synchronization of alternators.
12. Determination of sequence impedances of an alternator.

B. Tech. EEE V SEMESTER

ELECTRONIC CIRCUITS AND INTEGRATED CIRCUITS LAB

Course Code: **A1422**

L	T	P	C
-	-	3	2

LIST OF EXPERIMENTS: (Minimum 12 Experiments to be conducted)

PART - A:
ELECTRONIC CIRCUITS

1. Common Emitter Amplifier.
2. Two Stage RC Coupled Amplifier.
3. Voltage Series Feedback Amplifier.
4. Current Shunt Feedback Amplifier.
5. Class A Power Amplifier (With and Without Transformer Load).
6. Class B Complementary Symmetry Push Pull Amplifier.
7. Hartley and Colpitt's Oscillator
8. RC Phase Shift Oscillator.

PART - B:
IC APPLICATIONS

1. Measurement of IC741 op-amp parameters.
2. Basic applications of IC741 op-amp.
3. Adder, Subtractor, Comparator using IC 741 Op-Amp.
4. Integrator and differentiator using IC741 op-amp.
5. IC 555 timer in Astable and Monostable operation.
6. Schmitt trigger circuits using IC 741 op-amp & IC 555 timer.
7. Operation of phase locked loop using IC565.
8. Voltage regulator IC 723, three terminal voltage regulators- 7805, 7809, 7912.

SYLLABI FOR VI SEMESTER

B. Tech. EEE VI SEMESTER

INDUSTRIAL MANAGEMENT AND PSYCHOLOGY
(Common to EEE, ME & CE)

Course Code: **A1015**

L	T	P	C
4	-	-	4

UNIT - I

CONCEPTS OF MANAGEMENT AND ORGANISATION: Functions of management, evolution of management thought, Taylor's scientific management, fayol's principles of management, Hertzberg's Maslow's hierarchy of human needs, systems approach to management.

DESIGNING ORGANISATIONAL STRUCTURES: Basic concepts related to organisation - departmentation and decentralization, types of mechanistic and organic structures of organisation (line organization, line and staff organization, functional organization.

UNIT - II

PLANT LOCATION: Definition, factors affecting the plant location, comparison of rural and urban sites, methods for selection of plant- matrix approach. Plant layout - definition, objectives, types of production, types of plant layout, various data analyzing forms travel chart.

WORK STUDY: Definition, objectives, method study - definition, objectives, steps involved- various types of associated charts, difference between micromotion and memomotion studies. Work measurement- definition, time study, steps involved, equipment, different methods of performance rating, allowances, standard time calculation. Work Sampling - definition, steps involved, standard time calculations, differences with time study.

UNIT - III

INTRODUCTION TO PERT / CPM : Project management, network modeling-probabilistic model, various types of activity times estimation, programme evaluation review techniques, critical path, probability of completing the project, deterministic model, critical path method (CPM), critical path calculation, crashing of simple of networks.

INSPECTION AND QUALITY CONTROL: Types of inspections, statistical quality control, techniques, variables and attributes, assignable and non assignable causes, variable control charts, and R charts, attributes control charts, p charts and c charts. Acceptance sampling plan, single sampling and double sampling plans, OC curves. Introduction to TQM - quality circles, ISO 9000 series procedures.

UNIT - IV

MATERIALS MANAGEMENT: Objectives, inventory functions, types, associated costs, inventory classification techniques-ABC and VED analysis. Inventory control systems, continuous review system, periodical review system. Stores management and stores records. Purchase management, duties of purchase of manager, associated forms.

INTRODUCTION TO HUMAN RESOURCE MANAGEMENT: Functions of HRM, job evaluation, different types of evaluation methods. Job description, merit rating, difference with job evaluation, different methods of merit ratings, wage incentives, different types of wage incentive schemes. Marketing, marketing vs. selling, marketing mix, product life cycle.

UNIT - V

INDUSTRIAL PSYCHOLOGY: Definition and concept, industrial psychology vs. personnel management, aims and objectives of industrial psychology, scope of industrial psychology, individual and group, individual differences in behavior, group dynamics, theory x and y, Hawthorne experiment, morale, motivation, working environmental conditions, industrial fatigue.

TEXT BOOKS:

1. O. P. Khanna (2004), *Industrial Engineering and Management*, Dhanpat Rai, New Delhi.

REFERENCE BOOKS:

1. Stoner, Freeman (2005), *Gilbert, Management*, 6th edition, Pearson Education, New Delhi.
2. Panner Selvam (2004), *Production and Operations Management*, Prentice Hall of India, New Delhi.
3. Ralph M. Barnes (2004), *Motion and Time Studies*, John Wiley and Sons.
4. L. S. Srinath (2000), *PERT / CPM*, affiliate East-West Press, New Delhi.
5. Gary Dessler (2002), *Human Resource Management*, Pearson Education Asia, India.

B. Tech. EEE VI SEMESTER

MICRO PROCESSORS AND INTERFACING
(Common to EEE & ECE)

Course Code: **A1423**

L	T	P	C
3	1	-	4

UNIT - I

INTRODUCTION: Architecture of 8086 microprocessor, Register organization, 8086 flag register and its functions, addressing modes of 8086, Pin diagram of 8086, Minimum mode system operation, Timing diagram.

UNIT - II

8086 FAMILY ASSEMBLY LANGUAGE PROGRAMMING: 8086 Instruction Set, Simple programs, Assembly language programs involving logical, branch and call instructions, sorting, evaluation of arithmetic expressions, string manipulation, assembler directives, procedures and macros.

UNIT - III

8086 MEMORY AND DIGITAL INTERFACING: 8086 addressing and address decoding, Interfacing RAM, ROM, EPROM to 8086, 8255 programmable Peripheral Interface, various modes of operation and interfacing to 8086, Interfacing keyboard, Interfacing to Alphanumeric Displays, seven segment LED displays, stepper motor, D/A and A/D converter interfacing.

UNIT - IV

INTERRUPTS AND PROGRAMMABLE INTERRUPT CONTROLLERS: 8086 Interrupts and Interrupt Responses introduction to DOS and BIOS interrupts. 8259A Priority Interrupt Controller, Software Interrupt Applications.

The 8086 Maximum Mode, Direct Memory Access (DMA) Data Transfer, Interfacing and Refreshing Dynamic RAMs, 8254 Software-Programmable Timer/Counter.

UNIT - V

SERIAL DATA TRANSFER SCHEMES: Asynchronous and synchronous data transfer schemes, 8251 USART architecture and interfacing, RS - 232C Serial data standard, RS - 423A and RS - 422A, sample program of serial data transfer.

ADVANCED MICROPROCESSORS: Introduction to 80286, salient features of 80386, real and protected mode segmentation and paging.

TEXT BOOKS:

1. Douglas V. Hall (2007), *Microprocessors Interface*, 2nd edition, Tata McGraw Hill, New Delhi.

REFERENCE BOOKS:

1. Walter A. Triebel, Avtar Singh (2003), *The 8088 and 8086 Microprocessors* 4th edition, Prentice Hall of India, New Delhi.
2. Mazidi (2000), *The 8051 Microcontroller and Embedded System*, Prentice Hall of India, New Delhi.
3. Deshmukh (2004), *Microcontrollers*, Tata McGraw Hill Edition, New Delhi.

B. Tech. EEE VI SEMESTER

COMPUTER METHODS IN POWER SYSTEMS

Subject Code: **A1220**

L	T	P	C
4	-	-	4

UNIT - I

PER-UNIT SYSTEM OF REPRESENTATION: Per-Unit equivalent reactance network of a three phase Power System, Numerical Problems. Bus Incidence Matrix, Y_{bus} formation by Direct and Singular Transformation Methods, Numerical Problems**.**

FORMATION OF Z_{BUS}: Partial network, Algorithm for the Modification of Z_{Bus} Matrix for addition element for the following cases: Addition of element from a new bus to reference, Addition of element from a new bus to an old bus, Addition of element between an old bus to reference and Addition of element between two old busses (Derivations and Numerical Problems without mutual coupling)

UNIT - II

POWER FLOW ANALYSIS - I: Necessity of Power Flow Studies – Data for Power Flow Studies – Derivation of Static load flow equations – Load flow solutions using Gauss Seidel Method: Acceleration Factor, Load flow solution with and without P-V buses, Algorithm and Flowchart. Numerical Load flow Solution for Simple Power Systems (Max. 3-Buses): Determination of Bus Voltages, Injected Active and Reactive Powers (Sample One Iteration only).

UNIT - III

POWER FLOW ANALYSIS - II: Newton Raphson Method in Rectangular and Polar Co-Ordinates Form: Load Flow Solution with or without PV Busses- Derivation of Jacobian Elements. Decoupled and Fast Decoupled Methods.- Comparison of Different Methods – DC load Flow.

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

UNIT - IV

UNBALANCED FAULT ANALYSIS: Symmetrical Component Transformation, Positive, Negative and Zero sequence components (Voltages, Currents and Impedances) and networks, Numerical Problems. LG, LL, LLG faults with and without fault impedance, Numerical Problems.

POWER SYSTEM STEADY STATE STABILITY ANALYSIS: Elementary concepts of Steady State, Dynamic and Transient Stabilities. Description of Steady State Stability Power Limit, Transfer Reactance, Synchronizing Power Coefficient, Power Angle Curve and Determination of Steady State Stability and Methods to improve steady state stability.

UNIT - V

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

TEXT BOOKS:

1. G. W. Stagg, A. H. El-Abiad (2008), *Computer Methods in power System Analysis*, 2nd edition, Tata McGraw Hill Publications, New Delhi.
2. M. A. Pai (2008), *Computer Techniques in Power System Analysis*, 2nd edition, Tata McGraw Hill Publications, New Delhi, India.

REFERENCE BOOKS:

1. Hadi Saadat (2007), *Power System Analysis*, 5th edition, Tata McGraw Hill Publications, New Delhi.
2. I. J. Nagrath, D. P. Kothari (2005), *Modern Power system Analysis*, 3rd edition, Tata McGraw Hill Publications, New Delhi, India.

B. Tech. EEE VI SEMESTER

ELECTRICAL MEASUREMENTS

Course Code: **A1221**

L	T	P	C
3	1	-	4

UNIT - I

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

INSTRUMENT TRANSFORMERS: Current Transformer and Potential Transformer, Ratio and phase angle errors.

POWER FACTOR METERS: Type of Power Factor Meters, dynamometer and moving iron type 1-ph and 3-ph meters.

UNIT - II

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

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

MEASUREMENT OF FREQUENCY: Frequency meters - Resonance type and Weston type, Synchroscopes.

UNIT - III

D.C POTENTIOMETERS: Principle and operation of D.C. Crompton's potentiometer, standardization. Measurement of unknown resistance, current, voltage.

A.C. POTENTIOMETERS: Polar and coordinate type standardization, applications.

UNIT - IV

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

UNIT - V

A.C. BRIDGE: Measurement of inductance, Quality Factor, Maxwell's bridge, Hay's bridge, Anderson's bridge, Owen's bridge. Measurement of capacitance and loss angle, Desauty Bridge. Wien's bridge, Schering Bridge.

MAGNETIC MEASUREMENTS: Ballistic galvanometer, equation of motion, flux meter.

DIGITAL VOLTMETERS: Digital voltmeters-Successive approximation, ramp and dual-Slope integration continuous balance type-Micro processor based ramp type DVM digital frequency meter-digital phase angle meter.

TEXT BOOKS:

1. A. K. Sawhney (2011), A Course in Electrical & Electronic Measurement & Instruments, 19th edition, Dhanpat Rai & Co. Publications, New Delhi.
2. E. W. Golding, F. C. Widdis(2010), Electrical Measurements and Measuring Instruments, 5th edition, Wheeler Publishing, New Delhi.

REFERENCE BOOKS:

1. J. B. Gupta (2010), Electronics and Electrical Measurements and Instrumentation, 10th edition, S. K. Kataria sons, New Delhi.
2. Reissland, Martin. U (2010), Electrical Measurements: Fundamentals, Concepts, Applications, New Age International (P) Limited, New Delhi.

B. Tech. EEE VI SEMESTER

POWER ELECTRONICS

Course Code: **A1222**

L	T	P	C
3	1	-	4

UNIT - I

POWER SEMI CONDUCTOR DEVICES AND COMMUTATION CIRCUITS: Thyristors - silicon controlled rectifiers (SCR's), BJT, power MOSFET, power IGBT and their characteristics, other thyristors. Basic theory of operation of SCR, static characteristics, turn on and turn off methods, dynamic characteristics of SCR, turn on and turn off times, salient points, two transistor analogy, SCR UJT firing circuit, series and parallel connections of SCR's, snubber circuit details, specifications and ratings of SCR's, BJT, IGBT numerical problems, line commutation and forced commutation circuits.

UNIT - II

SINGLE PHASE CONTROLLED CONVERTERS: Phase control technique, single phase line commutated converters, midpoint and bridge connections, half controlled converters, fully controlled converters with resistive, RL loads and RLE load, derivation of average load voltage and current line commutated inverters, active and reactive power inputs to the converters without and with freewheeling diode. Effect of source inductance, derivation of load voltage and current, numerical problems.

UNIT - III

THREE PHASE LINE COMMUTATED CONVERTERS: Three phase converters, three pulse and six pulse converters, midpoint and bridge connections average load voltage with R and RL loads, effect of source inductance, dual converters (both single phase and three phase), waveforms, numerical problems.

AC VOLTAGE CONTROLLERS: AC voltage controllers, single phase two SCR's in anti parallel with R and RL loads, modes of operation of Triac, Triac with R and RL loads, derivation of RMS load voltage, current and power factor wave forms, firing circuits, numerical problems.

UNIT - IV

CYCLO CONVERTERS: Cyclo converters, single phase midpoint cyclo converters with resistive and inductive load (principle of operation only), bridge configuration of single phase cyclo converter (principle of operation only), waveforms.

CHOPPERS: Time ratio control and current limit control strategies, step down choppers derivation of load voltage and currents with R, RL and RLE loads, step up chopper, load voltage expression. Morgan's chopper, jones chopper and oscillation chopper (principle of operation only) waveforms, AC chopper, problems.

UNIT - V

INVERTERS: Inverters, single phase inverter, basic series inverter, basic parallel capacitor inverter bridge inverter, waveforms, simple forced commutation circuits for bridge inverters, MC Murray and MC Murray, bedford inverters, voltage control techniques for inverters pulse width modulation techniques, numerical problems.

TEXT BOOKS:

1. M. D. Singh, K. B. Kanchandhani (2008), *Power Electronics*, 3rd edition, Tata Mc graw hill publishing company, New Delhi, India.
2. M. H. Rashid (1998), *Power Electronics: Circuits, Devices and Applications*, 3rd edition, Prentice Hall of India, New Delhi, India.

REFERENCE BOOKS:

1. Vedam Subramanyam (1997), *Power Electronics*, New Age International (P) Limited, New Delhi.
2. V. R. Murthy (2005), *Power Electronics,* 1st edition, Oxford University Press, New Delhi.
3. P. C. Sen(2001), *Power Electronics*, 30th edition, Tata Mc Graw Hill Publishing, New Delhi.

B. Tech. EEE VI SEMESTER

DATABASE MANAGEMENT SYSTEMS

Interdepartmental Elective - I

(Common to EEE & ME)

Course Code: **A1511**

L	T	P	C
4	-	-	4

UNIT - I

INTRODUCTION: History of database systems, introduction to database management systems, database system applications, database systems versus file systems, view of data, data models, database languages- DDL & DML commands and examples of basic SQL queries, database users and administrators, transaction management, database system structure, application architectures.

DATABASE DESIGN: Introduction to database design and E-R diagrams, entities, attributes and entity sets, relationships and relationship sets, additional features of the E-R model, conceptual design with the E-R model, conceptual design for large enterprises.

UNIT - II

THE RELATIONAL MODEL: Introduction to the relational model, integrity constraints over relations, enforcing integrity constraints, querying relational data, logical database design: E-R to relational, 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.

SQL: Overview, the form of a basic SQL query, union, intersect and except operators, nested queries, aggregate operators, null values, complex integrity constraints in SQL, triggers and active databases, designing active databases.

UNIT - III

SCHEMA REFINEMENT AND NORMAL FORMS: Introduction to schema refinement, functional dependencies, reasoning about FDs. Normal forms: 1NF, 2NF, 3NF, BCNF, properties of decompositions, normalization, schema refinement in database design, other kinds of dependencies: 4NF, 5NF, DKNF, case studies.

UNIT - IV

TRANSACTIONS MANAGEMENT: Transaction concept, transaction state, implementation of atomicity and durability, concurrent executions, serializability, recoverability, implementation of isolation, transaction definition in SQL, testing for serializability.

CONCURRENCY CONTROL AND RECOVERY SYSTEM: Concurrency control - lock based protocols, time-stamp based protocols, validation based protocols, multiple granularity, and deadlock handling. Recovery system - failure classification, storage structure, recovery and atomicity, log-based recovery, shadow paging, recovery with concurrent transactions, buffer management, failure with loss of non-volatile storage, advanced recovery techniques, remote backup systems.

UNIT - V

OVERVIEW OF STORAGE AND INDEXING: Data on external storage, file organizations and indexing, index data structures, comparison of file organizations, indexes and performance tuning. Tree structured indexing - intuition for tree indexes, indexed sequential access method (ISAM), B+ Trees - a dynamic tree structure.

IBM DB2 FUNDAMENTALS*: DB2 product family - versions and editions, DB2 database and its objects, DB2 pure XML, backup and recovery, concurrency and its isolation levels, working with SQL, DB2 programming fundamentals - UDF, stored procedures.

** This topic is designed in collaboration with IBM India Private Limited.*

TEXT BOOKS:

1. Raghurama Krishnan, Johannes Gehrke (2007), *Database Management Systems*, 3rd edition, Tata McGraw Hill, New Delhi, India.

REFERENCE BOOKS:

1. Elmasri Navate (1994), *Fundamentals of Database Systems*, Pearson Education, India.
2. Abraham Silberschatz, Henry F. Korth, S. Sudarshan (2005), *Database System Concepts,* 5th edition, McGraw-Hill, New Delhi, India.
3. Peter Rob, Carlos Coronel (2009), *Database Systems Design, Implementation and Management*, 7th edition, India.

B. Tech. EEE VI SEMESTER

WIRELESS AND MOBILE COMPUTING

(Interdepartmental Elective - I)

Course Code: **A1605**

L	T	P	C
4	-	-	4

UNIT - I

SATIELLITE SYSTEM: History, Applications, Routing, Localization, Handover.

WIRELESS LAN: Infrared vs. radio transmission, infrastructure and ad hoc networks, IEEE 802.11.

HIPER LAN: Protocol architecture, physical layer, channel access control sub-layer, MAC sub-layer, information bases and networking.

UNIT - II

MOBILE COMPUTING: Introduction, history, architecture, devices and applications, limitations.

GLOBAL SYSTEM FOR MOBILE COMMUNICATIONS (GSM): Mobile services, system architecture, radio interface, protocols, localization and calling, handover, security, and new data services.

MEDIUM ACCESS CONTROL: Motivation for a specialized MAC (Hidden and exposed terminals, near and far terminals), SDMA, FDMA, TDMA, CDMA.

UNIT - III

MOBILE NETWORK LAYER: Mobile IP (goals, assumptions, entities and terminology, IP packet delivery, agent advertisement and discovery, registration, tunneling and encapsulation, optimizations), dynamic host configuration protocol (DHCP).

MOBILE ADHOC NETWORKS (MANETS): Overview, properties of a MANET, spectrum of MANET applications, routing and various routing algorithms, security in MANETs.

MOBILE TRANSPORT LAYER: Traditional TCP, indirect TCP, snooping TCP, mobile TCP, fast retransmit/ fast recovery, transmission /time-out freezing, selective retransmission, transaction oriented TCP.

UNIT - IV

DATA DISSEMINATION: Push based mechanisms, pull based mechanisms, hybrid mechanisms, selective tuning (indexing) techniques.

DATABASE ISSUES: Hoarding techniques, caching invalidation mechanisms, client server computing with adaptation, power-aware and context-aware computing, transactional models, query processing, recovery, and quality of service issues.

UNIT - V

PROTOCOLS AND TOOLS: Wireless Application Protocol-WAP. (Introduction, protocol architecture, and treatment of protocols of all layers), Bluetooth (user scenarios, physical layer, MAC layer, networking, security, link management) and J2ME.

TEXT BOOKS:

1. Jochen Schiller (2004), *Mobile Communications*, 2nd edition, Low price edition, Pearson Education, New Delhi.
2. Rajkamal (2007), *Mobile Computing*, 2nd edition, Oxford University Press, USA.

REFERENCE BOOKS:

1. Stojmenovic, Cacute(2002), *Handbook of Wireless Networks and Mobile Computing,* John Wiley, New York.
2. Hansmann, Merk, Nicklous, Stober(2003), *Principles of Mobile Computing*, 2nd edition, Springer, New Delhi.

B. Tech. EEE VI SEMESTER

VLSI DESIGN

(Interdepartmental Elective - I)

Course Code: **A1429**

L	T	P	C
4	-	-	4

UNIT - I

MOS TRANSISTOR THEORY: Introduction, MOS Device Design Equations–Threshold Voltage-Body Effect, Channel Length Modulation, MOS Models, the Complementary CMOS Inverter-DC characteristics, the differential inverter, the Tristate inverter, Bipolar devices.

UNIT - II

CMOS PROCESSING TECHNOLOGY: Overview-Wafer Processing, Oxidation, Epitaxy, deposition, ion-implantation and diffusion, the silicon gate process, Basic CMOS technology, Latchup – Origin of Latchup, Latchup triggering, Latchup prevention.

UNIT - III

MOS-CIRCUIT DESIGN PROCESSES: MOS Layers, Stick Diagrams-nMOS Design style, CMOS design style, Design Rules and Layout-Lambda based design rules, contact cuts, double metal MOS process rules, CMOS Lambda based design rules, general observations on design rules, 2 µm Double metal Double poly CMOS rules, Layout Diagrams.

CIRCUIT CHARACTERIZATION: Introduction, Resistance Estimation, Capacitance Estimation, Inductance, Switching Characteristics-analytic delay models, Power Dissipation, Scaling of MOS Transistor Dimensions.

UNIT - IV

CMOS CIRCUIT DESIGN AND LOGIC DESIGN: Introduction, CMOS logic gate design, Basic Physical design of simple logic gates, CMOS logic structures-CMOS complementary logic, Pseudo-nMOS logic, Dynamic CMOS logic, Pass transistor Logic, CMOS Domino Logic.

UNIT - V

CMOS TESTING: Need for Testing, Manufacturing Test Principles-fault models, Observability, Controllability, Design Strategies for Test, Chip Level test Techniques.

TEXT BOOKS:

1. Neil H. E. Weste, Kamran Eshraghian (2001), *Principles of CMOS VLSI Design – A System Perspective*, 2nd Edition, Pearson Education Asia, India.
2. Kamran Eshraghian, Dougles A. Pucknell, Sholeh Eshraghian (2005)*, Essentials of VLSI Circuits and Systems*, PHI, New Delhi.

REFERENCE BOOKS:

1. John .P. Uyemura (2011), *Introduction to VLSI Circuits and Systems,* John Wiley, India.
2. S.M. Sze (2003), *VLSI Technology,* 2nd Edition, Tata McGraw Hill, New Delhi.

B. Tech. EEE VI SEMESTER

ROBOTICS

Interdepartmental Elective - I

(Common to EEE & AE)

Course Code: **A1337**

L	T	P	C
4	-	-	4

UNIT - I

INTRODUCTION: Automation and Robotics, CAD/CAM and Robotics, an over view of Robotics, present and future applications – classification by coordinate system and control system.

COMPONENTS OF THE INDUSTRIAL ROBOTICS: Function line diagram representation of robot arms, common types of arms. Components, Architecture, number of degrees of freedom – Requirements and challenges of end effectors, determination of the end effectors, comparison of Electric, Hydraulic and Pneumatic types of locomotion devices.

UNIT - II

MOTION ANALYSIS: Homogeneous transformations as applicable to rotation and translation, problems.

MANIPULATOR KINEMATICS: Specifications of matrices, D-H notation joint coordinates and world coordinates Forward and inverse kinematics – problems.

UNIT - III

MANIPULATOR DYNAMICS - I: Differential transformation and manipulators, Jacobians, problems. Dynamics: Lagrange, Euler and Newton, Euler formations, Problems.

MANIPULATOR DYNAMICS - II: Trajectory planning and avoidance of obstacles, path planning, Skew motion, joint integrated motion, straight line motion, Robot programming, languages and software packages.

UNIT - IV

ROBOT ACTUATORS AND FEEDBACK COMPONENTS: Actuators: Pneumatic, Hydraulic actuators, electric & stepper motors. Feedback components: position sensors, potentiometers, resolvers, encoders, Velocity sensors.

UNIT - V

ROBOT APPLICATION IN MANUFACTURING: Material Transfer, Material handling, loading and unloading, Processing spot and continuous arc welding & spray painting, Assembly and Inspection.

TEXT BOOKS:

1. M. P. Groover (2010), *Industrial Robotics*, 3rd edition, Pearson Education, New Delhi.
2. K.S. Fu (2010), *Robotics*, 1st edition, Tata Mc Graw Hill Publishing Company Ltd., New Delhi.

REFERENCE BOOKS:

1. R.K. Mittal, I. J. Nagrath (2012), *Robotics and Control*, 1st edition, Tata Mc Graw Hill Publishing Company Ltd., New Delhi.
2. P. Coiffet, M. Chaironze (2010), *An Introduction to Robot Technology*, 3rd edition, Kogam Page Ltd., London.
3. Richard D. Klafter(2010), *Robotic Engineering*, 2nd edition, Prentice Hall of India, New Delhi.

B. Tech. EEE VI SEMESTER

INTRODUCTION TO AIRCRAFT INDUSTRY

(Interdepartmental Elective - I)

Course Code: **A1701**

L	T	P	C
4	-	-	4

This Course is Designed in Collaboration with Infosys Technologies Limited.

UNIT - I

AIRCRAFT INDUSTRY OVERVIEW: Evolution and History of Flight, Types Of Aerospace Industry, Introduction to ages of engineering, Aerospace Manufacturing, Introduction to the space environment & human space exploration.

UNIT - II

INTRODUCTION TO AIRCRAFTS, DURATION: Basic components of an Aircraft, Structural members, Aircraft Axis System, Aircraft Motions, Control surfaces and High lift Device. Types of Aircrafts - Lighter than Air/Heavier than Air Aircrafts Conventional Design Configurations based on Power Plant Location, Wing vertical location, intake location, Tail Unit Arrangements, Landing Gear Arrangements. Unconventional Configurations-Biplane, Variable Sweep, Canard Layout, Twin Boom Layouts, Span loaders, Blended Body Wing Layout, STOL and STOVL Aircraft, Stealth Aircraft. Advantages and disadvantages of these Configurations.

UNIT - III

INTRODUCTION TO AIRCRAFT SYSTEMs: Types of Aircraft Systems, Mechanical Systems, Electrical and Electronic Systems, Auxiliary systems. ***Mechanical Systems***: Environmental control systems (ECS), Pneumatic systems, Hydraulic systems, Fuel systems, Landing gear systems, Engine Control Systems, Ice and rain protection systems, Cabin Pressurization and Air Conditioning Systems, Steering and Brakes Systems Auxiliary Power Unit. ***Electrical systems:*** Avionics, Flight controls, Autopilot and Flight Management Systems, Navigation Systems, Communication, Information systems, Radar System.

UNIT - IV

BASIC PRINCIPLES OF FLIGHT: Significance of speed of Sound, Air speed and Ground Speed, Properties of Atmosphere, Bernoulli's Equation, Forces on the airplane, Airflow over wing section, Pressure Distribution over a wing section, Generation of Lift, Drag, Pitching moments, Types of Drag, Lift curve, Drag Curve, Lift/Drag Ratio Curve, Factors affecting Lift and Drag, Center of Pressure and its effects. Aerofoil Nomenclature, Types of Aerofoil, Wing Section- Aerodynamic Center, Aspect Ratio, Effects of lift, Drag, speed, Air density on drag.

UNIT - V

BASICS OF FLIGHT MECHANICS: Mach Waves, Mach Angles, Sonic and Supersonic Flight and its effects.

STABILITY AND CONTROL: Degree of Stability- Lateral, Longitudinal and Directional Stability and controls of Aircraft. Effects of Flaps and Slats on Lift Coefficients, Control Tabs, Stalling, Landing, Gliding Turning, Speed of Sound, Mach Numbers and Shock Waves.

AIRCRAFT PERFORMANCE AND MANEUVERS: Power Curves, Maximum and minimum speeds of horizontal flight, Effects of Changes of Engine Power, Effects of Altitude on Power Curves, Forces acting on a Aeroplane during a Turn, Loads during a Turn, Correct and incorrect Angles of Bank, Aerobatics, Inverted Maneuvers, Maneuverability

TEXT BOOKS:

1. Anderson J. D. (2012), *Introduction to Flight*, 7th edition, McGraw Hill, New Delhi.
2. Shevell (2004), *Fundamentals of Flight*, 2nd edition, Pearson Education Limited, India.
3. Allan Seabridge, Ian Moir (2008), *Aircraft Systems: Mechanical, Electrical and Avionics Subsystems Integration,* 3rd edition, John Willey & Sons, New Delhi, India.

REFERENCES BOOKS:

1. A.C Kermode (2012), *Mechanics of Flight*, 12th edition, Pearson Education Limited, India.
2. Kermode, A.C. (1989), *Flight without Formulae*, 5th edition, Pearson Education Limited, India.

B. Tech. EEE VI SEMESTER

AIR POLLLUTION AND CONTROL METHODOLOGIES

Interdepartmental Elective - I

(Common to EEE, ME & AE)

Course Code: **A1148**

L	T	P	C
4	-	-	4

UNIT - I

AIR POLLUTION: Definitions, scope, significance and episodes, air pollutants – classifications - natural and artificial - primary and secondary, point and non- point, line and areal sources of air pollution- stationary and mobile sources. Effects of air pollutants on man, material and vegetation: global effects of air pollution - green house effect, heat islands, acid rains, ozone holes etc.

UNIT - II

THERMODYNAMICS AND KINETICS OF AIR - POLLUTION: Applications in the removal of gases like SOx, NOx, CO, HC etc., air-fuel ratio. Computation and Control of products of combustion. Meteorology and plume Dispersion,

UNIT - III

PROPERTIES OF ATMOSPHERE: Heat, Pressure, Wind forces, Moisture and relative Humidity, Influence of Meteorological phenomena on Air Quality-wind rose diagrams.

LAPSE RATES: Pressure Systems, Winds and moisture plume behavior and plume Rise Models; Gaussian Model for Plume Dispersion.

UNIT - IV

CONTROL OF PARTICULATES: Control at Sources, Process Changes, Equipment modifications, Design and operation of control. Equipment's – Settling Chambers, Centrifugal separators, filters Dry and Wet scrubbers, Electrostatic precipitators. General Methods of Control of NOx and Sox emissions – In-plant Control Measures, process changes, dry and wet methods of removal and recycling.

UNIT - V

AIR QUALITY MANAGEMENT: Monitoring of SPM, SO; NO and CO Emission Standards.

TEXT BOOKS:

1. M. N. Rao, H. V. N. Rao (1988), *Air pollution*, Tata McGraw Hill Education, New Delhi, India.
2. C. S. Rao (2006), *Environmental Pollution control Engineering*, New age international, New Delhi, India.

REFERENCE BOOKS:

1. R. K. Trivedy, P.K. Goel (2003), *Introduction to Air pollution*, ABD Publications, New Delhi, India.
2. Wark, Warner (1998), *Air pollution its origin and control,* Addison-Wesley, New York.

B. Tech. EEE VI SEMESTER

MICRO PROCESSORS AND INTERFACING LAB

(Common to EEE & ECE)

Course Code: **A1427**

L	T	P	C
-	-	3	2

LIST OF EXPERIMENTS:

I. MICROPROCESSOR 8086:

1. Programs involving data Transfer Instructions
   a. Byte and word transfer in different addressing modes
   b. Block move Without overlapping
   c. Block move With overlapping
   d. Block interchanging

2. Programs involving arithmetic and logical operations like addition and subtraction of multi precision numbers
   a. Addition and Subtraction of Multi precision numbers
   b. Multiplication and division of signed and unsigned Hexadecimal numbers
   c. ASCII adjustment instructions
   d. Code Conversion
   e. Arithmetic program to find square ,cube ,LCM ,GCD and factorial

3. Programs involving bit manipulation instructions like checking
   a. If given data is positive or negative
   b. If given data is odd or even
   c. Logical ones and zeros in a given data
   d. 2 out of 5 code
   e. Bit wise palindrome
   f. Nibble wise palindrome

4. Programs involving Branch / Loop instructions like :
   a. Programs on arrays : addition/subtraction of N nos., finding largest/smallest no., ascending/descending order, etc.
   b. Near and Far Conditional and Unconditional jumps, Calls and Returns

5. Programs on String Manipulations like string transfer, string reversing, searching for a character in a string, palindrome etc.

6. Programs involving on Software Interrupts

7. Programs to use DOS interrupt INT 21H Function calls For:
   a. Reading a Character from Keyboard, Buffer Keyboard input
   b. Display of characters/String on console
   c. Creation of a new file, read/write from a file,
   d. Read system date, set system date, read system time, set system time

II. INTERFACING 8086:

1. Experiments on interfacing 8086 with the following modules through 8255 PPI / 8257 DMA / 8259 PIC
   a. A/D and D/A converters
   b. Matrix keyboard interface
   c. Seven segment display interface
   d. Logical controller interface
   e. Stepper motor interface
   f. Traffic signals by interfacing traffic controller to 8086
   g. Real time Clock using PIT 8253/8254

2. Interfacing a printer to an 8086 Microcomputer kit

B. Tech. EEE VI SEMESTER

POWER ELECTRONICS AND SIMULATION LAB

Course Code: **A1223**

L	T	P	C
-	-	3	2

LIST OF EXPERIMENTS:

1. Study of Characteristics of SCR, MOSFET & IGBT
2. DC Jone's Chopper.
3. Single Phase AC Voltage Controller with R and RL Loads.
4. Single Phase Half & fully controlled bridge converter with R and RL loads.
5. Single Phase Cyclo converter with R and RL loads.
6. Single Phase series inverter with R and RL loads.
7. Simulation of single-phase full converter with RLE load.
8. Simulation of single-phase AC voltage controller with RLE load.
9. Simulation of three phase full converter with RLE load.
10. Simulation of Buck chopper.
11. Simulation of single phase PWM inverter.
12. Simulation of three phase Half converter.

SYLLABI FOR VII SEMESTER

B. Tech. EEE VII SEMESTER

EMBEDDED SYSTEMS
(Common to EEE & ECE)

Course Code: **A1430**

L	T	P	C
4	-	-	4

UNIT - I

EMBEDDED COMPUTING: Introduction, complex systems and microprocessor, the embedded system design process, formalisms for system design, design examples.

UNIT - II

THE 8051 ARCHITECTURE: Introduction, 8051 micro controller hardware, input/output ports and circuits, external memory, counter and timers, serial data input/output, interrupts.

BASIC ASSEMBLY LANGUAGE PROGRAMMING CONCEPTS: The assembly language programming process, programming tools and techniques, programming the 8051. Data transfer and logical instructions, arithmetic operations, decimal arithmetic, jump and call instructions.

UNIT - III

INTRODUCTION TO REAL-TIME OPERATING SYSTEMS: Tasks and task states, tasks and data, semaphores, and shared data; message queues, mailboxes and pipes, timer functions, events, memory management, interrupt routines in an RTOS environment.

BASIC DESIGN USING A REAL-TIME OPERATING SYSTEM: Principles, semaphores and queues, hard real-time scheduling considerations, saving memory and power, an example RTOS like uC-OS (open source).

UNIT - IV

EMBEDDED SOFTWARE DEVELOPMENT TOOLS: Host and target machines, linker/locators for embedded software, getting embedded software into the target system

DEBUGGING TECHNIQUES: Testing on host machine, using laboratory tools, an example system.

UNIT - V

INTRODUCTION TO ADVANCED ARCHITECTURES: ARM and SHARC, processor and memory organization and instruction level parallelism; networked embedded systems: bus protocols, I^2C bus and CAN bus; internet-enabled systems, design example-elevator controller.

TEXT BOOKS:

1. Wayne Wolf (2008), *Computers as Components-principles of embedded computer system design*, Elsevier, New Delhi, India.
2. Kenneth J. Ayala (2008), *The 8051 Microcontroller*, 3rd edition, Cengage Learning, India.
3. David E. Simon (1999), *An Embedded Software Primer*, Pearson Education, India.

REFERENCE BOOKS:

1. Jean J. Labrosse (2000), Embedding System Building Blocks, 2nd edition, CMP publishers, USA.
2. Raj Kamal (2004), *Embedded Systems*, Tata McGraw hill, India.
3. Ajay V. Deshmukh (2005), *Micro Controllers*, Tata McGraw hill, India.
4. Frank Vahid, Tony Givargis (2002), *Embedded System Design*, John Wiley, India.

B. Tech. EEE VII SEMESTER

POWER SYSTEM SWITCHGEAR AND PROTECTION

Course Code: **A1224**

L	T	P	C
4	-	-	4

UNIT - I

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

UNIT - II

ELECTROMAGNETIC AND STATIC RELAYS: Principle of Operation and Construction of Attracted armature, Balanced Beam, Induction Disc and Induction Cup relays.

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

UNIVERSAL TORQUE EQUATION, DISTANCE RELAYS: Impedance, Reactance and Mho and Off-Set Mho relays, Comparison. Static Relays: Static Relays verses Electromagnetic Relays.

UNIT - III

GENERATOR, FEEDER AND BUS-BAR PROTECTION: Protection of generators against Stator faults, Rotor faults, and Abnormal Conditions. Restricted Earth fault and Inter-turn fault Protection. Numerical Problems on % Winding Unprotected. Protection of Bus bars – Differential protection.

PROTECTION OF TRANSFORMERS AND TRANSMISSION LINES: Percentage Differential Protection, Buchholtz relay Protection. Over Current, Three-zone distance relay protection using Impedance relays. Translay Relay.

UNIT - IV

POWER SYSTEM TRANSIENTS: Types of System Transients - Travelling or Propagation of Surges - Attenuation, Distortion, Reflection and Refraction Coefficients - Termination of lines with different types of conditions - Open Circuited Line, Short Circuited Line, T-Junction, Lumped Reactive Junctions , Bewley's Lattice Diagrams (for all the cases mentioned with numerical examples).

UNIT - V

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

PROTECTION AGAINST OVER VOLTAGES : Generation of Over Voltages in Power Systems.-Protection against Lightning Over Voltages - Valve type and Zinc-Oxide Lightning Arresters.

TEXT BOOKS:

1. Badari Ram, D. N. Viswakarma (2007), Power System Protection and Switchgear, 1st edition, Tata McGraw Hill Publications, New Delhi.
2. C. L. Wadhwa (2011), Electrical Power Systems, 6th edition, New Age International (P) Limited, New Delhi.

REFERENCE BOOKS:

1. Sunil S. Rao (1999), Switchgear and Protection, 10th edition, Khanna Publishers, New Delhi.
2. M. L. Soni, P. V. Gupta, U. S. Bhatnagar, A. Chakraborti (1999), A Text Book on Electrical Engineering, 1st edition, Dhanpat Rai & Co. Pvt. Ltd, New Delhi.

B. Tech. EEE VII SEMESTER

POWER SYSTEM OPERATION AND CONTROL

Course Code: **A1225**

L	T	P	C
3	1	-	4

UNIT - I

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

UNIT - II

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

UNIT - III

MODELLING OF TURBINE, GENERATOR AND AUTOMATIC CONTROLLERS: Modeling of Turbine: First order Turbine model, Block Diagram representation of Steam Turbines and Approximate Linear Models. Modeling of Generator (Steady State and Transient Models): Description of Simplified Network Model of a Synchronous Machine (Classical Model), Description of Swing Equation (No Derivation) and State-Space II-Order Mathematical Model of Synchronous Machine.

MODELLING OF GOVERNOR: Mathematical Modeling of Speed Governing System. Derivation of small signal transfer function.

MODELLING OF EXCITATION SYSTEM: Fundamental Characteristics of an Excitation system, Transfer function, Block Diagram Representation of IEEE Type-1 Model.

UNIT - IV

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

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

UNIT - V

REACTIVE POWER CONTROL: Overview of Reactive Power control, Reactive Power compensation in transmission systems, advantages and disadvantages of different types of compensating equipment for transmission systems. Load compensation, Specifications of load compensator. Uncompensated and compensated transmission lines: shunt and Series Compensation, deregulation.

TEXT BOOKS:

1. I. J. Nagrath, D. P .Kothari (2006), Modern Power System Analysis, 3rd edition, McGraw Hill higher Education, New Delhi, India.
2. P. S. R. Murthy (2008), Power System operation and Control, 1st edition, Tata McGraw Hill Publishers, New Delhi.

REFERENCE BOOKS:

1. Hadi Saadat (2010), Power System Analysis, Revised Edition, PSA Publishers, New Delhi.
2. O. I. Elgerd (2007), Electric Energy systems Theory, 2nd edition, Tata McGraw hill Publications, New Delhi.

B. Tech. EEE VII SEMESTER

POWER SEMICONDUCTOR DRIVES

Course Code: **A1226**

L	T	P	C
4	-	-	4

UNIT - I

CONTROL OF DC MOTORS BY PHASE CONTROLLED CONVERTERS: Introduction to Thyristor controlled Drives, Single Phase semi and Fully controlled converters connected to D.C separately excited and D.C series motors, continuous current operation, output voltage and current waveforms. Speed and Torque expressions, Speed - Torque Characteristics. Three phase semi and fully controlled converters connected to D.C separately excited and D.C series motors, output voltage and current waveforms. Speed and Torque expressions, Speed–Torque characteristics and Problems.

UNIT - II

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

CONTROL OF DC MOTORS BY CHOPPERS: Single quadrant, Two –quadrant and four quadrant chopper fed dc separately excited and series excited motors. Continuous current operation, Output voltage and current wave forms, Speed torque expressions, speed torque characteristics. Problems on Chopper fed D.C Motors, Closed Loop operation (Block Diagram Only)

UNIT - III

CONTROL OF INDUCTION MOTOR OF STATOR SIDE: Variable voltage characteristics, Control of Induction Motor by Ac Voltage Controllers, Waveforms, speed torque characteristics.

STATOR FREQUENCY CONTROL: Variable frequency characteristics, Variable frequency control of induction motor by Voltage source and current source inverter and cyclo converters. PWM control, Comparison of VSI and CSI operations, Speed torque characteristics, numerical problems on induction motor drives, Closed loop operation of induction motor drives (Block Diagram Only)

UNIT - IV

CONTROL OF INDUCTION MOTOR OF ROTOR SIDE: Static rotor resistance control, Slip power recovery, Static Scherbius drive, Static Kramer Drive, their performance and speed torque characteristics, advantages applications and problems

UNIT - V

CONTROL OF SYNCHRONOUS MOTORS: Separate control & self control of synchronous motors. Operation of self controlled synchronous motors by VSI and CSI cyclo converters. Load commutated CSI fed Synchronous Motor, Operation, Waveforms, speed torque characteristics, Applications, Advantages and Numerical Problems. Closed Loop control operation of synchronous motor drives (Block Diagram Only), variable frequency control, Cyclo converter, PWM, VFI, CSI

TEXT BOOKS:

1. G. K. Dubey (2002), Fundamentals of Electric Drives, 2nd edition, Narosa Publications, New Delhi.
2. M. H. Rashid (2003), Power Electronic Circuits, Devices and applications, 3rd edition, Prentice Hall of India, New Delhi, India.

REFERENCE BOOKS:

1. M. D. Singh, K. B. Khanchandani (2008), Power Electronics, 2nd Edition, Tata McGraw Hill Publications, New Delhi.
2. Vedam Subramanyam (2008), Thyristor Control of Electric drives, 1st Edition, Tata McGraw Hill Publications, New Delhi, India.
3. S. K. Pillai (2007), A First course on Electrical Drives, 2nd Edition, New Age International (P) Ltd., New Delhi.

B. Tech. EEE VII SEMESTER

HUMAN VALUES AND ETHICS

Interdepartmental Elective - II
(Common to EEE, ME, AE & CE)

Course Code: **A1016**

L	T	P	C
4	-	-	4

UNIT - I

HUMANVALUES: Morals, values and ethics, integrity, work ethic, service learning, civic virtue, respect for others, living peacefully, caring, sharing, honesty, courage, valuing time, co-operation, commitment, empathy, self-confidence, character and spirituality.

UNIT - II

ENGINEERING ETHICS: Senses of 'Engineering Ethics', variety of moral issued, types of inquiry, moral dilemmas, moral autonomy, Kohlberg's theory, Gilligan's theory, consensus and controversy, models of professional roles, theories about right action, self-interest, customs and religion, uses of ethical theories.

UNIT - III

ENGINEERING AS SOCIAL EXPERIMENTATION: Engineering as experimentation, engineers as responsible experimenters, codes of ethics, a balanced outlook on law, the challenger case study.

UNIT - IV

SAFETY, RESPONSIBILITIES AND RIGHTS: Safety and risk, assessment of safety and risk, risk benefit analysis and reducing risk, the Three Mile Island and Chernobyl case studies. Collegiality and loyalty, respect for authority, collective bargaining, confidentiality, conflicts of interest, occupational crime, professional rights, employee rights, Intellectual Property Rights (IPR), discrimination.

UNIT - V

GLOBAL ISSUES: Multinational corporations, environmental ethics, computer ethics, weapons development, engineers as managers-consulting engineers-engineers as expert witnesses and advisors -moral leadership-sample code of ethics like ASME, ASCE, IEEE, institution of engineers (India), Indian institute of materials management, institution of electronics and telecommunication engineers (IETE),India, etc.

TEXT BOOKS:

1. Mike Martin, Roland Schinzinger(1996), *Ethics in Engineering*, McGraw-Hill, New York.
2. Govindarajan M, Natarajan S, Senthil Kumar V. S (2004), *Engineering Ethics*, Prentice Hall of India, New Delhi, India.

REFERENCE BOOKS:

1. Charles D. Fleddermann(2004), *Engineering Ethics*, Pearson Education / Prentice Hall, New Jersey.
2. Charles E Harris, Michael S. Protchard, Michael J Rabins(2000), *Engineering Ethics - Concepts and Cases*, Wadsworth Thompson Learning, United States.
3. John R Boatright(2003), *Ethics and the Conduct of Business*, Pearson Education, New Delhi.
4. Edmund G Seebauer and Robert L Barry, (2001), *Fundamentals of Ethics for Scientists and Engineers,* Oxford University Press, New York.

B. Tech. EEE VII SEMESTER

HUMAN RESOURCE MANAGEMENT

Interdepartmental Elective - II

(Common to EEE, ME, AE & CE)

Course Code: **A1017**

L	T	P	C
4	-	-	4

UNIT - I

INTRODUCTION HUMAN RESOURCE MANAGEMENT: Introduction and significance of HRM, Scope, functions of HRM, changing environment of HRM and Challenges. Human Resource Planning, Objectives, Factors influencing Human Resource planning, HR Planning Process.

UNIT - II

JOB ANALYSIS AND RECRUITMENT: Process and Sources of Recruitment; Selection, process of selection and techniques, Retention of Employees.

UNIT - III

HUMAN RESOURCES DEVELOPMENT: Training Vs Development, Need, Process of training, Methods of training, Training Evaluation, Career planning, Performance Management System, Methods of Appraisal, Common Errors.

UNIT - IV

COMPENSATION MANAGEMENT: Concepts and components of wages, Factors influencing wage fixation, Job evaluation, Methods of payment, Incentives and Fringe benefits.

UNIT - V

MANAGING INDUSTRIAL RELATIONS: Components of Industrial Relation, Trade Unions, functions of Trade Union, Employee Participation, Importance and Schemes, Collective Bargaining, Grievance Redressal, Industrial Dispute Settlement machinery.

TEXT BOOKS:

1. Biswajeet Pattnayak (2009), *Human Resource Management*, Prentice hall of India, New Delhi, India.
2. R. Wayne Mondy and Robert M. Noe (2009), *Human Resource Management*, Pearson, India.

REFERENCE BOOKS:

1. Aswathappa. K. (2007), *Human Resources and Personnel Management*, Tata MC Graw Hill, New Delhi, India.
2. Monappa. A, Saiyadain. M. (1979), *Personnel Management*, Tata Mc Graw Hill, New Delhi, India.
3. C. B. Mamoria (2003), *Personnel Management*, Himalaya Publishing House, India.

B. Tech. EEE VII SEMESTER

ENTERPRENEURSHIP

Interdepartmental Elective - II

(Common to EEE, ME, AE & CE)

Course Code: **A1018**

L	T	P	C
4	-	-	4

UNIT - I

ENTREPRENEURSHIP: Importance and role of entrepreneurship, Characteristics of entrepreneurship, Qualities of an entrepreneur, Functions of entrepreneur; Theories of entrepreneurship, Stimulants of entrepreneurship and Barriers to entrepreneurship, Ethics and Social Responsibility, Role of entrepreneur in economic development.

UNIT - II

INSTITUTIONAL SUPPORT: Role of Government; Role of IDBI, SIDBI, SIDO, NIESBUD, SISI, DIC, Entrepreneurship Development Institute, MSMEs.

UNIT - III

WOMEN ENTREPRENEURSHIP: Role & Importance, Functions of women entrepreneur, Profile of Indian Women Entrepreneur, Problems of Women Entrepreneurs, Women Entrepreneurship Development in India and in Foreign Countries.

UNIT - IV

PROJECT MANAGEMENT: Concept of project and classification of project identification, project formulation - project report - project design, Project appraisal - profitability appraisal - project planning - social cost benefit analysis - financial analysis and project financing.

UNIT - V

TRAINING: Designing appropriate training programmes to inculcate Entrepreneurial Spirit, significance of entrepreneurial training, Training for New and Existing Entrepreneurs, Feedback and Performance of Trainees.

TEXT BOOKS:

1. Robert Hisrich, Michael P. Peter, Dean A. Shepherd (2010), E*ntrepreneurship*, Tata Mc Graw Hill, New Delhi.

REFERENCE BOOKS:

1. Bholanath Datta (2009), *Entrepreneurship*, Excel publications, India.
2. David H. Holt (2010), *Entrepreneurship*, Prentice hall of India, New Delhi, India.

B. Tech. EEE VII SEMESTER

BUSINESS COMMUNICATION

Interdepartmental Elective - II

(Common to EEE, ME, AE & CE)

Course Code: **A1019**

L	T	P	C
4	-	-	4

UNIT - I

INTRODUCTION TO MANAGERIAL COMMUNICATION: Meaning, Importance and objectives, Principles of Communication, Forms of communication, Communication Process, Barriers To effective communication, Gateways to effective communication.

UNIT - II

NONVERBAL COMMUNICATION: Body Language, Gestures, Postures, Facial Expressions, Dress Code. Listening and Speaking Skills, Probing questions, Observation, Business and Social etiquette.

UNIT - III

MANAGERIAL SPEECHES: Principles of Effective Speech & Presentations. Technical and Non-technical presentations. Speech of introduction, speech of thanks, occasional speech, theme speech, Use of audio visual aids.

UNIT - IV

INTERVIEW TECHNIQUES: Mastering the art of conducting and giving interviews, Placement interviews, discipline/technical interviews, appraisal interviews, exit Interviews. *Group communication*: Importance, Meetings, group discussions, Video conferencing.

UNIT - V

INTRODUCTION TO BUSINESS CORRESPONDENCE: *Business letters*: Enquiries, Circulars, Quotations, Orders, Acknowledgments, Executions, Complaints, Persuading letters, Sales letters, Job application letters, Bio-data, Covering Letter, Interview Letters, Letter of Reference, Memos, minutes, Circulars and Notices. *Reports:* Types of Business Reports - Format, Choice of vocabulary, Coherence, paragraph writing, organization reports by individual, Report by committee.

TEXT BOOKS:

1. Lesikar R. V, Flatley M. E (2005), *For Empowering the Internet Generation*, Tata McGraw Hill Publishing Company Ltd., New Delhi, India.
2. Ludlow. R, Panton. F (1998), *The Essence of Effective Communications*, Prentice Hall of India Pvt. Ltd., New Delhi, India.

REFERENCE BOOKS:

1. Adair .J (2003), *Effective Communication,* Pan Macmillan, London.
2. Pan Mcmillan Thill J. V, Bovee G. L (1993), *Excellence in Business Communication,* Tata McGraw Hill, New York.
3. Bowman J.P, Branchaw P. P (1987), *Business Communications: From Process to Product*, Dryden Press, Chicago.

B. Tech. EEE VII SEMESTER

INTELLECTUAL PROPERTY AND PATENT RIGHTS

(Interdepartmental Elective - II)

Common to EEE, ME, AE & CE

Course Code: **A1020**

L	T	P	C
4	-	-	4

UNIT - I

INTRODUCTION TO INTELLECTUAL PROPERTY: Introduction, types of intellectual property, international organizations, agencies and treaties, importance of intellectual property rights.

UNIT - II

TRADE MARKS: Purpose and function of trademarks, acquisition of trade mark rights, protectable matter, selecting and evaluating trade mark' trade mark registration processes.

UNIT - III

LAW OF COPY RIGHTS : Fundamental of copy right law, originality of material, rights of reproduction, rights to perform the work publicly, copy right ownership issues, copy right regisffation, notice of copy right' international copy right law.

LAW OF PATENTS: Foundation of patent law, patent searching process' ownership rights and transfer.

UNIT - IV

TRADE SECRETS: Trade secrete law, determination of trade secrete status' liability for misappropriations of trade secrets, protection for submission, trade secrete litigation.

UNFAIR COMPETITION: Misappropriation right of publicity, false advertising.

UNIT - V

NEW DEVELOPMENT OF INTELLECTUAL PROPERTY: New developments in trade mark law; copy right law patent law, intellectual property audits'. International overview on intellectual property, international - trade mark law, copy right law, international patent law, and international development trade secrets law.

TEXT BOOKS:

1. Deborah. E. Bouchoux (2009*), Intellectual property*, Cengage learning, India.
2. Deborah. E. Bouchoux (2001), *Protecting your companies intellectual property*, AMACOM, USA.

REFERENCE BOOKS:

1. Prabudda ganguli (2003), *Intellectual property right*, Tata McGraw Hill Publishing company ltd., India.
2. Robert Hisrich, Michael P. Peter, Dean A. Shepherd (2010), *Entrepreneurship*, Tata Mc Graw Hill, India.

B. Tech. EEE VII SEMESTER

PROJECT PLANNING AND MANAGEMENT

Interdepartmental Elective - II

(Common to EEE, ME, AE & CE)

Course Code: **A1021**

L	T	P	C
4	-	-	4

UNIT - I

PERT AND CPM : Introduction, origin of PERT and CPM, planning, scheduling and controlling, bar charts, milestone charts, weaknesses in bar charts, PERT and CPM networks comparison, event, activity, rules for drawing networks, numbering the events (Fulkerson's law), dummy activities.

UNIT - II

CPM - PERT NETWORK ANALYSIS : Time estimate, expected time, earliest allowable occurrence time, latest allowable occurrence time, slack, project duration, probability of completion, start and finish time estimates, floats, project scheduling, critical and sub-critical path. Updating - process of updating, when to update.

UNIT - III

CPM COST MODEL & RESOURCES ALLOCATIONS, RESOURCE SCHEDULING : Cost analysis, direct and indirect costs, operation time, normal and crash times and costs, optimizing project cost, crash limit, free float limit, optimization. Resource smoothening, resource leveling.

UNIT - IV

MANAGEMENT: Scope of construction management, significance of construction management, concept of scientific management, psychology in management, a historical account of management philosophy, qualities of manager, the roles/functions performed by effective and competent managers, the manager - as a decision maker, as a motivator, as a communication-link, as a conflict resolver, as a well wisher of co-employees and the employer etc.

UNIT - V

ORGANIZATION: Types of organization, merits and demerits of different types of organization, authority, policy, recruitment process and training; development of personnel department; labor problems; labor legislation in India; 'workmen's compensation act of 1923 and minimum wages act of 1948', and subsequent amendments. Safety in construction.

TEXT BOOKS:

1. Punmia, Khandelwal (2006), *Project planning and control with PERT and CPM*, 3rd edition, Laxmi Publications, New Delhi, India.

REFERENCE BOOKS:

1. L. S. Srinath (1975), *PERT and CPM*, 2nd Edition, Afflicted East West Press Pvt. Ltd, New Delhi, India.
2. U. K. Shrivastava (1999), *Construction Planning and Management*, Galgotia Publications Pvt. Ltd., New Delhi**,** India**.**

B. Tech. EEE VII SEMESTER

HIGH VOLTAGE ENGINEERING

(Professional Elective - I)

Course Code: **A1227**

L	T	P	C
3	1	-	4

UNIT - I

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

UNIT - II

BREAK DOWN IN GASEOUS, LIQUID DIELECTRICS AND SOLID DIELECTRICS: Gases as insulating media, collision process, Ionization process, Townsend's criteria of breakdown in gases, Paschen's law. Liquid as Insulator, pure and commercial liquids, breakdown in pure and commercial liquids. Intrinsic breakdown, electromechanical breakdown, thermal breakdown, breakdown of solid dielectrics in practice, Breakdown in composite dielectrics, solid dielectrics used in practice.

UNIT - III

GENERATION OF HIGH VOLTAGES AND CURRENTS: Generation of High Direct Current Voltages, Generation of High alternating voltages, Generation of Impulse Voltages, Generation of Impulse currents, Tripping and control of impulse generators.

MEASUREMENT OF HIGH VOLTAGES AND CURRENTS: Measurement of High Direct Current voltages, Measurement of High Voltages alternating and impulse, Measurement of High Currents-direct, alternating and Impulse, Oscilloscope for impulse voltage and current measurements.

UNIT - IV

OVER VOLTAGE PHENOMENON AND INSULATION CO-ORDINATION: Natural causes for over voltages – Lightning phenomenon, Overvoltage due to switching surges, system faults and other abnormal conditions, Principles of Insulation Coordination on High voltage and Extra High Voltage power systems.

UNIT - V

NON-DISTRUCTIVE TESTING OF MATERIAL AND ELECTRICAL APPARATUS: Measurement of D.C Resistivity, Measurement of Dielectric Constant and loss factor, Partial discharge measurements.

HIGH VOLTAGE TESTING OF ELECTRICAL APPARATUS: Testing of Insulators and bushings, Testing of Isolators and circuit breakers, Testing of cables, Testing of Transformers, Testing of Surge Arresters, Radio Interference measurements.

TEXT BOOKS:

1. M. S. Naidu, V. Kamaraju (2009), *High Voltage Engineering*, 4th edition, Tata McGraw Hill Publications, New Delhi.
2. E. Kuffel, W. S. Zaengl, J. Kuffel (2000), *High Voltage Engineering: Fundamentals*, 2nd edition, Elsevier Publishers, New York, USA.

REFERENCE BOOKS:

1. C. L. Wadhwa (2007), *High Voltage Engineering*, New Age Internationals (P) Limited, New Delhi.
2. Ravindra Arora Wolfgang Mosch (2011), *High Voltage Insulation Engineering,* 1st edition*,* New Age International (P) Ltd., New Delhi.

B. Tech. EEE VII SEMESTER

ENERGY MANAGEMENT

Professional Elective - I

(Common to EEE & ECE)

Course Code: **A1228**

L	T	P	C
3	1	-	4

UNIT - I

INTRODUCTION: Principles of Energy Management, Managerial Organization. Functional Areas for Manufacturing Industry, Process Industry, Commerce, Government. Role of Energy Manager in each of the organization. Initiating, Organizing and Managing Energy Management Programs.

UNIT - II

ENERGY AUDIT: Definition and Concepts, Types of Energy Audits, Basic Energy Concepts. Resources for Plant Energy Studies, Data Gathering, Analytical Techniques. Energy Conservation: Technologies for Energy Conservation , Design for Conservation of Energy materials, energy flow networks, critical assessment of energy usage, formulation of objectives and constraints, synthesis of alternative options and technical analysis of options, process integration.

UNIT - III

ECONOMIC ANALYSIS: Scope, Characterization of an Investment Project, Types of Depreciation, Time Value of money, budget considerations, Risk Analysis.

UNIT - IV

METHODS OF EVALUATION OF PROJECTS: Payback, Annualized Costs, Investor's Rate of return, Present worth, Internal Rate of Return. Pros and Cons of the common methods of analysis, replacement analysis. Energy Consultant: Need of Energy Consultant, Consultant Selection Criteria.

UNIT - V

ALTERNATIVE ENERGY SOURCES: Solar Energy: Types of devices for Solar Energy Collection, Thermal Storage System. Control Systems, Wind Energy, Availability, Wind Devices, Wind Characteristics, Performance of Turbines and systems.

TEXT BOOKS:

1. W. R. Murphy, G. McKay (2008), *Energy Management,* 1st edition*,* B.S. Publications, New Delhi.

REFERENCE BOOKS:

1. B. Smith (2007), *Energy Management Principles*, 1st edition, Pergamon Press, Inc., England.

B. Tech. EEE VII SEMESTER

LINEAR SYSTEMS ANALYSIS
(Professional Elective - I)

Course Code: **A1229**

L	T	P	C
3	1	-	4

UNIT - I

STATE VARIABLE ANALYSIS: Choice of state variables in Electrical networks, Formulation of state equations for Electrical networks, Equivalent source method. Network topological method, Solution of state equations, Analysis of simple networks with state variable approach.

UNIT - II

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

APPLICATIONS OF FOURIER SERIES AND FOURIER TRANSFORM REPRESENTATION: Introduction, Effective value and average values of non sinusoidal periodic waves, currents, Power Factor, Effects of harmonics, Application in Circuit Analysis, Circuit Analysis using Fourier series.

UNIT - III

LAPLACE TRANSFORM APPLICATIONS: Application of Laplace transform Methods of Analysis. Response of RL, RC, RLC Networks to Step, Ramp, and impulse functions, Shifting Theorem. Convolution Integral and Applications.

TESTING OF POLYNOMIALS: Elements of realisability, Hurwitz polynomials, positive real functions, Properties, Testing, Sturm's Test, examples.

UNIT - IV

NETWORK SYSNTHESIS: Synthesis of one port LC networks-Foster and Cauer methods-Synthesis of RL and RC one port networks-Foster and Cauer methods.

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

UNIT - V

Z-TRANSFORMS: Fundamental difference between continuous and discrete time signals, discrete time complex, exponential and sinusoidal signals, periodicity of discrete time complex exponential, concept of Z-Transform of a discrete sequence. Distinction between Laplace, Fourier and Z-Transforms. Region of convergence in Z-Transforms, constraints on ROC for various classes of signals, Inverse Z-Transform properties of Z-Transforms.

TEXT BOOKS:

1. A. N. Tripathi (1998), *Linear System Analysis*, 1st edition, New Age International (P) Limited, New Delhi.
2. D. Roy Chowdhary (2005), *Network and Systems,* 1st edition, New Age International (P) Limited, New Delhi.

REFERENCE BOOKS:

1. Prof. Satyanarayana, A. Rama Devi (2005), *Analysis of Linear System*, 1st edition, Right Publications, New Delhi.

B. Tech. EEE VII SEMESTER

INSTRUMENTATION

(Professional Elective - I)

Course Code: **A1230**

L	T	P	C
3	1	-	4

UNIT - I

CHARACTERISTICS OF SIGNALS: Measuring Systems, Performance Characteristics, - Static characteristics, Dynamic Characteristics; Errors in Measurement – Gross Errors, Systematic Errors, Statistical Analysis of Random Errors.

SIGNALS AND THEIR REPRESENTATION: Signal and their representation: Standard Test, periodic, aperiodic, modulated signal, sampled data, pulse modulation and pulse code modulation

UNIT - II

OSCILLOSCOPE: Cathode ray oscilloscope-Cathode ray tube-time base generator-horizontal and vertical amplifiers-CRO probes-applications of CRO-Measurement of phase and frequency-lissajous patterns-Sampling oscilloscope-analog and digital type.

UNIT - III

SIGNAL ANALYZERS: Wave Analyzers- Frequency selective analyzers, Heterodyne, Application of Wave analyzers-Harmonic Analyzers, Total Harmonic distortion, spectrum analyzers, Basic spectrum analyzers, spectral displays, vector impedance meter, Q meter. Peak reading and RMS voltmeters

UNIT - IV

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

UNIT - V

MEASUREMENT OF NON-ELECTRICAL QUANTITIES-I: Measurement of strain, Gauge Sensitivity, Displacement, Velocity, Angular Velocity, Acceleration, Force, Torque.

MEASUREMENT OF NON-ELECTRICAL QUANTITIES-II: Measurement of Temperature, Pressure, Vacuum, Flow, Liquid level.

TEXT BOOKS:

1. D. V. S. Murthy (2010), *Transducers and Instrumentation,* 2nd Edition, Prentice Hall of India, New Delhi.
2. A. K. Sawhney (2011), *A course in Electrical and Electronic Measurements and Instrumentation*, 19th edition, Dhanpatrai & Co., New Delhi.

REFERENCE BOOKS:

1. A. S. Morris (2001), *Principles of Measurement and Instrumentation*, 3rd Edition, Prentice Hall of India, New Delhi, India.
2. H. S. Kalsi (2010), *Electronic Instrumentation*, 3rd Edition, Tata McGraw Hill Publications, New Delhi.

B. Tech. EEE VII SEMESTER

SPECIAL ELECTRICAL MACHINES
(Professional Elective - I)

Course Code: **A1231**

L	T	P	C
3	1	-	4

UNIT - I

SYNCHRONOUS RELUCTANCE MOTORS: Constructional features, Types, Axial and radial air gap motors, Operating principle, Reluctance, Phasor diagram, Characteristics, Vernier motor.

UNIT - II

STEPPING MOTORS: Constructional features, Principle of operation, Variable reluctance motor, Hybrid motor, Single and multi stack configurations. Theory of torque predictions, Linear and non-linear analysis, Characteristics, Drive circuits.

UNIT - III

SWITCHED RELUCTANCE MOTORS: Constructional features, Principle of operation, Torque prediction. Power controllers, Non-linear analysis, Microprocessor based control, Characteristics, Computer control.

UNIT - IV

PERMANENT MAGNET BRUSHLESS D.C. MOTORS: Principle of operation, Types, Magnetic circuit analysis. EMF and torque equations, Power controllers , Motor characteristics and control.

UNIT - V

PERMANENT MAGNET SYNCHRONOUS MOTORS: Principle of operation, EMF and torque equations. Reactance, Phasor diagram, Power controllers, Converter, Volt-ampere requirements. Torque speed characteristics, Microprocessor based control.

TEXT BOOKS:

1. T. J. E. Miller (1989), *Brushless Permanent Magnet and Reluctance Motor Drives*, 1st edition, Clarendon Press, London.
2. P. P. Aearnley (1982), *Stepping Motors – A Guide to Motor Theory and Practice*, 1st Edition, Peter Perengrinus, London.

REFERENCE BOOKS:

1. T. Kenjo (1984), *Stepping Motors and Their Microprocessor Controls*, 1st Edition, Clarendon Press London.
2. T. Kenjo, S. Nagamori (1988), *Permanent Magnet and Brushless DC Motors*, 1st edition, Clarendon Press, London.

B. Tech. EEE VII SEMESTER

POWER SYSTEM TRANSIENTS
(Professional Elective - I)

Course Code: **A1232**

L	T	P	C
3	1	-	4

UNIT - I

INTRODUCTION AND SURVEY: Source of transients, various types of power systems transients, effect of transients on power systems, importance of study of transients in planning.

UNIT - II

SWITCHING TRANSIENTS: Introduction, circuit closing transients: RL circuit with sine wave drive, double frequency transients, observations in RLC circuit and basic transforms of the RLC circuit. Resistance switching: Equivalent circuit for the resistance switching problems, equivalent circuit for interrupting the resistor current. Load switching: Equivalent circuit, waveforms for transient voltage across the load, switch; normal and abnormal switching transients. Current suppression, current chopping, effective equivalent circuit. Capacitance switching, effect of source regulation, capacitance switching with a restrike, with multiple restrikes, illustration for multiple restriking transients, ferro resonance.

UNIT - III

LIGHTNING TRANSIENTS: Causes of over voltage, lightning phenomenon, charge formation in the clouds, rate of charging of thunder clouds, mechanisms of lighting strokes, characteristics of lightning strokes, factors contributing to good line design, protection afforded by ground wires, tower footing resistance.

INTERACTION BETWEEN LIGHTNING AND POWER SYSTEM: Mathematical model for lightning.

UNIT - IV

TRAVELLING WAVES ON TRANSMISSION LINE COMPUTATION OF TRANSIENTS: Transient response of systems with series and shunt lumped parameters and distributed lines. Travelling wave concept: step response, Bewely's lattice diagram, standing waves and natural frequencies, reflection and refraction of travelling waves.

UNIT - V

TRANSIENTS IN INTEGRATED POWER SYSTEM: The short line and kilometric fault, distribution of voltage in a power system: Line dropping and load rejection; voltage transients on closing and reclosing lines; over voltage induced by faults; switching surges on integrated system; EMTP for transient computation.

TEXT BOOKS:

1. Allan Greenwood (1991), *Electrical Transients in Power Systems*, 2nd edition, Wiley Interscience, New York.
2. C. L. Wadhwa (2011), *Electrical Power Systems*, 2nd edition, New Age International (P) Limited, New Delhi.

REFERENCE BOOKS:

1. R. D. Begamudre (2011), *Extra High Voltage AC Transmission Engineering*, 4th edition, Wiley Eastern Ltd., New Delhi, India.

B. Tech. EEE VII SEMESTER

ELECTRICAL MEASUREMENTS LAB

Course Code: **A1233**

L	T	P	C
-	-	3	2

LIST OF EXPERIMENTS:

1. Calibration and Testing of Single Phase Energy Meter.
2. Calibration of Dynamometer Power Factor Meter.
3. Measurement of 3 Phase Reactive Power with Single-Phase Wattmeter.
4. Measurement of Parameters of a choke coil using 3 voltmeter and 3 ammeter methods.
5. Calibration of PMMC ammeter and PMMC voltmeter using Crompton D.C. Potentiometer.
6. Measurement of Resistance using Kelvin's double bridge.
7. Schering Bridge & Anderson Bridge.
8. Calibration of LPF wattmeter by Phantom testing.
9. Dielectric Oil Testing using H.T testing Kit.
10. Measurement of 3 phase power with single watt meter and two current transformers.
11. Microprocessor based ramp type DVM Digital Frequency meter.
12. Measurement of Iron loss in a bar specimen using a wattmeter.

B. Tech. EEE VII SEMESTER

POWER SYSTEMS AND SIMULATION LAB - I

Course Code: **A1234**

L	T	P	C
-	-	3	2

LIST OF EXPERIMENTS:

1. Analysis of Single Line To Ground Fault
2. Analysis of Line To Line Fault
3. Determination of A, B, C, D parameters, hybrid parameters and image parameters of a given transmission model.
4. Performance of a Long Transmission Line Under No Load And Under Light Load Condition
5. Performance of a Long Transmission Line Under Load At Different Power Factors
6. Performance Characteristics of a Typical Dc Distribution System (Radial Configuration)
7. Conduct a power flow study on a given power system network using Gauss- Seidel iterative method
8. Conduct a power flow study on a given power system network using Newton -Raphson method
9. Develop a program to solve Swing Equation.
10. Simulation of a single- area load frequency problem.
11. Simulation of a two- area load frequency problem.
12. Design a PID controller for two- area power system and simulate the same.

SYLLABI FOR VIII SEMESTER

B. Tech. EEE VIII SEMESTER

UTILIZATION OF ELECTRICAL ENERGY

Course Code: **A1236**

L	T	P	C
3	1	-	4

UNIT - I

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

UNIT - II

ELECTRIC HEATING and WELDING: Advantages and methods of electric heating, resistance heating induction heating and dielectric heating. Electric welding, resistance and arc welding, electric welding equipment, comparison between A.C. and D.C. Welding.

UNIT - III

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

TYPES OF LAMPS: Discharge lamps, MV and SV lamps – comparison between tungsten filament lamps and fluorescent tubes, Basic principles of light control, Types and design of lighting and flood lighting.

UNIT - IV

ELECTRIC TRACTION - I: System of electric traction and track electrification. Review of existing electric traction systems in India. Special features of traction motor, methods of electric braking-plugging rheostatic braking and regenerative braking.

UNIT - V

ELECTRIC TRACTION - II: Mechanics of train movement. Speed-time curves for different services – trapezoidal and quadrilateral speed time curves. Calculations of tractive effort, power, specific energy consumption for given run, effect of varying acceleration and braking retardation, adhesive weight and braking retardation adhesive weight and coefficient of adhesion**.**

TEXT BOOKS:

1. G. C. Garg (2005), *Utilization of Electrical Power & Electric traction*, 8th edition, Khanna publishers, New Delhi.
2. N. V. Suryanarayana (2005), *Utilization of Electrical Power including Electric drives and Electric traction*, 1st edition New Age International (P) Ltd., New Delhi.

REFERENCE BOOKS:

1. Partab (2007), *Art & Science of Utilization of electrical Energy*, 2nd edition, Dhanpat Rai & Sons, New Delhi.
2. C. L. Wadhwa (2005), *Generation, Distribution and Utilization of Electrical Energy*, 2nd edition, New Age International (P) Ltd., New Delhi.

B. Tech. EEE VIII SEMESTER

ELECTRICAL DISTRIBUTION SYSTEMS

(Professional Elective - II)

Course Code: **A1237**

L	T	P	C
3	1	-	4

UNIT - I

GENERAL CONCEPTS: Introduction to distribution systems, Load modelling and characteristics. Coincidence factor, contribution factor loss factor - Relationship between the load factor and loss factor. Classification of loads (Residential, commercial, Agricultural and Industrial) and their characteristics.

UNIT - II

DISTRIBUTION FEEDERS & SUBSTATIONS: Design Considerations of Distribution Feeders: Radial and loop types of primary feeders, voltage levels, feeder loading; basic design practice of the secondary distribution system. Location of Substations: Rating of distribution substation, service area within primary feeders. Benefits derived through optimal location of substations.

UNIT - III

SYSTEM ANALYSIS: Voltage drop and power-loss calculations - Derivation for voltage drop and power loss in lines, manual methods of solution for radial networks, three phase balanced primary lines.

UNIT - IV

PROTECTION AND COORDINATION: Objectives of distribution system protection, types of common faults and procedure for fault calculations. Protective Devices: Principle of operation of Fuses, Circuit Reclosures, line sectionalizes, and circuit breakers Coordination of Protective Devices: General coordination procedure.

UNIT - V

COMPENSATION FOR POWER FACTOR IMPROVEMENT AND VOLTAGE CONTROL: Capacitive compensation for power-factor control. Different types of power capacitors, shunt and series capacitors, effect of shunt capacitors (Fixed and switched), Power factor correction, capacitor allocation - Economic justification - Procedure to determine the best capacitor location.

VOLTAGE CONTROL: Equipment for voltage control, effect of series capacitors, effect of AVB/AVR, line drop compensation.

TEXT BOOKS:

1. Turan Gonen (2007), *Electric Power Distribution system Engineering*, 5th edition, Tata McGraw Hill Book Company, New Delhi.
2. A.S. Pabla (2004), *Electric Power Distribution*, 5th edition, Tata McGraw Hill Education, New Delhi.

REFERENCE BOOKS:

1. S. Sivanagaraju, V. Sankar (2006), *Electrical Power Distribution and Automation*, 1st edition, Dhanpat Rai & Co, New Delhi, India.
2. S. Sivanagaraju, S. Satyanarayana (2008), *Electric Power Transmission and Distribution,* 1st edition, Pearson Education India, New Delhi.

B. Tech. EEE VIII SEMESTER

HIGH VOLTAGE DC TRANSMISSION AND FACTS

(Professional Elective - II)

Course Code: **A1238**

L	T	P	C
3	1	-	4

UNIT - I

HVDC CONCEPTS: Economics and Terminal equipment of HVDC transmission systems: Types of HVDC Links, Apparatus required for HVDC Systems. Comparison of AC &DC Transmission, Application of DC Transmission System, Planning & Modern trends in D.C. Transmission.

HVDC CONVERTERS & SYSTEM CONTROL: Choice of Converter configuration, analysis of Graetz, characteristics of 6 Pulse converters , Cases of two 3 phase converters in star –star mode and their performance. Principal of DC Link Control, Converters Control Characteristics, Firing angle control. Current and extinction angle control, Effect of source inductance on the system, Power Control.

UNIT - II

POWER FLOW ANALYSIS & REACTIVE POWER CONTROL IN HVDC: Modeling of DC Links-DC Network-DC Converter, Controller Equations-Solution of DC load flow. P.U. System for DC quantities-solution of AC-DC Power flow-Simultaneous method, Sequential method. Reactive Power Requirements in steady state, Conventional control strategies. Alternate control strategies, sources of reactive power, shunt capacitors Synchronous Condenser

CONVERTER FAULT & PROTECTION: Converter faults, protection against over current and over voltage in converter station. Surge arresters, smoothing reactors, DC breakers, Audible noise, space charge field, corona effects on DC lines-Radio interference.

UNIT - III

HARMONICS: Generation of Harmonics, Characteristics harmonics, calculation of AC Harmonics, Non- Characteristics harmonics, adverse effects of harmonics. Calculation of voltage & Current harmonics, Effect of Pulse number on harmonics.

FILTERS: Types of AC filters, Design of Single tuned filters. Design of High pass filters.

UNIT - IV

FACTS CONCEPTS: Transmission interconnections, power flow in an AC System, loading capability limits, Power flow and Dynamic stability considerations, importance of controllable parameters Opportunities for FACTS, basic types of FACTS controllers, benefits from FACTS controllers.

UNIT - V

STATIC SHUNT COMPENSATORS: Objectives of shunt compensation, mid point voltage regulation for line segmentation, End of line voltage support to prevent voltage instability, improvement of transient stability, Power oscillation damping. Methods of controllable var generation: variable impedance type static var generators TCR and TSR, TSC, FC-TCR, TSC-TCR

STATIC SERIES COMPENSATORS: Concept of series capacitive compensation, improvement of transient stability, power oscillation damping, functional requirements, GTO thyristor controlled series capacitor (GSC), thyristor switched series capacitor (TSSC), and thyristor controlled series capacitor (TCSC).

TEXT BOOKS:

1. K. R. Padiyar (2005), *HVDC Power Transmission Systems: Technology and system Interactions*, 1st edition, New Age International (P) Ltd, New Delhi.
2. N. G. Hingorani, L. Guygi (2001), *Understanding FACTS*, 1st edition, IEEE Press, USA.

REFERENCE BOOKS:

1. E. W. Kimbark (2006), *Direct Current Transmission*, 2nd edition, John Wiley & Sons, New Delhi.
2. K. R. Padiyar (2009), *FACTS Controllers in power Transmission and Distribution,* 1st edition, New Age International (P), Ltd, New Delhi.

B. Tech. EEE VIII SEMESTER

POWER QUALITY

(Professional Elective - II)

Course Code: **A1239**

L	T	P	C
3	1	-	4

UNIT - I

INTRODUCTION: Importance of power quality, terms and definitions of power quality as per IEEE std. 1159 such as transients, short and long duration voltage variations, interruptions, short and long voltage fluctuations, imbalance, flickers and transients. Symptoms of poor power quality: Definitions and terminology of grounding, Purpose of groundings, Good grounding practices and problems due to poor grounding.

UNIT - II

FLICKERS AND TRANSIENT VOLTAGES: RMS voltage variations in power system and voltage regulation per unit system, complex power. Principles of voltage regulation, Basic power flow and voltage drop, Various devices used for voltage regulation and impact of reactive power management. Various causes of voltage flicker and their effects, Short term and long term flickers. Various means to reduce flickers. Transient over voltages, sources, impulsive transients, switching transients, Effect of surge impedance and line termination, control of transient voltages.

UNIT - III

VOLTAGE SAG, SWELLS AND INTERRUPTIONS: Definitions of voltage sag and interruptions, Voltage sags versus interruptions. Economic impact of voltage sag, Major causes and consequences of voltage sags, Voltage sag characteristics, Voltage sag assessment. Influence of fault location and fault level on voltage sag, Areas of vulnerability.

LIMITS AND MEASURES FOR VOLTAGE SAG: Assessment of equipment sensitivity to voltage sags, Voltage sag limits for computer equipment, CBEMA, ITIC, SEMI F 42 curves. Representation of the results of voltage sags analysis, Voltage sag indices, Mitigation measures for voltage sags, such as UPS, DVR, SMEs, CVT etc., utility solutions and end user solutions.

UNIT - IV

WAVEFORM DISTORTION: Definition of harmonics, inter-harmonics, sub-harmonics. Causes and effect of harmonics, Voltage versus current distortion. Overview of Fourier analysis, Harmonic indices, A.C. quantities under non-sinusoidal conditions. Triplen harmonics, characteristics and non characteristics harmonics, harmonics series and parallel resonances, Consequences of harmonic resonance. Principles for controlling harmonics, Reducing harmonic currents in loads. K-rated transformer. Harmonic study procedure. Computer tools for harmonic analysis, Locating sources of harmonics, Harmonic filtering, passive and active filters. Modifying the system frequency response.

UNIT - V

POWER QUALITY MONITORING: Need of power quality monitoring and approaches followed in power quality monitoring. Power quality monitoring objectives and requirements. Initial site survey. Power quality Instrumentation. Selection of power quality monitors, selection of monitoring location and period. System wide and discrete power quality monitoring. Setting thresholds on monitors, data collection and analysis. Selection of transducers. Harmonic monitoring , Transient monitoring, event recording and flicker monitoring.

TEXT BOOKS:

1. M. H. J. Bollen (2000), *Understanding Power Quality Problems, voltage sag and interruptions,* 1st edition, IEEE Press, New Delhi.
2. Roger. C. Dugan, Mark. F. McGranagham, Surya Santoso, H. Wayne Beaty (2008), *Electrical Power Systems Quality,* 2nd edition, Tata McGraw Hill Publications, New Delhi.

REFERENCE BOOKS:

1. J. Arrillaga, M. R. Watson, S. Chan (2007), *Power system quality assessment,* 1st edition, John Wiley and sons, New Delhi.

B. Tech. EEE VIII SEMESTER

ADVANCED CONTROL SYSTEMS

(Professional Elective - II)

Course Code: **A1240**

L	T	P	C
3	1	-	4

UNIT - I

STATE SPACE ANALYSIS: State Space Representation, Solution of State Equation, State Transition Matrix, Canonical Forms: Controllable Canonical Form, Observable Canonical Form, Jordan Canonical Form.

UNIT - II

CONTROLLABILITY AND OBSERVABILITY: Tests for controllability and observability for continuous time systems, Time varying case, minimum energy control, time invariant case. Principle of Duality, Controllability and observability form Jordan canonical form and other canonical forms.

DESCRIBING FUNCTION ANALYSIS: Introduction to nonlinear systems, Types of nonlinearities, describing functions, describing function analysis of nonlinear control systems.

UNIT - III

PHASE-PLANE ANALYSIS: Introduction to phase-plane analysis, Method of Isoclines for Constructing Trajectories, singular points, phase-plane analysis of nonlinear control systems.

STABILITY ANALYSIS: Stability in the sense of Lyapunov. Lyapunov's stability and Lypanov's instability theorems. Direct method of Lypanov for the Linear and Nonlinear continuous time autonomous systems.

UNIT - IV

MODEL CONTROL: Effect of state feedback on controllability and observability, Design of State Feedback Control through Pole placement. Full order observer and reduced order observer.

CALCULUS OF VARIATIONS: Minimization of functionals of single function, constrained minimization. Minimum principle, Control variable inequality constraints. Control and state variable inequality constraints. Euler Lagrangine Equation.

UNIT - V

OPTIMAL CONTROL: Formulation of optimal control problem. Minimum time, Minimum energy, minimum fuel problems. State regulator problem. Output regulator problem. Tracking problem, Continuous-Time Linear Regulators.

TEXT BOOKS:

1. K. Ogata (2008), *Modern Control Engineering*, 4th edition, Prentice Hall of India Pvt. Ltd, New Delhi.
2. M. Gopal (2005), *Modern Control System Theory*, 2nd edition, New Age International Publishers, New Delhi.

REFERENCE BOOKS:

1. J. Nagrath, M. Gopal (2011), *Control Systems Engineering*, 5th edition, New Age International (P) Ltd, New Delhi.
2. M. Gopal (2009), *Digital Control and State Variable Method*, 3rd edition, Tata McGraw-Hill Companies, New Delhi.

B. Tech. EEE VIII SEMESTER

DYNAMICS OF ELECTRICAL MACHINES

(Professional Elective - II)

Course Code: **A1241**

L	T	P	C
3	1	-	4

UNIT - I

BASIC MACHINE THEORY: Electromechanical Analogy, Magnetic saturation, rotating field theory, operation of induction motor, equivalent circuit, steady state equations of DC machines. Operation of synchronous motor, power angle characteristics

UNIT - II

ELECTRO DYNAMICAL EQUATIONS AND THEIR SOLUTIONS: Spring and Plunger system, Rotation motion, mutually coupled coils. Lagrange's equations: Applications of Lagrange's equations, solution of electro dynamical equations.

UNIT - III

DYNAMICS OF DC GENERATORS: Separately excited DC generators, steady state analysis, and transient analysis.

DYNAMICS OF DC MOTORS: Separately excited DC motors, steady state analysis, transient analysis, Interconnection of machines, Ward Leonard system of speed control.

UNIT - IV

INDUCTION MACHINE DYNAMICS: Induction machine dynamics during starting and braking, accelerating time. Induction machine dynamics during normal operations, equation for dynamical response of the induction motor.

UNIT - V

SYNCHRONOUS MACHINE DYNAMICS: Electromechanical equation, motor operation, Generator operation, small oscillations, general equations for small oscillations. Representation of oscillation equations in a state variable form.

TEXT BOOKS:

1. D. P. Sen Gupta, J. W. Lynn (2008), *Electrical Machine Dynamics*, 1st edition, Macmillan Press Ltd, USA.
2. P. S. Bimbhra (2002), *Generalized theory of Electrical Machines*, 5th edition, Khanna Publishers, New Delhi.

REFERENCE BOOKS:

1. Vedam Subramanyam (2008), *Thyristor Control of Electric Drives*, 1st edition, Tata McGraw Hill Education, New Delhi.

B. Tech. EEE VIII SEMESTER

ADVANCED POWER SYSTEM PROTECTION

(Professional Elective - II)

Course Code: **A1242**

L	T	P	C
3	1	-	4

UNIT - I

INTRODUCTION TO PROTECTIVE RELAYS: Primary and back up protection, current transformers for protection, potential transformer, review of electromagnetic relays static relays. Over current relays time current characteristic, current setting time setting, directional relay, static over current relays.

UNIT - II

DISTANCE PROTECTION - I: Impedance, reactance, mho, angle impedance relays. Input quantities for various types of distance relays, effect of arc resistance on the performance of distance relays, selection of distance relays. MHO relay with blinders, quadrilateral relay, elliptical relay. Restricted mho, impedance directional, reactance relays. Swiveling characteristics.

UNIT - III

DISTANCE PROTECTION - II: Compensation for correct distance measurement, reduction of measuring units switched schemes. Pilot relaying schemes.

DISTANCE PROTECTION - III: Wire pilot protection, circulating current scheme, balanced voltage scheme, transley scheme, carrier current protection, phase comparison carrier current protection, carrier aided distance protection.

UNIT - IV

DIGITAL RELAYING TECHNIQUES: Digital relaying algorithms, differential equation technique, discrete Fourier transform technique, Walsh-Hadamard transform technique, rationalized Harr transform technique, removal of dc offset.

UNIT - V

MICROPROCESSOR BASED PROTECTIVE RELAYS: Over current, directional, impedance, reactance relays. Generalized mathematical expressions for distance relays, mho and offset mho relays, quadrilateral relay. Microprocessor implementation of digital distance relaying algorithms.

TEXT BOOKS:

1. Badri Ram, D. N. Vishwakarma (2007), *Power System Protection & Switchgear*, 1st edition, Tata McGraw Hill Publications, New Delhi.
2. T. S. Madhava Rao (2008), *Power System Protection Static Relays*, 2nd edition, Tata McGraw Hill Publications, New Delhi.

REFERENCE BOOKS:

1. B. Ravindra Nath, M. Chandra (2005), *Power System Protection & Switchgear*, 1st edition, New age International (P) Ltd, New Delhi.

B. Tech. EEE VIII SEMESTER

RELIABILITY ENGINEERING

(Professional Elective - III)

Course Code: **A1243**

L	T	P	C
3	1	-	4

UNIT - I

BASIC PROBABILITY THEORY: Rules for combining probability, Probability Distributions, Random variables, density and distribution functions. Mathematical expectation. Binominal distribution, Poisson distribution, normal distribution, exponential distribution, Weibull distribution.

UNIT - II

RELIABILITY: Definition of Reliability. Significance of the terms appearing in the definition. Component reliability, Hazard rate, derivation of the reliability function in terms of the Hazarad rate, Hazard models.

FAILURES: Causes of failures, types of failures, Modes of failure, Bath tub curve, Effect of preventive maintenance. Measures of reliability: mean time to failure and mean time between failures.

UNIT - III

CLASSIFICATION OF ENGINEERING SYSTEMS: Series, parallel, series-parallel, parallel-series and non-series-parallel configurations. Expressions for the reliability of the basic configurations.

RELIABILITY LOGIC DIAGRAMS: Reliability evaluation of Non-series-parallel configurations: minimal tie-set, minimal cut-set and decomposition methods. Deduction of the minimal cut sets from the minimal path sets.

UNIT - IV

DISCRETE MARKOV CHAINS: General modeling concepts, stochastic transitional probability matrix, time dependent probability evaluation and limiting state probability evaluation. Absorbing states.

CONTINUOUS MARKOV PROCESSES: Modeling concepts, State space diagrams, Stochastic Transitional Probability Matrix, Evaluating limiting state Probabilities. Reliability evaluation of repairable systems.

UNIT - V

SERIES SYSTEMS AND PARALLEL SYSTEM: Series systems, parallel systems with two and more than two components, Network reduction techniques. Minimal cut set/failure mode approach.

TEXT BOOKS:

1. Roy Billinton, Ronald. N. Allan (2009), *Reliability Evaluation of Engineering Systems*, 4th edition, Plenum Press, New York, USA.
2. Hoang Pham (2003), *Handbook of Reliability Engineering,* 1st edition, Springer Verlag, New York.

REFERENCE BOOKS:

1. Charles E. Ebeling (2010), *An Introduction to Reliability and Maintainability Engineering*, 3rd edition, Tata McGraw Hill Edition, New Delhi.

B. Tech. EEE VIII SEMESTER

DIGITAL CONTROL SYSTEMS

(Professional Elective - III)

Course Code: **A1244**

L	T	P	C
3	1	-	4

UNIT - I

SAMPLING AND RECONSTRUCTION: Introduction, Examples of Data control systems, Digital to Analog conversion and Analog to Digital conversion, sample and hold operations.

UNIT - II

THE Z - TRANSFORMS: Introduction, Linear difference equations, pulse response, Z - transforms, Theorems of Z - Transforms, the inverse Z - transforms, Modified Z – Transforms.

Z - PLANE ANALYSIS OF DISCRETE - TIME CONTROL SYSTEM: Z - Transform method for solving difference equations, Pulse transforms function, block diagram analysis of sampled data systems, mapping between S - plane and Z - plane.

UNIT - III

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

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

UNIT - IV

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

UNIT - V

DESIGN OF DISCRETE TIME CONTROL SYSTEM BY CONVENTIONAL METHODS: Transient and steady state response Analysis, Design based on the frequency response method, Bilinear Transformation and Design procedure in the W - plane, Lead, Lag and Lead - Lag compensators and digital PID controllers.

STATE FEEDBACK CONTROLLERS AND OBSERVERS: Design of state feedback controller through pole placement, Necessary and sufficient conditions, Ackerman's formula. State Observers – Full order and Reduced order observers.

TEXT BOOKS:

1. K. Ogata (2011), *Discrete-Time Control systems*, 2nd edition, Pearson Education / Prentice Hall of India, New Delhi.
2. Kuo (2003), *Digital Control Systems*, 2nd edition, Oxford University Press, New Delhi.

REFERENCE BOOKS:

1. M. Gopal (2009), *Digital Control and State Variable Methods*, 3rd edition, Tata McGraw Hill Publications, New Delhi.

B. Tech. EEE VIII SEMESTER

EXTRA HIGH VOLTAGE AC TRANSMISSION

(Professional Elective - III)

Course Code: **A1245**

L	T	P	C
3	1	-	4

UNIT - I

PRELIMINARIES: Necessity of EHV AC transmission, advantages and problems. Power handling capacity and line losses- mechanical considerations, resistance of conductors, properties of bundled conductors, bundle spacing and bundle radius with examples.

LINE AND GROUND REACTIVE PARAMETERS: Line inductance and capacitances, sequence inductances and capacitances, modes of propagation, ground return with examples.

UNIT - II

VOLTAGE GRADIENTS OF CONDUCTORS: Electrostatics: field of sphere gap, field of line changes and properties. Charge , potential relations for multi-conductors, surface voltage gradient on conductors. Distribution of voltage gradient on sub-conductors of bundle with examples.

UNIT - III

CORONA EFFECTS - I: Power loss and audible noise (AN): corona loss formulae, charge voltage diagram, generation, characteristics and limits. Measurements of AN, relation between 1-phase and 3-phase AN levels with examples.

CORONA EFFECTS - II: Radio interference (RI) : corona pulses generation, properties, limits. Frequency spectrum, modes of propagation, excitation function, measurement of RI, RIV and excitation functions with examples.

UNIT - IV

ELECTRO STATIC FIELD: Electrostatic field: calculation of electrostatic field of EHV/AC lines, effect on humans, animals and plants , electrostatic induction in un energized circuit of double-circuit line, electromagnetic interference with examples.

TRAVELING WAVE THEORY: Traveling wave expression and solution, source of excitation, terminal conditions. Open circuited and short-circuited end, reflection and refraction coefficients. Lumped parameters of distributed lines-generalized constants, No load voltage conditions and charging current.

UNIT - V

VOLTAGE CONTROL: Power circle diagram and its use, voltage control using synchronous condensers. Cascade connection of shunt and series compensation. Sub synchronous resonance in series capacitor, compensated lines, static VAR compensating system.

TEXT BOOKS:

1. Rakosh Das Begamudre (2011), *Extra High Voltage AC Transmission Engineering*, 4th edition, New Age International (P) Ltd, New Delhi.

REFERENCE BOOKS:

1. S. Rao (2009), *EHVAC - HVDC transmission and Distribution Engineering*, 3rd edition, Khanna Publishers, New Delhi, India.

B. Tech. EEE VIII SEMESTER

MACHINE MODELLING AND ANALYSIS

(Professional Elective - III)

Course Code: **A1246**

L	T	P	C
3	1	-	4

UNIT - I

BASIC TWO POLE MACHINE: Basic Two-pole DC machine - primitive 2-axis machine - Voltage and Current relationship - Torque equation.

UNIT - II

MODELLING AND ANALYSIS OF DC MACHINES: Mathematical model of separately excited DC motor and DC Series motor in state variable form - Transfer function of the motor - Numerical problems. Mathematical model of D.C. shunt motor and D.C. Compound motor in state variable form - Transfer function of the motor - Numerical Problems.

UNIT - III

TRANSFORMATIONS: Linear transformation - Phase transformation (a, b, c to a, p, o) - Active transformation (a, p, o to d, q).

MODELLING OF THREE PHASE INDUCTION MACHINES: Circuit model of a 3 - pahse Induction motor, linear transformation, Phase Transformation, Transformation to a Reference frame, two axis models for Induction motor.

UNIT - IV

REFERENCE FRAME THEORY: Voltage and current Equations in stator reference frame - Equation in Rotor reference frame - Equations in a synchronously rotating frame - Torque equation-Equations in state-space form.

UNIT - V

MODELLING OF SYNCHRONOUS MACHINE: Circuit model of a 3ph Synchronous motor - Two axis representation of Syn. Motor. Voltage and current Equations in state - space variable form - Torque equation.

TEXT BOOKS:

1. P. S. Bimbhra (2002), *Generalized Theory of Electrical Machines,* 5th edition, Khanna Publishers, New Delhi.
2. Vedam Subramanyam (2008), *Thyristor control of Electric Drives*, 1st Edition, Tata McGraw Hill Education, New Delhi.

REFERENCE BOOKS:

1. Paul C. Krause, Oleg wasynezuk, Scott D. Sudhoff (2002), *Analysis of Electric Machinery and Drive Systems*, 2nd Edition, Wiley Publishers, New Delhi.

B. Tech. EEE VIII SEMESTER

SOLAR ENERGY AND ITS APPLICATIONS

(Professional Elective - III)

Course Code: **A1247**

L	T	P	C
3	1	-	4

UNIT - I

PRINCIPLES OF SOLAR RADIATION: Role and potential of new and renewable source, the solar energy option, Environmental impact of solar power, physics of the sun, the solar constant, extraterrestrial and terrestrial solar radiation, solar radiation on titled surface, instruments for measuring solar radiation and Sun shine, solar radiation data.

UNIT - II

SOLAR ENERGY COLLECTION, STORAGE AND APPLICATIONS: Flat plate and concentrating collectors, classification of concentrating collectors, orientation and thermal analysis, advanced collectors. Different methods of solar energy storage, Sensible, latent heat and stratified storage, solar ponds. Solar Applications- solar heating /cooling technique, solar distillation and drying.

UNIT - III

PHOTO VOLTAICS (PV): Fundamentals of solar cells, types of solar cells, semiconducting materials, band gap theory, absorption of photons, excitations and photo emission of electrons, band engineering.

PV CELL PROPERTIES: Solar cell properties and design, p-n junction photodiodes, depletion region, electrostatic field across the depletion layer, electron and holes transports, device physics, charge carrier generation, recombination and other losses, I-V characteristics, output power.

UNIT - IV

SOLAR CELL APPLICATIONS: PV cell interconnection, module structure and module fabrication, Equivalent circuits, load matching, efficiency, fill factor and optimization for maximum power, Design of stand-alone PV systems, system sizing, device structures, device construction, DC to AC conversion, inverters, on-site storage and grid connections.

UNIT - V

COST ANALYSIS AND ENVIRONMENTAL ISSUES: Cost analysis and pay back calculations for different types of solar panels and collectors, installation and operating costs, Environmental and safety issues, protection systems, performance monitoring.

TEXT BOOKS:

1. G. D. Rai (2009), *Non-Conventional Energy Sources*, 4th edition, Khanna Publishers, New Delhi.
2. Martin A. Green (2008), *Solar Cells: Operating Principles, Technology and system Applications*, 1st edition, Prentice Hall, New Delhi.

REFERENCES BOOKS:

1. Sukatme (2008), *Solar Energy*, 3rd Edition, McGraw Hill Companies, New Delhi.
2. D. Yogi gosuami, Frank Kreith, Jan F. Kreider (2000), *Principles of Solar Engineering*, 2nd edition, Taylor & Francis, USA.

B. Tech. EEE VIII SEMESTER

PROGRAMMABLE LOGIC CONTROLLERS

(Professional Elective - III)

Course Code: **A1248**

L	T	P	C
3	1	-	4

UNIT - I

PLC BASICS: PLC system, I/O modules and interfacing, CPU processor, programming Equipment, programming formats, construction of PLC ladder diagrams, Devices connected to I/O modules.

UNIT - II

PLC PROGRAMMING: Input instructions, outputs, operational procedures, programming examples using contacts and coils. Drill press operation.

LADDER DIAGRAMS: Digital logic gates, programming in the Boolean algebra system, conversion examples
Ladder Diagrams for process control: Ladder diagrams & sequence listings, ladder diagram construction and flowchart for spray process system.

UNIT - III

PLC RESISTERS: Characteristics of Registers, module addressing, holding registers, Input Registers, Output Registers.

PLC FUNCTIONS: Timer functions and Industrial applications, counters, counter function industrial applications, Arithmetic functions, Number comparison functions, number conversion functions.

UNIT - IV

DATA HANDLING FUNCTIONS: SKIP, Master control Relay, Jump, Move, FIFO, FAL, ONS, CLR & Sweep functions and their applications. Bit Pattern and changing a bit shift register, sequence functions and applications, controlling of two-axis and three axis Robots with PLC, Matrix functions.

UNIT - V

ANALOG PLC OPERATION: Analog modules& systems, Analog signal processing, Multi bit Data Processing, Analog output Application Examples, PID principles, positions indicator with PID control, PID Modules, PID tuning, PID functions.

TEXT BOOKS:

1. John W. Webb, Ronald A. Reiss (2008), *Programmable Logic Controllers - Principles and Applications*, 5th edition, Prentice Hall of India, New Delhi.

REFERENCES BOOKS:

1. J. R. Hackworth, F. D. Hackworth (2004), *Programmable Logic Controllers - Programming Method and Applications*, 1st edition, Pearson Education, New Delhi.

B. Tech. EEE VIII SEMESTER

POWER SYSTEMS AND SIMULATION LAB - II

Course Code: **A1249**

L	T	P	C
-	-	6	2

LIST OF EXPERIMENTS:

1. Determination of breakdown strength of oil by variable distance electrodes.
2. Determination of earth resistance under various conditions.
3. Mille Volt Drop Test.
4. Breakdown characteristic of Sphere air gap (100mm Sphere gap).
5. Breakdown characteristic of Plane Rod gap.
6. Breakdown Voltage of PIN Insulator & Measurement of Leakage Current.
7. MATLAB Program for optimum loading of Generation.
8. MATLAB Program for building of Z_{bus} algorithm by addition of branch or link.
9. PSCAD Simulation of transient stability of multimachine system.
10. PSCAD Simulation of Lightning strikes, faults or breaker operations.
11. PSCAD Simulation of Insulation coordination of transformers, breakers and arrestors.
12. PSCAD Simulation of Impulse testing of transformers.

B. Tech. EEE VIII SEMESTER

TECHNICAL SEMINAR

Course Code: **A1250**

L	T	P	C
-	-	6	2

1. OBJECTIVE:

Seminar is an important component of learning in an Engineering College, where the student gets acquainted with preparing a report & presentation on a topic.

2. **PERIODICITY / FREQUENCY OF EVALUATION: Twice**

3. PARAMETERS OF EVALUATION:

1. The seminar shall have two components, one chosen by the student from the course-work without repetition and approved by the faculty supervisor. The other component is suggested by the supervisor and can be a reproduction of the concept in any standard research paper or an extension of concept from earlier course work.
2. The two components of the seminar are distributed between two halves of the semester and are evaluated for 50 marks each. The average of the two components shall be taken as the final score.
3. The students shall be required to submit the rough drafts of the seminar outputs within one week of the commencement of the class work.
4. Supervisor shall make suggestions for modification in the rough draft. The final draft shall be presented by the student within a week thereafter.
5. Presentation schedules will be prepared by different Departments in line with the academic calendar.

The Seminars shall be evaluated in two stages as follows:

A. Rough draft

In this stage, the student should collect information from various sources on the topic and collate them in a systematic manner. He/ She may take the help of the concerned supervisor.

The report should be typed in “MS-Word” file with “calibri” font, with font size of 16 for main heading, 14 for sub-headings and 11 for the body text. The contents should also be arranged in Power Point Presentation with relevant diagrams, pictures and illustrations. It should normally contain 18 to 25 slides, consisting of the followings:

1.	Topic, name of the student & guide	1 Slide
2.	List of contents	1 Slide
3.	Introduction	1 - 2 Slides
4.	Descriptions of the topic (point-wise)	7 - 10 Slides
5.	Images, circuits etc.	6 - 8 Slides
6.	Conclusion	1 - 2 Slides
7.	References/Bibliography	1 Slide

The soft copy of the rough draft of the seminar presentation in MS Power Point format along with the draft Report should be submitted to the concerned supervisor, with a copy to the concerned HOD within 30 days of the commencement of class work.

The evaluation of the Rough draft shall generally be based upon the following.

1.	Punctuality in submission of rough draft and discussion	2 Marks
2.	Resources from which the seminar have been based	2 Marks
3.	Report	3 Marks
4.	Lay out, and content of Presentation	3 Marks
5.	Depth of the students knowledge in the subject	5 Marks
Total		15 Marks

After evaluation of the first draft the supervisor shall suggest further reading, additional work and fine tuning, to improve the quality of the seminar work.

Within 7 days of the submission of the rough draft, the students are to submit the final draft incorporating the suggestions made by the supervisor.

B. Presentation:

After finalization of the final draft, the students shall be allotted dates for presentation (in the designated seminar classes) and they shall then present it in presence students, supervisor, faculties of the department and at least one faculty from some department / other department.

The student shall submit 3 copies of the Report neatly bound along with 2 soft copies of the PPT in DVD medium. The students shall also distribute the title and abstract of the seminar in hard copy to the audience. The final presentation has to be delivered with 18-25 slides.

The evaluation of the Presentation shall generally be based upon the following.

1.	Contents	10 Marks
2.	Delivery	10 Marks
3.	Relevance and interest the topic creates	5 Marks
4.	Ability to involve the spectators	5 Marks
5.	Question answer session	5 Marks
Total		35 Marks

4. WHO WILL EVALUATE?

The presentation of the seminar topics shall be made before an internal evaluation committee comprising the Head of the Department or his/her nominee, seminar supervisor and a senior faculty of the department / other department.

B. Tech. EEE VIII SEMESTER

COMPREHENSIVE VIVA

Course Code: **A1251**

L	T	P	C
-	-	-	2

1. OBJECTIVE:

- To enable the examiners to assess the candidate's knowledge in his or her particular field of learning.
- To test the student's awareness of the latest developments and relate them to the knowledge acquired during the classroom teaching.

2. PARAMETERS OF EVALUATION:

Subject Knowledge	Current Awareness	Career Orientation	Communication Skills	Total
20	10	10	10	50

3. WHO WILL EVALUATE?

The comprehensive Viva will be conducted by a committee comprising Head of the Department or his/her nominee, two senior faculty of the respective department and an external examiner from outside the college. The comprehensive viva shall be evaluated for 50 marks at the end of VIII semester. A minimum of 40% of maximum marks shall be obtained to earn the corresponding credits.

4. **PERIODICITY / FREQUENCY OF EVALUATION: Once**

5. PEDAGOGY:

- The viva will be held on a face to face basis.
- The students will be expected to answer the questions related to latest developments and all courses taken till date.
- Viva voce will be conducted within week before the beginning of midterm examinations. However, in exceptional circumstances it can be scheduled immediately after the end of midterm examinations.
- Students will have to make themselves available on the date of the viva voce.

B. Tech. EEE VIII SEMESTER

MINI PROJECT / PROJECT WORK

Course Code: **A1252/ A1235**

L	T	P	C
-	-	12	8

1. OBJECTIVE:

The main objective of the Project Work is for the students to learn and experience all the major phases and processes involved in solving "real life engineering problems".

2. EXPECTED OUTCOME:

The major outcome of the B. Tech project must be well-trained students. More specifically students must have acquired:

- System integration skills
- Documentation skills
- Project management skills
- Problem solving skills

3. PROJECT SELECTION:

Projects are suggested by the faculty, with or without collaboration with an industry. All faculty are to suggest projects. Students are also encouraged to give project proposals after identifying a faculty who would be willing to supervisor the work. A Project brief is to be given by the faculty to the group defining the project comprehensively.

All B. Tech major projects are to be done in the Institute. For industry specified projects, students will be permitted to spend 1-2 weeks in the industry on recommendation by the supervisor. The number of students per batch should be between 2 and 4. If more number of students is really needed, the project may be split into functional modules and given to subgroups.

4. WHO WILL EVALUATE?

The end semester examination shall be based on the report submitted and a viva-voce exam for 150 marks by committee comprising of the Head of the Department, project supervisor and an external examiner.

5. EVALUATION:

The basic purpose is to assess the student competencies with regard to his project work. More specifically to assess the student's individual contribution to the project, to establish the level of understanding of basic theoretical knowledge relevant to the project and to ensure that the student has good understanding and appreciation of design and development decisions taken in the course of the project. It is desirable that all faculty members are present for the evaluations as this is a platform to get to know the student projects and to motivate the students to do good projects. The faculty should adopt a clear and consistent pattern of asking questions from general to specific aspects of the project. The presentation and evaluation is open to other students of the department.

The project work shall be evaluated for 200 marks out of which 50 marks for internal evaluation and 150 marks for end-semester evaluation. The evaluation shall be done on the following basis

Semester VII	**Semester VIII**
Preliminary Evaluation - 10 marks	Design Evaluation II - 25 marks
Design Evaluation I - 15 marks	Final Evaluation – 150 marks

6. GUIDELINES FOR THE PREPARATION OF B. TECH PROJECT REPORTS

1.1. Project reports should be typed neatly only on one side of the paper with 1.5 or double line spacing on a A4 size bond paper (210 x 297 mm). The margins should be: Left - 1.25", Right - 1", Top and Bottom - 0.75".

1.2. The total number of reports to be prepared are:

- One copy to the department
- One copy to the concerned guide(s)
- One copy to the candidate.

1.3. Before taking the final printout, the approval of the concerned guide(s) is mandatory and suggested corrections, if any, must be incorporated.

1.4. For making copies dry tone Xerox is suggested.

1.5. Every copy of the report must contain

- Inner title page (White)
- Outer title page with a plastic cover
- Certificate in the format enclosed both from the college and the organization where the project is carried out.
- An abstract (synopsis) not exceeding 100 words, indicating salient features of the work.

6.6. The organization of the report should be as follows:

1. 2. 3. 4. 5.	Inner title page Abstract or Synopsis Acknowledgments Table of Contents List of table & figures (optional)	Usually numbered in roman

6.7 Chapters (to be numbered) containing Introduction, which usually specifies the scope of work and its importance and relation to previous work and the present developments, Main body of the report divided appropriately into chapters, sections and subsections.

- The chapters, sections and subsections may be numbered in the decimal form for e.g. Chapter 2, sections as 2.1, 2.2 etc., and subsections as 2.2.3, 2.5.1 etc.
- The report should be typed in "MS-Word" file with "calibri" font. The chapter must be left or right justified (font size 16). Followed by the title of chapter centered (font size 18), section/subsection numbers along with their headings must be left justified with section number and its heading in font size 16 and subsection and its heading in font size 14. The body or the text of the report should have font size 11.
- The figures and tables must be numbered chapter wise for e.g.: Fig. 2.1 Block diagram of a serial binary adder, Table 3.1 Primitive flow table, etc.
- The last chapter should contain the summary of the work carried, contributions if any, their utility along with the scope for further work.

6.8. Reference OR Bibliography: The references should be **numbered serially** in the order of their occurrence in the text and their numbers should be indicated within square brackets for e.g. [3]. The section on references should list them in serial order in the following format.

1. For textbooks - A.V. Oppenheim and R.W. Schafer, Digital Signal Processing, Englewood, N.J., Prentice Hall, 3 Edition, 1975.
2. For papers - Devid, Insulation design to combat pollution problem, Proc of IEEE, PAS, Vol 71, Aug 1981, pp 1901-1907.

6.9. Only SI units are to be used in the report. Important equations must be numbered in decimal form for e.g. **V = IZ** ..... **(3.2)**

6.10. All equation numbers should be right justified.

6.11. The project report should be brief and include descriptions of work carried out by others only to the minimum extent necessary. Verbatim reproduction of material available elsewhere should be strictly avoided. Where short excerpts from published work are desired to be included, they should be within quotation marks appropriately referenced.

6.12. Proper attention is to be paid not only to the technical contents but also to the organization of the report and clarity of the expression. Due care should be taken to avoid spelling and typing errors. The student should note that report-write-up forms the important component in the overall evaluation of the project

6.13. Hardware projects must include: the component layout, complete circuit with the component list containing the name of the component, numbers used, etc. and the main component data sheets as Appendix. At the time of report submissions, the students must hand over a copy of these details to the project coordinator and see that they are entered in proper registers maintained in the department.

6.14. Software projects must include a virus free disc, containing the software developed by them along with the read me file. Read me file should contain the details of the variables used, salient features of the software and procedure of using them: compiling procedure, details of the computer hardware/software requirements to run the same, etc. If the developed software uses any public domain software downloaded from some site, then the address of the site along with the module name etc. must be included on a separate sheet. It must be properly acknowledged in the acknowledgments.

6.15. Sponsored Projects must also satisfy the above requirements along with statement of accounts, bills for the same dully attested by the concerned guides to process further, They must also produce NOC from the concerned guide before taking the internal viva examination.

6.16. The reports submitted to the department/guide(s) must be hard bounded, with a plastic covering.

6.17. Separator sheets, used if any, between chapters, should be of thin paper

VARDHAMAN COLLEGE OF ENGINEERING

(Autonomous)

Shamshabad – 501 218, Hyderabad

Department of ……..

CERTIFICATE

Certified that the project work entitled …….. carried out by Mr./Ms. ……., Roll Number ……, a bonafide student of ……in partial fulfillment for the award of **Bachelor of Technology** in …… of the Jawaharlal Nehru Technological University, Hyderabad during the year …….. It is certified that all corrections / suggestions indicated for Internal Assessment have been incorporated in the Report deposited in the departmental library. The project report has been approved as it satisfies the academic requirements in respect of Project work prescribed for the said Degree.

Name & Signature of the Guide **Name Signature of the HOD** **Signature of the Principal**

External Viva

Name of the examiners Signature with date

1.

2.

Certificate issued at the Organization where the project was carried out

(On a separate sheet, If applicable)

NAME OF THE INDUSTRY / ORGANIZATION, Address with pin code

CERTIFICATE

Certified that the project work entitled …….. carried out by Mr./Ms . ……., Roll Number……, a bonafide student of ……in partial fulfillment for the award of **Bachelor of Technology** in …… of the Jawaharlal Nehru Technological University, Hyderabad during the year …….. It is certified that, he/she has completed the project satisfactorily

Name & Signature of the Guide **Name & Signature of the Head of Organization**

7. **DISTRIBUTION OF MARKS FOR B.TECH DISSERTATION EVALUATION**

S No.	Particulars	Max. Marks
1	Relevance of the subject in the present context	**10**
2	Literature Survey	**10**
3	Problem formulation	**20**
4	Experimental observation / theoretical modeling	**10**
5	Results – Presentation & Discussion	**20**
6	Conclusions and scope for future work	**10**
7	Overall presentation of the Thesis / Oral presentation	**40**
8	Project Report Writing	**30**
Total Marks		**150**

MALPRACTICES RULES
DISCIPLINARY ACTION FOR / IMPROPER CONDUCT IN EXAMINATIONS

	Nature of Malpractices/Improper conduct	Punishment
	If the candidate:	
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 subject 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 subject of the examination)	Expulsion from the examination hall and cancellation of the performance in that subject 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 subject 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 subject of the examination (theory or practical) in which the candidate is appearing.	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted to appear for the remaining examinations of the subjects of that Semester/year. The Hall Ticket of the candidate is to be cancelled and sent to the University.
3.	Impersonates any other candidate in connection with the examination.	The candidate who has impersonated shall be expelled from examination hall. The candidate is also debarred and forfeits the seat. The performance of the original candidate, who has been impersonated, shall be cancelled in all the subjects of the examination (including practicals and project work) already appeared and shall not be allowed to appear for examinations of the remaining subjects of that semester/year. The candidate is also debarred for two consecutive semesters from class work and all University examinations. The continuation of the course by the candidate is 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.
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 subject and all the other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred for two consecutive semesters from class work and all University examinations. The continuation of the course by the candidate is 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 subject.
6.	Refuses to obey the orders of the Chief Superintendent/Assistant – Superintendent / any officer on duty or misbehaves or creates disturbance of any kind in and around the examination hall or organizes a walk out or instigates others to walk out, or threatens the officer-in charge or any person on duty in or outside the examination hall of any injury to his person or to any of his relations whether by words, either spoken or	In case of students of the college, they shall be expelled from examination halls and cancellation of their performance in that subject and all other subjects the candidate(s) has (have) already appeared and shall not be permitted to appear for the remaining examinations of the subjects of that semester/year. The candidates also are debarred and forfeit their seats. In case of outsiders, they will be handed over to

	written or by signs or by visible representation, assaults the officer-in-charge, or any person on duty in or outside the examination hall or any of his relations, or indulges in any other act of misconduct or mischief which result in damage to or destruction of property in the examination hall or any part of the College campus or engages in any other act which in the opinion of the officer on duty amounts to use of unfair means or misconduct or has the tendency to disrupt the orderly conduct of the examination.	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 subject and all the other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred for two consecutive semesters from class work and all University examinations. The continuation of the course by the candidate is 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 subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred and forfeits the seat.
9.	If student of the college, who is not a candidate for the particular examination or any person not connected with the college indulges in any malpractice or improper conduct mentioned in clause 6 to 8.	Student of the colleges expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred and forfeits the seat. Person(s) who do not belong to the College will be handed over to police and, a police case will be registered against them.
10.	Comes in a drunken condition to the examination hall.	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year.
11.	Copying detected on the basis of internal evidence, such as, during valuation or during special scrutiny.	Cancellation of the performance in that subject and all other subjects the candidate has appeared including practical examinations and project work of that semester/year examinations.
12.	If any malpractice is detected which is not covered in the above clauses 1 to 11 shall be reported to the University for further action to award suitable punishment.	

Frequently asked Questions and Answers about autonomy

1. Who grants Autonomy? UGC, Govt., AICTE or University

In case of Colleges affiliated to a university and where statutes for grant of autonomy are ready, it is the respective University that finally grants autonomy.

2. Shall VCE award its own Degrees?

No. Degree will be awarded by Jawaharlal Nehru Technological University, Hyderabad with a mention of the name Vardhaman College of Engineering on the Degree Certificate.

3. What is the difference between a Deemed University and an Autonomy College?

A Deemed University is fully autonomous to the extent of awarding its own Degree. A Deemed University is usually a Non-Affiliating version of a University and has similar responsibilities like any University. An Autonomous College enjoys Academic Autonomy alone. The University to which an autonomous college is affiliated will have checks on the performance of the autonomous college.

4. How will the Foreign Universities or other stake – holders know that we are an Autonomous College?

Autonomous status, once declared, shall be accepted by all the stake holders. Foreign Universities and Indian Industries will know our status through our college website.

5. What is the change of Status for Students and Teachers if we become Autonomous?

An autonomous college carries a prestigious image. Autonomy is actually earned out of continued past efforts on academic performances, capability of self-governance and the kind of quality education we offer.

6. Who will check whether the academic standard is maintained / improved after Autonomy? How will it be checked?

There is a built in mechanism in the autonomous working for this purpose. An Internal Committee called Academic Programme Evaluation Committee is a Non – Statutory body, which will keep a watch on the academics and keep its reports and recommendations every year. In addition to Academic Council, the highest academic body also supervises the academic matters. At the end of three years, there is an external inspection by the University for this purpose. The standards of our question papers, the regularity of academic calendar, attendance of students, speed and transparency of result declaration and such other parameters are involved in this process.

7. Will the students of VCE as an Autonomous College qualify for University Medals and Prizes for academic excellence?

No. VCE has instituted its own awards, medals, etc. for the academic performance of the students. However for all other events like sports, cultural and co-curricular organized by the University the students shall qualify.

8. Can VCE have its own Convocation?

No, since the University awards the Degree the Convocation will be that of the University.

9. Can VCE give a provisional degree certificate?

Since the examinations are conducted by VCE and the results are also declared by VCE, the college sends a list of successful candidates with their final percentage of marks to the University. Therefore with the prior permission of the University the college will be entitled to give the provisional certificate.

10. Will Academic Autonomy make a positive impact on the Placements or Employability?

Certainly. The number of students qualifying for placement interviews is expected to improve, due to rigorous and repetitive classroom teaching and continuous assessment, besides the autonomous status is more responsive to the needs of the industry. As a result, there will be a lot of scope for

industry oriented skill development built-in into the system. The graduates from an autonomous college will therefore represent better employability.

11. What is the proportion of Internal and External Assessment as an Autonomous College?

Presently, it is 25 % for internal assessment and 75 % for external assessment. As the autonomy matures the internal assessment component shall be increased at the cost of external assessment.

12. Will there be any Revaluation or Re-Examination System?

No. There will not be any Revaluation system or Re-examination. But, there is a personal verification of the answer scripts.

13. How fast Syllabi can be and should be changed?

Autonomy allows us the freedom to change the syllabi as often as we need.

14. Will the Degree be awarded on the basis of only final year performance?

No. The percentage of marks will reflect the average performance of all the semesters put together.

15. Who takes Decisions on Academic matters?

The Academic Council of College is the top academic body and is responsible for all the academic decisions. Many decisions are also taken at the lower level like the BOS which are like Boards of Studies of the University.

16. What is the role of Examination committee?

The Exam Committee is responsible for the smooth conduct of inter and external examinations. All matters involving the conduct of examinations, spot valuations, tabulations, preparation of Memorandum of Marks etc fall within the duties of the Examination Committee.

17. Is there any mechanism for Grievance Redressal?

Yes, the college has grievance redressal committee, headed by a senior faculty member of the college.

18. How many attempts are permitted for obtaining a Degree?

All such matters are defined in Rules & Regulations.

19. Who declares the result?

The result declaration process is also defined. After tabulation work the entire result is reviewed by the Moderation Committee. Any unusual deviations or gross level discrepancies are deliberated and removed. The entire result is discussed in the College Academic Council for its approval. The result is then declared on the college notice boards as well put on the web site of the college. It is eventually sent to the University.

20. What is our relationship with the Jawaharlal Nehru Technological University, Hyderabad?

We remain an affiliated college of the Jawaharlal Nehru Technological University, Hyderabad. The University has the right to nominate its members on the academic bodies of the college.

21. Shall we require University approval if we want to start any New Courses?

Yes, It is expected that approvals or such other matters from an autonomous college will receive priority.

22. Shall we get autonomy for PG and Doctoral Programmes also?

Yes, presently our PG programmes are also enjoying autonomous status.

23. How many exams will be there as an autonomous college?

This is defined in the Rules & Regulations.