VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

Affiliated to JNTUH, Approved by AICTE, Accredited by NAAC and ISO 9001:2008 Certified

Shamshabad - 501 218, Hyderabad, Telangana State, India.

www.vardhaman.org

BACHELOR OF TECHNOLOGY

ELECTRICAL AND ELECTRONICS ENGINEERING

(Accredited by NBA)

ACADEMIC REGULATIONS
COURSE STRUCTURE (VCE-R15)

CHOICE BASED CREDIT SYSTEM

B. Tech. - Regular Four Year Degree Program
(For batches admitted from the Academic Year 2015 - 2016)
&
B. Tech. - Lateral Entry Scheme
(For batches admitted from the Academic Year 2016 - 2017)

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PRELIMINARY DEFINITIONS AND NOMENCLATURES

- "Autonomous Institution / College" means an institution / college designated as autonomous institute / college by University Grants Commission (UGC), as per the UGC Autonomous College Statutes.

- "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" means 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, A4001: Linear Algebra and Ordinary Differential Equations, A4501: Programming for Problem Solving, etc. The description of allocation of course code is mentioned in the table 1.

Table 1: Course Code Description

First Digit	Second Digit	Third Digit	Fourth and Fifth Digits
Indicates Program	**Indicates Regulation**	**Indicates Department**	**Indicates Course Number**
A : B. Tech. **B** : M. Tech. **C** : MBA	**1** : R11 **2** : R14 **3** : R15	**0**: H&S/MBA **1** : Civil **2** : EEE **3** : MECH **4** : ECE **5**: CSE **6** : IT	**01** **02** .. ..

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

FOREWORD

The autonomy conferred on Vardhaman College of Engineering by UGC 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 norms set by the monitoring bodies like UGC and AICTE. It reflects the confidence of the UGC 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 Board of Studies are constituted under the guidance of the Governing Body of the College and recommendations of the JNTUH to frame the regulations, course structure and syllabi under autonomous status.

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

All the faculty, parents and students are requested to go through all the rules and regulations carefully. Any clarifications, if 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

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Vision:

To be a pioneer institute and leader in engineering education to address societal needs through education and practice.

Mission:

- To adopt innovative student centric learning methods.
- To enhance professional and entrepreneurial skills through industry institute interaction.
- To train the students to meet dynamic needs of the society.
- To promote research and continuing education.

Quality Policy:

We at Vardhaman College of Engineering, endeavour to uphold excellence in all spheres by adopting best practices in effort and effect.

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DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

Department Vision:

Producing professionally competent graduates in the domain of Electrical Engineering to serve the industry/society addressing the challenges

Department Mission:

- Provide professional skills in electrical circuit design and simulation to the students.
- Develop industry institute interface for collaborative research, internship and entrepreneurial skills among the stakeholders(Faculty and Students).
- Bringing awareness among the students with emerging technologies to meet the dynamic needs of the society
- Encourage multi-disciplinary activities through research and continuous learning activities

Program Educational Objectives (PEOs)

PEO – I: Graduates will excel to make way to give solutions to real time problems through technical knowledge and operational skills in the field of Electrical Engineering

PEO – II: Graduates will demonstrate their ability to acquaint with the ongoing trends in the field of Electrical Engineering to address the needs of the society.

PEO - III : Graduates will communicate effectively as team players to cope with, building a Prospective career.

PEO - IV: Graduates of the program will act with Integrity and have inter-personal skills in catering the needbased requirements blended with ethics and professionalism.

Program Outcomes (POs):

PO1: **Engineering Knowledge:**Apply knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems**.**

PO2: **Problem Analysis:**Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences and engineering sciences**.**

PO3: **Design/ Development of Solutions:** Design solutions for complex engineering problems and design system components or processes that meet specified needs with appropriate consideration for the public health and safety, and cultural, societal, and environmental considerations**.**

PO4: **Conduct investigations of complex problems:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of information to provide valid conclusions**.**

PO5: **Modern Tool Usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

PO6: **The Engineer and Society:**Apply reasoning informed by contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to professional engineering practice**.**

PO7: **Environment and Sustainability:**Understand the impact of professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development**.**

PO8: **Ethics:**Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice**.**

PO9: **Individual and Team Work:**Function effectively as an individual, and as a member or leader in diverse teams, and in multi-disciplinary settings**.**

PO10: **Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions**.**

PO11: **Project Management and Finance:**Demonstrate knowledge and understanding of engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments**.**

PO12: **Life-long Learning:** Recognize the need for, and have the preparation and ability to engage in independent and life- long learning in the broadest context of technological change.

Program Specific Outcomes (PSOs)

PSO-1: Conceptualize complex electricaland electronics systems, employ controlstrategies for power electronics relatedapplications to prioritize societalrequirements.

PSO-2: Design, analyse, create energy efficient and eco-friendly power & energy systems.

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ACADEMIC REGULATIONS

B. Tech. - Regular Four Year Degree Program
(For batches admitted from the Academic Year 2015 - 2016)
&
B. Tech. - Lateral Entry Scheme
(For batches admitted from the Academic Year 2016 - 2017)

For pursuing undergraduate Bachelor Degree Program of study in Engineering (B. Tech.) offered by Vardhaman College of Engineering under Choice Based Credit System (CBCS)and herein after Vardhaman College of Engineering is 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 2015-2016 onwards. Any reference to "College" in these rules and regulations stands for Vardhaman College of Engineering.

2. EXTENT

All the rules and regulations, specified hereinafter shall be read as a whole for the purpose of interpretation and as and when a doubt arises, the interpretation of the Chairman of Academic Council is final. As per the requirements of statutory bodies, Principal, Vardhaman College of Engineering shall be the Chairman of the Academic Council.

3. ADMISSION

3.1. Admission into First year of Four Year B. Tech. Degree Program of study in Engineering:

3.1.1. Eligibility:

A student seeking admission into the first year of four-year B. Tech. Degree Program should have

(i) Passed either Intermediate Public Examination (I.P.E) conducted by the Board of Intermediate Education, Telangana, with Mathematics, Physics and Chemistry as optional subjects or any equivalent examination recognized by Board of Intermediate Education, Telangana or a Diploma in Engineering in the relevant branch conducted by the Board of Technical Education, Telangana or equivalent Diploma recognized by Board of Technical Education for admission as per the guidelines of Telangana State Council for Higher Education (TSCHE).

(ii) Secured a rank in the EAMCET examination conducted by TSCHE for allotment of a seat by the Convener, EAMCET, for admission into the program offered by the Institution.

3.1.2. Admission Procedure:

Admissions are made into the first year of four-year B.Tech. Degree Program as per the stipulations of TSCHE.

(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 Program in Engineering

3.2.1. Eligibility:

A student seeking admission under lateral entry into the II year I semester B. Tech. Degree Program should have passed the qualifying exam (B.Sc. Mathematics & Diploma holders), based on the rank secured by the student at Engineering Common Entrance Test (FDH) in accordance with the instructions received from the Convener, ECET and Government of Telangana.

3.2.2. Admission Procedure:

Admissions are made into the II year of four-year B. Tech degree Program through Convener, ECET (FDH) 20% against the sanctioned strength in each Program of study under lateral entry scheme.

4. PROGRAMS OFFERED

Vardhaman College of Engineering, an autonomous college affiliated to JNTUH, offers the following B. Tech Programs of study leading to the award of B. Tech. Degree under the autonomous status.

1) B. Tech. - Civil Engineering
2) B. Tech. - Electrical and Electronics Engineering
3) B. Tech. - Mechanical Engineering
4) B. Tech. - Electronics and Communication Engineering
5) B. Tech. - Computer Science and Engineering
6) B. Tech. - Information Technology

5. MEDIUM OF INSTRUCTION

The medium of instruction is English for all the courses.

6. DURATION OF THE PROGRAMS

6.1. Minimum Duration

6.1.1. B. Tech. Degree program duration is for a period of minimum four academic years leading to the Degree of Bachelor of Technology (B.Tech.) of the Jawaharlal Nehru Technological University Hyderabad.

6.1.2. For students admitted under lateral entry scheme, B. Tech. Degree program duration is for a period of minimum three academic years leading to the Degree of Bachelor of Technology (B.Tech.) of the Jawaharlal Nehru Technological University Hyderabad (JNTUH).

6.2. Maximum Duration

6.2.1. The maximum period within which a student must complete a full-time academic program is eight academic years for B. Tech. If a student fails to complete the program within the maximum duration as specified above, student will forfeit the seat.

6.2.2. For students admitted under lateral entry scheme the maximum duration is six academic years. If a student fails to complete the program within the maximum duration as specified above, student will forfeit the seat.

6.2.3. The period is calculated from the academic year in which the student is admitted for the first time into the B. Tech. Degree Program.

7. SEMESTER STRUCTURE

The College follows semester system. An academic year consists of first semester, second semester and the summer term follows in sequence. The duration of each semester shall be of 23 weeks spell which includes time for course work, preparation and examinations. Each semester shall have a minimum of 90 instructional days.

Each semester has Continuous Internal Evaluation (CIE) and Semester End Examination (SEE). Choice Based Credit System (CBCS) and Credit Based Semester System (CBSS) as indicated by UGC and curriculum/course structure as suggested by AICTE are followed.

Table 2: Academic Calendar

FIRST SEMESTER (23 weeks)	Instruction Period	:17 weeks	19 weeks
	Mid Semester Tests	:2 weeks	
	Preparation & Practical Examinations		2 weeks
	External Examinations		2 weeks
Semester Break			2 weeks
SECOND SEMESTER (23 weeks)	Instruction Period	:17 weeks	19 weeks
	Mid Semester Tests	:2 weeks	
	Preparation & Practical Examinations		2 weeks
	External Examinations		2 weeks
Summer Vacation			4 weeks

8. PROGRAM STRUCTURE

The Program of instruction consists of:

(i) Humanities, Social Sciences and Management, Basic Sciences, Basic Engineering, and other Mandatory / Audit courses.

(ii) Core Engineering courses impart skills among the students on the fundamentals of engineering in the branch concerned.

(iii) Elective courses enabling the students to take up a group of professional and open courses of their interest.

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

Every course of the B. Tech. Program will be placed in one of the ten groups of courses with credits as listed in the Table 3.

Note: All components prescribed in the curriculum of any program of study shall be conducted andevaluated.

Table 3: Group of courses

S. NO	GROUP OF COURSES	CATEGORY	RANGE OF TOTAL CREDITS
1	Humanities, Social Sciences and Management	HS	5% to 10%
2	Basic Sciences	BS	15% to 20%
3	Basic Engineering	BE	15% to 20%
4	Core Engineering	CE	30% to 40%
5	Professional Elective	PE	10% to 15%
6	Open Elective	OE	5% to 10%
7	Audit Course	AC	0%
8	Mini Project	MP	10% to 15%
9	Technical Seminar	TS	
10	Project Work	PW	

9. CREDIT BASED SYSTEM

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

9.1. The duration of each semester will normally be 23 weeks with 6 days a week (the second Saturday will be observed as holiday in a month). A working day shall have 6 lecture hours each of 60 minutes duration.

Table 4: Credit Representation

Lectures (hrs/wk/Sem.)	Tutorials (hrs/wk/Sem.)	Practical Work (hrs/wk/Sem.)	Credits (L: T: P)	Total Credits
3	0	0	3:0:0	3
3	1	0	3:0:0	3
3	2	0	3:1:0	4
4	0	0	4:0:0	4
4	1	0	4:0:0	4
0	2	4	0:1:2	3
0	0	3	0:0:2	2
0	0	2	0:0:1	1
0	0	20	0:0:12	12

9.2. The four-year curriculum of any B. Tech. program of study shall have 192 credits in total. 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. program for III, IV, V, VI VII and VIII semesters of study shall have a total 144 credits.

9.3. For courses like mini project / project work / technical seminar, where formal contact hours are not specified, credits are assigned based on the complexity of the work.

10. 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, practical / computer aided engineering drawing lab. In addition, mini-project and technical seminar work shall be evaluated for 100 marks each and project work shall be evaluated for 200 marks.

10.1 Theory Courses

The evaluation of the students in each course is a continuous process and is based on their performance in different examinations and attendance as mentioned below:

Table 5: Method of Evaluation

Continuous Internal Evaluation	Mid Semester Test	15 Marks
	Online Objective Test	05 Marks
	Alternate Assessment	05 Marks
External Evaluation	End Semester Examination	75 Marks

10.1.1. Mid Semester Test

There will be two Mid Semester Tests in theory courses for a maximum of 15 marks, to be answered in one and half hour duration. The first Mid Semester Test will be held in the 09^{th} week as per the given schedule for the first half of the total syllabus. The second Mid Semester Test will be held in the 18^{th} week as per the given schedule with the second half of the total syllabus. In case a student does not appear for Mid Semester Test or underperformance, makeup test will be conducted upon the recommendations of the standing committee, subject to payment of a prescribed fee for each examination missed.

10.1.2. Online Objective Test

There will be one Online Objective Test in Theory Courses for a maximum of 05 marks, to be answered in 20 minutes duration. The Online Objective Test will be held in the 18^{th} week as per the schedule declared covering all the units of syllabus. In case a student does not appear for the Online Objective Test due to any reason whatsoever, no makeup test shall be conducted.

10.1.3. Mid Marks

The final marks of Mid Exam, is the average of Mid Semester Test 1 and Mid Semester Test 2 along with Online Objective Test marks and subject wise aggregate percentage of attendance.

10.1.4. End Semester Examination

The end semester examination question paper in theory courses 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.

The question paper shall be set externally and evaluated both internally and externally. If the difference between the first and second valuation is less than 15 marks, the average of the two valuations shall be awarded, and if the difference between the first and second valuation is more than or equal to 15 marks, third evaluation will be conducted and the average marks given by all three examiners shall be awarded as final marks.

10.2 Practical

Practical shall be evaluated for 100 marks, out of which 75 marks shall be for external examination and 25 marks for internal. The 25 internal marks are distributed as 15 marks for day-to-day evaluation 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.

10.3 For Engineering Drawing-I, Engineering Drawing-II and Machine Drawing, the distribution shall be 25 marks for internal evaluation (15 marks for day-to-day evaluation 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 awarding internal marks.

10.4 The Computer Aided 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.

10.5 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 shall be 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 nominee and two faculty members of the department including the project supervisor for 100 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 VII semester.

10.6 Technical Seminar

The seminar shall have two components; one chosen by the student from the course-work without repetition and another 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 shall be made before an internal evaluation committee comprising the Head of the Department or his 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 100 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.

10.7 Project Work

The project work shall be evaluated for 200 marks of which 50 marks shall be for internal evaluation and 150 marks for end-semester evaluation. 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.

In VIII semester, a mid-course review is conducted by Head of the Department and the project supervisor on the progress of the project for 25 marks. On completion of the project, a second evaluation is conducted for award of internal marks for another 25 marks before the report is submitted making the total internal marks to be 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.

11. ATTENDANCE REQUIREMENTS TO APPEAR FOR THE END SEMESTER EXAMINATION

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

11.2. 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.

11.3. Shortage of attendance that is below 65% in aggregate shall in no case be condoned.

11.4. The shortage of attendance shall not be condoned more than four times during the entire course of study.

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

11.6. 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.

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

11.8. 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 Telangana norms in vogue.

12. EVALUATION

Following procedure governs the evaluation.

12.1. The marks for the internal evaluation components will be added to the external evaluation marks secured in the end semester examinations to arrive at total marks for any subject in that semester.

12.2. Performance in all the courses is tabulated course-wise and will be scrutinized by the Examination Committee. Moderation is applied, if needed, based on the recommendations of results committee and then course-wise grade lists are finalized.

12.3. Student-wise tabulation is done and grade sheet is generated which is issued to the student.

13. REVALUATION

Students shall be permitted to apply for revaluation after the declaration of semester end examination results within due dates by paying prescribed fee. After revaluation if there is any betterment in the grade, then improved grade will be considered. Otherwise old grade shall be retained.

14. SUPPLEMENTARY EXAMINATION

14.1. 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 or absent in regular examinations. Such students writing supplementary examinations may have to write more than one examination per day.

14.2. Advanced Supplementary Examination:

Advanced supplementary examinations will be conducted for IV year II semester after announcement of regular results.

15. ACADEMIC REQUIREMENTS FOR PROMOTION / COMPLETION OF REGULAR B. TECH. PROGRAM OF STUDY

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

FOR STUDENTS ADMITTED INTO B. TECH. PROGRAM (BATCHES ADMITTED FROM 2015–2016)

i. A student shall be deemed to have satisfied the minimum academic requirements for each theory, practical, design, drawing subject and project, if he secures not less than 35% of marks in the end semester examination and a minimum of 40% of marks in the sum of the internal evaluation and end semester examination taken together.

ii. In case of mini projectand technical seminar, a student shall be deemed to have satisfied the minimum academic requirements and earned the credits allotted to each of them, if he 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 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 I Year to II Year program of study only if he fulfills the academic requirement of securing **24 out of 48** credits from the regular examinations held till the end of I year II semesterincluding supplementary examinations.

v. A student shall be promoted from II Year to III Year program of study only if he fulfills the academic requirement of securing **48 out of 96** credits from the regular examinations held till the end of II year II semesterincluding supplementary examinations.

vi. A student shall be promoted from III year to IV year program of study only if he fulfills the academic requirements of securing **72 out of 144** credits, from the regular examinations held till the end of III year II semester including supplementary examinations.

vii. A student shall register for all 192 credits and has to earn all the 192 credits. Marks obtained in best 184 credits shall be considered for the award of the class based on aggregate of grades.

viii. A student who fails to earn 192 credits as indicated in the course structure within **eight** academic years from the year of their admission shall forfeit his seat in the B. Tech. program and his admission stands cancelled.

FOR LATERAL ENTRY STUDENTS (BATCHES ADMITTED FROM 2016–2017)

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

ii. In case of mini project and technical seminar, a student shall be deemed to have satisfied the minimum academic requirements and earned the credits allotted to each of them, if he 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 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 II Year to III Year program of study only if he fulfills the academic requirement of securing **24 out of 48** credits from the regular examinations held till the end of II year II semester including supplementary examinations held till the end of II year II semester.

v. A student shall be promoted from III year to IV year program of study only if he fulfills the academic requirements of securing **48 out of 96** credits, from the regular examinations held till the end of III year II semester including supplementary examinations held till the end of III year II semester.

vi. A student shall register for all 144 credits and earn all the 144 credits. Marks obtained in best 136 credits shall be considered for the award of the class based on aggregate of grades.

vii. A student who fails to earn 144 credits as indicated in the course structure within **six** academic years from the year of his admission shall forfeit his seat in the B. Tech. Program and his admission stands cancelled.

16. TRANSITORY REGULATIONS

Students who are detained for lack 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 the B. Tech. Degree.

17. TRANSFER OF STUDENTS FROM OTHER COLLEGES/UNIVERSITIES

Transfer of students from other colleges or universities are permitted subjected to the rules and regulations of TSCHE (TE Department) and JNTUH in vogue.

18. TRANSCRIPTS

After successful completion of the entire program 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.

19. AWARD OF DEGREE

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

19.1. For students admitted into B.Tech. program (Batches admitted from 2015-2016)

Eligibility: A student shall be eligible for the award of B. Tech. Degree, if he fulfills all the followingconditions:

- The candidate shall pursue a course of study for not less than four academic years and not more than eight academic years.
- The candidate shall register for 192 credits and has to secure all the 192 credits. Marks obtained in best 184 credits shall be considered for the award of the class based on aggregate of grades.
- The candidate has to obtain not less than 40% of marks (minimum requirement for declaring as passed).
- The candidate has no dues to the college, hostel, and library etc. and to any other amenities provided by the College.
- The candidate has no disciplinary action pending against him.

19.2. For lateral entry students (batches admitted from 2016–2017)

Eligibility: A student shall be eligible for the award of B. Tech. Degree, if he fulfills all the followingconditions:

- The candidate shall pursue a course of study for not less than three academic years and not more than six academic years.
- The candidate shall register for 144 credits and secure all 144 credits. Marks obtained in best 136 credits shall be considered for the award of the class based on aggregate of grades.
- The candidate has to obtain not less than 40% of marks (minimum requirement for declaring as passed).
- The candidate has no dues to the college, hostel, and library etc. and to any other amenities provided by the College.
- The candidate has no disciplinary action pending against him.

19.3. Award of class

After a student has satisfied the requirement prescribed for the completion of the Program and is eligible for the award of B. Tech. Degree, he shall be placed in one of the following four classes shown in Table 7:

Table 7: Declaration of Class based on CGPA (Cumulative Grade Point Average)

Class Awarded	Grades to be Secured	
First Class with Distinction	≥ 8.0 CGPA	From the aggregate marks secured from **184** Credits for Regular Students and **136** Credits for Lateral Entry Students.
First Class	6.5 to <8.0 CGPA	
Second Class	5.5 to <6.5 CGPA	
Pass Class	5.0 to <5.5 CGPA	
Fail	Below 5.0 CGPA	

19.4. Letter Grade and Grade Point

It is necessary to provide equivalence of percentages and/or *Class* awarded with *GradePoint Average (GPA).* This shall be done by prescribing certain specific thresholds in averages for *Distinction, First Class and Second Class,* as mentioned in Table 8.

Table 8: Percentage Equivalence of *Grade Points* (For a 10-Point Scale)

Grade	Grade Points (GP)	Percentage of Marks
O	10	≥ 80 and above
A+	9	≥ 70 and < 80
A	8	≥ 60 and < 70
B+	7	≥ 55 and < 60
B	6	≥ 50 and < 55
C	5	≥ 45 and < 50
P	4	≥ 40 and < 45
F	0	Below 40
AB	0	

For calculating the final percentage of marks equivalent to the computed CGPA, the following formula may be used.

Percentage of marks = (CGPA-0.5) X 10

SEMESTER GRADE POINT AVERAGE (SGPA)

The SGPA is the ratio of sum of the product of the number of credits with the grade points scored by a student in all the courses taken by a student and the sum of the number of credits of all the courses undergone by a student, i.e.

$$\mathbf{SGPA\ (S_i) = \sum (C_i x\ G_i) / \sum C_i}$$

Where $\mathbf{C_i}$is the number of credits of the $\mathbf{i}^{th}$ course and $\mathbf{G_i}$ is the grade point scored by student in the$\mathbf{i}^{th}$ course.

CUMULATIVE GRADE POINT AVERAGE (CGPA)

The CGPA is also calculated in the same manner taking into account all the courses undergone by a student over all the semesters of a program, i.e.

$$\mathbf{CGPA = \sum (C_i\ x\ S_i) / \sum C_i}$$

Where $\mathbf{S_i}$ is the SGPA of the $\mathbf{i}^{th}$ semester and $\mathbf{C_i}$ is the total number of credits in that semester.

20. ADDITIONAL ACADEMIC REGULATIONS

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

20.2 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.

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

21. REGISTRATION

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

to register for courses in time. IN ABSENTIA registration will not be permitted under any circumstance.

21.2. Registration without fine: The courses prescribed for a semester can be registered on the date scheduled in the academic calendar. The registration is also permitted on the second day (which is the first working day of the semester) without fine.

21.3. Registration with fine: Late registration shall be permitted by the HOD concerned up to seven working days inclusive of the date of registration on payment of a late registration fee of stipulated amount.

21.4. Procedure to get permission for late registration: The student concerned shall apply with proper reason to the HOD concerned through the Academic Counselor to get the permission of the Dean (UG) for the late registration of the courses. Beyond the prescribed time limit, no student shall be permitted to register the courses for a particular semester.

22. 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. If the student fails to satisfy the requirements of the program within the maximum period stipulated for that program.

II. If the student fails to satisfy the norms of discipline specified by the Institute from time to time.

23. CURRICULUM

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

II. The BOS for a program is completely responsible for designing the curriculum at least once in two years for that program.

24. WITHHOLDING OF RESULTS

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

25. GRIEVANCES REDRESSAL COMMITTEE

"Grievance and Redressal Committee" (General) constituted by the Principal shall deal in 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 and 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.

26. MALPRACTICE PREVENTION COMMITTEE

A malpractice prevention committee shall be constituted to examine and punish the student who involves in malpractice/behaves in an in-disciplinary manner during the examination. The committee shall consist of:

Principal
Subject expert
Head of the department to which the student belongs to
The invigilator concerned
Controller of Examinations

The committee constituted shall conduct the meeting on the same day of examination or latest by next working day of the incident and punish the student as per the guidelines prescribed by the JNTUH from time to time.

Any action on the part of student at the examination like trying to get undue advantage in the performance at examinations, 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, evaluating 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 will be recommended for appropriate punishment after thorough enquiry.

27. 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.

28. STUDENTS' FEEDBACK

It is necessary for the College 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 is 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.

29. GRADUATION DAY

The College shall have its own annual *Graduation Day* for the distribution 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.

30. AWARD OF A RANK UNDER AUTONOMOUS SCHEME

30.1. 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. and 3 years for B. Tech. under lateral entry scheme.

30.2. 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.

31. CODE OF CONDUCT

31.1. Each student shall conduct himself in a manner befitting his association with VCE.

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

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

31.4. Lack of courtesy, decorum, indecorous behaviour or untoward attitude both inside and outside the college premises is strictly prohibited. Willful damage or discard of Institute's property or the belongings of fellow students are not at all accepted. Creating disturbance in studies or adopting any unfair means during the examinations or breach of rules and regulations of the Institute or any such undesirable means and activities shall constitute violation of code of conduct for the student.

31.5. Ragging in any form is strictly prohibited and is considered a serious and punishable offence as per law. It will lead to the expulsion of the offender from the college.

31.6. 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.

31.7. 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.

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

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

32. 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 Program, 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 aptitude 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.

33. 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.

MALPRACTICES RULES
DISCIPLINARY ACTION FOR / IMPROPER CONDUCT IN EXAMINATIONS

	Nature of Malpractices/Improper conduct	Punishment
	If the student:	
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 student 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 student orally or by any other body language methods or communicates through cell phones with any student 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 students 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 student is appearing.	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the student 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 student is to be cancelled and sent to the University.
3.	Impersonates any other student in connection with the examination.	The student who has impersonated shall be expelled from examination hall. The student is also debarred and forfeits the seat. The performance of the original student, 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 student is also debarred for two consecutive semesters from class work and all University examinations. The continuation of the course by the student 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 student 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 student is also debarred for two consecutive semesters from class work and all University examinations. The continuation of the course by the student 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,	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 student(s) has (have) already appeared and shall not be permitted to appear for the

	or threatens the officer-in charge or any person on duty in or outside the examination hall of any injury to his person or to any of his relations whether by words, either spoken or written or by signs or by visible representation, assaults the officer-in-charge, or any person on duty in or outside the examination hall or any of his relations, or indulges in any other act of misconduct or mischief which result in damage to or destruction of property in the examination hall or any part of the College campus or engages in any other act which in the opinion of the officer on duty amounts to use of unfair means or misconduct or has the tendency to disrupt the orderly conduct of the examination.	remaining examinations of the subjects of that semester/year. The students also are debarred and forfeit their seats. In case of outsiders, they will be handed over to the police and a police case is registered against them.
7.	Leaves the exam hall taking away answer script or intentionally tears of the script or any part thereof inside or outside the examination hall.	Expulsion from the examination hall and cancellation of performance in that subject and all the other subjects the student 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 student is also debarred for two consecutive semesters from class work and all University examinations. The continuation of the course by the student 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 student 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 student is also debarred and forfeits the seat.
9.	If student of the college, who is not a student 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 student 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 student 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 student 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 student 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.	

COURSE STRUCTURE (VCE-R15)

B. TECH. - ELECTRICAL AND ELECTRONICS ENGINEERING

REGULATIONS: VCE-R15

I SEMESTER

Code	Course	Category	Periods per Week			Credits	Scheme of Examination Maximum Marks		
			L	T	P		Internal	External	Total
A3001	Mathematics - I	BS	4	1	0	4	25	75	100
A3004	Probability Theory and Numerical Methods	BS	3	1	0	3	25	75	100
A3005	Technical English	HS	3	0	0	3	25	75	100
A3201	Basic Electrical Engineering	BE	4	1	0	4	25	75	100
A3501	Computer Programming	BE	4	1	0	4	25	75	100
A3008	English Language Communication Skills Lab	HS	0	0	3	2	25	75	100
A3502	Computer Programming Through C Lab	BE	0	0	3	2	25	75	100
A3305	Engineering Workshop	BE	0	0	3	2	25	75	100
	TOTAL		**18**	**04**	**09**	**24**	**200**	**600**	**800**

II SEMESTER

Code	Course	Category	Periods per Week			Credits	Scheme of Examination Maximum Marks		
			L	T	P		Internal	External	Total
A3006	Mathematics – II	BS	4	1	0	4	25	75	100
A3002	Engineering Physics	BS	3	1	0	3	25	75	100
A3003	Engineering Chemistry	BS	3	1	0	3	25	75	100
A3401	Electronic Devices and Circuits	BE	4	1	0	4	25	75	100
A3503	Data Structure	BE	4	1	0	4	25	75	100
A3007	Engineering Physics and Engineering Chemistry Lab	BS	0	0	3	2	25	75	100
A3504	Data Structure Lab	BE	0	0	3	2	25	75	100
A3403	Electronic Devices and Circuits Lab	BE	0	0	3	2	25	75	100
	TOTAL		**18**	**05**	**09**	**24**	**200**	**600**	**800**

III SEMESTER

Code	Course	Category	Periods per Week			Credits	Scheme of Examination Maximum Marks		
			L	T	P		Internal	External	Total
A3011	Managerial Economics and Financial Analysis	HS	3	0	0	3	25	75	100
A3404	Digital Logic Design	BE	3	1	0	3	25	75	100
A3203	Network Analysis	CE	3	1	0	3	25	75	100
A3204	Electro Magnetic Fields	CE	4	0	0	4	25	75	100
A3205	Electrical Machines – I	CE	3	1	0	3	25	75	100
A3009	Mathematics – III	BS	4	0	0	4	25	75	100
A3207	Networks lab	CE	0	0	3	2	25	75	100
A3208	Electrical Machines – I Lab	CE	0	0	3	2	25	75	100
	TOTAL		**20**	**04**	**06**	**24**	**200**	**600**	**800**

B. TECH. - ELECTRICAL AND ELECTRONICS ENGINEERING

REGULATIONS: VCE-R15

IV SEMESTER

Code	Course	Category	Periods per Week			Credits	Scheme of Examination Maximum Marks		
			L	T	P		Internal	External	Total
A3010	Environmental Science	BS	3	0	0	3	25	75	100
A3210	Power System Generation	CE	3	1	0	3	25	75	100
A3211	Electrical Machines – II	CE	4	0	0	4	25	75	100
A3212	Control Systems	CE	4	0	0	4	25	75	100
A3405	Signals and Systems	CE	3	1	0	3	25	75	100
A3313	Basic Mechanical Engineering	BE	3	1	0	3	25	75	100
A3214	Electrical Machines – II Lab	CE	0	0	3	2	25	75	100
A3215	Control Systems Lab	CE	0	0	3	2	25	75	100
A3021	Gender Sensitization	AC	0	3	0	0	25*	50*	75*
	TOTAL		**20**	**06**	**06**	**24**	**200**	**600**	**800**

V SEMESTER

Code	Course	Category	Periods per Week			Credits	Scheme of Examination Maximum Marks		
			L	T	P		Internal	External	Total
A3216	Electrical Measurements and Instrumentation	CE	4	0	0	4	25	75	100
A3420	Electronic Circuits and Integrated Circuits	CE	3	1	0	3	25	75	100
A3217	Power System Transmission & Distribution	CE	4	0	0	4	25	75	100
A3218	Renewable Energy Sources	CE	3	1	0	3	25	75	100
A3219	Advanced Control Systems	CE	3	1	0	3	25	75	100
A3508	Computer Organization and Architecture	CE	3	1	0	3	25	75	100
A3220	Electrical Measurements and Instrumentation Lab	CE	0	0	3	2	25	75	100
A3423	Electronic Circuits and Integrated Circuits Lab	CE	0	0	3	2	25	75	100
A3012	Professional Ethics and Human Values	AC	3	0	0	0	25*	75*	100*
	TOTAL		**23**	**04**	**06**	**24**	**200**	**600**	**800**

VI SEMESTER

Code	Course	Category	Periods per Week			Credits	Scheme of Examination Maximum Marks		
			L	T	P		Internal	External	Total
A3221	Power System Operation and Control	CE	3	1	0	3D	25	75	100
A3222	Power Electronics	CE	3	1	0	3	25	75	100
A3419	Microprocessors and Microcontrollers	CE	3	1	0	3	25	75	100
	Open Elective - I	OE	3	0	0	3	25	75	100
	Professional Elective - I	PE	4	0	0	4	25	75	100
	Professional Elective - II	PE	4	0	0	4	25	75	100
A3223	Power Electronics Lab	CE	0	0	3	2	25	75	100
A3422	Micro Processors and Interfacing Lab	CE	0	0	3	2	25	75	100
A3013	Intellectual Property Rights	AC	3	0	0	0	25*	75*	100*
	TOTAL		**23**	**04**	**06**	**24**	**200**	**600**	**800**

*Marks awarded for audit courses will not be considered for calculating SGPA and CGPA

B. TECH.- ELECTRICAL AND ELECTRONICS ENGINEERING

REGULATIONS: VCE-R15

VII SEMESTER

Code	Course	Category	Periods per Week			Credits	Scheme of Examination Maximum Marks		
			L	T	P		Internal	External	Total
A3224	Power Semi Conductor Drives	CE	3	1	0	3	25	75	100
A3225	Computer Methods in Power Systems	CE	3	1	0	3	25	75	100
A3226	Power System Switchgear and Protection	CE	3	1	0	3	25	75	100
	Open Elective - II	OE	3	0	0	3	25	75	100
	Professional Elective - III	PE	4	0	0	4	25	75	100
	Professional Elective - IV	PE	4	0	0	4	25	75	100
A3227	Power System Lab	CE	0	0	2	1	25	75	100
A3228	Power Semi Conductor Drives Lab	CE	0	0	2	1	25	75	100
A3229	Mini Project	MP	0	0	2	2	100	0	100
	TOTAL		**20**	**03**	**04**	**24**	**300**	**600**	**900**

VIII SEMESTER

Code	Course	Category	Periods per Week			Credits	Scheme of Examination Maximum Marks		
			L	T	P		Internal	External	Total
A3014	Management Science	HS	3	0	0	3	25	75	100
	Open Elective - III	OE	3	0	0	3	25	75	100
	Professional Elective - V	PE	4	0	0	4	25	75	100
A3230	Technical Seminar	TS	0	0	3	2	100	-	100
A3231	Project Work	PW	0	0	20	12	50	150	200
	TOTAL		**10**	**0**	**23**	**24**	**225**	**375**	**600**

B. TECH. - ELECTRICAL AND ELECTRONICS ENGINEERING

REGULATIONS: VCE-R15

Professional Elective - I			
Code	**Course**	**Code**	**Course**
A3251	Optimal Control System	**A3253**	Neural Networks and Fuzzy Logics
A3252	Special Electrical Machines	**A3254**	Dynamics of Electrical Machines
Professional Elective - II			
Code	**Course**	**Code**	**Course**
A3255	Reliability Engineering	**A3257**	Evolutionary Computation
A3256	Digital Control Systems	**A3258**	Power System Dynamics and Stability
Professional Elective - III			
Code	**Course**	**Code**	**Course**
A3259	High Voltage Engineering	**A3261**	Machine Modeling Analysis
A3260	Extra High Voltage AC Transmission	**A3262**	Power Quality
Professional Elective - IV			
Code	**Course**	**Code**	**Course**
A3263	Utilization of Electrical Engineering	**A3265**	Programmable Logic Controllers
A3264	High Voltage DC Transmission & FACTS	**A3266**	Process Control
Professional Elective - V			
Code	**Course**	**Code**	**Course**
A3267	Advanced Switchgear Protection	**A3269**	Distribution Automation
A3268	Power Electronic Control of DC Drives	**A3270**	Power System Transients
Open Electives			
Code	**Course**	**Code**	**Course**
A3576	Fundamentals of Database Management Systems	**A3577**	Fundamentals of Image Processing
A3578	Operating System Fundamentals	**A3579**	JAVA programming
A3676	Cyber Laws	**A3677**	E-Commerce Trends
A3678	Principles of Software Engineering	**A3679**	Scripting Languages
A3476	Digital Electronics	**A3477**	Principles of Analog and Digital Communications
A3478	Transducers and Measurements	**A3479**	Communication Networking Devices
A3276	Nano Technology Applications to Electrical Engineering	**A3277**	Industrial Electronics
A3278	Solar Energy and Applications	**A3279**	Energy Management and Audit
A3376	Elements of Mechanical Engineering	**A3377**	Basic Thermodynamics and Heat Transfer
A3378	Mechanical Measurements and Instrumentation	**A3379**	Engineering Optimization
A3176	Environmental pollution and management	**A3177**	Remote sensing and GIS
A3178	Disaster Management	**A3179**	Constructing planning and management
A3076	Entrepreneurship Development	**A3077**	Human Resource Management
A3078	Organization Behavior	**A3079**	Logistics and Supply Chain Management
A3080	National Service Scheme (NSS)	**A3680**	Python for Data Science
A3081	Basic Program in Entrepreneurship		

Course Categories

HS	–	Humanities and Social Sciences	**BS**	–	Basic Sciences
BE	–	Basic Engineering	**CE**	–	Core Engineering
AC*	–	Audit Courses	**OE**	–	Open Electives
PE	–	Professional Electives	**MP**	–	Mini Project
TS	–	Technical Seminar	**CV**	–	Comprehensive Viva
PW	–	Project Work			

Note: Open electives to be offered will be notified by each department at the time of registration.

SYLLABI FOR
I SEMESTER

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

B. Tech. EEE I SEMESTER **VCE-R15**

MATHEMATICS - I

Course Code: **A3001**

L	T	P	C
4	1	0	4

Course Overview:

This course develops the theory of differential equations and indicating its applications. This course deals with more advanced Engineering Mathematics topics which provide students with the relevant mathematical tools required in the analysis of problems in engineering and scientific professions. Topics includethe differential equations of firstorder and their applications, higher order linear differential equations and their applications, functions of single variable and their applications and multiple integrals, Laplace transforms, Vector integral theorems(Green's, Stoke's and Gauss's divergence theorems). The mathematical skills derived from this course form a necessary base to analytical and design concepts encountered in the program

Prerequisite(s):NIL

Course Outcomes:

Up on successful completion of this course, student will be able to:

CO1.**Solve**the first and higher order linear differential equations.

CO2.**Make use of** differential equations to solve orthogonal trajectories, rate of growth/decay, Newton's law of cooling, Electrical circuits and simple harmonic motion problems.

CO3.**Examine** extremum of a function of several variables and evaluate the multiple integrals.

CO4.**Apply** Laplace transforms to solve differential equations.

CO5.**Evaluate** line, surface and volume integrals using vector integral theorems.

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

B. Tech. EEE I Semester **VCE-R15**

MATHEMATICS - I

Course Code: A3001

L	T	P	C
4	1	0	4

SYLLABUS

UNIT – I **(12 Lectures)**

DIFFERENTIAL EQUATIONS OF FIRST ORDER AND THEIR APPLICATIONS: Formation of a differential equation – Differential equations of first order and first degree – Linear equations, Bernoulli's equation, Exact equations and equations reducible to exact form - Applications of first order differential equations - Orthogonal trajectories - Newton's law of cooling - Law of natural growth and decay.

UNIT – II **(11 Lectures)**

HIGHER ORDER LINEAR DIFFERENTIAL EQUATIONS AND THEIR APPLICATIONS: Linear differential equations of second and higher order with constant coefficients, Non-homogeneous term of the type $Q(x) = e^{ax}, \sin ax, \cos ax, x^n, e^{ax}V(x), x^nV(x)$ - Equations reducible to linear equations with constant coefficients – Cauchy's homogeneous linear equation – Legendre's linear equation - Method of variation of parameters - Applications to L - C - R Circuits and Simple Harmonic Motion.

UNIT – III **(13 Lectures)**

FUNCTIONS OF SINGLE AND SEVERAL VARIABLES, MULTIPLE INTEGRALS: Mean Value Theorems **-** Rolle's Theorem - Lagrange's mean value theorem – Cauchy's mean value theorem - Generalized mean value theorem (all theorems statements and their verification). Functions of several variables - Functional dependence - Jacobian - Maxima and Minima of functions of two variables – Lagrange's method of undetermined multipliers. Multiple integrals - Double and triple integrals - Change of order of integration - Change of variables in double integrals.

UNIT – IV **(10 Lectures)**

LAPLACE TRANSFORMAND ITS APPLICATIONS TO ORDINARY DIFFERENTIAL EQUATIONS: Laplace transforms of elementary functions - First shifting theorem - Change of scale property - Multiplication by t^n - Division by t - Laplace transforms of derivatives and integrals - Unit step function - Second shifting theorem - Periodic function - Evaluation of integrals by Laplace transforms - Inverse Laplace transforms - Method of partial fractions - Other methods of finding inverse transforms - Convolution theorem - Applications of Laplace transforms to ordinary differential equations.

UNIT-V **(10 Lectures)**

VECTOR CALCULUS: Scalar and vector point functions - Gradient, divergence, curl and their related properties - Solenoidal and irrotational vector point functions - Scalar potential function - Laplacian operator - Line integral - work done - surface integrals - volume integral - Vector integral theorems - Green's theorem in a plane - Stoke's theorem - Gauss divergence theorem (all theorem statements and their verification).

TEXT BOOKS:

1. B S Grewal (2012), *Higher Engineering Mathematics*, 42nd Edition, New Delhi, Khanna Publishers.
2. B V Ramana (2010), *Engineering Mathematics*, New Delhi, Tata Mc Graw Hill Publishing Co. Ltd

REFERENCE BOOKS:

1. Kreyszig Ervin, *Advanced Engineering Mathematics,* 10th*Edition,* New Jersy,John *Wiley*& Sons
2. T K V Iyengar, B Krishna Gandhi & Others. (2011), *Engineering Mathematics Vol - I*, Tenth Revised Edition, New Delhi, S.Chand & Co.Ltd.
3. H K Dass, Er Rajnish Varma (2012), *Higher Engineering Mathematics*, Second Revised Edition, New Delhi, S Chand & Co. Ltd

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

B. Tech. EEE I SEMESTER **VCE-R15**

PROBABILITY THEORY AND NUMERICAL METHODS

Course Code: **A3004**

L	T	P	C
3	1	0	3

Course Overview:

Thecoursematterisdividedinto5chapterscoveringduly-recognizedareasoftheoryandstudy.This Course dealswithmoreadvancedEngineeringMathematics and Statistics topicswhichprovidestudents withthe relevantmathematical and statistical toolsrequired inthe analysis of problems inengineeringandscientific professions.The topics coveredincludeprobability, random variables anddistributions,solutions of algebraic andtranscendental equations,interpolation,curve fitting,numerical integrationandnumericalsolutionof ordinarydifferentialequations. Themathematicalskills derived from thiscourse forma necessary baseto analyticaland design conceptsencountered in the programme.

Prerequisite(s): NIL

Course Outcomes:

Up on successful completion of this course, student will be able to:

CO1.**Solve** real world problems using basic concepts of probability.

CO2.Identify the types of random variables involved in a given problem and calculate relevant probabilities.

CO3.Develop appropriate Numerical methods to approximate a function.

CO4.Make use of Numerical differentiation and integration in solving problems of engineering.

CO5.Apply appropriate method to find numerical solution of a differential equation.

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

B. Tech. EEE I SEMESTER **VCE-R15**

PROBABILITY THEORY AND NUMERICAL METHODS

Course Code: **A3004**

L	T	P	C
3	1	0	3

SYLLABUS

UNIT-I **(8 Lectures)**

PROBABILITY: Sample space and events, probability- axioms of probability-some Elementary theorems-conditional probability.-Bayes Theorem.

UNIT-II **(8 Lectures)**

RANDOM VARIABLES &DISTRIBUTIONS: Random variables. Discrete distribution – continuous distribution.Binomial distribution - Poisson distribution –Normal distribution-Related properties. Normal Approximation to binomial distribution

UNIT-III **(12 Lectures)**

ALGEBRAIC AND TRANSCENDENTAL EQUATIONS, INTERPOLATION: Bisection method - Regula-falsi method - Iteration method – Newton-Raphson method.

INTERPOLATION: Finite differences: Forward, Backward and Central differences - Other difference operators and relations between them - Differences of a polynomial – Missing terms - Newton's forward interpolation, Newton's backward interpolation, Interpolation with unequal intervals – Lagrange's interpolation.

UNIT-IV **(8 Lectures)**

NUMERICAL DIFFERENTIATION, INTEGRATION AND CURVE FITTING: Numerical differentiation: Derivatives using Newton's interpolation formulae. Numerical integration: Newton-cotes quadrature formula - Trapezoidal rule - Simpson's one-third rule - Simpson's three-eighth rule.
Curve Fitting: Method of least squares - Fitting a straight line, second degree parabola and non-linear curves of the form by the method of least squares.

UNIT-V **(8 Lectures)**

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 order equations – Multistep method: Adam's bash forth Predictor and Corrector method.

TEXT BOOKS:

1. B S Grewal, (2012), *Higher Engineering Mathematics*, 42nd Edition, New Delhi, Khanna Publishers.
2. Richard Arnold Johnson, Irwin Miller,John E.Freund,(2011), *Probability and Statistics for Engineers*, Eighth Edition, New Delhi, Prentice Hall

REFERENCE BOOKS:

1. G S S Bhishma Rao (2011), *Probability and Statistics*, Fifth Edition, Hyderabad, Scitech Publications Pvt.Ltd.
2. N P Bali and N Ch Narayana Iyengar, (2004), *A Textbook of Engineering Mathematics*, Sixth Edition, New Delhi, Laxmi Publications.
3. S S Sastry ,(2005), *Introductory Methods of Numerical Analysis*, Fourth Edition, New Delhi, PHI Learning Pvt.Ltd.
4. Iyengar T.K.V., Krishna Gandhi B. & Others., (2013), Numerical Methods, Second Revised Edition, New Delhi, S.Chand& Co.Ltd.

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

B. Tech. EEE I SEMESTER **VCE-R15**

TECHNICAL ENGLISH

Course Code: **A3005**

L	T	P	C
3	0	0	3

Course Overview:

The basic idea behind offering Technical English as a subject at the undergraduate level is to acquaint students with a language held by common consent to be the most popular language and predictably the most used in countries across the globe. The lessons included as part of syllabus, aim to take the nuances of English to students as it reveals its strengths and complexity when used to perform a variety of functions. For prospective engineers, nothing could be more useful or productive than being able to reach out to the world of technology and business through grammar, vocabulary, collocations besides letter-writing, advertisements, posters, technical presentations, report writing, seminars etc. and teachers of English have a special role to play in polishing and honing the linguistic skills of engineers in the making, through a variety of tasks, assignments and role plays that bring alive the language in the classroom and prepare students for the world of work. The mission of taking the language to students is achieved from teaching texts that are rich in vocabulary and grammar, texts that teach learners how to contextualize, situate meaning amidst ambiguity and learn the art of being able to persuade, compel, cajole, complain, narrate, describe etc. through recourse to a range of devices- linguistic and literary- on offer. Besides, the course has in mind the task of preparing students to fulfil basic functions with language that come their way during the course of study, such as being able to compose email effectively, prepare technical papers, abstracts, write effective business ,formal and job application letters , publish articles, etc.

Prerequisite(s): NIL

Course Outcomes:

Up on successful completion of this course, student will be able to:

CO1. Develop an understanding of the significance of humanity, love and service to mankind and be involved in community service.

CO2. Perceive the importance of technological impact on society and plan for the technological advancement.

CO3. Applythe rules of grammar effectively (articles, prepositions, concord, tenses etc.) in writing reports, technical articles, essays and in day- to-day conversations.

CO4. Build creativity for career planning and entrepreneurship.

CO5. Develop effective written communication skills in academic writing.

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

B. Tech. EEE I SEMESTER **VCE-R15**

TECHNICAL ENGLISH

Course Code: **A3005**

L	T	P	C
3	0	0	3

SYLLABUS

UNIT – I **(8 Lectures)**

Chapter entitled ***Heaven's Gate***From Enjoying Everyday English published by Orient Black Swan, Hyderabad.

Chapter entitled **Mother Teresa** from Inspiring speeches and lives Published by Maruthi Publication, Hyderabad.

Grammar **:** Articles – Prepositions

Vocabulary **:** Word formation with Prefixes and suffixes – Synonyms and Anonyms –Homonyms, Homophones and Homographs – Idiomatic Expressions –Phrasal Verbs.

Writing **:** Paragraph Writing.

UNIT - II **(8 Lectures)**

Chapter entitled ***The Connoisseur***From Enjoying Everyday English published by Orient Black Swan, Hyderabad.

Chapter entitled **Sam Pitroda** from Inspiring speeches and lives Published by Maruthi Publication, Hyderabad.

Grammar **:** Concord (Subject verb Agreement) - Adjectives and Degrees of Comparisons

Vocabulary **:** Word formation with Prefixes and suffixes- Synonyms and Anonyms-Collocations- One word substitutes

Writing **:** Letter Writing: Types of letters, Styles of letters, Parts of letters, Letter of Apology and reply, Letter of Complaint and Reply.

UNIT - III **(8 Lectures)**

Chapter entitled ***The Odds Against Us*** From Enjoying Everyday English published by Orient Black Swan, Hyderabad.

Chapter entitled **I have a Dream** by Martin Luther King from Inspiring speeches and lives Published by Maruthi Publication, Hyderabad.

Grammar **:** Tenses, Question Tags

Vocabulary **:** Technical Vocabulary, Word formation with Prefixes and suffixes- Synonyms and Anonyms Morphemes

Writing **:** Speech Writing, Dialogue and Speech Writing, Writing Technical Articles

UNIT - IV **(8 Lectures)**

Chapter entitled ***The Cuddalore Experience***From Enjoying Everyday English published by Orient Black Swan, Hyderabad.

Grammar **:** Active and Passive Voice

Vocabulary **:** Synonyms and Anonyms, Words often confused/misspelled

Writing **:** Letter of Application and Preparation of Resume

UNIT - V **(10 Lectures)**

Chapter entitled ***Obama*** from Inspiring speeches and lives Published by Maruthi Publication, Hyderabad.

Grammar **:** Simple, Compound and Complex - Direct and indirect Speech

Vocabulary **:** One wordsubstitutes and Technical Vocabulary

Writing **:** Report Writing –Types of reports, importance of Reports, Styles of Reports, Structure of Reports–Writing informational, Progress Reports and Analytical Reports in Technical Contexts.

TEXT BOOKS:

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

REFERENCE BOOKS:

1. Ashraf Rizvi M, (2005). *Effective Technical Communication*. New Delhi: Tata Mc Graw Hill.
2. Raymond Murphy, (2004). *Murphy's English Grammar with CD.* 3rd edition. Cambridge University Press.
3. Wren & Martin (1936), revised by N.D.V. Prasad Rao (1999), *English Grammar and Composition*, S. Chand Publications
4. Mario Rinvolucri &Paul Davis(2005),*More Grammar Games*. Cambridge University Press.
5. Edgar Thorpe & Showick Thorpe., (2008). *Basic Vocabulary for Competitive Examination.* Pearson Education.

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

B. Tech. EEE I SEMESTER **VCE-R15**

BASIC ELECTRICAL ENGINEERING

Course Code: **A3201**

L	T	P	C
4	1	0	4

Course Overview:

This is a basic course for all Engineering students of first Year. The objective is to make them familiar with basic principles of Electrical Engineering. The course addresses the underlying concepts & methods behind Electrical Engineering. The course is present a problem oriented introductory knowledge of the Fundamentals of Electrical Engineering and to focus on the study of basic electrical parameters, basic principles, different types of electrical circuit and methods to solve electrical circuit.

Prerequisite(s): NIL

Course Outcomes:

CO1.Applynetwork reduction techniques and Knowledge of Alternating quantities to calculate Current, Voltage and Power for complex circuits.

CO2.Analyse electrical Circuits using Nodal Analysis, Mesh analysis and Network theorems.

CO3.Applythe concepts of network topology to obtain Node incidence, Tie set and Cut set matrices.

CO4.Designtwo port networks, their equivalent circuits and obtain their parameters.

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

B. Tech. EEE I SEMESTER **VCE-R15**

BASIC ELECTRICAL ENGINEERING

Course Code: **A3201**

L	T	P	C
4	1	0	4

SYLLABUS

UNIT - I **(11 Lectures)**

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 **(11 Lectures)**

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

NETWORK TOPOLOGY: Definitions, graph, tree, basic tieset and basic cutset matrices for planar networks duality & dual networks.

UNIT – III **(11 Lectures)**

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. Concepts of 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.

UNIT – IV **(12 Lectures)**

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

UNIT – V **(11 Lectures)**

NETWORK PARAMETERS: Two port network parameters, Z, Y, ABCD, Inverse ABCD, hybrid parameters and Inverse hybrid 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. Joseph Edminister (2001), *Electric Circuits*, 6th Edition Schaum's Outlines, Tata Mc Graw Hill, 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. Sudhakar, Shyammohan S. Palli (2003), *Electrical Circuits*, 2nd Edition, Tata Mc Graw Hill, New Delhi.
4. Chakrabarthy (2005), Circuit Theory, 4th Edition, Dhanpat Rai & Sons Publications, New Delhi.

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

B. Tech. EEE I SEMESTERVCE-R15

COMPUTER PROGRAMMING

Course Code:**A3501**

L	T	P	C
4	1	0	4

Course Overview:

The course is a Basic Engineering course for all computing aspiring students. It is designed to provide acomprehensive study of the C programming language that covers the fundamental principles of computerprogramming, with an emphasis on problem solving strategies using structured programming techniques.The syntax and constructs of data types, control statements, arrays, functions and pointers are elaborated.The derived data types like structures, union and enumerations is also importantly discussed. The consoleand file I/O systems are explained with the wide variety of examples and applications. It stresses thestrengths of C, which provide students with the means of writing efficient, maintainable and reusable codeto solve mathematical, engineering and simple data processing problems.

Prerequisite(s): NIL

Course Outcomes:

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

CO1.**Write** algorithm and draw corresponding flowchart for simple problems besides explainingfunctions of computer components.

CO2.**Select** the right identifiers, data types and operators for effective computation.

CO3.Write programs, **demonstrating** use of control statements, arrays and strings

CO4.**Demonstrate** use of functions and pointers by writing programs.

CO5.**Write** C programs for simple real life problems using structures and unions.

CO6.**Illustrate** use of files by writing programs.

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

B. Tech. EEE I SEMESTER **VCE-R15**

COMPUTER PROGRAMMING

Course Code:**A3501**

L	T	P	C
4	1	0	4

SYLLABUS

UNIT – I **(15 Lectures)**

INTRODUCTION TO COMPUTERS: Computer systems, Computing environments, Computer languages, Creating and Running Programs, System Development - Algorithm, Pseudo Code, Flow Charting.

INTRODUCTION TO THE C LANGUAGE: Background, C Programs, Identifiers, Types, Variables, Constants, Formatted and Unformatted Console I/O Functions.

OPERATORS AND EXPRESSIONS: Arithmetic, Relational and Logical Operators, Assignment Operators**,** **I**ncrement and Decrement Operators, Conditional Operator, Bitwise Operators, Special Operators, Expressions, Precedence and Associatively, Side Effects, Type Conversion

UNIT – II **(14 Lectures)**

STATEMENTS: Null, Expression, Return, Compound, Selection, Iteration, Jump Statements.

ARRAYS: Using Arrays in C, Two-Dimensional Arrays, Multidimensional Arrays,

STRINGS: String Concepts, C Strings, String Input/Output Functions, Array of Strings, String Manipulation Functions.

UNIT – III **(12 Lectures)**

FUNCTIONS: User-Defined Functions, Inter-Function Communication, Standard Functions, Storage Classes, Recursion, Preprocessor Commands.

POINTERS: Introduction, Pointers for Inter-Function Communication, Pointers to Pointers, Arrays and Pointers, Pointer Arithmetic and Arrays, Passing an Array to a Function, Array of Pointers, Pointers to Void and to Functions, Memory Allocation Functions, Command-Line Arguments.

UNIT – IV **(09 Lectures)**

STRUCTURES, UNIONS, ENUMERATIONS AND TYPEDEF: Structure Definition, Initialization, Accessing Structures, Nested Structures, Arrays of Structures, Structures and Functions, Passing Structures through Pointers, Self-referential Structures, Unions, Bit-Fields, typedef, Enumerations.

UNIT – V **(08 Lectures)**

FILE I/O: Streams, Files, File Operations, File Opening Modes, Formatted File I/O Functions, Unformatted File I/O Functions, File Status Functions, File Positioning Functions.

TEXT BOOKS:

1. B. A. Fouruzan and R. F. Gilberg (2014), *C Programming & Data Structures,* 3rd Edition, CENGAGE Learning, India.

REFERENCE BOOKS:

1. Herbert Schildt (2013), *C: The Complete Reference*, 4th Edition, Mc Graw Hill Education (India) Pvt Ltd.
2. B. W. Kerninghan, Dennis M. Ritche (1988), *TheC Programming Language*, 2nd edition, Prentice Hall Software Series, India.

Stephen G. Kochan (2014), *Programming in C*, 4th Edition, Addison-Wesley Professional.

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)

B. Tech. EEE I SEMESTER **VCE-R15**

ENGLISH LANGUAGE COMMUNICATION SKILLS LAB

Course Code: **A3008**

L	T	P	C
0	0	3	2

Course Overview:

English- being the foremost global language has its domination in internationally sensitive domains such as science and technology, business and commercial relation, education and diplomatic relationships, politics and administration and so on. It is the language of corporate India, a passport for better career, better pay, and advanced knowledge and for communication with the entire world. In higher education, English is the prevalent prestigious language. Careers in any area of business communication or within the government, or in science and technology require fluency in English. It is certainly considered instrumental in terms of having access to information from all over the world as a key factor for professional success. With the number of foreign investors flocking to India and the growth of outsourcing, English has come to play a key role for the transactions in written form in professional relationships between foreign and Indian companies. Hence in the existing world of cutthroat completion, it is vital to the students pursuing Engineering course to have a command not only on the academic skills but also on communication skills. The basic idea behind offering English as a practical subject at the undergraduate level is to acquaint students with a language that enjoys currency as a lingua franca of the globe. For prospective engineers nothing could be more useful or productive than being able to reach out to the world of technology. In the ELCS lab the students are trained in Communicative English Skills, phonetics, word accent, word stress, rhythm and intonation, making effective oral presentations- both extempore and Prepared- seminars, group discussions, presenting techniques of writing, role play, telephonic skills, asking and giving directions, information transfer , debates, description of person, place, objects etc; . The lab encourages students to work in a group, engage in peer-reviews and inculcate team spirit through various exercises on grammar, vocabulary, listening and pronunciation games, etc.

Course Outcomes:

Thefollowing outcomesareachieved:

CO1.Improve their pronunciation using the rules of Phonetics.

CO2.Take part in role-plays and interviews to perform effectively in real life situations.

CO3.Choose appropriate words and phrases to make the telephonic conversation conveying the meaning with etiquettes.

CO4.Minimize the stage fear and make presentations with proper body language.

CO5.Adapt the art of debating and group discussion to present your view point convincingly.

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

B. Tech. EEE I SEMESTER **VCE-R15**

ENGLISH LANGUAGE COMMUNICATION SKILLS LAB

Course Code: **A3008**

L	T	P	C
0	0	3	2

SYLLABUS

a. Computer Assisted Language Learning (CALL) Lab

b. Interactive Communication Skills (ICS) Lab

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

Exercise – I

CALL Lab: Introduction to Phonetics – Speech Sounds – Vowels and Consonants

ICS Lab: Ice-Breaking activity and JAM sessionArticles, Prepositions, Word formation- Prefixes & Suffixes, Synonyms & Antonyms

Exercise – II

CALL Lab: Structure of Syllables - Past Tense Marker and Plural Marker – Weak Forms and Strong Forms - Consonant Clusters.

ICS Lab: Situational Dialogues – Role-Play- Expressions in Various Situations – Self-introduction and IntroducingOthers – Greetings – Apologies – Requests – Social and Professional Etiquette - Telephone Etiquette.Concord (Subject in agreement with verb) and Words often mis-spelt-confused/misused.

Exercise - III

CALL Lab: Minimal Pairs- Word accent and Stress Shifts- Listening Comprehension.

ICS Lab: Descriptions- Narrations- Giving Directions and guidelines.Sequence of Tenses, Question Tags and One word substitutes.

Exercise – IV

CALL Lab: Intonation and Common errors in Pronunciation.

ICS Lab: Extempore- Public SpeakingActive and Passive Voice, –Common Errors in English, Idioms and Phrases

Exercise – V

CALL Lab: Neutralization of Mother Tongue Influence and Conversation Practice

ICS Lab: Information Transfer- Oral Presentation Skills.Eading Comprehension and Job Application with Resume preparation.

Suggested Software's:

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

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

B. Tech. EEE I SEMESTER **VCE-R15**

COMPUTER PROGRAMMING THROUGH C LAB

Course Code: **A3502**

L	T	P	C
0	0	3	2

Course Overview:

This hands-on course provides a comprehensive introduction to the ANSI C language, emphasizing portability and structured design. Students are introduced to all major language elements including data types, control statements and pre-processor directives. Thorough treatment is given to the topics of arrays, functions and pointers. The course elucidates the use of structures, unions, and enumerations. Emphasis is given to the processing of command line arguments and file systems, so as to write flexible, user-friendly programs. Comprehensive hands on exercises are integrated throughout to reinforce learning and develop real competency. It is used to program desktop applications, compilers, tools and utilities and even hardware devices.

Prerequisite(s): NIL

Course Outcomes:

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

CO1.Implement programs by selecting the right identifiers, data types and operators for effectivecomputation.

CO2.Implement programs, demonstrating use of control statements, arrays and strings

CO3.Implement programs demonstrating use of functions and pointers.

CO4.Implement C programs for simple real life problems using structures and unions.

CO5.Implement programs illustrating use of files.

CO6.Debug erroneous programs related to the course.

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

B. Tech. EEE I SEMESTER **VCE-R15**

COMPUTER PROGRAMMING THROUGH C LAB

Course Code: **A3502**

L	T	P	C
0	0	3	2

LIST OF EXPERIMENTS

Week – 1 (Operators)

1. Write C programs for the following:
   a) Swapping of two numbers without using a third variable.
   b) Check whether the given number is odd or even using conditional operator.
   c) Read two integers and shift the first integer by two bits to the left and second integer by one bit to the right.

Week – 2 (if and switch statements)

2. Write C programs for the following:
   a) Check whether the input alphabet is a vowel or not.
   b) Find the roots of a quadratic equation.
   c) Which takes two integer operands and one operator from the user, performs the operation and then prints the result. (Consider the operators +,-,*, /, % and use Switch Statement)

Week – 3 (Loops)

3. Write C programs for the following:
   a) Print Armstrong numbers between 1 to n where n value is entered by the user. An Armstrong number is defined as the sum of the cubes of the individual digits of the given number. (e.g. 371 = $3^3 + 7^3 + 1^3$)
   b) Generate the first n terms of the Fibonacci sequence.
   c) Calculate the following sum:
   Sum=1 + $x^2/2!$ + $X^4/4!$ + ---------- up to given 'n' terms.

Week – 4 (Loops)

4. Write C programs for the following:
   a) Generate all the prime numbers between 1 and n, where n value is supplied by the user.

   b) Print first n lines of the Pascal's Triangle. Pascal's Triangle is a triangular array of the binomial coefficients.

```
          1
       1     1
    1     2     1
1     3     3     1
```

   c) Print first n lines of Floyd's Triangle.

```
1
2  3
4  5  6
7  8  9  10
11 12 13 14 15
```

Week – 5 (Arrays)

5. Write C programs for the following:
   a) Find the largest and smallest number among a list of integers.
   b) Read a list of elements into an array 45, 14, 78, 36, 64, 9, 25, 99, 11 and find weather a particular element is present in the list or not using linear search.
   c) Read two matrices and find the addition and multiplication of two matrices.

Week – 6 (Strings)

6. Write C programs for the following:
   a) Check whether the given string is palindrome or not with and without using string functions.

b) Insert a sub-string in to given main string from a given position.
c) Count the number of lines, words and characters in a given string.

Week – 7 (Functions)

7. Write C programs that uses both recursive and non-recursive functions:
   a) Find the factorial of a given number.
   b) Find the N^{th} Fibonacci number.
   c) Find the reverse of a number.

Week – 8 (Pointers)

8. Write C programs for the following:
   a) Reverse a string using pointers.
   b) Read a list of elements into an array. Find the sum of array elements using pointers.
   c) Read an array of integers whose size will be specified interactively at rum time.

Week – 9 (Command line arguments)

9. Write C programs for the following:
   a) Pass n number of arguments at the command line and display total number of arguments and their names.
   b) Add two numbers using command line arguments.

Week – 10 (Structure and Union)

10. Write C programs for the following:
    a) Read the full name and date of birth of a person and display the same using nested structure.
    b) Create a Student structure containing name, roll No and grade as structure members. Display the name, roll No and grade of n students by using array of structures concept.
    c) Create a union named Item that contains itemName, itemPrice and itemQuantity as members and find the size of the union and number of bytes reserved for it.

Week – 11 (Enumerated Data Types, Typedef, Bit Fields, Pre-processor Directives)

11. Write C programs for the following:
    a) Create enumerated data type for 7 days of a week. Display their values in integer constants.
    b) Find the biggest number among two numbers using a parameterized macro.
    c) Create a Student structure using typedef containing id, name and age as structure members. Declare a bit field of width 3 for age and display the student details.

Week – 12 (Files)

12. Write C programs for the following:
    a) Copy the contents of one file to another.
    b) Merge the contents of two files and store it in a third file.
    c) Reverse the contents of a file.

Week – 13 (Additional Programs)

13. Write C programs for the following:
    a) Read the student marks in five courses and based on the calculated average display the grade of the student.
    b) Read two strings and compare these two strings character by character. Display the similar characters found in both the strings.
    c) Read name and marks of N students' records from user and store them in a file.

REFERENCE BOOKS:

1. Yashawanth Kanethkar (2014), *Let us C*, 13th Edition, BPB Publications, India.
2. E. Balaguruswamy (2014), *Computer Programming,* 1st Edition, McGraw-Hill, India
3. Pradip Dey, Ghosh Manas (2009), *Programming in C,* Oxford University Press, USA.

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

B. Tech. EEE I SEMESTER **VCE-R15**

ENGINEERING WORKSHOP

Course Code: **A3305**

L	T	P	C
0	0	3	2

Course Overview:

This course provides comprehensive knowledge of the various trades and tools used in an Engineering workshop. It emphasizes on the use of various workshop tools with safety aspects. The essence of this lab is also to make the students know about identifying hardware devices in PC, hardware assembling and disassembling, and internet capabilities and understand the usage different software's like MS Office.

Course Outcomes:

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

CO1.Identify the tools and equipment utilized in workshop.

CO2.Choose the required trade for the suitable operations.

CO3.Make the Wooden joints, MS fittings, house wiring, sheet metal components and simple forgings.

CO4.Explain the working of Arc Welding and Plumbing operations, uses of power tools and Installation of Software in the computer systems.

CO5.Prepare the documents, data sheets and power point slides by using the Microsoft office tools.

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

B. Tech. EEE I SEMESTER **VCE-R15**

ENGINEERING WORKSHOP

Course Code: **A3305**

L	T	P	C
0	0	3	2

LIST OF EXPERIMENTS

PART – A

TRADES FOR PRACTICE:

Note: Minimum two exercises have to be practiced in each of the following trades

a. Carpentry
b. Fitting
c. Tin-Smithy
d. Foundry
e. Black-Smithy
f. House Wiring

PART-B

TRADES FOR DEMONSTRATION:

a. Arc-Welding
b. Plumbing
c. Power Tools

PART-C

Note: At least two tasks have to be carried out from the following tasks

Task 1

Introduction to Computer: block diagram of the CPU along with the configuration of each peripheral component and its functions. Practice to disassemble and assemble the components of a PC to working condition.

Task 2

Installation of operating systems: like MS Windows, Linux and different packages on a PC. Diagnosis of PC malfunction, types of faults, common issues and how to fix them. Basic hardware & software troubleshooting steps, PC diagnostic tools.

Task 3

Introduction to Network:types of Networks, types of network topologies, types of network protocols, drivers loading and configuration settings, mapping of IP addresses, configuration of internet and Wi-Fi , bookmarks, search toolbars and pop up blockers.

Task 4

Introduction toSearch Engines and Cyber Hygiene: types of search engines and how to use search engines, awareness of various threats on internet, types of attacks and how to overcome. Installation of antivirus software, configuration of personal firewall and windows update on computers.

Task 5

Introduction to Word: importance of word as word processor, overview of toolbars, saving, accessing files, using help and resources.

Creating project Certificate: Abstract Features to be covered:-Formatting Styles, Inserting table, Bullets and Numbering, Changing Text Direction, Cell alignment, Footnote, Hyperlink, Symbols, Spell Check , Track Changes, Images from files and clipart, Drawing toolbar and Word Art, Formatting Images, Textboxes and Paragraphs.

Creating Time Table: Abstract Features to be covered:-Formatting Styles, Inserting table.

Task 6

Introduction to Power Point: Utilities, Overview of toolbars, PPT Orientation, slide layouts, Types of views.

Creating Front page of The presentation: Create a power point presentation using the features - 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

Task 7

Introduction to Excel: Overview of toolbars, accessing, saving excel files, Using help and resources. Create a excel using the features - 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, sorting, conditional formatting.

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

Task 8

Introduction to latex: Importance of LaTeX, Details of LaTeX word accessing, overview of toolbars, saving files and using help and resources, features to be covered in LaTeX word and LaTeX power point.

Creating project Certificate: Abstract Features to be covered:-Formatting Styles, Inserting table, Bullets and Numbering, Changing Text Direction, Cell alignment, Footnote, Hyperlink, Symbols, Spell Check , Track Changes, Images from files and clipart, Drawing toolbar and Word Art, Formatting Images, Textboxes and Paragraphs.

TEXT BOOKS:

1. H. S. Bawa (2007), Workshop Practice, Tata McGraw-Hill Publishing Company Limited, New Delhi.
2. B. Rajendra Prasad & P. M. M. S. Sarma (2002), Workshop Practice, SreeSai Publication, New Delhi.

REFERENCE BOOKS:

1. K. Jeyachandran, S. Natarajan, S. Balasubramanian (2007), A Primer on Engineering Practices Laboratory, Anuradha Publications, New Delhi.
2. T. Jeyapoovan, M. Saravanapandian, S. Pranitha (2006), Engineering Practices Lab Manual, Vikas Publishing House Private Limited, New Delhi
3. Workshop Technology, Part 1, W.A.J. Chapman, Viva Low Priced Student Edition.
4. Introduction to Information Technology, ITL Education Solutions limited, Pearson Education.
5. IT Essentials PC Hardware and Software Companion Guide Third Edition by David Anfinson and Ken.
6. Quamme. – CISCO Press, Pearson Education.
7. PC Hardware and A+Handbook – Kate J. Chase PHI (Microsoft)

SYLLABI FOR
II SEMESTER

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

B. Tech. EEE II SEMESTER **VCE-R15**

MATHEMATICS – II

Course Code: **A3006**

L	T	P	C
4	1	0	4

Course Overview:

This course focus on basic areas of theory and more advanced Engineering Mathematics topics which provide students with the relevant mathematical tools required in the analysis of problems in engineering and scientific professions. The topics covered include solution for linear systems, Eigen values & Eigen vectors, linear transformations, partial differential equations, Fourier series, Fourier transforms & Z - transforms. The mathematical skills derived from this course form a necessary base to analytical and design concepts encountered in the program.

Prerequisite(s):

- Mathematics – I (A3001)

Course Outcomes:

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

CO1.**Solve** system of linear equations using rank of a matrix.

CO2.**Examine** the nature of the Quadratic form by Eigen values and Eigen vectors.

CO3.**Classify** and solvePartial differential equations.

CO4.**Develop** Fourier series and Fourier transforms of a function.

CO5.**Apply** Z- Transforms to solve difference equations.

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

B. Tech. EEE II SEMESTER **VCE-R15**

MATHEMATICS – II

Course Code: **A3006**

L	T	P	C
4	1	0	4

SYLLABUS

UNIT – I (11 Lectures)

THEORY OF MATRICES: Real matrices: Symmetric, skew – symmetric and orthogonal matrices - Complex matrices: Hermitian, Skew - Hermitian and Unitary matrices - Elementary row and column transformations - Elementary matrix - Finding rank of a matrix by reducing to Echelon form and Normal form - Finding the inverse of a matrix using elementary row**/**column transformations (Gauss-Jordan method) - Consistency of system of linear equations (homogeneous and non- homogeneous) using the rank of a matrix - Solving $m \times n$ and $n \times n$ linear system of equations by Gauss elimination - Cayley-Hamilton Theorem (Statement and Verification) - Finding inverse and powers of a matrix by Cayley-Hamilton theorem.

UNIT – II (12 Lectures)

LINEAR TRANSFORMATIONS: Linear dependence and independence of vectors - Linear Transformation, Orthogonal Transformation - Eigen values and Eigen vectors of a matrix – Properties of eigen values and eigen vectors of real and complex matrices - Diagonalization of a matrix.Quadratic forms up to three variables - Rank, Index, Signature and Nature of quadratic form - Reduction of a quadratic form to canonical form using linear and orthogonal transformations.

UNIT – III (10 Lectures)

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 - Equations reducible to standard forms - Method of separation of variables for second order equations.

UNIT – IV (10 Lectures)

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

UNIT – V (13 Lectures)

FOURIER TRANSFORMS & Z - TRANSFORMS: Fourier integral theorem (statement) - Fourier sine and cosine integrals - Fourier transforms - Fourier sine and cosine transforms - Properties - Inverse transforms - Finite Fourier transforms.

Z-transforms: Definition - Some standard Z-transforms - Damping rule - Shifting rule - Multiplication by n - Initial and final value theorems - Inverse Z-transforms using partial fractions - Convolution theorem - Solution of difference equations by Z - transforms.

TEXT BOOKS:

1. B S Grewal (2012), *Higher Engineering Mathematics*, 42nd Edition, New Delhi, Khanna Publishers.
2. B V Ramana (2010), *Engineering Mathematics*, New Delhi, Tata Mc Graw Hill Publishing Co. Ltd

REFERENCE BOOKS:

1. Ervin Kreyszig, *Advanced Engineering Mathematics,* 10th*Edition,* New Jersy,John *Wiley*& Sons
2. T K V Iyengar, B Krishna Gandhi & Others. (2011), *Mathematical Methods*, Tenth Revised Edition New Delhi, S.Chand & Co. Ltd.
3. H K Dass, Er Rajnish Varma (2012), *Higher Engineering Mathematics*, Second Revised Edition, New Delhi, S.Chand & Co. Ltd.

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

B. Tech. EEE II SEMESTER **VCE-R15**

ENGINEERING PHYSICS

Course Code: **A3002**

L	T	P	C
3	1	0	3

Course Overview:

Engineering physics is the study of the combined disciplines of physics, engineering and mathematics in order to develop an understanding of the interrelationships of these three disciplines. Fundamental physics is combined with problem solving and engineering skills, which then has broad applications. Career paths for Engineering physics are usually "engineering, applied science or applied physics through research, teaching or entrepreneurial engineering". This interdisciplinary knowledge is designed for the continuous innovation occurring with technology.

Prerequisite(s): NIL

Course Outcomes:

Up on successful completion of this course, student will be able to:

CO1.Analyze crystal structures in terms of lattice parameters and interpret the structures using X-ray diffraction methods.

CO2.Apply the principles of quantum mechanics to analyze the properties of the semiconducting materials.

CO3.Categorize nano and dielectric materials. Discuss synthesis and react to environmental concerns due to nanotechnology.

CO4.Categorize magnetic materials and objectivize their role in science and technology. Apply magnetism to explain superconductivity.

CO5.Illustrate working of a laser and develop communication systems using optical fibers.

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

B. Tech. EEE II SEMESTER **VCE-R15**

ENGINEERING PHYSICS

Course Code: **A3002**

L	T	P	C
3	1	0	3

SYLLABUS

UNIT - I **(10 Lectures)**

INTRODUCTION TO CRYSTALLOGRAPHY: Space lattice, Unit cell, lattice parameters, Atomic radius, co-ordination number and packing factor of SC, BCC, FCC, and diamond, Miller indices, Crystal planes and directions, Interplanar spacing of orthogonal crystal systems.

X-Ray Diffraction: Basic principles of X-ray diffraction, Bragg's law, Laue method, Rotating Crystal Method, Powder method, applications of X- ray diffraction.

UNIT - II **(8 Lectures)**

PRINCIPLES OF QUANTUM MECHANICS: Waves and particles, De Broglie hypothesis, matter waves, Davisson and Germer experiment, G. P. Thomson experiment, Schrödinger's time independent wave equation, Application of Schrodinger equation (particle in one dimensional potential box).

SEMICONDUCTOR PHYSICS: Intrinsic and Extrinsic Semiconductors, p-n junction diode, Forward and reverse bias, V-I characteristics, Fermi level in Intrinsic and Extrinsic semiconductors (qualitative), Applications of Semiconductors (LED).

UNIT - III **(8 Lectures)**

NANO SCIENCE: Origin of Nano science, Nano scale, surface to volume ratio, Bottom-up and Top-down approaches; Synthesis: Sol-gel, Chemical vapour deposition, physical vapour deposition, pulsed laser vapour deposition methods; Applications of Nanomaterials.

DIELECTRIC PROPERTIES: Electric dipole moment, dielectric constant, Types of polarization (qualitative), Local Field, Clausius – Mossotti Equation, Piezoelectricity and Ferroelectricity and their applications.

UNIT - IV **(8 Lectures)**

MAGNETIC PROPERTIES: Magnetic moment, classification of magnetic materials, Weiss theory of ferromagnetism, hysteresis curve, soft and hard magnetic materials and their applications.

SUPERCONDUCTORS: Meissner effect, BCS Theory, Type-I and Type-II Superconductors, High temperature Superconductors, applications of superconductors.

UNIT - V **(8 Lectures)**

LASERS: Characteristics of lasers, spontaneous and stimulated emission of radiation, population inversion, Einstein's coefficients, Pumping mechanisms, 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, Functioning of Optical Fiber communication system, applications of optical fibers.

TEXT BOOKS:

1. Pillai, S.O. (2007), *Engineering Physics*, New Age International.
2. Arumugam.M (2005), *Engineering Physics*, Anuradha Publishers.

REFERENCE BOOKS:

1. Rajendran.V and Marikani.A(2004), *Engineering Physics,* Tata Mc Graw Hill Publications Ltd, 3rd Edition
2. H K Dass, Er Rajnish Varma (2012), *HigherEngineering Mathematics,* Second Revised Edition, S. Chand & Co. Ltd, New Delhi.
3. P.Sarah and M. Geetha (2012), *Engineering Physics and Engineering Chemistry*, VGS Booklinks, Hyderbad
4. M. Ratner, D. Ratner (2003), *Nanotechnology,* Pearson Edition, India.

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

B. Tech. EEE II SEMESTER **VCE-R15**

ENGINEERING CHEMISTRY

Course Code: **A3003**

L	T	P	C
3	1	0	3

Course Overview:

This course will involve minimum lecturing, content will be delivered through assigned reading and reinforced with large and small group discussions, as well as assigned in class (and occasional out of class) group activities. Water and its treatment for various purposes, engineering materials such as plastics, composites, ceramic, abrasives, their preparation, properties and applications, conventional and non-conventional energy sources, nuclear, solar, various batteries, combustion calculations, corrosion and control of metallic materials.

Prerequisite (s): NIL

Course Outcomes:

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

CO1. Apply the knowledge of standard electrode potentials of various metals and non-metals to protect them from corrosion.

CO2. Identify difference and similarities of three types of Batteries.

CO3. Compare different methods of softening of hard water.

CO4. Apply the knowledge of Materials, Fuels and Nano particles in controlling pollution.

CO5. Compare and contrast the chemical behaviour, properties and applications of engineering substances.

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

B. Tech. EEE II SEMESTER **VCE-R15**

ENGINEERING CHEMISTRY

Course Code: **A3003**

L	T	P	C
3	1	0	3

SYLLABUS

UNIT – I **(11 Lectures)**

ELECTROCHEMISTRY: Introduction, Conductance-Specific, Equivalent and Molar conductance, effect of dilution on electrolytic conductance.EMF: Galvanic Cells, Nernst equation, numerical problems. Concept of concentration cells, electro chemical series-applications.

BATTERIES: Primary and secondary cells, (Lechlanche cell, Lead-Acid cell, Ni- Cd cell, Lithium cells). Applications of batteries, Fuel cells: Hydrogen – Oxygen fuel cell, advantages of fuel cells.

CORROSION AND ITS CONTROL: Introduction, causes of corrosion, theories of corrosion – Chemical, Electrochemical corrosion. Corrosion control methods – Cathodic protection, sacrificial anode, impressed current cathode. Surface coatings – electroplating, metal cladding.Galvanizing.

UNIT – II **(8 Lectures)**

WATER TREATMENT: Introduction to Hardness, causes, expression of hardness, units. Types of hardness, numerical problems. Treatment of water: Internal treatment, types & External treatment: Zeolite process, Ion exchange process and Lime- soda process. Numerical problems on lime- soda and Zeolite process. Treatment of brackish water: Reverse osmosis and Electro dialysis.

UNIT – III **(10 Lectures)**

ENGINEERING MATERIALS:

A) HIGH POLYMERS: Introduction, Types of Polymerization. Plastics: Thermoplastic resins & Thermosetting resins, preparation, properties and engineering applications of plastics: polyethylene, Poly vinyl chloride, Teflon, Nylon. Rubbers: Natural rubber and vulcanization. Synthetic rubbers: Buna-S, Buna-N. Fibers: Polyester- applications. Conducting Polymers: Classification, doping and applications.

B) MATERIAL CHEMISTRY: Cement- Composition and manufacture of Port land Cement. Lubricants: Criteria of a good lubricant, classification. Refractory: Criteria of a good refractory, classification. Insulators & conductors: Classification of insulators. Characteristics of thermal & electrical insulators, Superconductors: Applications of Superconductors.

UNIT – IV **(7 Lectures)**

ENERGY SOURCES: Fuels: Classification -Conventional fuels: solid, liquid, gaseous fuels- comparison. Solid fuels: Coal- analysis- proximate and ultimate analysis, significance. Liquid fuels: Petroleum –origin, refining of petroleum. Synthetic petrol: Fischer Tropsch's and Bergius process. Gaseous fuels: Natural gas, Flue gas: Analysis of Flue gas by Orsat's method. Combustion: problems (calculation of amount and volume of oxygen for combustion).

UNIT – V **(7 Lectures)**

A) PHASE RULE: Gibb's phase rule expression, terms involved: Phase, Component and Degree of Freedom. Significance and limitations of phase rule. Phase diagrams: One component system- Water system. Two component system- Silver- lead system.

B) SURFACE CHEMISTRY: Adsorption: Types of adsorption. Adsorption isotherm: Langmuir adsorption isotherm, applications of adsorption. Colloid: Classification of colloids. Properties of colloid: Electrical & optical properties. Applications of colloids: Natural and industrial applications.

Nanomaterials: Introduction, preparation and applications of nanomaterial.

TEXT BOOKS:

1. S.S Dara & Mukkanti, (2006). Engineering Chemistry, S. Chand & Co. New Delhi.

REFERENCE BOOKS:

1. PC Jain & Monica Jain, (2008). Engineering Chemistry, Dhanpatrai Publishing Company.
2. K.N Mishra, R.P Mani &B. Rama Devi (2009). Chemistry of Engineering Materials, CENGAGE.
3. J.C Kuriacase & J Raja ram (2004), Engineering Chemistry, Tata McGraw Hills Co. New Del.

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

B. Tech. EEE II SEMESTER **VCE-R15**

ELECTRONIC DEVICES AND CIRCUITS

Course Code: **A3401**

L	T	P	C
4	1	0	4

Course Overview:

This course covers fundamental topics that are common to a wide variety of electronic devices, circuits and systems. The topics include right from the inception of evolution of semiconductor devices to their real time applications. This course starts with basics of semiconductors, review the operation and characteristics of semiconductor devices (namely, semiconductor diodes, BJTs, JFETs and MOSFETs), and build-up to more advanced topics in analog circuit designs. This course provides a basis for students to continue education by undertaking advanced study and research in the variety of different branches of semiconductor device applications.

Prerequisite(s):

- Engineering Physics (A3002)
- Basic Electrical Engineering(A3201)

Course Outcomes:

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

CO1.Analyze the physical behaviour of diodes and transistor.

CO2.Compare various rectifiers, filters, transistors, biasing circuits and transistor amplifier configurations.

CO3.Apply various stabilization and compensation techniques to obtain stable operating point of a transistor.

CO4.Analyze single stage amplifier circuits using small signal low frequency transistor model.

CO5.Design regulated power supply and amplifier circuits for given specifications.

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

B. Tech. EEE II SEMESTER **VCE-R15**

ELECTRONIC DEVICES AND CIRCUITS

Course Code: **A3401**

L	T	P	C
4	1	0	4

SYLLABUS

UNIT - I **(11 Lectures)**

SEMICONDUCTOR DIODE CHARACTERISTICS: Review of semiconductors, Continuity Equation, Hall Effect, and Open- circuited p-n junction, Energy band diagrams, the current components in p-n diode, Diode current equation, Volt-ampere characteristics, Ideal versus practical diodes, static and dynamic resistances, equivalent circuits, Temperature dependence, Transition and Diffusion capacitances.

UNIT – II **(12 Lectures)**

SPECIAL PURPOSE DIODES: Breakdown Mechanisms in Semiconductor diodes, Zener diode characteristics, Zener diode as voltage regulator, Principle of operation and Characteristics of Tunnel Diode (With the help of Energy band diagrams) and Varactor Diode.

RECTIFIERS AND FILTER: The P-N junction as a rectifier – Half Wave Rectifier, Full Wave Rectifier, Bridge Rectifier, Ripple Factor, Harmonic components in Rectifier Circuits, Filters – Inductor Filters, Capacitor Filters, L- section Filters, π- section Filters.

UNIT - III **(10 Lectures)**

BIPOLAR JUNCTION TRANSISTOR (BJT) - Construction, Principle of Operation, Amplifying Action, Common Emitter, Common Base and Common Collector configurations.

FIELD EFFECT TRANSISTOR (FET): JFET **-** Construction, Principle of Operation, Pinch-Off Voltage, Volt-Ampere Characteristic, Comparison of BJT and JFET. MOSFET - Depletion and Enhancement type MOSFETs, operation and volt-ampere characteristics.

UNIT - IV **(11 Lectures)**

BJT BIASING: Need for biasing, operating point, load line analysis, biasing and stabilization techniques: fixed bias, collector to base bias, voltage divider bias, Stabilization against variations in I_{CO}, V_{BE} and β, bias compensation techniques, thermal runaway, heat sink and thermal stability.

JFET BIASING: Biasing techniques: Fixed bias, Self-bias and Voltage divider bias**.**

UNIT - V **(12 Lectures)**

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.

JFET AMPLIFIERS: Small signal JFET model, common source amplifier, common drain amplifier, common gate amplifier.

TEXT BOOKS:

1. J. Millman, C. C. Halkias, and Satyabratha Jit (2011), Electronic Devices and Circuits, 3rd Edition, Tata McGraw Hill, New Delhi.
2. R.L. Boylestad and Louis Nashelsky (2006), Electronic Devices and Circuits, 9th Edition, Pearson/Prentice Hall.

REFERENCE BOOKS:

1. S. Salivahanan, N. Suresh Kumar, A. Vallavaraj (2008), Electronic Devices and Circuits, 2nd edition, Tata McGraw Hill, New Delhi.
2. Rober T. Paynter (2003), Introduction to Electronic Devices and Circuits, 6th edition, Pearson Education, New Delhi, India.

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

B. Tech. EEE II SEMESTER **VCE-R15**

DATA STRUCTURES

Course Code: **A3503**

L	T	P	C
4	1	0	4

Course Overview:

Data Structures is a subject of primary importance to the discipline of Computer Science and Engineering. It is a logical and mathematical model of sorting and organizing data in a particular way in a computer, required for designing and implementing efficient algorithms and program development. Different kinds of data structures like arrays, linked lists, stacks, queues, etc, are suited to different kinds of applications. Some specific data structures are essential ingredients of many efficient algorithms, and make possible the management of huge amounts of data, such as large databases and internet indexing services. Nowadays, various programming languages like C, C++ and Java are used to implement the concepts of Data Structures, of which C remains the language of choice for programmers across the world.

Prerequisite(s):

- Computer Programming (A3501)

Course Outcomes:

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

CO1.**Solve** computer software problems by using recursive, non-recursive techniques and, analyzevarious algorithms with respect to time and space complexity.

CO2.**Demonstrate** ability to exhibit knowledge of various searching and sorting techniques and identifythe potential benefits of each one over the other and propose appropriate technique to solveprogramming problems.

CO3.**Illustrate** the applications of linear stack and queue.

CO4.**Exhibit** the skills of demonstrating use of linked lists.

CO5.**Design** novel solutions for simple real life problems using the concepts of non linear datastructures.

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

B. Tech. EEE II SEMESTER **VCE-R15**

DATA STRUCTURES

Course Code: **A3503**

L	T	P	C
4	1	0	4

SYLLABUS

UNIT – I **(12 Lectures)**

INTRODUCTION TO DATA STRUCTURES AND ALGORITHMS: Basic Terminology, Classification of Data Structures, Operations on Data Structures, Algorithms, Different Approaches to Design an Algorithm, Control Structures used in Algorithms, Time and Space Complexity, Asymptotic Notations, Linear and Binary Recursion, Fibonacci sequence, Towers of Hanoi.

SEARCHING: Basic Terminologies, Linear Search, Binary Search, and FibonacciSearch.

UNIT – II **(12 Lectures)**

SORTING TECHNIQUES: Introduction To Sorting, Sorting Techniques: Bubble Sort, Selection Sort, Insertion Sort, Shell Sort, Merge Sort, Quick Sort, Radix Sort, Comparison of Sorting Algorithms.

UNIT – III **(10 Lectures)**

LINEAR DATA STRUCTURES - STACKS: Introduction to Stacks, Array Representation of Stacks, Operations on a Stack, Applications of Stacks-Infix-to-Postfix Transformation, evaluating Postfix Expressions.

QUEUES: Introduction to Queues, Array Representation of Queues, Operations on a Queue, Types of Queues-De-Queue, Circular Queue, Applications of Queues-Round Robin Algorithm.

UNIT – IV **(12 Lectures)**

LINKED LISTS: Introduction, Singly Linked List, Representation of a Linked List in Memory, Operations on a Single Linked List, Applications of Linked Lists- Polynomial Representation and Sparse Matrix Manipulation, Circular Linked Lists, Doubly Linked Lists, Linked List Representation and Operations of Stack, Linked List Representation and Operations of Queue.

UNIT – V **(12 Lectures)**

NON LINEAR DATA STRUCTURES -TREES: Basic Terminologies, Definition and Concepts of Binary Trees,Representations of a Binary Tree using Arrays and Linked Lists, Operations on a Binary Tree- Insertion, Deletion, Traversals, Heap Sort, Types of Binary Trees- Expression Trees,Binary Search Trees, Threaded Binary Trees.

GRAPHS: Introduction, Graph Terminologies, Representation of Graphs- Set, Linked, Matrix, Graph Traversals- Breadth First Search (BFS) and Depth First Search (DFS), Minimum Spanning Trees.

TEXT BOOKS:

1. ReemaThareja (2014), *Data Structures Using C*, 2nd Edition, Oxford University Press India.
2. Samanta Debasis (2012), *Classic Data Structures*, 2nd Edition, Prentice Hall of India.

REFERENCE 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 (2012), *Data Structures: A Pseudo code approach with C*, 2nd Edition, CENGAGE Learning, India.
3. G. A. V. Pai (2008), *Data Structures and Algorithms: Concepts, Techniques and Applications*, McGraw-Hill Education, India.

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

B. Tech. EEE II SEMESTERVCE-R15

ENGINEERING PHYSICS AND ENGINEERING CHEMISTRY LAB

Course Code: **A3007**

L	T	P	C
0	0	3	2

ENGINEERING PHYSICS LAB

Course Overview:

Engineering physics laboratory course includes the experimental methods for the determination of mechanical property (Rigidity modulus of a given material), frequency of an AC signal, basic electronic circuits (LED, RC circuit), and to study characteristics of LASERS & Optical fiber (LASER wavelength, divergence, Numerical aperture of fiber, Losses in fibers). This interdisciplinary knowledge is designed for the continuous innovation occurring with technology.

Prerequisite(s): NIL

Course Outcomes:

Up on successful completion of this course, student will be able to:

CO1. Analyze the rigidity modulus of the given material to interpret the mechanical properties.

CO2. Estimate the frequency of AC power supply and time constant of a R-C circuit.

CO3. Apply the principles of optics to evaluate the characteristics of LED, laser and optical fibers.

CO4. Apply various titrations for the estimation of strengths of solutions and hardness of water.

CO5. Analyze the effect of temperature on viscosity and surface tension of liquids.

ENGINEERING CHEMISTRY LAB

Course Overview:

Although engineers are not expected to carry out chemical analysis by themselves it is absolutely essential for them to have appreciation regarding the principles, applications, merits and limitations of the modern techniques of instrumental chemical analysis. The objective of few instrumental techniques, namely, pH metry, potentiometry, conductometry is to inculcate the knowledge of engineering chemistry discipline. The experiments on ion selective electrodes are proved to be vital in engineering applications on industrial level.

Prerequisite(s): NIL

Course Outcomes:

Up on successful completion of this course, student will be able to:

CO1. **Develop** the applications of current chemical and scientific theories.

CO2. **Design**, carry out, record and analyze the results of chemical experiments.

CO3. **Analyze** the importance of temperature for Viscosity, Surface Tension and explain the instrumental components and principles of operation.

CO4. **Examine** the ethical, historical, philosophical, and environmental aspects as factual problems and issues facing chemists.

CO5. **Evaluate** data collected to determine the identity, purity, and percent yield of products.

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

B. Tech. EEE II SEMESTERVCE-R15

ENGINEERING PHYSICS AND ENGINEERING CHEMISTRY LAB

Course Code: **A3007**

L	T	P	C
0	0	3	2

LIST OF EXPERIMENTS (ENGINEERING PHYSICS LAB):

1. Determination of Rigidity modulus (η) of the material of the given wire using a Torsional pendulum.
2. Determination of Frequency (n) of an AC supply using sonometer.
3. Study of V-I characteristics of light emitting diode and determination of the Threshold voltage of LED.
4. Study of exponential decay of charge in a R.C. Circuit and determination of time constant of R.C circuit
5. Determination of numerical aperture of a given optical fiber.
6. Determination of wavelength of a given source of laser light using a plane transmission grating by normal incidence method.
7. Determination of angular divergence of the laser beam.
8. Determination of Losses in optical fibers.
9. Determination of Dispersive power of material of a prism(Demonstration Experiment).

LIST OF EXPERIMENTS (ENGINEERING CHEMISTRY LAB):

INSTRUMENTAL METHODS:

1. **Conductometry:**
   a. Conductometric titration of strong acid Vs strong base.
   b. Conductometric titration of mixture of acids Vs strong base.

2. **Potentiometry:**
   a. Potentiometric titration of strong acid Vs strong base.
   b. Potentiometric titration of weak acid Vs strong base.

3. **Complexometry:**
   a. Estimation of hardness of water by EDTA method.

4. **Physical Properties:**
   a. Determination of viscosity of sample oil by Ostwald's viscometer
   b. Determination Surface Tension of lubricants.

5. **Organic Synthesis:**
   a. Preparation of organic compounds Aspirin

DEMONSTRATION EXPERIMENTS

1. Preparation of Thiokol rubber

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

B. Tech. EEE II SEMESTERVCE-R15

DATA STRUCTURES LAB

Course Code: **A3504**

L	T	P	C
0	0	3	2

Course Overview:

This Laboratory is meant to make the students to learn efficient data structures and algorithms that use them, designing and writing large programs. This laboratory emphasizes on how to choose appropriate data structures for solving real world problems with best efficiency and performance.

Prerequisite(s): NIL

Course Outcomes:

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

CO1. **Implement** various searching techniques suitable to resolve data searching problems.

CO2. **Demonstrate** ability to exhibit knowledge of various sorting techniques and identify the potentialbenefits of each one over the other.

CO3.**Illustrate** about linear data structures like stacks and queues representations and operations andapply them to design and build C based real-time applications.

CO4.**Design** and implement novel solutions for simple real life problems using the concepts of nonlinear data structures.

CO5. **Debug** erroneous programs related to the course.

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

B. Tech. EEE II SEMESTERVCE-R15

DATA STRUCTURES LAB

Course Code: **A3504**

L	T	P	C
0	0	3	2

LIST OF EXPERIMENTS

Week- 1: (Recursion function)

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

Week- 2: (Searching Techniques)

2. Write C programs that use both recursive and non-recursive functions to perform for the following:
   a) Searching operations for a key value in a given list of integers by using linear search technique.
   b) Searching operations for a key value in a given list of integers by using binary search technique.
   c) Searching operations for a key value in a given list of integers by using Fibonacci search technique.

Week-3: (Sorting Techniques)

3. Write C programs for the following:
   a) Implement Bubble sort, to sort a given list of integers in descending order.
   b) Implement Selection sort, to sort a given list of integers in ascending order.
   c) Implement Insertion sort, to sort a given list of integers in descending order.

Week-4: (Sorting Techniques)

4. Write C programs for the following:
   a) Implement Shell sort, to sort a given list of integers in descending order.
   b) Implement Merge sort, to sort a given list of integers in ascending order.

Week-5: (Sorting Techniques)

5. Write C programs for the following:
   a) Implement Quick sort, to sort a given list of integers in ascending order.
   b) Implement radix sort, to sort a given list of integers in ascending order.

Week- 6: (Linked List)

6. Write C programs for the following:
   a) Uses functions to perform the following operations on single linked list.
      (i) Creation (ii) insertion (iii) deletion (iv) traversal
   b) To store a polynomial expression in memory using linked list.
   c) To represent the given sparse matrix using linked list

Week-7: (Linked List)

7. Write C programs for the following:
   a) Uses functions to perform the following operations on Circular linked list.
      (i) Creation (ii) insertion (iii) deletion (iv) traversal
   b) Uses functions to perform the following operations on double linked list.
      (i) Creation (ii) insertion (iii) deletion (iv) traversal in both ways.

Week- 8: (Stack)

8. Write C programs for the following:
   a) Implement Stack operations using array.
   b) Implement Stack operations using linked list.
   c) Write a function called copystack() that copies those contents of one stack into another. The algorithm passes two stacks, the source stack and the destination stack. The order of the stack must be identical. (Hint: Use a temporary stack to preserve the order).

Week-9: (Stack)

9. Write C programs for the following:
   a) Uses Stack operations to convert infix expression into postfix expression.
   b) Uses Stack operations for evaluating the postfix expression.

Week-10: (Queue)

10. Write C programs for the following:
   a) Implement Queue operations using array.
   b) Implement Queue operations using linked list.

Week-11: (Trees)

11. Write C programs for the following:
   a) To create a Binary Tree of integers.
   b) Uses Recursion for traversing a binary tree in preorder, in-order and post-order.
   c) Write a C program to implement the following operations on Binary Search Tree.
      (i) insert (ii) delete (iii) search (iv) traverse

Week-12: (Graphs)

12. Write C programs for the following:
   a) Implement the Breadth First Search Graph Traversal.
   b) Implement the Depth First Search Graph Traversal.

Week-13: (Additional Programs)

13. Write C programs for the following:
   a) Consider the motor racing game in which there are 7 participants. Out of 7, one quits the race due to bad vehicle condition. Others completed the race and their scores are as follows: p1 (56 points), p2 (96 points), p3 (40 points), p4 (89 points), p5 (66 points), p6 (22 points). Now write a program for sorting the positions of players in ascending order based on points scored using merge sort and print the highest score.
   b) Implement heap sort, to sort a given list of integers in ascending order.
   c) Reverse elements of a single linked list.
   d) Non-recursion for traversing a binary tree in preorder, in-order and post-order.

REFERENCE BOOKS:

1. Reema Thareja (2014), *Data Structures Using C*, 2nd Edition, Oxford University Press India.
2. Debasis, Samanta (2012), *Classic Data Structures*, 2nd Edition, Prentice Hall of India.
3. Horowitz, Ellis, Sahni, Sartaj, Anderson-Freed, Susan (2008), *Fundamentals of Data Structure in C*, 2nd Edition, University Press, India.
4. Richard F. Gilberg, Behrouz A. Forouzan (2012), *Data Structures: A Pseudo code approach with C*, 2nd Edition, CENGAGE Learning, India.

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

B. Tech. EEE II SEMESTERVCE-R15

ELECTRONIC DEVICES AND CIRCUITS LAB

Course Code: **A3403**

L	T	P	C
0	0	3	2

Course Overview:

The electronic devices and circuits lab is one of the first electronics and communication engineering lab course that a student will undergo. The students become familiar with laboratory test and measuring instruments such as CRO, dual regulated power supply, function generator and multimeter. The exposure of the students to these instruments and the knowledge about basic electronic components will enable them to design, construct and test the basic electronic circuits such as power supplies and amplifiers.

Prerequisite(s): NIL

Course Outcomes:

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

CO1.Identify and use various electronic components, test and measuring instruments that are frequently used in experimentation of various circuits.

CO2.Interpret the V - I characteristics of PN junction diode, Zener diode and Bipolar Junction Transistor so as to realize the applications like switching, regulation and etc,.

CO3.Construct a simple regulated power supply by making use of rectifiers, filters and regulators.

CO4.Apply various biasing techniques to fix the operating point and stabilize given electronic device like BJT and FET.

CO5.Build various single stage amplifiers that are frequently used in the construction of real time applications.

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

B. Tech. EEE II SEMESTERVCE-R15

ELECTRONIC DEVICES AND CIRCUITS LAB

Course Code: **A3403**

L	T	P	C
0	0	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

PART - B:

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

SYLLABI FOR
III SEMESTER

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

B. Tech. EEE III SEMESTERVCE-R15

MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS

Course Code:**A3011**

L	T	P	C
3	0	0	3

Course Overview:

This course addresses the concepts, principles and techniques of Managerial Economics and Financial Analysis. It covers the fundamentals of Managerial Economics and its various techniques such as demand, elasticity of demand, demand forecasting, production laws, cost concepts, price determination in various type of markets and pricing strategies.Apart from Capital budgeting and its techniques,Financial Analysis gives clear idea about concepts and conventions of accounting, accounting procedures like journal, ledger, trial balance, balance sheet and interpretation of financial statements through ratios.

Prerequisite(s): NIL

Course outcomes:

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

CO1. Explain and infer the concepts of Managerial Economics and Financial Accounting.

CO2. Analyze the demand, production, cost and break even to know interrelationship of among variables and their impact.

CO3. Classify the market structure to decide the fixation of suitable price.

CO4. Apply capital budgeting techniques to select best investment opportunity.

CO5. Prepare financial statements and analyze them to assess financial health of business.

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

B. Tech. EEE III SEMESTERVCE-R15

MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS

Course Code: **A3011**

L	T	P	C
3	0	0	3

SYLLABUS

UNIT – I

INTRODUCTION TO MANAGERIAL ECONOMICS & DEMAND: Managerial Economics - Definition, Nature and Scope of Managerial Economics, –Demand Analysis: Demand- Types, Demand Determinants, Law of Demand and its exceptions.

ELASTICITY OF DEMAND: Types, Measurement and Significance, Demand Forecasting: Meaning, methods of demand forecasting.

UNIT – II

THEORY OF PRODUCTION: Production function – Isoquants and Isocosts, MRTS, Least Cost Combination of Inputs. Laws of Production, Internal and External Economies of Scale.

COST & BREAK EVEN ANALYSIS: Cost concepts, Opportunity cost, Fixed vs. Variable costs, Explicit costs Vs. Implicit costs, Out of pocket costs vs. Imputed costs. Break-even Analysis (BEA)-Determination of Break-Even Point (simple problems) - Managerial Significance and limitations of BEA.

UNIT – III

INTRODUCTION TO MARKETS: Market structures-Types of competition, Features of Perfect competition, Monopoly and Monopolistic Competition, oligopoly - Price-Output Determination in case of Perfect Competition, Monopoly.

PRICING: Objectives and Policies of Pricing- Methods of Pricing**:** Cost Plus Pricing, Marginal Cost Pricing, Sealed Bid Pricing, Going Rate Pricing, Limit Pricing, Market Skimming Pricing, Penetration Pricing, Two-Part Pricing, Block Pricing, Bundling Pricing, Peak Load Pricing, Cross Subsidization.

UNIT – IV

CAPITAL AND CAPITAL BUDGETING: Capital and its significance, Types of Capital, Components of working capital & Factors determining the need of working capital. Methods and sources of raising finance.

CAPITAL BUDGETING: Nature and scope of capital budgeting, features of capital budgeting proposals, Methods of Capital Budgeting: Payback Method, Accounting Rate of Return (ARR), Net Present Value Method, Profitability Index, Internal rate of return (simple problems).

UNIT – V

INTRODUCTION TO FINANCIAL ACCOUNTING: Accounting Principles - Concepts,Conventions, Double-Entry Book Keeping, Journal, Ledger, Trial Balance- Final Accounts with simple adjustments.

FINANCIAL ANALYSIS THROUGH RATIOS: Importance, types: Liquidity Ratios, Activity Ratios, Turnover Ratios and Profitability ratios. (simple problems).

TEXT BOOK:

1. A.R. Aryasri (2011), *Managerial Economics and Financial Analysis*, TMH, India.

REFERENCE BOOKS:

1. Varshney&Maheswari(2003), *Managerial Economics*, Sultan Chand.
2. Ambrish Gupta (2011), *Financial Accounting for Management: An Analytical Perspective*, 4th Edition, Pearson Education, New Delhi.
3. Richard Lipsey and Alec Chrystal (2012), *Economics*, Oxford University Press.
4. Domnick Salvatore: *Managerial Economics in a Global Economy*, 4th Edition,Thomson.

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

B. Tech. EEE III SEMESTERVCE-R15

DIGITAL LOGIC DESIGN

Course Code: **A3404**

L	T	P	C
3	1	0	3

Course Overview:

This course provides a modern introduction to logic design and the basic building blocks used in digital systems, in particular digital computers. It starts with a discussion of information representation and number systems, Boolean algebra, logic gates and minimization techniques. The second part of the course deals with combinational and sequential logic, where in the procedures to analyze and design the same will be discussed. State machines will then be discussed and illustrated through case studies of complex systems. The course has an accompanying lab that integrates hands-on experience with LabVIEW software including logic simulation, implementation and verification of all the combinational and sequential circuits. Moreover, this course forms the basis for the study of advanced subjects like Computer Architecture and Organization, Microprocessors and Interfacing and Embedded systems.

Prerequisite(s): NIL

Course Outcomes:

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

CO1. **Demonstrate** the importance of various number systems and to perform different arithmetic operations on them.

CO2. **Make use of** Boolean algebra postulates-map and tabulation method to minimize Boolean functions and to implement with logic gates.

CO3. **Construct and Analyze** various combinational and sequential circuits used in digital systems such as adders, sub-tractors, codeconvertors, decoders, encoders, multiplexer, flip flop, register and counters.

CO4. **Design** various combinational PLDs such as ROMs, PALS, PLAS and PROMs.

CO5. **Minimize** the finite state machine and to construct special flow charts called ASMs charts to define digital hardware algorithms.

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

B. Tech. EEE III SEMESTERVCE-R15

DIGITAL LOGIC DESIGN

Course Code: **A3404**

L	T	P	C
3	1	0	3

SYLLABUS

UNIT-I

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

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, Sum of Products and Product of Sums simplification, don't-care conditions, NAND and NOR implementation, AND-OR-INVERT,OR-AND-INVERT implementations, exclusive – OR function,The tabulation(Quine Mccluskey) method, determination and selection of Prime implicants.

UNIT-III

COMBINATIONAL LOGIC: Introduction, combinational circuits, analysis procedure, design procedure, binary adder, binary subtractor, BCD adder, binary multiplier, Magnitude comparator, decoder, encoders, multiplexers.

SEQUENTIAL LOGIC: Classification of Sequential circuits (Synchronous, Asynchronous, Pulse mode, Level mode with examples), latches, Flip-Flops, analysis of clocked sequential circuits, state reduction and assignment, design procedure.

UNIT-IV

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

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

FINITE STATE MACHINES (FSM): Finite State Machine - Capabilities and limitations, Mealy and Moore models minimization of completely specified sequential machines, Partition techniques, incompletely specified sequential machines using merger table.

ALGORITHMIC STATE MACHINES (ASM): Salient features of ASM chart, Simple examples, System design using data path and control sub-systems – Control implementations – Examples of weighing machine and Binary multiplier.

TEXT BOOKS:

1. M. Morris Mano, Michael D. Ciletti (2008), *Digital Design*, 4th edition, Pearson Education/PHI, India.
2. Thomas L. Floyd (2006), *Digital fundamentals*, 9th edition, Pearson Education International.

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.

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

B. Tech. EEE III SEMESTERVCE-R15

NETWORK ANALYSIS

Course Code: **A3203**

L	T	P	C
3	1	0	3

Course Overview:

Network Analysis is a second course on electric circuits and is intended to both enhance the knowledge of students with regard to electric circuits and develop skills in analysis. Although the focus is electric circuits, the theory and skills learned are useful in other areas as well. The course makes the student understand the basic philosophy behind the network theorems and its application to solve dc and ac circuits. The course introduces the basic concepts of poly phase systems and the importance of three phase systems. The course also emphasizes the basic principles of transients for first order and second order DC and AC systems using time-domain analysis and Laplace transform approach. The course exposes the students to the importance of DC circuit analysis in their electrical engineering career and impresses how important AC circuit analysis is to their future success as electrical engineers. The various design considerations of network filters and attenuators and the application of Fourier transforms & Fourier series for electric circuits are also discussed.

Prerequisite(s):

- Basic Electrical Engineering(A3201)
- Engineering Mathematics (A3001)

Course Outcomes:

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

CO1 **. Apply** the knowledge of AC fundamentals to 1-phase coupled circuits, resonant circuits and filter circuits.

CO2 **. Identify** various 3-phase circuits and connections in the analysis of balanced and unbalanced circuits.

CO3 **. Measure** active, reactive power and power factor for 3-phase balanced and unbalanced loads.

CO4 **. Examine** the behavior of circuit elements by drawinglocus diagrams, phasor diagrams and frequency response for series and parallel RLC circuits.

CO5 **. Analyze** transient and steady state behavior of RLC circuits for DC and AC excitations using differential equations and Laplace transform technique.

CO6 **. Design** various resonant, filter and attenuator networks for given design specifications.

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

B. Tech. EEE III SEMESTERVCE-R15

NETWORK ANALYSIS

Course Code: **A3203**

L	T	P	C
3	1	0	3

SYLLABUS

UNIT - I

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.

RESONANCE: Resonance for series and parallel circuits, Tank circuit, concept of band width and Q factor.

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.

TEXT BOOKS:

1. William Hart Hayt, Jack Ellsworth Kemmerly, Steven M. Durbin (2007), *Engineering Circuit Analysis,* 7th edition, McGraw-Hill Higher Education, 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 (2010), *Electrical Circuits, 5*rd edition, Dhanpat Rai & Sons Publications, New Delhi.
3. Van Valkenburg, M. E. (1974), *Network Analysis*, 3rd Edition, Prentice Hall of India, New Delhi.
4. A. Sudhakar, Shyammohan S. Palli (2003), *Electrical Circuits*, 2nd Edition, Tata Mc Graw Hill, New Delhi.

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

B. Tech. EEE III SEMESTERVCE-R15

ELECTRO MAGNETIC FIELDS

Course Code: **A3204**

L	T	P	C
4	0	0	4

Course Overview:

The course is to provide students with an introduction to the fundamentals of electrostatics, magnet statics and electromagnetic and to analyze the basic concepts of electromagnetic field theory along with static electromagnetic behavior, properties of dielectrics, magnetic materials and time-varying Fields. This course also emphasizes the physical understanding and practical applications of electromagnetics in Power Systems and Electronics

Prerequisite(s): NIL

Course Outcomes:

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

CO1. Apply Orthogonal coordinate systems to solve problems related Electric and magnetic fields from charge distributions.

CO2. Analyse Electric and Magnetic fields due to charge configurations using Coulombs law, Guass's law, Biot-Savart's Law and Ampere's Law.

CO3. Evaluate the capacitance, Inductances and Magnetic forces for conductors Electromagnetic fields.

CO4. Investigate the behaviour of Electric and Magnetic Fields in Static and Time Varying Fields by Maxwell's equations.

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

B. Tech. EEE III SEMESTERVCE-R15

ELECTRO MAGNETIC FIELDS

Course Code: **A3204**

L	T	P	C
4	0	0	4

SYLLABUS

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.

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

B. Tech. EEE III SEMESTERVCE-R15

ELECTRICAL MACHINES – I

Course Code: **A3205**

L	T	P	C
3	1	0	3

Course Overview:

This course deals with the D.C. Machines (Motor & Generator), basic electromechanical energy principle, design of windings used in D.C. Machines, process of commutation & armature reaction in D.C. Machines, types & characteristics of DC generators & motors, speed control and testing methods of D.C. Motors. Also the concepts of Principle, constructional and operation of single phase and three phase transformers will be discussed along with the different operating conditions of the transformers.

Prerequisite(s): NIL

Course Outcomes:

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

CO1.**Apply** the knowledge of basic principles and construction of DC machines and Transformers for various applications**.**

CO2.**Analyze** the characteristics and performance of DC machines for a suitable application.

CO3.**Apply** the knowledge of armature reaction and commutation to suggest suitable method for improving commutation.

CO4.**Analyse** speed control techniques and starters of dc motors and suggest a suitable method for a given application.

CO5.**Analyze** the performance of 1-Ø and 3-Ø transformers for different loading conditions.

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

B. Tech. EEE III SEMESTERVCE-R15

ELECTRICAL MACHINES – I

Course Code: **A3205**

L	T	P	C
3	1	0	3

SYLLABUS

UNIT - I

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 – II

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 excited 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 – III

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.

TESTING OF D.C. MACHINES: Testing of D.C. machines- Losses - Constant & Variable losses, calculation of efficiency, and 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.

UNIT - IV

CONSTRUCTION, OPERATION & 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.

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 - V

POLYPHASE TRANSFORMERS: Polyphase transformers - Polyphase connections - Y/Y, Y/Δ, Δ/Y, Δ/Δ and openΔ, 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.

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.

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

B. Tech. EEE III SEMESTERVCE-R15

MATHEMATICS – III

Course Code: **A3009**

L	T	P	C
4	0	0	4

Course Overview:

This course develops the theory of functions of a complex variable, emphasizing their geometric properties and indicating some applications. This course deals with more advanced Engineering Mathematics topics which provide students with the relevant mathematical tools required in the analysis of problems in engineering and scientific professions. Topics include the Special functions like Gamma and Beta functions, Bessel functions, Legendre's functions; Analyticity of a complex function Cauchy-Riemann equations and Milne-Thomson method; Elementary functions including exponential, circular, hyperbolic and logarithmic functions of a complex variable; Conformal mapping, Complex integration, Cauchy's integral theorem & Cauchy's theorem; Taylor's and Laurent's Series expansions; the calculus of residues and various methods of contour integration. The mathematical skills derived from this course form a necessary base to analytical and design concepts encountered in the program.

Prerequisite(s): Nil

Course Outcomes:

After completing this course, the student will be able to:

CO1. Evaluate improper integrals using Beta and Gamma functions; distinguish the concepts of Bessel and Legendre functions.

CO2. Test for analyticity of complex functions using Cauchy-Riemann equations.

CO3. Identify real and imaginary parts of elementary functions; apply conformal mapping to transform complex regions into simpler regions.

CO4. Develop analytic function in series form using Taylor's series and Laurent's series.

CO5. Evaluate integrals along a contour using Cauchy's integral formula and Residue theorem.

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

B. Tech. EEE III SEMESTERVCE-R15

MATHEMATICS - III

Course Code: **A3009**

L	T	P	C
4	0	0	4

SYLLABUS

UNIT - I

SPECIAL FUNCTIONS: Gamma and Beta functions and their properties - Evaluation of improper integrals using. Bessel's functions – properties - recurrence relations – orthogonality.Legendre Polynomials – properties - Rodrigue's formula - recurrence relations – orthogonality.

UNIT - II

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

UNIT - III

ELEMENTARY FUNCTIONS: Exponential, circular, hyperbolic and logarithmic functions of a complex variable -General and principal value of a logarithmic function.

CONFORMAL MAPPING: Geometrical interpretation of $w = f(z)$. Some standard transformations: Translation, rotation, inversion and Bilinear transformation. Fixed points, properties and invariance of cross ratio under bilinear transformation. Determination of bilinear transformation mapping three given points.Conformal transformation, special conformal transformations:

$$z^2, z+\frac{1}{z},\ e^z, \sin z,\ \cos z, \sinh z, \cosh z$$

UNIT - IV

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 and Laurent's series. Zeros, singular points and poles of an analytic function.

UNIT - V

CALCULUS OF RESIDUES: Residues, Residue theorem, calculation of residues. Evaluation of real definite Integrals of the type: (a) $\int_0^{2\pi} f(\cos\theta, \sin\theta)d\theta$ (b) $\int_{-\infty}^{\infty} f(x)dx$ (c) $\int_{-\infty}^{\infty} e^{imx} f(x)dx$ (d) Integration by indentation

TEXT BOOKS:

1. B S Grewal (2012), *Higher Engineering Mathematics*, 42nd Edition, Khanna Publishers, New Delhi.
2. T K V Iyengar, B Krishna Gandhi & Others (2012), *Engineering Mathematics Volume - III*, 9th Revised Edition, S. Chand & Co. Ltd, New Delhi.

REFERENCE BOOKS:

1. Ruel V Churchill, James W Brown (2010), *Complex Variables and Applications,* 7th edition, Tata McGraw Hill Publishing Co. Ltd, New Delhi.
2. H K Dass, ErRajnish Varma (2012), *Higher Engineering Mathematics,* Second Revised Edition, S. Chand &Co. Ltd, New Delhi.

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

B. Tech. EEE III SEMESTERVCE-R15

NETWORKS LAB

Course Code: **A3207**

L	T	P	C
0	0	3	2

Course Overview:

The objective is to make them familiar with basic principles of Electrical Engineering. The course addresses the underlying concepts & methods behind Electrical Engineering. The course presents a problem oriented introductory knowledge of the Fundamentals of Electrical Engineering and to focus on the study of basic electrical parameters, basic principles, different types of electrical circuit and methods to solve electrical circuit

Prerequisite(s):

- Network Analysis(A3203)

Course Outcomes:

Upon the completion of course students will be able to

CO1. Apply knowledge of circuit fundamental to verify network theorems and two port parameters for different circuits using MYDAC and Multisim.

CO2. Apply ohms law, mesh and nodal analysis for different circuits using MYDAC and Multisim.

CO3. Analyze transient analysis of RL, RC and RLC circuit using MYDAC and Multisim.

CO4. Determine self, mutual inductance and coefficient of coupling of magnetic circuits.

CO5. Analyze filter circuits using MYDAC and Multisim.

CO6. Analyze diode, opamp and ac circuit using MYDAC and Multisim.

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

B. Tech. EEE III SEMESTERVCE-R15

NETWORKS LAB

Course Code: **A3207**

L	T	P	C
0	0	3	2

LIST OF EXPERIMENTS

1. Multisim verification of theorems:
   a. Ohms law
   b. Thevenin, Norton, Maximum power transfer theorems
   c. Super position and reciprocity theorems
   d. Milliman and compensation theorems
2. Multisim verification of:
   a. Mesh analysis
   b. Nodal analysis
3. Mulitism verification of
   a. High pass and low pass circuits
   b. Band pass filters
4. Multisim verification of
   I. Transient analysis of RL circuit
   II. Transient analysis of RC circuit
   III. Transient analysis of RLC circuit
5. Multisim verification of:
   a. Z and Y parameters
   b. Hybrid and transmission parameters
   c. Locus diagrams
6. Multisim verification of diodes and op-amps
7. My DAQ verification of:
   a. Thevenin, Norton, Maximum power transfer theorems
   b. Super position theorem
8. My DAQ verification of:
   a. High pass and low pass circuits
   b. Band pass filters
9. My DAQ verification of:
   a. Transient analysis of RL circuit
   b. Transient analysis of RC circuit
   c. Transient analysis of RLC circuit
10. My DAQ verification of:
    a. Z and Y parameters
    b. Hybrid and transmission parameters
    c. Locus diagrams
11. My DAQ verification of AC circuit
12. Determination of Self, Mutual inductance and coefficient of coupling
13. MY DAQ verification of diodes and op-amps

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

B. Tech. EEE III SEMESTERVCE-R15

ELECTRICAL MACHINES - I LAB

Course Code: **A3208**

L	T	P	C
0	0	3	2

Course Overview

This course deals with the D.C. Machines (Motor & Generator), basic electromechanical energy principle, characteristics of DC generators & motors, speed control and testing methods of D.C. Motors. Also deals with the conduction of different tests on transformers.

Prerequisite(s):

- Network Analysis(A3203)
- Electromagnetic field (A3204)

Course Outcomes:

Upon the completion of course students will be able to

CO1.**Apply** suitable testing method for a given DC machine or transformer to calculate efficiency.

CO2.**Analyse** the excitation methods and characteristics of dc generators by conducting suitable test.

CO3.**Apply** the suitable test to calculate the voltage regulation of a transformer.

CO4.**Analyse** speed control techniques of dc motors and suggest a suitable method for a given application.

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

B. Tech. EEE III SEMESTERVCE-R15

ELECTRICAL MACHINES - I LAB

Course Code: **A3208**

L	T	P	C
0	0	3	2

LIST OF EXPERIMENTS

1. Magnetization and Load characteristics of DC shunt generator.
2. Load test and Fields test on DC series machine.
3. Load test on DC compound generator.
4. Brake test on DC compound motor.
5. Brake test on DC series motor.
6. Brake test and Retardation test on DC Shunt motor.
7. Hopkinson's test on DC shunts machines.
8. Predetermination of efficiency of a DC machine (Swinburne's test) and Speed control of DC shunt motor.
9. Speed control of DC shunt motor by Ward Leonard method.
10. O.C. & S.C. Tests on Single phase Transformer.
11. Sumpner's test on a pair of single phase transformers.
12. Scott connection of transformers.

SYLLABI FOR
IV SEMESTER

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

B. Tech. EEE IV SEMESTERVCE-R15

ENVIRONMENTAL SCIENCE

Course Code: **A3010**

L	T	P	C
3	0	0	3

Course Overview:

Environmental study is interconnected; interrelated and interdependent subject. Hence, it is multidisciplinary in nature. The present course is framed by expert committee of UGC under the direction of Honorable Supreme Court to be as a core module syllabus for all branches of higher education and to be implemented in all universities over India. The course is designed to create environmental awareness and consciousness among the present generation to become environmental responsible citizens. The course description is: multidisciplinary nature of environmental studies, Natural Resources: Renewable and non-renewable resources; Ecosystems; Biodiversity and its conservation; Environmental Pollution; Social Issues and the Environment; Human Population and the Environment; pollution control acts and Field Work. The course is divided into five chapters for convenience of academic teaching followed by field visits.

Prerequisite(s): NIL

Course Outcomes:

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

CO1. Identify the important components of environment.

CO2. Identify global environmental problems and come out with best possible solutions.

CO3. Apply environmental laws for the protection of forest and wildlife.

CO4. Apply the knowledge of Environmental ethics to maintain harmonious relation between nature and human being.

CO5. Illustrate the major environmental effects of exploiting natural resources.

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

B. Tech. EEE IV SEMESTERVCE-R15

ENVIRONMENTAL SCIENCE

Course Code: **A3010**

L	T	P	C
3	0	0	3

SYLLABUS

UNIT – I

ENVIRONMENTAL SCIENCE 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: Useand 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.

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.

UNIT- II

ECOSYSTEMS: Concept of an ecosystem. Structure and function of an ecosystem.Producers, consumers and decomposers.Energy flow in the cosystem.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

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 a mega diversity nation .Hot-spots 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: 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

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.

UNIT- IV

GREEN ENVIRONMENTAL ISSUES: Clean development mechanism, carbon foot printing, carbon credits, and carbon sequestration polluter pay principle. Green building practices. Approaches to green computing and nanotechnology.IS014000.Role of information Technology in Environment and human health.Case Studies.

UNIT – V

ENVIRONMENTALETHICS: 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 ASSESSMENT: 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. ErachBharucha (2005), *Textbook of Environmental Studies for Undergraduate Courses*, Hyderabad, Universities Press.
2. Benny Joseph (2005), *Environmental Studies*, New Delhi, Tata McGraw Hill Publishing co. Ltd.

REFERENCE BOOKS:

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

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)

B. Tech. EEE IV SEMESTERVCE-R15

POWER SYSTEM GENERATION

Course Code:A3210

L	T	P	C
3	1	0	3

Course Overview:
Electrical Power plays significant role in day-to-day life of entire mankind. This course concerns the generation and distribution of power along with the economic aspects. It deals with basic theory of various power stations along with emphasis on AC & DC distribution systems, PF & voltage control, Tariff methods.

Prerequisite(s): Nil

Course Outcomes:

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

CO1. **Apply** the knowledge of conversion of energy for different energy sources to generate electrical power.

CO2. **Analyze** the base load and peak load conditions to select suitable generating stations.

CO3. **Develop** single line diagram and layout for given substation.

CO4. **Compare** different types of tariffs suitable for different loads.

CO5. **Analyze** power factor correction techniques and economic aspects to reduce economic losses.

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)

B. Tech. EEE IV SEMESTERVCE-R15

POWER SYSTEM GENERATION

Course Code:A3210

L	T	P	C
3	1	0	3

SYLLABUS

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

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

B. Tech. EEE IV SEMESTERVCE-R15

ELECTRICAL MACHINES-II

Course Code: **A3211**

L	T	P	C
4	0	0	4

Course Overview:

This course focuses on basic principle, construction & operation of single phase transformers, poly phase transformers and three phase Induction Motors. The detailed study about the operation of transformer under load and no load conditions will be concentrated. The design aspects about the equivalent circuit of transformer will be elucidated and also the various poly phase connections will be enlightened. The basic principle involved in the production of rotating magnetic field in an three phase induction motor will be discussed also the Speed control and starting methods of three phase Induction motors are emphasized

Prerequisite(s):

- Electrical Machines -I(A3205)

Course Outcomes:

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

CO1**.Apply** the basic knowledge of AC machines in selecting appropriate motor for any specified applications.

CO2**. Analyze** the characteristics and performance of AC machines.

CO3**. Evaluate** the performance of AC machine for different loading conditions.

CO4**. Develop** the equivalent circuit and phasor diagrams for AC machine.

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

B. Tech. EEE IV SEMESTERVCE-R15

ELECTRICAL MACHINES-II

Course Code: **A3211**

L	T	P	C
4	0	0	4

SYLLABUS

UNIT - I

3-Phase 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 II

CIRCLE DIAGRAM & 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.

UNIT – III

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.

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 – IV

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.

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

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 machines, stepper motors

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.

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

B. Tech. EEE IV SEMESTERVCE-R15

CONTROL SYSTEMS

Course Code: **A3212**

L	T	P	C
4	0	0	4

Course Overview:

From this course students can understand the principles and applications of control system in daily life. This deals with basic concepts of block diagram reduction, time domain analysis, analysis to time invariant systems and also with the different aspects of the stability analysis of the system in frequency domain, time domain and state equations.

Prerequisite(s):

- Mathematics-I(A3001)

Course Outcomes:

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

CO1. Developtransfer functions and state space models of dynamical systems such as electrical, electro-mechanical systems and components of control systems.

CO2. Analyze feedback characteristics, block diagrams and signal flow graphs, transient and steady state behavior, controllability and observeability of time invariant dynamical systems.

CO3. Apply Routh's and Nyquist stability criterions in the analysis and design of feedback control systems.

CO4. Examine the performance of feedback control system by using graphical techniques such as root locus, Bode, polar and Nyquist plots.

CO5. Design compensators and controllers for time invariant systems.

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

B. Tech. EEE IV SEMESTERVCE-R15

CONTROL SYSTEMS

Course Code: **A3212**

L	T	P	C
4	0	0	4

SYLLABUS

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.

UNIT - I

REPRESENTATION OF TRANSFER FUNCTION AND CONTROL DESIGN TECHNIQUES: Block diagram representation of systems considering electrical systems as examples. Block diagram reduction techniques, Signal Flow Graph representation, Reduction using Mason's gain formula.

CONTROL SYSTEM COMPONENETS: Transfer Function of DC Servo motor, AC Servo motor- Synchro transmitter and Receiver.

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.

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: Polar Plots, Nyquist Plots-Stability Analysis.

UNIT - V

Design of Controllers: Compensation techniques **–** Lag, Lead, and Lead-Lag Controllers design, PID Controllers**.**

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.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.

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

B.Tech. EEE IV SEMESTERVCE-R15

SIGNALS AND SYSTEMS

(Common to ECE & EEE)

Course Code: A3405

L	T	P	C
3	1	0	3

Course Overview:

This course is an introductory course to study analog and digital signal processing, a topic that forms an integral part of engineering systems in many diverse areas including seismic data processing, communications, speech processing, image processing, defence electronics, consumer electronics and consumer products. The course presents and integrates the basic concepts for both continuous-time and discrete time signals and systems. Signal and system representations are developed for both time and frequency domains. This course will serve as a central building block for students interested in further studying information processing in any form. This course also emphasizes on MATLAB basics with applications to signals and systems.

Prerequisite(s):

- Mathematics – I (A3001)
- Mathematics – II (A3006)

Course Outcomes:

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

CO1. **Classify** various types of signals and **illustrate** them with various examples.

CO2. **Construct** the block level representation of system and **experiment with** the periodic and non-periodic input signals.

CO3. **Analyze** the system in terms of magnitude and phase spectrums with both periodic and non-periodic input signals.

CO4. **Determine** the stability of the continuous and discrete time domain systems with the help of Region of Convergence.

CO5. **Design** the system which is non-aliasing for transmission of the signals.

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

B.Tech. EEE IV SEMESTERVCE-R15

SIGNALS AND SYSTEMS

(Common to ECE & EEE)

Course Code: A3405

L	T	P	C
3	1	0	3

SYLLABUS

UNIT - I **(12 Lectures)**

CLASSIFICATION OF SIGNALS: Continuous time (CT) and Discrete time (DT) signals, elementary signals- Unit, Step, Impulse, ramp signals, singularity functions and operations on signals.

CONVOLUTION AND CORRELATION OF SIGNALS: System analysis by convolution, graphical interpretation of convolution, correlation and convolution. Properties of correlation function, correlation functions for non finite energy signals.

UNIT - II **(12 Lectures)**

SIGNAL TRANSMISSION THROUGH LTI SYSTEMS: Classification of systems, discrete time LTI systems and continuous time LTI systems, properties of LTI system, Impulse and unit step response of a linear system.

FOURIER SERIES: Trigonometric Fourier series and Exponential Fourier series ,relationship between trigonometric Fourier series and exponential Fourier series, convergence of Fourier series, symmetry conditions.

UNIT - III **(10 Lectures)**

FOURIER TRANSFORMS: Fourier transform (FT), Fourier transform of standard signals Fourier transforms involving impulse function, Fourier transform of periodic signals.

PROPERTIES OF FOURIER TRANSFORMS: Properties of continuous Fourier transforms Hilbert transform and its properties.Filter characteristics of LTI system, distortion less transmission.

UNIT - IV **(12 Lectures)**

LAPLACE TRANSFORMS: The Laplace transform (LT), The Region of convergence (ROC) for Laplace transforms, Properties of Laplace transforms, some Laplace transform pairs.

INVERSE LAPLACE TRANSFORMS: Inverse Laplace transforms, Partial fraction method and long division method, Laplace transforms methods in circuit analysis, the transfer function.Analysis and characterization of LTI system using Laplace transform,

UNIT - V **(10 Lectures)**

SAMPLING: Sampling of continuous time signals, sampling theorem, reconstruction of signal from its samples, the effect of under sampling- aliasing, practical aspects of sampling.

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.

TEXT BOOKS:

1. Oppenheim A. V, Willisky (2009), *Signals and Systems*, 2nd edition, Prentice Hall of India, India.
2. B. P. Lathi (2001), *Signals, Systems & Communications*, BS Publications, New Delhi.
3. A. Anand Kumar, *Signals and Systems,*PHI Learning Pvt. Ltd.

REFERENCE BOOKS:

1. Simon Haykin, Van Veen (2007), *Signals & Systems*, 2nd edition, Wiley publications, India.
2. Hwei Piao Hsu, Schaums (2003), *Outline of Theory Problems of Signals and Systems*, McGraw Hill, India.

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)

B. Tech. EEE IV SEMESTERVCE-R15

BASIC MECHANICAL ENGINEERING

Course Code: **A3313**

L	T	P	C
3	1	0	3

Course Overview:

This course is designed to lay emphasis on the fundamental principles of Thermodynamics, Fluid Mechanics, Hydraulic Machines and heat transfer and to equip the students with the knowledge and skills to solve mechanical engineering problems efficiently.

Prerequisite(s):

- Mathematics(A3001)

Course Outcomes:

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

CO1. **Develop** the general energy equations for thermal systems by laws of thermodynamics.

CO2. **Compare** types of fluids, fluid flows, pressure and flow measuring devices, losses in pipes, laminar and turbulent boundary layer concepts.

CO3. **Evaluate** designparameters of hydraulic turbines at given efficiency and discharge.

CO4. **Analyze** an expression for force, workdone and efficiency of vane, turbines and pumps.

CO5. **Apply** the principles of conduction, convection and radiation heat transfer to analyze natural phenomena.

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

B. Tech. EEE IV SEMESTERVCE-R15

BASIC MECHANICAL ENGINEERING

Course Code: **A3313**

L	T	P	C
3	1	0	3

SYLLABUS

UNIT - I

Thermodynamics: Basic concepts - Closed and open systems - Properties of a system - State and equilibrium - Processes and cycles - Forms of energy - Work and heat transfer - Temperature and Zeroth law of thermodynamics; First law of thermodynamics - Energy balance for closed systems - First law applied to steady flow engineering devices; Performance of heat engines and heat pumps - Kelvin-Planck and Clausius statements of second law of thermodynamics - Perpetual Motion Machines - Reversible and Irreversible process - Carnot cycle - Entropy - Clausius inequality.

UNIT – II

Fluid Mechanics: Properties of fluids - Mass density - Specific weight - Specific gravity - Specific Volume - Viscosity - Fluid pressure at a point - Pascal's law - pressure variation in a static fluid -Simple and differential manometers - Types of fluid flow - continuity equation -Euler's and Bernoulli's equations - Flow measurement by Venturi meter and Orifice meter.

UNIT - III:

Hydraulic Turbines: Classification of hydraulic turbines - Pelton wheel - Francis turbine and Kaplan turbines - Velocity triangles - Heads and efficiencies- Specific speed - unit quantities - Theory of draft tube - Governing - Selection of turbines.

UNIT –IV:

Hydraulic Pumps - Centrifugal Pumps - major parts - construction - working - Heads and Efficiencies - Specific Speed - Maximum Suction Lift - Net Positive Suction Head (NPSH), Reciprocating pumps - major parts - construction - working - discharge - work done - power required and slip in a reciprocating pump.

UNIT - V

Heat Transfer - Basic concepts - Conduction - Convection and Radiation - Laws, General equation of heat conduction – In Cartesian coordinate. One dimensional steady state heat conduction in simple geometries (plane wall, cylinder and sphere, composite walls, composite cylinders and composite spheres). Critical thickness of insulation - Thermal contact resistance - Overall heat transfer coefficient - Electrical analogy .

TEXT BOOKS:

1. P. K. Nag (2008), Engineering Thermodynamics, 3rdedition, Tata McGraw-Hill, New Delhi, India.
2. R. K. Bansal (2011), *A Textbook of Fluid Mechanics and Hydraulic Machines*, 10th edition, Laxmi Publications, New Delhi, India.
3. R.C. Sachdeva, (2008), Fundamentals of Engineering, Heat & Mass Transfer, Third Edition, New Age, New Delhi

REFERENCE BOOKS:

1. J. B. Jones, R. E. Dugan (2009), Engineering Thermodynamics, 1st edition, Prentice Hall of India Learning, New Delhi, India.
2. P. N. Modi, S. M. Seth (2013), Hydraulics and fluid mechanics including hydraulic machines, 19th revised Edition, Standard Publishers Distributors, India.
3. Yumus A. Cengel, John M. Cimbala (2014), "Fluid Mechanics (SIE): Fundamentals and Applications", 3rd edition, McGraw Hill Education (India) Private Limited, India.
4. Yunus A. Cengel (2012), Heat Transfer a Practical Approach, 4thedition, Tata McGraw hill education (P) Ltd, New Delhi, India.

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

B. Tech. EEE IV SEMESTERVCE-R15

ELECTRICAL MACHINES - II LAB

Course Code:A3214

L	T	P	C
0	0	3	2

Course Overview:

This course focuses on operation of synchronous machines and three phase Induction Motors. The detailed study about the operation of Synchronous motor, generator under load and no load conditions will be concentrated. The design aspects about the equivalent circuit of single phase induction motors will be elucidated and also the various poly phase connections will be enlightened. The basic principle involved in the production of rotating magnetic field in a three phase induction motor will be discussed also the Speed control and starting methods of three phase Induction motors are emphasized

Prerequisite(s):

- Electrical Machines -I(A3205)

Course Outcomes:

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

CO1. **Compute** the equivalent circuit parameters and performance of Induction motor at different loading conditions.

CO2. **Assess** the performance of synchronous machines by using various methods.

CO3. **Analyze** the synchronization methods of alternators.

CO4. **Distinguish** the core losses of a transformer by using Alternator.

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

B. Tech. EEE IV SEMESTERVCE-R15

ELECTRICAL MACHINES - II LAB

Course Code:A3214

L	T	P	C
0	0	3	2

LIST OF EXPERIMENTS

1. Separation of core losses of a single phase transformer through an alternator.
2. No-load & Blocked rotor tests on three phase Induction motor.
3. Regulation of a three phase alternator by synchronous impedance method.
4. V and Inverted V curves of a three phase synchronous motor.
5. Equivalent Circuit of a single phase Induction motor.
6. Determination of $X_d$and X_q of a salient pole synchronous machine.
7. Brake test on a three phase Induction motor.
8. Synchronization of alternators.
9. Determination of sequence impedances of an alternator.
10. Brake test on a single phase Induction motor.
11. Efficiency of 3 phase alternator.
12. Slip-Torque characteristics of a 3 phase Induction motor with fixed rotor resistance.

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

B. Tech. EEE IV SEMESTERVCE-R15

CONTROL SYSTEMS LAB

Course Code: **A3215**

L	T	P	C
0	0	3	2

Course Overview:

From this course students can understand and validate the principles and applications of control system in daily life. This deals with basic concepts about the time domain analysis of time invariant systems and with the different aspects of the stability analysis of the system in frequency domain and time domain.

Prerequisite(s):

- Mathematics-I(A3001)

Course Outcomes:

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

CO1. Develop transfer functions of dynamical electrical systems such as series RLC second order system, DC motor.

CO2. Analyze the characteristics of OP-AMP Circuits, magnetic amplifier, AC servo motor and Synchros.

CO3. Examine the performance of feedback control system by using graphical techniques such as step response, root locus, Bode, polar and Nyquist plots using MATLAB.

CO4. Analyze the effect of PID controller on second order systems and state space model for classical transfer function using MATLAB.

CO5. Analyze state space model for classical transfer function using MATLAB.

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

B. Tech. EEE IV SEMESTERVCE-R15

CONTROL SYSTEMS LAB

Course Code: **A3215**

L	T	P	C
0	0	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.

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

B. Tech. EEE IV SEMESTERVCE-R15

GENDER SENSITIZATION

Course Code: **A3021**

L	T	P	C
0	3	0	0

Course Overview:

Gender Sensitization is one of the basic requirements for the normal development of an individualand primarily highlights the contribution of both the genders in creation and development of a well balanced society. A curriculum-based approach to bring a change is desired to inculcate sensitivity towards issues concerning the relationship between men and women, caste, declining sex ratio, struggles with discrimination, sexual harassment, new forums for justice, eve-teasing, etc., The need for this sensitivity has been felt and realized through times immemorial and in almost all kinds of human existence, across the globe.

Towards a World of Equals is a course that introduces you to different dimensions of the current discussion on gender issuesthrough a variety of materials: academic studies, court cases, laws, theoretical analyses, newspaper reports, stories, poems, videos and autobiographical texts. The lessons critically scrutinize many commonly held assumptions about gender relations and demonstrate why they are unacceptable in a society committed to justice and equality.

Prerequisite(s): NIL

Course Outcomes:

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

CO1. Understand the significance of process of socialization and relationships between men and women on the basis of a just, equal world.

CO2. Examine the decline of female sex ratio and discrimination faced by people with different gender identities.

CO3. To take part in house work in order to allow for more equal, share family spaces.

CO4. Estimate women's contribution to the nation's economy.

CO5. Analyze the consequences of sexual violence and importance of consent in friendships and other relationships.

CO6. Perceive the invisibility of women in history and show how locating a woman in history makes them visible.

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

B. Tech. EEE IV SEMESTERVCE-R15

GENDER SENSITIZATION

Course Code:**A3021**

L	T	P	C
0	3	0	0

SYLLABUS:

1. Gender Sensitization: Why should we study it?

2. Socialization: Making Women, Making Men

Introduction
Preparing for womanhood
Growing up male
First lessons in caste
Different masculinities

3. Just Relationships: Being Together as Equals

Mary Kom and Onler
Love and Acid just do not mix
Love letters
Mothers and fathers
Further Reading: Rosa
Parks-The Brave heart

4. Missing Women: Sex Selection and Its Consequences

Declining Sex Ratio
Demographic Consequences

5. Gender Spectrum: Beyond the Binary

Two or Many?
Struggles with Discrimination

6. Additional Reading: Our Bodies, Our Health

7. Housework: The Invisible Labour

"My Mother doesn't work"
"Share the load"

8. Women's Work: Its Politics and Economics

Fact and fiction
Unrecognized and unaccounted work
Further Reading: wages and conditions of work.

9. Sexual Harassment: Say No!

Sexual harassment, not eve-teasing
Coping with everyday harassment
Further Reading: "Chupulu"

10. Domestic Violence:

Speaking Out
Is home a safe place?
When women unite (Film)
Rebuilding lives
Further Reading: New Forums for justice.

11. Thinking about Sexual Violence

Blaming the Victim- " I Fought for my life..."
Further Reading: The caste face of violence.

12. Knowledge: Through the Lens of Gender

Point of view
Gender and the structure of knowledge
Further Reading: Unacknowledged women artists of Telangana

13. Whose History? Questions for Historians and Others

Reclaiming a Past
Writing other Histories
Further Reading: Missing pages
From modern Telangana history

TEXT BOOK:

1. "Towards a World of Equals: A Bilingual Textbook on Gender". Telugu Akademi, Hyderabad, 2015

ADDITIONAL RESOURCES:

1. www.worldofequals.org.in

SYLLABI FOR
V SEMESTER

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

B. Tech. EEE V SEMESTERVCE-R15

ELECTRICAL MEASUREMENTS AND INSTRUMENTATION

Course Code: **A3216**

L	T	P	C
4	0	0	4

Course Overview:

The students shall gain an overview of the most important analog and digital methods for measurement of physical quantities. The common measuring instruments, devices and circuits, and their application to electrical testing is emphasized. The minimization of different error sources and their effects in particular measurement situations are elucidated. The single- and three-phase circuits to determine voltage and current values, by means of complexors, matrices and phasor diagrams are enlightened. The test measurements and circuit performance mathematically both in time and frequency domains, with the aid of network theorems, response curves and locus diagrams are studied.

Prerequisite(s):

Understand basic network and electrical machines concepts

Course Outcomes:

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

CO1. Categorize the various electrical instruments for measuring electrical parameters.

CO2. Determine various unknown electrical parameters by using bridges.

CO3. Examine the unknown resistance, voltage, current using DC potentiometers.

CO4. Identify various electrical and non-electrical transducers for suitable Applications.

CO5. Analyse the Q meter and determine the harmonic distortion using wave analyzers.

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

B. Tech. EEE V SEMESTERVCE-R15

ELECTRICAL MEASUREMENTS AND INSTRUMENTATION

Course Code:**A3216**

L	T	P	C
4	0	0	4

SYLLABUS

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 – Introduction to Digital Meters.

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, 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

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

SIGNAL ANALYZERS: Wave Analyzers- Frequency selective analyzers, heterodyne, spectrum analyzers, Basic spectrum analyzers, Q meter

UNIT - IV

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.

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

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.

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.
3. H. S. Kalsi (2010), Electronic Instrumentation, 3rd Edition, Tata McGraw Hill Publications, New Delhi.

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

B.Tech.EEE V SEMESTERVCE-R15

ELECTRONIC CIRCUITS & INTEGRATED CIRCUITS

Course Code:**A3420**

L	T	P	C
3	1	0	3

Course Overview:

The course is an introduction to Electronic circuits which are the applications of the electronic devices. Course creates the background in the field of electronic circuits such as an amplifier of various types, oscillators etc. The course introduces circuit configurations used for generation and processing of waveforms like sine, step, exponential, ramp etc. The lectures cover the analysis and design of multivibrators which are used in applications like waveform generation, memory element and gating circuits. The course also acquaints the students with general analog principles and design methodologies using practical devices and applications. It focuses on process of learning about signal condition, signal generation, instrumentation, timing and control using various IC circuitries. It also covers study and design of fixed and variable voltage regulator ICs.

Prerequisite(s):

- Electronic Devices and Circuits(A3401)
- Basic Electrical Engineering (A3201)

Course Outcomes:

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

CO1**. Apply** the knowledge of Barkhausen criterion to solve the frequency of oscillation for oscillator.

CO2**. Analyze** the high pass and low pass RC circuits for sine, step, pulse, exponential and ramp input.

CO3**. Design** different types of multivibrators for generating waveforms.

CO4**. Examine** linear and nonlinear circuits using 741 IC.

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

B.Tech.EEE V SEMESTERVCE-R15

ELECTRONIC CIRCUITS & INTEGRATED CIRCUITS

Course Code:**A3420**

L	T	P	C
3	1	0	3

SYLLABUS

UNIT - I

SMALL SIGNAL AMPLIFIERS: Overview of amplifiers, concept of gain and bandwidth.

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.

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.

UNIT - II

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-LINEARWAVE 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 - III

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.

UNIT - IV

INTEGRATED CIRCUITS AND OPERATIONAL AMPLIFIER: Introduction, Classification of ICs, 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.

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

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

UNIT - V

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.

VOLTAGE REGULATORS: IC 723 general purpose regulators, 78XX and 79XX regulators.

TEXT BOOKS:

1. Jacob Millman, HerbertTaub, Mothiki S. PrakashRao (2008), *Pulse, Digital and Switching Waveforms*, 3rd edition, Tata McGraw Hill, New Delhi.
2. D. Roy Choudhury, Shail B. Jain (2012), Linear Integrated Circuit, 4th edition, New Age International Pvt. Ltd., New Delhi, India.
3. Ramakant A. Gayakwad, (2012), OP-AMP and Linear Integrated Circuits, 4th edition, Prentice Hall / Pearson Education, New Delhi.

REFERENCE BOOKS:

1. Jacob Millman, Arvin Grabel (2003), *Microelectronics*, 2nd edition, Tata McGraw Hill, New Delhi.
2. A. Anand Kumar (2005), *Pulse and Digital Circuits*, Prentice Hall of India, India.
3. Sergio Franco (1997), Design with Operational Amplifiers and Analog Integrated Circuits, McGraw Hill, New Delhi.
4. Gray, Meyer (1995), Analysis and Design of Analog Integrated Circuits, Wiley International, New Delhi.

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

B. Tech. EEE V SEMESTERVCE-R15

POWER SYSTEM TRANSMISSION AND DISTRIBUTION

Course Code: **A3217**

L	T	P	C
4	0	0	4

Course Overview:

This course deals with basic theory of transmission lines modeling and their performance analysis. Also this course gives emphasis on mechanical design of transmission lines, cables and insulators. The main objective of the course is to introduce students to Transmission system concepts. In particular, concepts like Transmission line parameters, Cables, Performance of Transmission lines, Transients, Sag & tension calculations & Underground cables concepts are emphasized.

Prerequisite(s): Basic concepts of Power System Generation

Course Outcomes:

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

CO1. Apply the knowledge of electromagnetic fields to calculate the transmission line parameters.

CO2. Analyze the Voltage regulation and efficiency for different Power transmission lines.

CO3. Analyze power loss due to corona with various factors and physical strength of transmission line by Sag calculations.

CO4. Identify the importance of various types of insulators and string efficiency in power system transmission.

CO5. Analyze the voltage drop and power loss calculations for different scheme of connections in AC and DC distribution systems.

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

B. Tech. EEE V SEMESTERVCE-R15

POWER SYSTEM TRANSMISSION AND DISTRIBUTION

Course Code: **A3217**

L	T	P	C
4	0	0	4

SYLLABUS

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. 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.

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

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, Stringing chart and sag template and its applications.

UNIT - IV

OVERHEAD LINE INSULATORS & UNDERGROUND CABLES: Types of Insulators, String efficiency and Methods for improvement - 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. Capacitance of Single and 3-Core belted cables. Grading of Cables - Capacitance grading.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 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 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.
2. HadiSaadat (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.

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

B. Tech. EEE V SEMESTERVCE-R15

RENEWABLE ENERGY SOURCES

Course Code:**A3218**

L	T	P	C
3	1	0	3

Course Overview:

This is an engineering introduction to renewable energy technologies and potentials. The courseaims to introduce a general engineering/science audience to the basic concepts of renewableenergy. In the interest of time some mathematical criteria will be covered, e.g. Betz limit forwind, limit of efficiency of WEC point absorber. Each lecture contains several examples fromreal world applications and in-progress industrial developments.

Course Outcomes:

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

CO1. **Apply** the principles of Renewable energy sources for the construction of Power generating station.

CO2. Analyse various harvesting techniques of Renewable energy for different applications.

CO3. Applyenergy storage methods in renewable energy systems.

CO4. AnalyseRenewable energy systems for various environmental conditions.

CO5.Categorizevarious energy conversion systems and their limitations.

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

B. Tech. EEE V SEMESTERVCE-R15

RENEWABLE ENERGY SOURCES

Course Code:**A3218**

L	T	P	C
3	1	0	3

SYLLABUS

UNIT – I

PRINCIPLES OF SOLAR RADIATION: Role and potential of new and renewable source, Environmental impact of solar power, physics of the sun, the solar constant, extraterrestrial and terrestrial solar radiation, solar radiation on tilted surface, instruments for measuring solar radiation and sun shine, solar radiation data.

SOLAR ENERGY COLLECTION: Flat plate and concentrating collectors, classification of concentrating collectors, orientation and thermal analysis, advanced collectors.

UNIT-II

WIND ENERGY: Sources and potentials, horizontal and vertical axis windmills, performance characteristics, Betz criteria

BIO-MASS: Principles of Bio-Conversion, Anaerobic/aerobic digestion, types of Bio-gas digesters, gas yield, combustion characteristics of bio-gas, utilization for cooking, I.C. Engine operation and economic aspects.

UNIT-III

GEOTHERMAL ENERGY: Resources, types of wells, methods of harnessing the energy, potential in India.

OCEAN ENERGY: OTEC, Principles utilization, setting of OTEC plants, thermodynamic cycles.

TIDAL AND WAVE ENERGY: Potential and conversion techniques, mini-hydel power plants, and their economics.

UNIT-IV

SOLAR ENERGY STORAGE AND APPLICATIONS: Different methods, Sensible, latent heat and stratified storage, solar ponds. Solar Applications- solar heating /cooling technique, solar distillation and drying, photovoltaic energy conversion.

UNIT-V

DIRECT ENERGY CONVERSION: Need for DEC, limitations, principles of DEC and different types of Energy conversions

TEXT BOOKS:

1. Renewable energy resources, Tiwari and Ghosal/ Narosa, second edition (2008), Mc Graw Hill Company, New Delhi.
2. Non-Conventional Energy Sources, G.D.Rai, fourth edition (2009), Khanna Publishers, New Delhi.

REFERENCE:

1. Renewable Energy Sources, Twidell& Weir, fourth Edition (2009), Tata McGraw Hill Education Private Limited, New Delhi.
2. Solar Energy, S.P. Sukhatme, Third Edition (2010), Tata McGraw Hill Education Private Limited, New Delhi.

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

B. Tech. EEE V SEMESTERVCE-R15

ADVANCED CONTROL SYSTEMS

Course Code:**A3219**

L	T	P	C
3	1	0	3

Course Overview:

Modern day control engineering is a relatively new field of study that gained significant attention during the 20th century with the advancement of technology. It can be broadly defined or classified as practical application of control theory. It seeks to understand physical systems, using mathematical modeling, in terms of inputs, outputs and various components with different behaviors, use control systems design tools to develop controllers for those systems and implement controllers in physical systems employing available technology. A system can be mechanical, electrical, fluid, chemical, financial and even biological, and the mathematical modeling, analysis and controller design uses control theory in one or many of the time, frequency and complex-s domains, depending on the nature of the design problem.

Prerequisite(s): Basic math and science • Engineering topics, design, software

Course Outcome:

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

CO1. Develop the mathematical modeling of linear/non-linear systems in state space.

CO2. Investigate the controllability/observability of a given system.

CO3. Analyze stability of linear / Non-linear systems using various methods.

CO4. Design state feedback controller and optimal controller for a given system.

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

B. Tech. EEE V SEMESTERVCE-R15

ADVANCED CONTROL SYSTEMS

Course Code:**A3219**

L	T	P	C
3	1	0	3

SYLLABUS

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.

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

B. Tech. EEE V SEMESTERVCE-R15

COMPUTER ORGANIZATION AND ARCHITECTURE

Course Code: **A3508**

L	T	P	C
3	1	0	3

Course Overview:

The computer organization is concerned with the structure and behavior of digital computers. The main goal of this subject to understand the overall basic computer hardware structure, including the peripheral devices. In spite of variety and pace in the computer field, certain fundamental concepts apply consistently throughout. The application of these concepts depends upon the current state of technology and the price/performance objectives of the designer. The aim of the subject is to provide a thorough discussion of the fundamentals of computer organization and architecture and to relate these to contemporary design issues.

Prerequisite(s): Knowledge of Digital logic design and computer hardware.

Course Outcomes:

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

CO1. Analyze the computer fundamentals and computer internal organization.

CO2. Apply the register transfer operations and instructions in programs.

CO3. Evaluate the computer arithmetic algorithms.

CO4. Analyze the memory access operations and memory architecture.

CO5. Apply the multiprocessing in different inter process structures.

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

B. Tech. EEE V SEMESTERVCE-R15

COMPUTER ORGANIZATION AND ARCHITECTURE

Course Code: **A3508**

L	T	P	C
3	1	0	3

SYLLABUS

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, ZvonksVranesic, 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.

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

B. Tech. EEE V SEMESTERVCE-R15

ELECTRICAL MEASUREMENTS AND INSTRUMENTATION LAB

Course Code: **A3220**

L	T	P	C
0	0	3	2

Overview: This course is designed to explain the measurement ofResistance, Inductance and Capacitance of different ranges using bridge circuits. Here the concepts of calibration of PMMC meters, wattmeter, energy meter and power factor meter.

Course outcomes:

Upon the completion of course Students will be able to

CO1. Measure resistance, inductance and capacitance of all ranges using bridge circuits

CO2. Assess percentage error of various measuring instruments, LVDT, resistance strain gauge.

CO3 Measure 3-Φ active power and reactive power of different loads.

CO4 Measure Iron loss, transformer turns ratio and test dielectric strength of oil.

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

B. Tech. EEE V SEMESTERVCE-R15

ELECTRICAL MEASUREMENTS AND INSTRUMENTATION LAB

Course Code: **A3220**

L	T	P	C
0	0	3	2

SYLLABUS

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

1. Calibration and Testing of Single Phase Energy Meter.
2. Calibration of Dynamometer Power Factor Meter.
3. Measurement of Parameters of a choke coil using 3 voltmeter and 3 ammeter methods.
4. Calibration of PMMC ammeter and PMMC voltmeter using Crompton D.C. Potentiometer.
5. Measurement of Resistance using Kelvin's double bridge.
6. Measurement of unknown Inductance Anderson Bridge.
7. Calibration of LPF wattmeter by Phantom testing.
8. Measurement of Iron loss in a bar specimen using a wattmeter.
9. LVDT characteristics and Calibration
10. Resistance strain gauge - strain measurements and Calibration
11. Transformer turns ratio measurement using A.C. bridge
12. Dielectric Oil Testing using H.T testing Kit.
13. Measurement of 3phase reactive power with single wattmeter
14. Measurement of unknown Capacitance by schering Bridge
15. Measurement of 3 phase power with single wattmeter and two current transformers

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

B. Tech. EEE V SEMESTERVCE-R15

ELECTRONIC CIRCUITS AND INTEGRATED CIRCUITS LAB

Course Code:**A3423**

L	T	P	C
0	0	3	2

Course Overview:

This lab gives an insight into the design of various electronic circuits which are basic building blocks for the Electronics Engineering. The students will become familiar with the design of various amplifiers and oscillators using BJTs and JFETs.The IC Applications lab gives an insight into the design of various hardware usages. The students will become familiar with the design of various circuits using IC 741, IC555, and IC 565.

Prerequisite(s):

- Electronic Devices and Circuits (A3401)
- Electronic Circuits and Integrated Circuits (A3420)
- Basic Electrical Engineering (A3201)

Course Outcomes:

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

CO1**. Determine** the frequency response of Voltage series and current shunt feedback amplifiers.

CO2**. Evaluate** the frequency of oscillation for different types of oscillators.

CO3**. Examine** the wave shaping circuits and operational Amplifers.

CO4**. Analyse** various applications using op-amps and IC 555.

CO5**. Experiment** with the different types of Voltage regulator.

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

B. Tech. EEE V SEMESTERVCE-R15

ELECTRONIC CIRCUITS AND INTEGRATED CIRCUITS LAB

Course Code:**A3423**

L	T	P	C
0	0	3	2

SYLLABUS

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

PART - A:

ELECTRONIC CIRCUITS

1. Voltage Series Feedback Amplifier.
2. Current Shunt Feedback Amplifier.
3. Hartley and Colpitts Oscillator
4. RC Phase Shift Oscillator.
5. Linear wave shaping Low Pass RC circuits
6. Linear wave shaping - High Pass RC circuits
7. Non Linear wave shaping - Clippers
8. Non Linear wave shaping - Clampers.

PART - B:

INTEGRATED CIRCUITS

1. Measurement of IC741 op-amp parameters.
2. Adder, Subtractor Using IC741 op-amp.
3. 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

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

B. Tech. EEE V SEMESTERVCE-R15

PROFESSIONAL ETHICS & HUMAN VALUES

Course Code: **A3012**

L	T	P	C
3	0	0	0

Course Outcomes:

At the end of the course, the student

CO1. Acquires the basic concepts of Professional ethics and human values & Students also gain the connotations of ethical theories.

CO2. Knows the duties and rights towards the society in an engineering profession.

CO3. Would realize the importance and necessity of intellectual property rights.

CO4. Take all the necessary precautions while conducting the experiments, which may reduce the risk.

CO5. Understands the importance of risk evacuation system in reality and takes the utmost.

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

B. Tech. EEE V SEMESTERVCE-R15

PROFESSIONAL ETHICS & HUMAN VALUES

Course Code: **A3012**

L	T	P	C
3	0	0	0

SYLLABUS

UNIT - I

ETHICS: Senses of 'Engineering Ethics' -Variety of moral issues - Types of inquiry -Moral dilemmas Moral autonomy -Kohlberg's theory, Gilligan's theory -Consensus and controversy – Models of Professional Roles -Theories about right action- Self interest - Customs and religion -Uses of Ethical theories.

UNIT - II

HUMAN VALUES: Morals, Values and Ethics – Integrity – Work Ethic – Service Learning - Civic Virtue – Respect for Others – Living Peacefully – Caring – Sharing - Honesty – Courage– Valuing Time - Cooperation – Commitment – Empathy – Self Confidence – Character – Spirituality.

UNIT – III

ENGINEERING AS SOCIAL EXPERIMENTATION: Engineering as experimentation - Engineering Projects VS. Standard Experiments - Engineers as responsible experimenters – Codes of ethics - Industrial Standards - 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- Three Mile Island and Chernobyl case study - 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 Corporation's -Environmental ethics-computer ethics -weapons development, Engineers as managers - consulting engineers-engineers as expert witnesses and advisors, Moral leadership - sample code of Ethics (Specific to a particular Engineering Discipline).

TEXT BOOKS

1. R.S.Nagarajan, a Textbook on "Professional Ethics and Human Values", New Age Publishers – 2006.
2. Mike Martin and Roland Schinzinger, "Ethics in engineering", McGraw Hill, New York 1996.

REFERENCES

1. Govindarajan M, Natarajan S, Senthil Kumar V. S, " Engineering Ethics", Prentice Hall of India, New Delhi, 2004.
2. Charles D. Fleddermann, "Engineering Ethics", Pearson Education/ Prentice Hall, New Jersey,2004 (Indian Reprint now available)
3. Charles E Harris, Michael S. Protchard and Michael J Rabins, "Engineering Ethics – Concepts and Cases", Wadsworth Thompson Leatning, United States, 2000 (Indian Reprint now available).
4. John R Boatright, "Ethics and the conduct of business", Pearson Education, New Delhi,2003.
5. Edmund G Seebauer and Robert L Barry, "Fundamentals of ethics for scientists and engineers", Oxford University Press, Oxford, 2001.

SYLLABI FOR
VI SEMESTER

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

B. Tech. EEE VI SEMESTERVCE-R15

POWER SYSTEM OPERATION AND CONTROL

Course Code: **A3221**

L	T	P	C
3	1	0	3

Course Overview:

In this course it is aimed to the students the principles and applications of control system in everyday life. The basic concepts of block diagram reduction, time domain analysis solution analysis to time invariant systems and also deals with the different aspects of the stability analysis of the system in frequency domain and time domain.

Prerequisite(s):

Knowledge on generation, transmission of power and Economic aspects of generation

Course Outcomes:

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

CO1. **Apply the** basic knowledge for economic operation, load frequency control and reactive power compensation.

CO2. **Analyze**the static and dynamic performance of single and multi area Load Frequency Control.

CO3. **Analyze**the techniques and devices used for reactive power compensation.

CO4. **Evaluate** the load scheduling among various thermal and hydrothermal plants.

CO5. **Model** various components of an isolated power system.

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

B. Tech. EEE VI SEMESTERVCE-R15

POWER SYSTEM OPERATION AND CONTROL

Course Code: **A3221**

L	T	P	C
3	1	0	3

SYLLABUS

UNIT - I

INTRODUCTION TO 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 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: Principle of Reactive Power control, Reactive Power compensation in transmission systems, different types of compensating equipment for transmission systems. Load compensation, Specifications of load compensator. Uncompensated and compensated transmission lines: shunt and Series Compensation.

DEREGULATION: Introduction to Deregulation.

TEXT BOOKS:

1. 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. HadiSaadat (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.

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

B. Tech. EEE VI SEMESTERVCE-R15

POWER ELECTRONICS

Course Code: **A3222**

L	T	P	C
3	1	0	3

Course Overview:

The course is an introduction to power electronic devices and provides a basic knowledge of circuitry for the control and conversion of electrical power with high efficiency. These elements can change and regulate the voltage, current, or power via dc-dc converters, ac-dc rectifiers, dc-ac inverters, and ac-ac cycloconverters. Also it carries the study of power semiconductor devices operation extends to high power applications by their switching and static characteristics. Applications include electronic power supplies, aerospace and vehicular power systems, and renewable energy systems.

Prerequisite(s): EDC, Network Analysis

Course Outcomes:

Upon the completion of course Students will be able to

CO1. Apply the knowledge of thyristor in different PE converters..

CO2 Analyse AC-DC, DC-DC, DC-AC and AC-AC converters and commutation circuits.

CO3. Apply the knowledge of converters to select suitable converter for a given application.

CO4. Calculate different parameters of Converters for the given requirements to investigate the performance of converters.

CO5. Apply the knowledge of PWM techniques to improve the performance of DC-DC and DC-AC converters.

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

B. Tech. EEE VI SEMESTERVCE-R15

POWER ELECTRONICS

Course Code: **A3222**

L	T	P	C
3	1	0	3

SYLLABUS

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.

UNIT - III

THREE PHASE LINE COMMUTATED CONVERTERS: Three phase converters, three pulse and six pulse conversion, 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.

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.

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 waveforms, AC chopper.

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, bedford inverters, voltage control techniques for inverters pulse width modulation techniques.

TEXT BOOKS:

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

REFERENCE BOOKS:

1. VedamSubramanyam (1997), Power Electronics, New Age International (P) Limited, New Delhi.
2. 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.

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

B. Tech. EEE VI SEMESTERVCE-R15

MICROPROCESSORS AND MICROCONTROLLERS

Course Code: **A3419**

L	T	P	C
3	1	0	3

Course Overview:

This course provides a comprehensive introduction to microprocessors, microcontrollers (8051) and their architectures with an emphasis on its interfacing with external devices. Focus is on 8086 microprocessor family which includes internal architecture, pin diagram, instruction set, register organization, addressing modes, operating modes, interrupt structure, assembly language programming etc. Various aspects of hardware design, such as interfacing of memory and different types of I/O devices will be covered in detail. It also emphasis on 8051 microcontroller, different interfaces and data transfer schemes. The course is accompanied by laboratory experiments directly linked to the lecture topics for hands-on learning of the material.This course will be useful to students as a first level course for embedded systems.

Prerequisite(s):

- Digital Logic Design (A3404)
- Computer Organization and Architecture (3508)

Course Outcomes:

Up on successful completion of this course, student will be able to:

CO1. Apply the fundamentals of microprocessor & controller to investigate existing designs.

CO2. Compare & contrast the processor and controller for the implementation of real time applications.

CO3. Demonstrate assembly language programming proficiency to assemble and run on host machine.

CO4. Identify the required driver circuitry to microprocessor and controller I/O ports to interface external devices.

CO5. Design the required hardware & software modules and integrate to be a functional model.

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

B. Tech. EEE VI SEMESTERVCE-R15

MICROPROCESSORS AND MICROCONTROLLERS

Course Code: **A3419**

L	T	P	C
3	1	0	3

SYLLABUS

UNIT - I **(11 Lectures)**

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

UNIT - II **(14 Lectures)**

8086 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.

8086 MEMORY INTERFACING:8086 addressing and address decoding, Interfacing RAM, ROM, EPROM to 8086, Interfacing and Refreshing Dynamic RAMs, Direct Memory Access (DMA) Data Transfer.

UNIT - III **(12 Lectures)**

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

SERIAL DATA TRANSFER SCHEMES: Asynchronous and synchronous data transfer schemes, RS - 232C Serial data standard, USART, sample programs of serial data transfer.

UNIT - IV **(10 Lectures)**

THE 8051 ARCHITECTURE: Introduction, 8051 micro controller hardware, external memory interfacing, Data transfer and logical instructions, arithmetic operations, decimal arithmetic, jump and call instructions and simple programs. The assembly language programming process, programming tools and techniques, counter and timers programming, interrupt programming.

UNIT – V **(10 Lectures)**

I/O INTERFACES:8255 programmable Peripheral Interface, various modes of operation and interfacing to 8086, 8051 interfacing with seven segment LED displays, stepper motor, D/A converter interfacing, InterfacingDC motor, Interfacing 4*4 Matrix Keypad, Interfacing to Alphanumeric Displays (LCD) & A/D converter interfacing.

Text Books:

1. Douglas V. Hall (2007), *Microprocessors and Interfacing*, 2nd edition, Tata McGraw Hill, New Delhi.
2. Kenneth J. Ayala (2008), *The 8051 Microcontroller*, 3rd edition, Cengage Learning, India.

Reference Books:

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

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

B. Tech. EEE VI SEMESTERVCE-R15

OPTIMAL CONTROL SYSTEMS

(Professional Elective - I)

Course Code:**A3251**

L	T	P	C
4	0	0	4

Overview: In this course concepts and techniques of optimal guidance,Control and state estimation will be studied both in linear and nonlinear systems theory framework. However, the theory as well as some demonstrative examples will be quite generic and hence this course is expected to be useful to the students from other engineering disciplines as well.

Course Outcomes:

Upon the completion of course Students will be able to

CO1. Apply principle of optimality to decision making an optimal control system.

CO2. To design continuous and discrete linear regulator problem using pontrygins principle.

CO3. Apply iterative numerical techniques for finding optimal controls and trajectories.

CO4. Design of non statistical estimation with full estimator and reduced estimator.

CO5. Design optimal regulator problem for optimal estimation problem.

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

B. Tech. EEE VI SEMESTERVCE-R15

OPTIMAL CONTROL SYSTEMS

(Professional Elective - I)

Course Code:**A3251**

L	T	P	C
4	0	0	4

SYLLABUS

UNIT-I

Optimal control law, the principal of optimality, application of their optimality principle to decision making, an optimal control system.Recurrence relation of dynamic programming, computational procedure for solving control problem, characteristics of dynamic programming solution.

UNIT-II

Discrete linear regulator problem.Hamilton –jocobi-bellman equation.Continuous linear regulator problems, necessary and sufficient conditions examples. The calculus of variations &Pontrygin's minimum principle: Fundamental concepts, functional of a single function, functional involving several independent functions, necessary conditions for optimal control, linear regulator problem.

UNIT-III

Pontrygin's minimum principle and state inequality constrains, minimum time problems, minimum control effort problems. Iterative numerical techniques for finding optimal controls and trajectories: Two point boundary value problems, method of steepest descent algorithm, variation of extremalas, variation of extremal algorithm, gradient projection algorithm

UNT-IV

The nature of the state estimation problem, non-statistical estimation design with full estimator dimension, non-statistical estimation with reduced estimator design.

UNIT-V

Description of plants noise statistics, statement of optimal estimation problem, information of the
Optimal estimation problem as an optimal regulator problem, solution to the regulator problem in feedback form, explicit solution of the optimal estimation problem.

TEXT BOOKS:

1. Jasbir S. Arora, Introduction to optimum design, Elesevier, 2005.
2. A Ravindran, K.M. Ragsdell, and G.V. Reklaitis, Engineering optimization: Methods and applications, Wiley India Edition.
3. Donald E.Kirk, Optimal Control Theory an Introduction, Prentice -Hall Network series –First edition, 1970.

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

B. Tech. EEE VI SEMESTERVCE-R15

SPECIAL ELECTRICAL MACHINES

(Professional Elective - I)

Course Code:**A3252**

L	T	P	C
4	0	0	4

Overview: Students will be exposed to various special machines which are gaining importance in industry. This course covers topics related to principles, performance and applications of these special machines including switched reluctance motors, stepper motors, permanent magnet dc motors and linear motors

Course Outcomes:

Upon the completion of course Students will be able to

CO1. Utilize the series booster, shunt booster, Rosenberg generator and different types of electrical machines for suitable applications.

CO2. Choose the suitable controller for various types of stepper motor.

CO3. Categorize the variable reluctance stepper motors by the performance characteristics and Control the position of the motor.

CO4. Select the suitable stepper motors for different applications.

CO5. Classify the Switched reluctance motor according to the design parameter and control the motor with logic circuits.

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

B. Tech. EEE VI SEMESTERVCE-R15

SPECIAL ELECTRICAL MACHINES

(Professional Elective - I)

Course Code:**A3252**

L	T	P	C
4	0	0	4

SYLLABUS

UNIT-I

SPECIAL TYPES OF D.C MACHINES-I

Series booster-Shunt booster-Non-reversible boost-Reversible booster

SPECIAL TYPES OF DC MACHINES –II

Armature excited machines—Rosenberg generator-The Amplidyne and Metadyne - Rototrol and Regulex-third brush generator-three-wire generator-dynamometer.

UNIT–II

STEPPER MOTORS

Introduction-synchronous inductor (or hybrid stepper motor), Hybrid stepping motor, construction, principles of operation, energization with two phase at a time -essential conditions for the satisfactory operation of a 2 -phase hybrid step motor -very slow -speed synchronous motor for servo control-different configurations for switching the phase windings -control circuits for stepping motors-an open-loop controller for a 2-phase stepping motor.

UNIT-III

VARIABLE RELUCTANCE STEPPING MOTORS-I

Variable reluctance (VR) Stepping motors, single-stack VR step motors, Multiple stack VR motors-Open-loop control of 3-phase VR step motor-closed-Loop control of step motor, Discriminator (or rotor position sensor) transilator, major loop -characteristics of step motor in open-loop drive –comparison between open-loop position control with step motor and a position control servo using a conventional (dc or ac) servo motor-Suitability

UNIT-IV

APPLICATIONS OF STEPPING MOTORS

Areas of application of stepping motors-5-phase hybrid stepping motor -single phase -stepping motor, the construction, operating principle torque developed in the motor.

UNIT-V

SWITCHED RELUCTANCE MOTOR: Introduction –improvements in the design of conventional reluctance motors-Some distinctive differences between SR and conventional reluctance motors-principle of operation of SRM-Some design aspects of stator and rotor pole arcs, design of stator and rotor and pole arcs in SR motor-determination of L(θ)-θ profile -power converter for SR motor-A numerical example – Rotor sensing mechanism and logic control, drive and power circuits, position sensing of rotor with Hall problems-derivation of torque expression, general linear case.

TEXT BOOKS:

1. K. Venkataratnam, “Special electrical machines” -University press.
2. R. K. Rajput, “Electrical machines”-5th edition.
3. V.V. Athani, “Stepper motor: Fundamentals, Applications and Design”-New age International pub.

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

B. Tech. EEE VI SEMESTERVCE-R15

NEURAL NETWORKS AND FUZZY LOGICS

(Professional Elective - I)

Course Code: A3253

L	T	P	C
4	0	0	4

Course Overview:

The course addresses the concepts, skills, methodologies, and models of Neural networks and fuzzy logics. The course addresses proper techniques for designing Neural networks for artificial intelligence, logic circuits, and covers concepts for memories of the Neural networks and other fuzzy logic applications in DBMS. Artificial Neural Networks is an extract from the functionalities of a biological brain, and it is a powerful new technology with great potential to help in various electrical applications like forecasting, load flow studies and economic load dispatch.

Prerequisite(s): DLD, Mathematics Set theory

Course Outcomes:

Upon the completion of course Students will beto

CO1. Build the basic model of artificial neuron and compare the functions of both artificial neuron and biological Neuron.

CO2. Develop different architectures of Artificial Neural Networks and apply learning laws and the learning rules associated with the neural networks.

CO3. Analyze the problem of linearly separable using Perceptron model and relate to the concept of Madaline networks.

CO4.Explore the associative learning of the neural network, the architecture of Hopfield network and the error performance of Hopfield network.

CO5.Analyze the fuzzy sets and evaluate the fuzzy logic system with fuzzification, rule base and defuzzification methods

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

B. Tech. EEE VI SEMESTERVCE-R15

NEURAL NETWORKS AND FUZZY LOGICS

(Professional Elective - I)

Course Code: A3253

L	T	P	C
4	0	0	4

SYLLABUS

UNIT-I

INTRODUCTION TO NEURAL NETWORKS: Introduction, Humans and Computers, Organization of the Brain, Biological Neuron, Biological and Artificial Neuron Models, Characteristics of ANN, McCulloch-Pitts Model, Historical Developments, Applications of ANN.

ESSENTIALS OF ARTIFICIAL NEURAL NETWORKS: Artificial Neuron Model, Operations of Artificial Neuron, Types of Neuron Activation Function, ANN Architectures, Learning Strategy (Supervised, Unsupervised, Reinforcement), Learning Rules, Types of Application

UNIT–II

FEED FORWARD NEURAL NETWORKS : Introduction, Perceptron Models: Discrete, Continuous and Multi-Category, Training Algorithms: Discreteand Continuous Perceptron Networks, Perceptron Convergence theorem, Credit Assignment Problem, Generalized Delta Rule, Derivation of Backpropagation (BP) Training,Summary of Backpropagation Algorithm,

UNIT III

ASSOCIATIVE MEMORIES: Paradigms of Associative Memory, Pattern Mathematics, Hebbian Learning, General Concepts ofAssociative Memory (Associative Matrix, Association Rules, Hamming Distance, Bidirectional Associative Memory (BAM) Architecture. Architecture of Hopfield Network: Discrete and Continuous versions,

UNIT – IV

CLASSICAL & FUZZY SETS: Introduction to classical sets – properties, Operations and relations; Fuzzy sets, Membership, Uncertainty, Operations, properties, fuzzy relations, cardinalities, membership functions.

UNIT V

FUZZY LOGIC SYSTEM COMPONENTS: Fuzzification, Membership value assignment, development of rule base and decision making system, Defuzzification to crisp sets, Defuzzification methods.

TEXT BOOK:

1. Neural Networks, Fuzzy logic, Genetic algorithms: synthesis and applications by Rajasekharan and Rai – PHI Publication.
2. Introduction to Neural Networks using MATLAB 6.0 – S.N.Sivanandam, S.Sumathi, S.N.Deepa, TMH,

REFERENCE BOOKS:

1. Neural Networks – James A Freeman and Davis Skapura, Pearson Education, 2002.
2. Neural Networks – Simon Hakins , Pearson Education
3. Neural Engineering by C.Eliasmith and CH.Anderson, PHI
4. Neural Networks and Fuzzy Logic System by Bart Kosko, PHI Publications.

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

B. Tech. EEE VI SEMESTER **VCE-R15**

DYNAMICS OF ELECTRICAL MACHINES

(Professional Elective - I)

Course Code: A3254

L	T	P	C
4	0	0	4

Overview: Students will be exposed to rotating field theory and operation of Induction motors. This course covers topics related to dynamics of Dc Generators, DC Motors, Induction Machines and Synchronous Machines

Course Outcomes:

Upon the completion of course Students will be able to

CO1. **Apply** the knowledge of Electrical machines to understand the operational characteristics of DC and AC rotating machines.

CO2. **Apply** the knowledge of DC machines dynamicsto formulate its steady state equations.

CO3. **Apply** Lagrange's and electro dynamical equations to model the mechanical and electrical systems for steady state analysis.

CO4. **Analyze** the steady state and transient behavior of separately excited DC generators and DC motors.

CO5. **Apply** the theory of machine dynamics to formulate the equations for the dynamical behavior of induction machines and analyze its behavior during starting, braking and accelerating.

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

B. Tech. EEE VI SEMESTER **VCE-R15**

DYNAMICS OF ELECTRICAL MACHINES

(Professional Elective - I)

Course Code:**A3254**

L	T	P	C
4	0	0	4

SYLLABUS

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. VedamSubramanyam (2008), *Thyristor Control of Electric Drives*, 1st edition, Tata McGraw Hill Education, New Delhi.

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

B. Tech. EEE VI SEMESTERVCE-R15

RELIABILITY ENGINEERING

(Professional Elective - II)

Course Code:**A3255**

L	T	P	C
4	0	0	4

Course Overview:

A Reliability Engineering approach can be of value in equipment selection, system design, maintenance planning, and may other fields of direct everyday relevance to engineers.Reliability plays a key role in the cost-effectiveness of systems. To apply engineeringknowledge and specialist techniques to prevent or to reduce the likelihood or frequency of failures.

Prerequisite(s): Probability concepts

Course Outcomes:

Upon the completion of course Students will be able to

CO1. Analyze the concepts of reliability, common reliability functions, parameters and methods of their modelling and prediction.

CO2. Apply the knowledge of mathematics, statistical distributions to characterise the reliability of an item and for modelling failure data.

CO3. Evaluate the Reliability of different engineering systems like Series, parallel and complex configurations using cutest/tieset methods.

CO4. Describe the reliability functions with their relationships and Markov modeling.

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

B. Tech. EEE VI SEMESTERVCE-R15

RELIABILITY ENGINEERING

(Professional Elective - II)

Course Code:**A3255**

L	T	P	C
4	0	0	4

SYLLABUS

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 functions 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 modelling concepts, stochastic transitional probability matrix, time dependent probability evaluation and limiting state probability evaluation. Absorbing states.

CONTINUOUS MARKOV PROCESSES: Modelling 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.

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

B. Tech. EEE VI SEMESTERVCE-R15

DIGITAL CONTROL SYSTEMS

(Professional Elective - II)

Course Code:**A3256**

L	T	P	C
4	0	0	4

Overview: The core course in electrical engineering introduces the fundamental concepts, principles and application of digital control system analysis .The course goes deeper into the various aspects of digital control engineering. Each topic is developed in logical progression with up-to-date information.

Course Outcomes:

Upon the completion of course Students will be able to

CO1 Apply the Sampling & quantization in A/ D conversion & sampling and hold circuit in reconstruction process D/A Conversion

CO2 Analysis of the given system in time domain, frequency domain and Z domain.

CO3 Inspect the Stability, Controllability and Observability of digital systems.

CO4 Design an appropriate compensator, state feedback controller and observer of digital Systems.

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

B. Tech. EEE VI SEMESTERVCE-R15

DIGITAL CONTROL SYSTEMS

(Professional Elective - II)

Course Code:**A3256**

L	T	P	C
4	0	0	4

SYLLABUS

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 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.

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

B. Tech. EEE VI SEMESTERVCE-R15

EVOLUTIONARY COMPUTATION

(Professional Elective - II)

Course Code: A3257

L	T	P	C
4	0	0	4

Course Overview:

Computational systems inspired by natural evolution; natural and artificial evolution, evolutionary; chromosome representations; search operators; co-evolution; constraint handling techniques, genetic programming; classifier systems and theoretical foundations; implementation of selected algorithms

Prequisites(s):

- Knowledge of neural networks

Course Outcomes:

Upon the completion of course Students will be able to

CO1. Analyses the conventional optimization approach and heuristic methods of optimization.

CO2. Analyses different genetic algorithm operators and their characteristics and parameter variation.

CO3. Analyses classification, evolving agent based systems and adoptive rule based neural networks.

CO4. Analyses and evaluate particle swarm optimizations and its characteristics.

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

B. Tech. EEE VI SEMESTERVCE-R15

EVOLUTIONARY COMPUTATION

(Professional Elective - II)

Course Code: A3257

L	T	P	C
4	0	0	4

SYLLABUS

UNIT-I

GENETIC ALGORITHMS: Biology, method, variants, schema theorem, applications Genetic Programming: evolving computer programs, tree/linear/graph based genomes Evolution Strategies: method, variations, optimization.

UNIT-II

EVOLUTIONARY PROGRAMMING: method, variations, applications Issues: preferred operators, co-evolution, speciation, creative evolutionary systems, network representations and genetic operations, spatially-distributed populations

UNIT-III:

EVOLUTION AND ADAPTATION OF INTELLIGENT AGENTS EVOLVING RULE-BASED SYSTEMS: classifier systems, GABIL, cellular automata, L-systems Evolving Neural Networks: weights, architectures, recurrent networks, cellular coding, .Evolving Multi-Agent Systems: cooperative/competitive behavior, communication

UNIT-IV

COMPUTER IMPLEMENTATION OF GENETIC ALGORITHM: Reproduction, Cross Over & Mutation, Fitness Scaling, Coding, Discretization, Applications of GA

UNIT-V

PARTICLE SWARM OPTIMIZATION: Concept of Particle Swarm Optimization, PSO Modeling, PSO Parameter control, Comparison between PSO and GA, Comparison between PSO and ANN

TECT BOOKS

1. Back, T, 2000. Evolutionary Computation 1: Basic Algorithms and Operators. Institute of Physics Publishing, Bristol.
2. Neural Networks, Fuzzy logic, Genetic algorithms: synthesis and applications by Rajasekharan and Rai – PHI Publication.
3. Introduction to Neural Networks using MATLAB 6.0 – S.N.Sivanandam, S.Sumathi, S.N.Deepa, TMH,

REFERENCE

1. Fogel, D.B., 1999. Evolutionary Computation: Toward a New Philosophy of Machine Intelligence-2nded. Wiley-IEEE Press.
2. Jacob, C., 2001. Illustrating Evolutionary Computation with Mathematical. Morgan Kaufmann

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

B. Tech. EEE VI SEMESTERVCE-R15

POWER SYSTEM DYNAMICS AND STABILITY

(Professional Elective -II)

Course Code:**A3258**

L	T	P	C
4	0	0	4

Course Overview:

This course provides an understanding of the electromechanical dynamics of the interconnected electric power grid. This subject is presented from a theoretical viewpoint; however, many practical examples are included. The course begins with a description of the physics of the power system, frequency regulation during "steady-state" operation, dynamic characteristics of modern power systems, a review of feedback control systems, power system frequency regulation, and a review of protective relaying. This is followed by material on synchronous machine theory and modeling. Simulation of power system dynamic response, small signal stability, transient stability analysis using SIMULINK and effects of non-traditional power sources on systems dynamics will also be covered. Power system stabilizers, load modeling and under frequency load shedding are covered in the final lectures.

Prerequisite(s):

- A fundamental course on power System
- A primer on Power Systems Engineering
- Good knowledge of network theory

Course Outcomes:

Upon the completion of course Students will be able to

CO1**. Analyze**the steady state behavior of synchronous machine using Park's transformation.

CO2**. Analyze**the dynamic behavior of synchronous generator under system conditions leading to instability.

CO3**. Analyze**the generator excitation, prime mover controls and recognize their role in power system stability control.

CO4**. Compare** different types of power system stabilities and methods to improve overall system stability.

CO5**. Evaluate** the power system behavior under small signal, transient and voltage instability conditions using PSCAD simulation.

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

B. Tech. EEE VI SEMESTERVCE-R15

POWER SYSTEM DYNAMICS AND STABILITY

(Professional Elective - II)

Course Code:**A3258**

L	T	P	C
4	0	0	4

SYLLABUS

UNIT –I

Introduction General basic concept of Power System Stability, States of operation & System Security, System Dynamics Problems, Review of Classical Model, System Model, Analysis of Steady State Stability & Transient Stability

UNIT –II

Modeling of Synchronous Machine Synchronous Machine, Park's Transformation, Analysis of Steady State Performance, P. U. Quantities, Equivalent Circuit of Synchronous Machine

UNIT –III

Excitation systems & Prime Mover Controllers: Simplified Representation of Excitation Control, Excitation systems, Modeling, Block Diagram, State Equations, Prime Mover Control System, Transmission Line & Load Modeling

UNIT –IV

Dynamics of Synchronous Generator Connected to Infinite Bus System Model, Synchronous Machine Model, System Simulation, Consideration of other Machine Models including SVC Model

UNIT –V

Small signal Stability -Single and multi-machine system, Damping and Synchronizing torque Analysis, Power System Stabilizers Transient Stability and Voltage Stability controllers. Voltage Stability: Introduction, affecting factors, analysis, comparison with angle stability

TEXT BOOKS:

1. K. R. Padiyar, Power System Dynamics – Stability & Control, BS Publications
2. I.J. Nagrath and M. Gopal, Control system engineering, Wiley Eastern Ltd, 3rd edition, 2000.

REFERENCE BOOKS:

1. Benjamin C. Kuo, Automatic Control system, Prentice Hall of India Pvt Ltd.
2Prabha Kundur, Power System Stability and Control, Tata McGraw Hill

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

B. Tech. EEE VI SEMESTERVCE-R15

POWER ELECTRONICS LAB

Course Code: **A3223**

L	T	P	C
0	0	3	2

Overview: This Lab course is designed to obtain the characteristics of SCR, MOSFET and IGBTs. The Characteristic of different converters like single phase converter, cyclo converter, inverter and chopper at different load conditions will be obtained.

Course Outcomes:

Upon the completion of course Students will be able to

CO1. Apply the knowledge of Matlab/Simulinktool to Power electronic converters.

CO2. Analyze ACR firing and commutation circuits & the characteristics of MOSFET, IGBT, SCR

CO3. Analyze dc-dc, dc-ac, ac-ac and ac-dc converters for different loads.

CO4. Evaluate the performance parameters of power electronic Converters.

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

B. Tech. EEE VI SEMESTERVCE-R15

POWER ELECTRONICS LAB

Course Code: **A3223**

L	T	P	C
0	0	3	2

SYLLABUS

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

1. Study of SCR, MOSFET & IGBT Characteristics.
2. Study of DC Jone's Chopper.
3. Single Phase AC Voltage Controller with R and RL Loads.
4. Study of Single Phase converter with R and RL loads.
5. Study of Single Phase Cyclo converter with R and RL loads.
6. Single Phase series inverter with R and RL loads.
7. Study of single phase dual converter
8. Study of single phase half controlled converter with R & RL loads
9. Simulation of three phase semi converter with RL load using MATLAB
10. Simulation of single phase PWM inverter using MATLAB
11. Simulation of Three phase Inverter using MATLAB.
12. Simulation of single-phase Semi converter with RLE load using MATLAB
13. Simulation of single-phase AC voltage controller with RLE load using MATLAB
14. Simulation of three phase full converter with RL load using MATLAB.
15. Simulation of Single phase full Bridge converter using MATLAB
16. Simulation of Buck chopper using MATLAB

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

B. Tech. EEE VI SEMESTERVCE-R15

MICROPROCESSORS AND INTERFACING LAB

Course Code:**A3422**

L	T	P	C
0	0	3	2

Course Overview:

The Microprocessor and Interfacing lab course is designed to train students to develop programs to be executed on 8086 microprocessor based system and design system hardware through experiments conducted individually on various interfacing components like ADC, DAC, Keyboard etc. In this course students will write all stand alone programs in assembly language compile and debug those programs using the assembler. All the interfacing experiments will be conducted using trainer kits and interfacing modules. This Lab provides students with the opportunity to gain experience in microprocessor-based system design, assembly language programming and I/O interfacing to microprocessors.

Prerequisite(s):

- Digital Logic Design (A3404)
- Computer Organization and Architecture (A3508)
- Microprocessors and Interfacing (A3419)

Course Outcomes:

Up on successful completion of this course, student will be able to:

CO1. Analyze the data interaction between CPU, external memory and I/O devices in microprocessor based systems.

CO2. Compile the assembly language programming as error free to general purpose computer systems applications.

CO3. Apply appropriate techniques to design circuits to interface assorted I/O devices to microprocessor.

CO4. Design a simple microprocessor based system with functional requirements using optimal hardware and software components.

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

B. Tech. EEE VI SEMESTERVCE-R15

MICRO PROCESSORS AND INTERFACING LAB

Course Code: **A3422**

L	T	P	C
0	0	3	2

SYLLABUS

PART - A

MICROPROCESSOR 8086 PROGRAMMING USING ASSEMBLER:

1. Programs involving data Transfer Instructions.
2. Programs involving arithmetic and logical operations like addition and subtraction of multi-precision numbers.
3. Programs involving bit manipulation instructions.
4. Programs involving Branch / Loop instructions.
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.

PART – B

INTERFACING 8086 TO OTHER PERIPHERAL USING TRAINER KITS:

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.

REFERENCE BOOKS / MATERIALS:

1. Douglas V.Hall, Microprocessors Interface, 2nd Edition, 2007, TMH.
2. Liu and GA Gibson (1988), Micro Computer System 8066/8088 Family Architecture, programming and Design, 2nd Edition, PHI, India.
3. Walter A.Triebel, Avtar Singh (2003), the 8088 and 8086 Microprocessors 4th Edition, PHI, India.

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

B. Tech. EEE VI SEMESTERVCE-R15

INTELLECTUAL PROPERTY RIGHTS

(Common to ECE, EEE, MECH., CIVIL, CSE & IT)

Course Code: **A3013**

L	T	P	C
3	0	0	0

Course Outcomes:

Upon the completion of course Students will be able to

CO1. Acquires the basic concepts of Professional ethics and human values & Students also gain the connotations of ethical theories.

CO2. Knows the duties and rights towards the society in an engineering profession.

CO3. Would realize the importance and necessity of intellectual property rights.

CO4. Take all the necessary precautions while conducting the experiments, which may reduce the risk.

CO5. Understands the importance of risk evacuation system in reality and takes the utmost. Responsibility while handling the risky situations.

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

B. Tech. EEE VI SEMESTERVCE-R15

INTELLECTUAL PROPERTY RIGHTS

(Common to ECE, EEE, MECH., CIVIL, CSE & IT)

Course Code: **A3013**

L	T	P	C
3	0	0	0

SYLLABUS

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 trademarks, trade mark registration process.

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 registration, 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 secretes status, liability for misappropriations of trade secrets, protection for submission, and trade secrete litigation.

UNFAIR COMPETITION: Misappropriation right of publicity, false advertising.

UNIT – V

NEW DEVELOPMENT OF IPR: Geographical indication, Geographical indication protection, Importance to protect geographical indications, Biotechnology Research and Intellectual Property Rights Management, Intellectual property audits.

TEXT BOOKS:

1. Deborah. E. Bouchoux 4th Edition (2012*), Intellectual property*, Cengage learning, India.
2. T. M Murray and M.J. Mehlman, Encyclopedia of Ethical, Legal and Policy issues in Biotechnology, John Wiley & Sons 2000

REFERENCE BOOKS:

1. Prabuddaganguli (2003), *Intellectual property right*, Tata McGraw Hill Publishing company ltd., India.
2. P.N. Cheremisinoff, R.P. Ouellette and R.M. Bartholomew, Biotechnology Applications and Research, Technomic Publishing Co., Inc. USA, 1985.
3. P. Narayanan; Law of Copyright and Industrial Designs; Eastern law House, Delhi, 2010.

SYLLABI FOR
VII SEMESTER

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

B. Tech. EEE VII SEMESTERVCE-R15

POWER SEMICONDUCTOR DRIVES

Course Code: **A3224**

L	T	P	C
3	1	0	3

Course Overview:

This course focuses on basic principles of speed control of DC & AC machines. The study of Improvement of Speed response by closed loop control is emphasized

Prerequisite(s): Power Electronics, Machines

Course Outcomes:

Upon the completion of course Students will be able to

CO1. Analyze1phase and 3phase controlled converters for speed control operation of DC Drives.

CO2. Apply the knowledge of DC-Dc Converter and dual converter for speed and torque control of DC Drives.

CO3. Analyze variable frequency control of Induction motor on stator side using different converters.

CO4. Test the performance of Induction Motor by conducting different speed control methods.

CO5. Assess different power electronic converter to control speed of synchronous motor drives.

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

B. Tech. EEE VII SEMESTERVCE-R15

POWER SEMI CONDUCTOR DRIVES

Course Code: **A3224**

L	T	P	C
3	1	0	3

SYLLABUS

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.

UNIT - II

FOUR QUADRANT OPERATIONS 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.

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. 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.

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

B. Tech. EEE VII SEMESTERVCE-R15

COMPUTER METHODS IN POWER SYSTEMS

Course Code: **A3225**

L	T	P	C
3	1	0	3

Course Overview:

Computer methods in power systems deals with the computer control of power systems. The student is going to study load flow studies, short circuit studies and stability studies. Knowledge of Y bus matrix, Z bus matrix, and graph theory is very much required for this subject. The knowledge of per unit system is required while solving problems.

Prerequisite(s): Understand basics of graph theory.

Course Outcomes:

Upon the completion of course Students will be able to

CO1. **Develop** per-unit reactance diagrams, bus incidence, Ybus and Zbus matrices for modeling the actual power system.

CO2. **Determine** steady state power flow analysis of power system using Gauss-Seidel, Newton-Raphson and fast decoupled iterative methods.

CO3. **Analyze** symmetrical and unsymmetrical power system faults.

CO4. **Examine** steady state and transient stability of power system.

CO5. **Apply** the methods to improve steady state and transient stability of power system.

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

B. Tech. EEE VII SEMESTERVCE-R15

COMPUTER METHODS IN POWER SYSTEMS

Course Code: **A3225**

L	T	P	C
3	1	0	3

SYLLABUS

UNIT - I

PER-UNIT SYSTEM OF REPRESENTATION: Per-Unit equivalent reactance network of a three phase Power System. Bus Incidence Matrix, Ybus formation by Direct and Singular Transformation Methods.

FORMATION OF ZBUS: Partial network, Algorithm for the Modification of ZBus 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 buses.

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.

UNIT - IV

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

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. J. Nagrath, D. P. Kothari (2005), Modern Power system Analysis, 3rd edition, Tata McGraw Hill Publications, New Delhi, India.

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

B. Tech. EEE VII SEMESTERVCE-R15

POWER SYSTEM SWITCHGEAR AND PROTECTION

Course Code: **A3226**

L	T	P	C
3	1	0	3

Course Overview:

This course introduces all varieties of circuit breakers and relays for protection of Generators, Transformers and feeder busbars from over voltages and other hazards. It emphasis on neutral grounding for overall protection. This is very interesting and useful subject for a power system engineer.

Prerequisite(s): Power system generation, transmission and distribution

Course Outcomes:

Upon the completion of course Students will be able to

CO1. **Analyze** the operational aspects of different types of circuit breakers.

CO2. Distinguish various types of relaying schemes such as differential, distance, over current / under voltage, Instantaneous, DMT and IDMT relays.

CO3. Develop protection schemes for generators, bus-bars, feeders & transformers.

CO4. Analyze power system transients for termination of lines with different types of conditions.

CO5. Analyze different neutral grounding methods and protection schemes against over voltages.

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

B. Tech. EEE VII SEMESTERVCE-R15

POWER SYSTEM SWITCHGEAR AND PROTECTION

Course Code: **A3226**

L	T	P	C
3	1	0	3

SYLLABUS

UNIT - I

CIRCUIT BREAKERS: Circuit Breakers: Elementary principles of arc interruption, Recovery, Restriking Voltage and Recovery voltages, Restriking Phenomenon, Average and Max. RRRV.Current Chopping and Resistance Switching, CB ratings and Specifications, Types. 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.

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

B. Tech. EEE VII SEMESTERVCE-R15

HIGH VOLTAGE ENGINEERING

(Professional elective –III)

Course Code: **A3259**

L	T	P	C
4	0	0	4

Course Overview:

This course introduces the fundamental techniques for the generation and measurement of high voltages, electrostatic fields and field stress control, electrical breakdown in gases, dielectrics, nondestructive insulation tests, over-voltages, design and testing of external insulation.

Prerequisite(s): Power system apparatus and protection

Course Outcomes:

Upon the completion, of course Students will be able to

CO1. **Analyze** the techniques used for high voltage generation and their measurements.

CO2. **Apply** various methods to find field factor for uniform and non-uniform fields.

CO3. **Discriminate** the dielectric strengths usedfor all electrical apparatus and their breakdown mechanism.

CO4. **Categories** the methods used for testing electrical apparatus and its insulation coordination.

CO5. **Analyze** the protective devices for over voltages, surge voltages and their control.

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

B. Tech. EEE VII SEMESTERVCE-R15

HIGH VOLTAGE ENGINEERING

(Professional elective –III)

Course Code: **A3259**

L	T	P	C
4	0	0	4

SYLLABUS

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.

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

B. Tech. EEE VII SEMESTERVCE-R15

EXTRA HIGH VOLTAGE AC TRANSMISSION

(Professional Elective - III)

Course Code:**A3260**

L	T	P	C
4	0	0	4

Overview:

This course covers topics such as Transmission line parameters, Corona, RIV and Audible noise on transmission lines, Mechanical vibration of conductors, Electric fields under transmission lines, Overhead line insulators and their performance under polluted environments, Grounding of Towers, HV substations, Overvoltages , Surge protective devices, Insulation Co-ordination,etc

Course Outcomes:

Upon the completion of course Students will be able to

CO1. **Apply** the knowledge, of basics in power systems, in EHVAC Transmission for computing various parameters such as inductance, capacitance, power transfer, surge impedance loading etc.

CO2. **Analyze** the voltage gradients of conductors to suit corona characteristics calculations.

CO3. **Evaluate** the corona power loss, audible noise, radio interference, modes of propagation etc.

CO4. **Develop** power circle diagrams and its use, voltage control using synchronous condensers and other compensating devices**.**

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

B. Tech. EEE VII SEMESTERVCE-R15

EXTRA HIGH VOLTAGE AC TRANSMISSION

(Professional Elective - III)

Course Code:**A3260**

L	T	P	C
4	0	0	4

SYLLABUS

UNIT - I

PRELIMINARIES: Necessity of EHV AC transmission, advantages. 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.

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

B. Tech. EEE VII SEMESTERVCE-R15

MACHINE MODELLING AND ANALYSIS

(Professional Elective - III)

Course Code:**A3261**

L	T	P	C
4	0	0	4

Course Overview:

This course is designed to introduce you to the principles and practice of smart electrical energy conversion. The fundamental power electronic converter topologies are introduced, and you will learn about modulation processes (i.e. switching) and control techniques for these systems

Prerequisite(s): Circuit analysis, and in particular able to analyze single and three phase AC electrical circuits.

Course Outcomes:

Upon the completion of course Students will be able to

CO1. **Construct** the two pole machine diagram for any given machine modelling.

CO2. **Analyze** the response both in transient and steady state for any DC machine.

CO3. **Apply** the knowledge of Machines to transform one set of variables into any other set of variables as required.

CO4. **Develop**the model of an induction machine and synchronous machine.

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

B. Tech. EEE VII SEMESTERVCE-R15

MACHINE MODELLING ANALYSIS

(Professional Elective - III)

Course Code:**A3261**

L	T	P	C
4	0	0	4

SYLLABUS

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. Mathematical model of D.C. shunt motor and D.C. Compound motor in state variable form. Transfer function of the motor.

UNIT - III

TRANSFORMATIONS: Linear transformation, Phase transformation (a, b, c to α,β,γ), Active transformation

MODELLING OF THREE PHASE INDUCTION MACHINES: Circuit model of a 3 - phase 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.

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

B. Tech. EEE VII SEMESTERVCE-R15

POWER QUALITY

(Professional Elective - III)

Course Code:**A3262**

L	T	P	C
4	0	0	4

Overview: The course addresses various issues related to power quality in power systems. This course explains the concepts of transients, flickers, voltage sag, Voltage swell, limits for voltage sag and power quality monitoring

Course Outcomes:

Upon the completion of course Students will be able to

CO1. Analyze the severity of power quality problems in distribution system.

CO2. Analyze the various causes of voltage flicker and their effects and various means to reduce flickers.

CO3. Apply the knowledge of voltage sag/swell interruptions to improve power quality.

CO4. Apply the knowledge of harmonic sources and effects to improve the performance of system.

CO5. Evaluate the approaches followed in power quality monitoring.

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

B. Tech. EEE VII SEMESTERVCE-R15

POWER QUALITY

(Professional Elective - III)

Course Code:**A3262**

L	T	P	C
4	0	0	4

SYLLABUS

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.

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

B. Tech. EEE VII SEMESTERVCE-R15

UTILIZATION OF ELECTRICAL ENGINEERING

(Professional Elective – IV)

Course Code: **A3263**

L	T	P	C
4	0	0	4

Course Overview:

This course deals with the fundamentals of illumination and its classification and the electric heating and welding. It gives the detailed study of all varieties of Electric drives and electrical traction systems and to clearly understand the basic concepts related to use of electric energy in various industrial, commercial and residential applications and important issues related to such usage.

Prerequisite(s): Power system generation, transmission and distribution

Course Outcomes:

Upon the completion of course Students will be able to

CO1. Analyze various types Electric drives and their applications.

CO2. Identify the various modern methods of speed control & braking techniques.

CO3. Analyze the modern circuits for generation of high frequency power for induction & electric heating.

CO4. Explain the various welding processes used in industry.

CO5. Model the different illumination schemes for different applications.

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

B. Tech. EEE VII SEMESTERVCE-R15

UTILIZATION OF ELECTRICAL ENGINEERING

(Professional Elective – IV)

Course Code: **A3263**

L	T	P	C
4	0	0	4

SYLLABUS

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 rheostat 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.

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

B. Tech. EEE VII SEMESTERVCE-R15

HIGH VOLTAGE DC TRANSMISSION & FACTS

(Professional Elective – IV)

Course Code: **A3264**

L	T	P	C
4	0	0	4

Course Overview:

The course studies High Voltage Direct Current technologies, their operation, control and interactions with AC systems. The traditional thyrisor-based HVDC is introduced with basic 6-pulse rectifiers and analyzed on typical large systems with the main control loops. The interactions with AC systems through controls and harmonics are analyzed. A special study is concerned with weak AC systems and other reported operating problems. The modern VSC HVDC are introduced using basic self-commutating converter principles. The VSC HVDC controls are presented in a rotating DQ coordinate frame and interaction with AC is explored. The course also analyses the latest Modular Multilevel HVDC topologies. In the last segment of this course, the students will learn about multiterminal HVDC and DC grids. The course is supported with live simulation on SIMULINK HVDC models, which are made available to the students.

Prerequisites(S): Power transmission lines.

Course Outcomes

Upon the completion of course Students will be able to

CO1. Evaluate the HVDC Transmission systems and Lines.

CO2. Identify and analyze converter configurations used in HVDC and list the performance metrics.

CO3. Compute the filter parameters for elimination of voltage and current harmonics in HVDC system.

CO4. Identify HVDC/FACTS devices to address a power quality issues related to power system

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

B. Tech. EEE VII SEMESTERVCE-R15

HIGH VOLTAGE DC TRANSMISSION & FACTS

(Professional Elective – IV)

Course Code: **A3264**

L	T	P	C
4	0	0	4

SYLLABUS

UNIT - I

HVDC CONCEPTS: Economics & 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. Designs 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.

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

B. Tech. EEE VII SEMESTERVCE-R15

PROGRAMMABLE LOGIC CONTROLLERS

(Professional Elective - IV)

Course Code:**A3265**

L	T	P	C
4	0	0	4

Course Overview:

The course provides an in depth knowledge on development, installation and testing of programs for programmable logic controllers and industrial systems requiring advanced control functions. On completion of this course learners will be able to apply knowledge of control systems and development of programming methods; Use ladder and function block diagrams, statement lists, and instruction sets; Follow written programming instructions, document program development and testing activities. Use structured logic and acceptable design techniques and apply knowledge of high level instructions.

Course Outcomes:

Upon the completion of course Students will be able to

CO1. Discriminate types of PLC programming schemes.

CO2. Analyze ladder diagrams for process control.

CO3. Apply suitable PLCs with drives in achieving required control.

CO4. AnalyzePLC functions and Data Handling Functions and their operations.

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)

B. Tech. EEE VII SEMESTERVCE-R15

PROGRAMMABLE LOGIC CONTROLLERS
(Professional Elective - IV)

Course Code:**A3265**

L	T	P	C
4	0	0	4

SYLLABUS

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 REGISTERS: Characteristics of Registers, module addressing, holding registers, Input Registers, Output Registers.

PLC FUNCTIONS: Timer functions & 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 & 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.

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

B. Tech. EEE VII SEMESTERVCE-R15

PROCESS CONTROL

(Professional Elective –IV)

Course Code:**A3266**

L	T	P	C
4	0	0	4

Overview:

This course aims to provide students with knowledge and understanding of process dynamics, process models, process control, and control system analysis and design. Students will be taught to develop mathematical and transfer function models for dynamic processes.

Course outcome

Upon the completion of course Students will be able to

CO1. Develop the mathematical modelling of dynamic systems.

CO2. Design of Various types of controller.

CO3. Investigate the optimum performance index by time response, frequency response and various techniques.

CO4. Analyze the different types of control elements in process control system.

CO5. Design of different types of process control systems.

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

B. Tech. EEE VII SEMESTERVCE-R15

PROCESS CONTROL

(Professional Elective –IV)

Course Code:**A3266**

L	T	P	C
4	0	0	4

SYLLABUS

UNIT -I

Process Dynamics Process variables-Load variables-Dynamics of simple processes.Flow, level, temperature and pressure.Interacting and non-interacting system, continuous and batch process-self - regulation-Servo and regulator operation problems.

UNIT -II

Basic control actions-characteristics of two position, three position, proportional, single speed floating. Integral and derivative control modes- P+I. P+D and P+I+D control modes. Problems on pneumatic, hydraulic and electronic controllers to realize various control actions.

UNIT -III

Optimum Controller Settings Evaluation criteria, 1/4th decay ratio, IAE. ISE, ITAE- determination of optimum settings for mathematically described process using time response and frequency response. Tuning process reaction curve method-continuous, oscillation method-damped oscillation method-problems.

UNIT -IV

Final Control Element I/P Converter-pneumatic, electric and hydraulic actuators- valve positioner-control valves- characteristics of control valves-valve body-Globe, butterfly, diaphragm; Ball valves-Control valve sizing-Cavitation, flashing problem.

UNIT -V

Multi Loop Control System Feed forward control-Ratio control-Cascade control-Split range-Multivariable controland examples from distillation column & Boiler system.Plantwide control issues, Hypothetical plant for plantwide control studies, internal feedback for material and energy, Interaction of plant design and control system design, Systematic Procedure for plantwide control system design –Case Study: The Reactor/Flash Unit plant, effect of control structure on Closed loop performance

TEXT BOOKS:

1. Process control, Pollard A. Heinemann, Educational Books. London, 1971.
2. Process control, Harriott P., Tata McGraw- publishing Co. New Delhi. Reprint 1991.

REFERENCES:

1. Automatic process control, Eckman D.P., Wiley Eastern Ltd. New Delhi. 1993.
2. Chemical Process Control Stephanoupoulis, G., Prentice Hall, New Delhi. 1990. Process Control, Palranabis.

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

B. Tech. EEE VII SEMESTERVCE-R15

POWER SYSTEM LAB

Course Code: **A3227**

L	T	P	C
0	0	2	1

Overview: This Lab course is designed to explain the measurement of earth resistance, analyze the field geometry, IDMT characteristics of Fuser and Circuit breaker. Here the analysis if faults in transmission line and Ferranti effect in transmission line will be done

Course Outcomes:

The student will be able to:

CO1. Analyze the characteristics of circuit breaker, LG, LL, LLG, LLL, LLLG faults and Ferranti effects on long transmission using PSCAD.

CO2. Evaluate the compensation required at mid-point, end-point, line and load ends for a transmission line using PSCAD.

CO3. Apply Gauss-Seidal method on power flow study to get optimal values using MATLAB.

CO4 Analyze the load behaviour of short and medium transmission lines using MATLAB.

CO5 Analyze y-bus matrix and single area load frequency of power system using MATLAB..

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

B. Tech. EEE VII SEMESTERVCE-R15

POWER SYSTEM LAB

Course Code: **A3227**

L	T	P	C
0	0	2	1

SYLLABUS

LIST OF EXPERIMENTS:

1. Measurement of Earth Resistivity
2. Breakdown Characteristic of Sphere-Sphere Field Geometry
3. Determination of ABCD Parameters for a Long Transmission Line
4. Measurement of Low resistances (Mill Volt Drop Test)
5. Inverse Definite Minimum Time Characteristics of Fuse
6. IDMT characteristics of miniature circuit breaker
7. Verification of Ferranti Effect on a Transmission Line using PSCAD
8. Simulation of Mid-Point Compensation using PSCAD
9. Line Compensation Under Lagging PF Conditions using PSCAD
10. Simulation of load Compensation using PSCAD
11. Study of LG,LL,LLG,LLL and LLLG faults using PSCAD
12. End Point Compensation Under Light-Load using PSCAD

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

B. Tech. EEE VII SEMESTERVCE-R15

POWER SEMI CONDUCTOR DRIVES LAB

Course Code: **A3228**

L	T	P	C
0	0	2	1

Overview: This Lab course is designed to explain the speed control techniques of Dc motor using single phase half converter, full converters, three phase Half Controlled Bridge Converter and chopper. This course also covers study of PMDC Motors.

Course Outcomes:

Upon the completion of course Students will be able to

CO1. Apply various configurations of 1phase & 3phase AC-DC Converters and DC-DC converters to control the speed of DC Motor.

CO2. Apply various AC-AC Convertors to control the speed of Induction Motor.

CO3. Apply various control techniques for speed control of Induction Motor drive.

CO4. Apply closed loop technique to control the speed of PMDC Motor.

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

B. Tech. EEE VII SEMESTERVCE-R15

POWER SEMI CONDUCTOR DRIVES LAB

Course Code: **A3228**

L	T	P	C
0	0	2	1

SYLLABUS

LIST OF EXPERIMENTS:

1. Speed Control of DC Motor using single phase Half Converter.
2. Speed Control of DC Motor using single phase Full Converter.
3. Speed Control of DC Motor using Three phase Half Controlled Bridge Converter
4. Speed Control of DC Motor using Chopper.
5. Study of SCR to drive small load.
6. Speed Control of single phase AC Motor using SCR.
7. Single phase cycloconverter fed AC Motor.
8. Three phase AC Induction Motor drive with VVVF control.
9. Speed Measurement and closed loop control using PMDC Motor.
10. Thyristorised drive for PMDC motor with speed measurement and closed loop control.
11. Study of series inverter for light load
12. Speed control of PMDC motor using MOSFET based Buck Boost Converter

SYLLABI FOR
VIII SEMESTER

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

B. Tech. EEE VIII SEMESTERVCE-R15

MANAGEMENT SCIENCE

Course Code: **A3014**

L	T	P	C
3	0	0	3

Course Description:

In this course, students will learn the fundamental concepts and contributions of Management. This course also explains Inventory control techniques, Human Resource Practices, Quality control techniques and Project Management which plays a vital role in the organization.

Prerequisite(s): To make students understand the concepts of Management, Administration and Organization.

Course Outcomes:

Upon the completion of this course students will able to:

CO1. Explain and infer the concepts and aspects of management and Industrial Psychology.

CO2. Analyze the different organization structures, plant layouts, work study tools for enhancement of productivity in an organization.

CO3. Apply the project management techniques to decide the optimum time and cost for completion of a project.

CO4. Apply statistical quality control techniques to know quality of product with in control limits.

CO5. Use human resources management and marketing techniques for better people management.

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

B. Tech. EEE VIII SEMESTERVCE-R15

MANAGEMENT SCIENCE

Course Code: **A3014**

L	T	P	C
3	0	0	3

SYLLABUS

UNIT I

INTRODUCTION: Management - Definition, Nature, Importance of management Functions of Management - Taylor's scientific management theory, Fayol's principles of management, Contribution of Elton mayo, Maslow, Herzberg, Douglas MC Gregor, Basic concepts of Organisation- Authority, Responsibility, Delegation of Authority, Span of control, Departmentation and Decentralization - Organisation structures (Line organization, Line and staff organization, Functional organization, Committee organization, Matrix organization)

UNIT II

OPERATIONS MANAGEMENT: Plant location, Factors influencing location, Principles and types of plant layouts - Methods of production (job, batch and mass production), Work study - Basic procedure involved in method study and Work measurement.

UNIT III

QUALITY CONTROL AND MATERIALS MANAGEMENT: Statistical quality control – Meaning- Variables and attributes - X chart, R Chart, C Chart, P Chart, (simple Problems) Acceptance sampling, Sampling plans, Deming's contribution to quality. Materials management – objectives, Need for inventory control, Purchase procedure, Store records, EOQ, ABC analysis, Stock levels.

UNIT IV

HUMAN RESOURCE MANAGEMENT (HRM): Concepts of HRM, Basic functions of HR manager: Man power planning, Recruitment, Selection, Training and development, Placement, Wage and salary administration, Promotion, Transfers Separation, performance appraisal, Job evaluation and Merit rating.

UNIT V

PROJECT MANAGEMENT: Early techniques in project management - Network analysis: Programme evaluation and review technique (PERT), Critical path method (CPM), Identifying critical path, Probability of completing project within given time, Project cost analysis, project crashing (simple problems)

TEXT BOOKS:

1. Dr. A.R.Aryasri, Management Science, TMH, 4th edition, 2009

REFERENCES:

1. Koontz & weihrich – Essentials of management, TMH, 8th edition, 2010
2. Stoner, Freeman, Gilbert, Management, 6th edition Pearson education, New Delhi, 2004
3. O.P. Khana, Industrial engineering and Management L.S.Srinath, PERT &CPM.

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

B. Tech. EEE VIII SEMESTERVCE-R15

ADVANCED SWITCHGEAR PROTECTION

(Professional Elective – V)

Course Code: **A3267**

L	T	P	C
4	0	0	4

Overview: The purpose of an Electric Power System to generate and supply electrical energy to consumers. The power system should be designed and managed to deliver this energy to the utilization points with both reliability and economically.This course explains how Switchgear protection plays its role in modern power system network, right from generation through transmission to distribution end.

Course Outcomes:

Upon the completion of course Students will be able to

CO1. Apply the knowledge of static relays to different comparators.
CO2. Analyze different protection schemes used for Generator, Motor and Transformer.
CO3. Design differential protection schemes to transformers and bus bars.
CO4. Apply advanced protection schemes for different electrical equipment.

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

B. Tech. EEE VIII SEMESTERVCE-R15

ADVANCED SWITCHGEAR PROTECTION

(Professional Elective – V)

Course Code: **A3267**

L	T	P	C
4	0	0	4

SYLLABUS

UNIT I

Static relays-Comparators and static relay characteristics: Relays as comparators – Amplitude and Phase comparison schemes – General equation for comparators for different types of relays – Static comparators – Coincidence circuits Phase splitting methods – Hall effect comparators – Operating principles – Use of level detectors – Time delay circuits – Filters – Thyristors – Triggering circuits and DC power supplies.

UNIT II

STATIC RELAY HARDWARE: Operating principles: Static time current relays directional units based on phase and amplitude comparison – Differential relays – Distance relays – Quadrilateral relay – Elliptical relay – Relay response –Principle of R - X diagram – Convention for superposing relay and system characteristics – Power swings, Loss of synchronism and its effect on distance relays.

UNIT III

GENERATOR, MOTOR AND TRANSFORMER PROTECTION: Generator protection against short circuits using differential relays against inter - phase fault – Combined split - phase and overall differential relays – Protection against stator open circuits – Rotor and Stator overheating, Loss of excitation protection and field & ground fault protection. Digital protection scheme based upon second harmonic current induced in the rotor field circuit.

UNIT IV

TRANSFORMER DIFFERENTIAL PROTECTION: Effect of magnetizing in rush currents – Grounding transformers – Bus protection with differential relays. Line protection: 3 zone protection using distance relays – Switched schemes – Auto - reclosing –Single and multi –shot auto reclosing – Single pole and three pole auto reclosing.

UNIT V

PILOT WIRE AND CARRIER PROTECTION: Circulating current scheme – Balanced Voltage scheme – Translay scheme – Half wave comparison scheme – Phase comparison carrier current protection – carrier transfer scheme – carrier blocking scheme –Digital protection EHV/UHV transmission line based upon traveling wave phenomena.

TEXT BOOKS:

1. Badriram and Viswakarma D.N., Power System Protection and Switchgear — Tata McGraw Hill, 2004.
2. L.P.Singh, Digital Protection , Wiley Eastern Ltd., 1994.

REFERENCES BOOKS:

1. Warrington A.R. Van C, Protective Relays ,Vol I & II Chapman & Hall, London and John Wiley & Sons, 1977.
2. Mason C.R. The art and science of Protective Relaying, Wiley & Sons, 1956.

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

B. Tech. EEE VIII SEMESTER **VCE-R15**

POWER ELECTRONIC CONTROL OF DC DRIVES

(Professional Elective - V)

Course Code:**A3268**

L	T	P	C
4	0	0	4

Overview: The course provides basic understanding of main principles of DC drives, various modes Of operation, control from converters and choppers

Course Outcomes:

Upon the completion of course Students will be able to

CO1. Apply the knowledge of different power electronic converters to control the speed of DC drives.

CO2. Analyze the operation of 1-Ø and 3-Ø rectifiers during continuous and discontinuous current mode to select suitable converter for a given application.

CO3. Analyze the effect of compensation for 3-Ø bridge converter with different loads.

CO4. Design current and speed controllers for a closed loop operation of DC Drives.

CO5. Analyze the steady state operation of a converter fed DC Drives.

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

B. Tech. EEE VIII SEMESTERVCE-R15

POWER ELECTRONIC CONTROL OF DC DRIVES

(Professional Elective - V)

Course Code:**A3268**

L	T	P	C
4	0	0	4

SYLLABUS

UNIT - I

CONTROLLED BRIDGE RECTIFIER (1-Φ) WITH DC MOTOR LOAD: Separately exited DC motors with rectified single phase supply, single phase semi converter and single phase full converter for continuous and discontinuous modes of operation, power and power factor.

UNIT - II

CONTROLLED BRIDGE RECTIFIER (3-Φ) WITH DC MOTOR LOAD: Three phase semi converter and three phase full converter for continuous and discontinuous modes of operation, power and power factor, addition of free wheeling diode, three phase double converter.

UNIT - III

THREE PHASE NATURALLY COMMUTATED BRIDGE CIRCUIT AS A RECTIFIER OR AS AN INVERTER: Three phase controlled bridge rectifier with passive load impedance, resistive load and ideal supply, highly inductive load and ideal supply for load side and supply side quantities, shunt capacitor compensation, three phase controlled bridge rectifier inverter.

UNIT - IV

PHASE CONTROLLED DC MOTOR DRIVES: Three phase controlled converter, control circuit, control modeling of three phase converter, steady state analysis of three phase converter control DC motor drive, two quadrant, three phase converter controlled DC motor dive, DC motor and load converter.

UNIT - V

CURRENT AND SPEED CONTROLLED DC MOTOR DRIVES: Current and speed controllers, current and speed feedback, design of controllers, current and speed controllers, motor equations, filter in the speed feed back loop speed controller, current reference generator, current controller and flow chart for simulation, harmonics and associated problems, sixth harmonics torque.

TEXT BOOKS:

1. Shepherd, Hulley, Liang (2000), *Power Electronic and motor control*, 2nd Edition, Cambridge University Press, UK.
2. R. Krishnan (2005), *Electric Motor drives modeling, Analysis and control,* 1st Edition, Prentice Hall of India, New Delhi, India.

REFERENCE BOOKS:

1. M. H. Rashid (1995), *Power Electronic circuits, Drives and Applications,* 1st Edition, Prentice Hall of India, New Delhi, India.
2. G. K. Dubey (1995), *Fundamentals of Electric Drives*, 1st Edition, Narosa Publications, New Delhi, India.
3. S. B. Dewan, A. Straughen (1984), *Power Semiconductor drives,* 1st Edition*,* Wiley & sons, USA.

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

B. Tech. EEE VIII SEMESTERVCE-R15

DISTRIBUTION AUTOMATION

(Professional Elective - V)

Course Code:**A3269**

L	T	P	C
4	0	0	4

Overview: The goal of Advanced Distribution Automation is real-time adjustment to changing loads, generation, and failure conditions of the distribution system, usually without operator intervention. The purpose of this course is to explain about functions of distribution automation, technical benefits and evaluation process.

Course Outcomes:

Upon the completion of course Students will be able to

CO1. Analyze the Operational & Maintenance benefits, financial benefits andCustomer related benefits.

CO2. Apply the knowledge of supervisory control and data acquisition (SCADA) and energy management system (EMS) operations.

CO3. Analyze automatic monitoring and control mechanisms in the distribution system.

CO4. Identify different functions of Primary Automation Technique.

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

B. Tech. EEE VIII SEMESTERVCE-R15

DISTRIBUTION AUTOMATION

(Professional Elective - V)

Course Code:**A3269**

L	T	P	C
4	0	0	4

SYLLABUS

UNIT-I

DISTRIBUTION AUTOMATION AND THE UTILITY SYSTEM

Introduction to Distribution Automation (DA), control system interfaces, control and data requirements, centralized (Vs) decentralized control, DA System (DAS), DA Hardware, DAS software.

UNIT-II

DISTRIBUTION AUTOMATION FUNCTIONS

DA capabilities, Automation system computer facilities, management processes, Information management, system reliability management, system efficiency management, voltage management, Load management.

UNIT-III

COMMUNICATION SYSTEMS FOR DA

DA communication requirements, Communication reliability, Cost effectiveness, Data rate Requirements, Two way capability, Ability to communicate during outages and faults, Ease of operation and maintenance, Conforming to the architecture of data flow Communication systems used in DA: Distribution line carrier (Power line carrier), Ripple control, Zero crossing technique, telephone, cable TV, Radio, AM broadcast, FM SCA, VHF Radio, UHF Radio, Microwave satellite. Fiber optics, Hybrid Communication systems, Communication systems used in field tests.

UNIT-IV

TECHNICAL BENEFITS

DA benefit categories, Capital deferred savings, Operation and Maintenance savings, Interruption related savings, Customer related savings, Operational savings, improved operation, Function benefits, Potential benefits for functions, and function shared benefits, Guidelines for formulation of estimating equations Parameters required, economic impact areas, Resources for determining benefits impact on distribution system, integration of benefits into economic evaluation.

UNIT-V

ECONOMIC EVALUATION METHODS

Development and evaluation of alternate plans, Select study area, Select study period, Project load growth, Develop Alternatives, Calculate operating and maintenance costs, Evaluate alternatives. Economic comparison of alternate plans, Classification of expenses and capital expenditures, Comparison of revenue requirements of alternative plans, Book Life and Continuing plant analysis, Year by year revenue requirement analysis, short term analysis, end of study adjustment, Break even analysis, Sensitivity analysis computational aids.

TEXT BOOKS:

1. IEEE Tutorial Course “Distribution Automation”
2. IEEE Working Group on “Distribution Automation”

REFERENCES BOOKS:

1. Control and Automation of Electrical Distribution Systems, James. Northcote – Green Robert Wilson, CRC Press
2. Electric Power Distribution Automation, Dr. M. K. Khedkar, Dr. G.M.Dhole

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

B. Tech. EEE VIII SEMESTERVCE-R15

POWER SYSTEM TRANSIENTS

(Professional Elective - V)

Course Code:**A3270**

L	T	P	C
4	0	0	4

Overview: This course aims in explaining the generation of switching transients and their control using circuit – theoretical concept, mechanism of lighting strokes and the production of lighting surges. Propagation, reflection and refraction of travelling waves.

Course Outcomes:

Upon the completion of course Students will be able to

CO1. Apply the basic knowledge to identify the sources of transients and its effects on power system.

CO2. Analyze the RL and RLC transient circuits in various cases like current suppression, chopping, capacitive switching and restriking transients of power system.

CO3. Analyze the nature of voltage transients on closing and reclosing lines.

CO4. Analyze the behavior of travelling waves on transmission lines and compute transients.

CO5. Distinguish betweenvoltage transients on closing and reclosing lines and examine the switching surges on integrated system.

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

B. Tech. EEE VIII SEMESTERVCE-R15

POWER SYSTEM TRANSIENTS

(Professional Elective - V)

Course Code:**A3270**

L	T	P	C
4	0	0	4

SYLLABUS

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.

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

B. Tech. EEE VI/VII/VIII Semester **VCE-R15**

FUNDAMENTALS OF DATABASE MANAGEMENT SYSTEMS

(Open Elective)

Course Code: A3576

L	T	P	C
3	0	0	3

Course Overview:

This course introduces to understand techniques to the design the database systems. This course consists of E-R modeling, data definition and manipulation languages, database security and administration. It also covers essential DBMS concepts such as: Transaction Processing, Concurrency Control and Recovery and various types of database and uses Indexing concepts for faster retrieval of data in database.

Prerequisite(s): Object oriented Programming
Discrete Mathematical Structures

Course Outcomes:

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

CO1. Design a model for database base on given problem.

CO2. Formulate a query to retrieve information from database.

CO3. Implement securityand maintenance using consistency and recovery mechanism.

CO4. Normalize a database.

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

B. Tech. EEE VI/VII/VIII Semester **VCE-R15**

FUNDAMENTALS OF DATABASE MANAGEMENT SYSTEMS

(Open Elective)

Course Code: A3576

L	T	P	C
3	0	0	3

SYLLABUS

UNIT – I **(13 Lectures)**

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. (T2: Ch-1)

DATABASE DESIGN: Introduction to database design and E-R diagrams, entities, attributes and entity sets, relationships and relationship sets, conceptual design for large enterprises. (T1: Ch-2)

UNIT – II **(13 Lectures)**

THE RELATIONAL MODEL: Introduction to the relational model, integrity constraints over relations, enforcing integrity constraints, querying relational data. (T1: Ch-3)

RELATIONAL ALGEBRA AND CALCULUS: Preliminaries, relational algebra operators, relational calculus - tuple and domain relational calculus. (T1: Ch-4)

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, cursors, triggers (T1: Ch-5)

UNIT – III **(9 Lectures)**

SCHEMA REFINEMENT AND NORMAL FORMS: 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. (T1: Ch-19)

UNIT – IV **(10 Lectures)**

TRANSACTIONS MANAGEMENT: Transaction concept, transaction state, implementation of atomicity and durability, concurrent executions,Anomalies due to interleaved execution of transactions, serializability, recoverability. (T2: Ch-14)

CONCURRENCY CONTROL AND RECOVERY SYSTEM: Concurrency control - lock based protocols, time-stamp based protocols, validation based protocols, deadlock handling. (T2: Ch-16)

UNIT – V **(8 Lectures)**

OVERVIEW OF STORAGE AND INDEXING: RAID levels, Index data structures, Tree structured indexing - intuition for tree indexes, indexed sequential access method (ISAM), B+ Trees - a dynamic tree structure. (T1: Ch-9,10)

TEXT BOOK(S):

1. Raghurama Krishnan, Johannes Gehrke (2007), *Database Management Systems*, 3rd Edition, Tata McGraw-Hill, New Delhi, India.
2. Abraham Silberschatz, Henry F. Korth, S. Sudarshan (2010), *Database System Concepts,* 6th Edition, McGraw- Hill, New Delhi, India.

REFERENCE BOOK(S):

1. Elmasri Navate (2014), *Fundamentals of Database Systems*, Pearson Education, India.

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

B. Tech EEE VI/VII/VIII Semester **VCE-R15**

FUNDAMENTALS OF IMAGE PROCESSING

(Open Elective)

Course Code: A3577

L	T	P	C
3	0	0	3

Course Overview:

Visual information plays an important role in many aspects of our life. Much of this information is represented by digital images and videos. Extracting such information from the digital images and videos has numerous applications in computer vision, robotics, remote sensing, medical imaging, etc. This course gives the students the ability to understand and apply the principles of digital image processing and pattern recognition and develop some applications by following the team based learning principles.

Prerequisite(s): NIL

Course Outcomes:

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

CO1. Have an appreciation of the fundamentals of digital image processing and pattern recognition including the topics such as filtering, transforms, morphology, image analysis, compression, clustering, etc.

CO2. Be able to implement basic image processing algorithms in MATLAB and/or OpenCV (Python).

CO3. Have the skill base necessary to further explore advanced topics of digital image processing and pattern recognition.

CO4. Be in a position to make a positive professional contribution in the field of digital image processing and pattern recognition

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

B. Tech. EEE VI/VII/VIII Semester **VCE-R15**

FUNDAMENTALS OF IMAGE PROCESSING

(Open Elective)

Course Code: A3577

L	T	P	C
3	0	0	3

SYLLABUS

UNIT - I **(Lectures 10)**

FUNDAMENTALS OF IMAGE PROCESSING:

Image acquisition, image model, sampling, quantization, relationship between pixels, distance measures, connectivity, and image geometry. (Chapter1: T1)

UNIT – II **(Lectures 8)**

IMAGE TRANSFORMS:

Fourier transform, DFT, DFT-properties , FFT, WALSH transform, HADAMARD transform, DCT. (chapter2: T1,R2)

UNIT – III **(Lectures 11)**

IMAGE ENHANCEMENT (SPATIAL Domain Methods):

Histogram Processing - definition, equalization, matching, local enhancement, use of histogram statics for image enhancement, Arithmetic and logical operations, pixel or point operations, size operations, Smoothing filters-mean, median, mode filters, sharpening spatial filtering. (chapter3: T1)

UNIT – IV **(Lectures 9)**

IMAGE ENHANCEMENT (FREQUENCY Domain Methods):

Design of low pass, high pass, edge enhancement, smoothening filters in frequency domain. Butter worth filter, sharpening frequency domain filters, homomorphic filters in frequency domain. (chapter4: T1,R1)

UNIT – V **(Lectures 13)**

IMAGE SEGMENTATION:

Detection of discontinuities, edge linking and boundary detection, thresholding, region based segmentation, use of motion in segmentation. (Chapter5: T1)

COLOR IMAGE PROCESSING:

Fundamentals, models, pseudo color image, color transformation, Fundamentals of image compression, image compression models, and color image compression. (Chapter5: T1,R1)

TEXT BOOK(S):

1. Rafael C. Gonzalez, Richard E. Woods (2008), Digital Image Processing, Low Price Edition, Pearson Education, New Delhi, India.

REFERENCE BOOK(S):

1. Rafael C. Gonzalez, Richard E. Woods, Digital Image Processing, Second Edition, Prentice Hall.
2. Fundamentals of digital image processing by Anil K. jain, Low Price Edition, Pearson Education.
3. Arthur R. Weeks (1996), Fundamentals of Electronic Image Processing, Prentice Hall of India, New Delhi.
4. Milan Sonka, Vaclav Hlavac, Roger Boyle (2008), Image processing, Analysis and Machine vision, Thomson Publications, India.

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

B. Tech. EEE VI/VII/VIII Semester **VCE-R15**

OPERATING SYSTEM FUNDAMENTALS

(Open Elective)

Course Code: A3578

L	T	P	C
3	0	0	3

Course Overview:

Operating Systems Course is intended as a general introduction to the services provided by it. The course will give idea of various Operating system structures and types. The topics include process management and synchronization, handling of deadlocks, memory and storage management. The course also provides how Input-Output communicates with the system. The file, directory and disk management information can be understood. It compares different operating systems how they manage resources and services. Provides basic information related to protection and security.

Prerequisite(s):NIL

Course Outcomes:

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

CO1.Understand the basic concepts of operating systems, Process Management and Synchronization.

CO2. Use Deadlock handling methods.

CO3.Understand the concepts of Memory and Storage management.

CO4.Apply File, Directory and disk management methods

CO5.Understand Protection and Security principles and methods to handle.

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

B. Tech. EEE VI/VII/VIII Semester **VCE-R15**

OPERATING SYSTEM FUNDAMENTALS

(Open Elective)

Course Code: A3578

L	T	P	C
3	0	0	3

SYLLABUS

UNIT – I **(11 Lectures)**

OPERATING SYSTEMS OVERVIEW: Introduction-operating system operations, process management, memorymanagement, storage management, protection and security, System structures-Operating system services, systems calls, Types of system calls, system programs (T1: Ch-1, 2)

UNIT – II **(12 Lectures)**

PROCESS MANAGEMENT:Process concepts- Operations on processes, IPC, Process Scheduling (T1: Ch-3, 5).

PROCESS COORDINATION: Process synchronization- critical section problem, Peterson's solution,synchronization hardware, semaphores, classic problems of synchronization, readers and writers problem, dining philosopher's problem, monitors (T1: Ch-6).

UNIT – III **(11 Lectures)**

DEADLOCKS: System model, deadlock characterization, deadlock prevention, avoidance, detection and recovery fromdeadlock. (T1: Ch-7)

MEMORY MANAGEMENT: Memory management strategies-Swapping, contiguous memory allocation, paging, structure of the page table,segmentation, virtual-memory management- demand paging, page-replacement algorithms, allocation of frames, thrashing. (T1: Ch-8, 9)

UNIT – IV **(10 Lectures)**

STORAGE MANAGEMENT: File system-Concept of a file, access methods, directory structure, file system mounting, file sharing, protection. (T1: Ch-10)

SECONDARY-STORAGE STRUCTURE: Overview of mass storage structure, disk structure, disk attachment, diskscheduling algorithms, swap space management, stable storage implementation, and tertiary storage structure (T1: Ch-12).

UNIT – V **(11 Lectures)**

PROTECTION: System protection-Goals of protection, principles of protection, domain of protection access matrix, implementation ofaccess matrix, access control, revocation of access rights. (T1: Ch-13)

SECURITY: System security-The security problem, program threats, system and network threats, implementing security defenses, firewalling to protect systems(T1: Ch -18).

TEXT BOOKS:

1. Abraham Silberschatz, Peter Baer Galvin, Greg Gagne (2009), Operating System Concepts, 8th Edition, Wiley India Private Limited, New Delhi.

REFERENCE BOOKS:

1. Stallings(2006), Operating Systems, Internals and Design Principles, 5th Edition, Pearson Education, India.
2. Andrew S. Tanenbaum (2007), Modern Operating Systems, 2nd Edition, Prentice Hall of India, India.
3. Deitel & Deitel (2008), Operating systems, 3rd Edition, Pearson Education, India.
4. Dhamdhere (2008), Operating Systems, 2nd Edition, Tata Mc graw Hill, New Delhi.
5. Paul Love, Joe Merlino, Craig Zimmerman, Jeremy C. Reed, and Paul Weinstein (2005), Beginning Unix, Wiley Publishing, Inc.

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

B. Tech. EEE VI/VII/VIII Semester **VCE-R15**

JAVA PROGRAMMING
(Open Elective)

Course Code: A3579

L	T	P	C
3	0	0	3

Course Overview:

The Course provides a comprehensive coverage of conceptual and practical Java language, describing its syntax, keywords, and fundamental programming principles to become a proficient Java Programmer. The course is divided into five units, each focusing on a different aspect of core Java Environment suitable to write efficient, maintainable, and portable code. At the outset, the course ignites Object Oriented thinking and explores with the evolution of Java and its basics. It gives strong foundation on Inheritance, Packages and Interfaces and also discusses Exception Handling and Multithreaded mechanisms. The course examines java concepts such as Applets and Event handling. The course end up with nourishing AWT Controls and Swing concepts used for GUI applications. Overall, the knowledge of this course is essential to learn advanced Java and other OOP based languages and hence, stands as a pre-requisite for few fore coming courses like Struts and Spring Framework, Hibernate Framework. The course also plays a vital role in building front-end applications for Mini and Major Project Works in the final year.

Prerequisite(s): Data Structures (A3503)

Course Outcomes:

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

CO1. Use various programming constructs of object oriented language.

CO2. Apply principles of object oriented programming to model/design real world problems.

CO3. Use exception handling mechanism to develop fault tolerant applications.

CO4. Analyze the concepts of multi threaded programming and synchronization.

CO5. Use GUI controls and event handling mechanism to develop interactive window/desktop applications.

CO6. Analyze need of applets, swings to develop simple web application.

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

B. Tech. EEE VI/VII/VIII Semester **VCE-R15**

JAVA PROGRAMMING
(Open Elective)

Course Code: A3579

L	T	P	C
3	0	0	3

SYLLABUS

UNIT – I **(15 Lectures)**

EVOLUTION OF JAVA: Object-Oriented Programming Introduction, Two Paradigms, The Three OOP Principles,Evolution of Java, Java Buzzwords, Java Program Structure, Implementing a Java Program, JVM Architecture, Data Types, Variables, Constants, Type Conversion and Casting, I/O Basics, Operators, and Control Statements.

CLASS, METHODS, OBJECTS AND CONSTRUCTORS: Introducing Classes, Objects, Methods, Constructors, Garbage Collection, finalize, Overloading Methods and Constructors, Argument Passing, Recursion, static and final Keywords.

ARRAYS: One dimensional and two dimensional arrays with sample examples.

STRINGS: Exploring String and String Buffer class and Methods.

UNIT – II **(10 Lectures)**

INHERITANCE: Inheritance Basics, Member Access and Inheritance, this and super Keywords, Creating Multilevel Hierarchy, Method Overriding, Dynamic Method Dispatch, Abstract Classes ,inheritance with final keyword.

PACKAGES AND INTERFACES: Defining a Package, Finding Packages and CLASSPATH,Access Protection, Importing Packages, Defining an Interface, and Implementing Interfaces.

UNIT – III **(10 Lectures)**

EXCEPTION HANDLING: Exception-Handling Fundamentals, Exception Types, Uncaught Exceptions, Using try, catch,throw, throws and finally Keywords, Built-in Exceptions, Creating Own Exception.

MULTITHREADED PROGRAMMING: Thread Life Cycle, Creating a Thread - Extending Thread Class and Implementing Runnable Interface,Creating Multiple Threads**,** Thread Priorities, Synchronization.

UNIT – IV **(10 Lectures)**

AWT CONTROLS: AWT Classes, Window Fundamentals, Working with Frame Windows, Working with Graphics, Color, Fonts, Control Fundamentals, Labels, Buttons, Check Boxes, Checkbox Group, Choice Controls, Lists, Scroll Bars, TextArea, and Layout Managers.

SWINGS: Swings Introduction, Features, Hierarchy of Swing, Top Level Containers - JFrame, JWindow,JApplet, Light Weight Containers - JPanel, Create a Swing Applet, Swing Components - JLabel and Image Icon, JTextField, JButton,JCheckBox, JRadioButton, and JComboBox.

EVENT HANDLING: Delegation Event Model, Event Classes, Sources of Events, Event Listener Interfaces, Handling Mouse and Keyboard Events, Adapter Classes.

UNIT – V **(10 Lectures)**

FILE I/O: Streams, Stream Classes- Byte and Character, File Operations – Reading, Writing and Closing,

EXPLORING JAVA.UTIL: Array List, Vector, Hash table, StringTokenizer, and Date.

APPLETS: Applet Basics, Applet Lifecycle, Applet Skeleton, Simple Applet Display Methods, the HTML APPLET Tag, Passing Parameters to Applets.

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TEXT BOOK:

1. Herbert Schildt (2011), *Java: The Complete Reference*, 8th Edition, Tata McGraw-Hill Education, New Delhi.

REFERENCE BOOKS:

1. Michael Ernest (2013), *Java SE 7 Programming Essentials*, John Wiley & Sons Inc.
2. Y. Daniel Liang (2014), *Introduction to Java Programming, Comprehensive Version*, 10th Edition, Pearson Education, India.
3. Kathy Sierra, Bert Bates (2014), *OCA/OCP Java SE 7 Programmer I & II Study Guide* (Exams 1Z0-803 & 1Z0-804), 1st Edition, McGraw-Hill Education Publisher, USA.

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

B. Tech. EEE VI/VII/VIII Semester **VCE-R15**

CYBER LAWS

(Open Elective)

Course Code: A3676

L	T	P	C
3	0	0	3

Course Overview:

This course drawing upon a wealth of experience from academia, industry, and government service, Cyber Security details and dissects, in current organizational cyber security policy issues on a global scale—taking great care to educate students on the history and current approaches to the security of cyberspace. It includes thorough descriptions—as well as the pros and cons—of an excess of issues, and document policy alternatives for the sake of clarity with respect to policy alone. It also delves into organizational implementation issues, and equips students with descriptions of the positive and negative impact of specific policychoices.

Prerequisite(s):NIL

- Computer Networks(A3519)
- Information Security(A3608)
- E-Commerce (A3605)

Course Outcomes:

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

CO1.Analyze cyber-attack on different online webapplications

CO2.Apply different techniques to classify different types ofcybercrimes.

CO3.Understand different government cyber laws and cyber forensics techniques and how to protect themselves and society from cyber-attacks.

CO4.Describe and analyze the hardware, software, components of a network and theinterrelations.

CO5.Illustrate the concepts of confidentiality, availability and integrity in Information Assurance, including physical, software, devices, policies andpeople.

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

B. Tech. EEE VI/VII/VIII Semester **VCE-R15**

CYBER LAWS

(Open Elective)

Course Code: A3676

L	T	P	C
3	0	0	3

SYLLABUS

UNITI **10Lectures)**

INTRODUCTION: Cyber Security– Cyber Security policy – Domain of Cyber Security Policy – Laws and Regulations – Enterprise Policy – Technology Operations – Technology Configuration - Strategy Versus Policy – Cyber security Evolution – Productivity – Internet – E commerce – Counter Measures Challenges.

UNITII **(11Lectures)**

CYBER SECURITY OBJECTIVES AND GUIDANCE: Cyber Security Metrics – Security Management Goals – Counting Vulnerabilities – Security Frameworks – E Commerce Systems – Industrial Control Systems – Personal Mobile Devices – Security Policy Objectives – Guidance for Decision Makers – Tone at the Top – Policy as a Project – Cyber Security Management – Arriving at Goals – Cyber Security Documentation – The Catalog Approach – Catalog Format – Cyber Security Policy Taxonomy.

UNITIII **(10Lectures)**

CYBER SECURITY POLICY CATALOG: Cyber Governance Issues – Net Neutrality – Internet Names and Numbers – Copyright and Trademarks – Email and Messaging - Cyber User Issues – Malvertising – Impersonation – Appropriate Use – Cyber Crime – Geo location – Privacy - Cyber Conflict Issues – Intellectual property Theft – Cyber Espionage – Cyber Sabotage – Cyber Welfare.

UNITIV **(10Lectures)**

CYBER MANGEMENT ISSUES: Fiduciary Responsibility – Risk Management – Professional Certification – Supply Chain – Security Principles – Research and Development – Cyber Infrastructure Issue – Banking and finance – Health care – Industrial Control systems.

UNIT V **(10Lectures)**

CASE STUDY: A Government's Approach to Cyber Security Policy

TEXTBOOKS:

1. Jennifer L. Bayuk , J. Healey , P. Rohmeyer , Marcus Sachs , Jeffrey Schmidt , Joseph Weiss " Cyber Security Policy Guidebook" John Wiley & Sons2012.
2. Rick Howard "Cyber Security Essentials" Auerbach Publications2011

REFERENCE BOOKS:

1. Richard A. Clarke, Robert Knake " Cyberwar: The Next Threat to National Security & What to Do About It" Ecco2010
2. Dan Shoemaker Cyber security The Essential Body Of Knowledge, 1st ed. Cengage Learning2011
3. Anti-Hacker Tool Kit (Indian Edition) by Mike Shema, Publication Mc GrawHill.
4. Cyber Security Understanding Cyber Crimes, Computer Forensics and Legal Perspectives by Nina Godbole and Sunit Belpure, PublicationWiley

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

B. Tech. EEE VI/VII/VIII Semester **VCE-R15**

E-COMMERCE TRENDS
(Open Elective)

Course Code: A3677

L	T	P	C
3	0	0	3

Course Overview:

The tremendous growth of the Internet and World Wide Web is having great impact on businesses, governments and individuals throughout the world. In this course, we will attempt to understand the phenomena, technological, economic and social, behind these rapid changes, and how organizations successfully conduct Internet-based activities. We will also study some of the technology of the Internet. This course provides an overview of e-commerce from both technological and managerial perspectives. It introduces e-commerce frameworks, and technological foundations; and examines basic concepts such as strategic formulation for e-commerce enterprises, management of their capital structures and public policy. It is particularly important that the student place a great deal of emphasis in understanding the different E-Commerce system design principles.

Prerequisite(s):NIL

Course Outcomes:

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

CO1.Elaborate the components and roles of the E-Commerceenvironment.

CO2.Explain how to sell products and services on the web as well as to meet the needs of web site visitors.

CO3.Analyze e-commerce payment systems.

CO4.Identify and reach customers on theweb.

CO5.Understand legal and ethical issues related to E-Commerce and web marketingapproaches.

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

B. Tech. EEE VI/VII/VIII Semester **VCE-R15**

E-COMMERCE TRENDS
(Open Elective)

Course Code: A3677

L	T	P	C
3	0	0	3

SYLLABUS

UNIT - I (10 Lectures)

INTRODUCTION TO E-BUSINESS AND E-COMMERCE: What is the difference between e-commerce and e-business, E-business risks and barriers to business adoption, Management responses to e-commerce and e-business.

E-COMMERCE FUNDAMENTALS- Location of trading in the marketplace, Business models for e-commerce, *Focus on* auction business models, *Focus on* Internet start-up companies.

UNIT - II (10 Lectures)

E-BUSINESS INFRASTRUCTURE- Introduction, Internet technology, Web technology, Internet-access software applications, Managing e-business infrastructure, *Focus on* web services, SaaS and service-oriented Architecture (SOA), *Focus on* mobile commerce.

UNIT - III (10 Lectures)

E-ENVIRONMENT- Social and legal factors, Environmental and green issues related to Internet Usage, Focus on e-commerce and globalization, Political factors.

E-BUSINESS STRATEGY- What is e-business strategy, Strategic analysis, Strategic objectives, Strategy definition, Strategy implementation, Focus on information systems strategy and e-business strategy.

UNIT - IV (10 Lectures)

SUPPLY CHAIN MANAGEMENT-What is supply chain management?, Focus on the value chain, Using e-business to restructure the supply chain, Supply chain management implementationE-procurement-What is e-procurement, Drivers of e-procurement, Focus on estimating e-procurement cost, Implementing e-procurement, Focus on electronic B2B marketplaces.

UNIT - V (12 Lectures)

E-MARKETING-What is e-marketing?, E-marketing planning, Situation analysis, Objective setting, Strategy, Tactics, Focus on online branding.

CUSTOMER RELATIONSHIP MANAGEMENT- What is e-CRM, The online buying process, Focus on marketing communications for customer Acquisition, Customer retention management, Technology solutions for CRM.

TEXT BOOK:

1. E-Business and E-Commerce Management , strategy, Implementation and practice, Dave Chaffey, Fourth Edition, Prentice Hall

REFERENCE BOOKS:

1. Frontiers of electronic commerce – Kalakata, Whinston, Pearson.
2. E-Commerce fundamentals and applications Hendry Chan, Raymond Lee, Tharam Dillon, Ellizabeth Chang, John Wiley.
3. E-Commerce, S.Jaiswal – Galgotia.
4. E-Commerce, Efrain Turbon, Jae Lee, David King, H.Michael Chang.

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

B. Tech. EEE VI/VII/VIII Semester **VCE-R15**

PRINCIPLES OF SOFTWARE ENGINEERING

(Open Elective)

Course Code: A3678

L	T	P	C
3	0	0	3

Course Overview:

This course acts as a foundation in the field of software engineering and is aimed at helping students develop an understanding of how software systems are developed from scratch, by guiding them through the development process, adopting the fundamental principles of system development. The course will orient the students to the different software process models, software requirements engineering process, systems analysis and design as a problem-solving activity, with focus on quality.

Prerequisite(s):

Object Oriented Programming (A3509)

Course Outcomes:

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

CO1.Identify the right process model to develop the right softwaresystem.

CO2.Gather requirements and analyze them scientifically in order to develop the right product, besides authoring software requirementsdocument.

CO3.Propose design as per functional and non-functional requirements using designprinciples.

CO4.Apply testing strategies for application beingdeveloped.

CO5.Find right set of umbrella activities for quality management andassurance.

CO6.Understand metrics in the process and projectdomains.

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

B. Tech. EEE VI/VII/VIII Semester **VCE-R15**

PRINCIPLES OF SOFTWARE ENGINEERING

(Open Elective)

Course Code: A3678

L	T	P	C
3	0	0	3

SYLLABUS

UNIT I **(13 Lectures)**

INTRODUCTION TO SOFTWARE ENGINEEIRNG: The Evolving nature of software engineering, Changing nature of software engineering, Software engineering Layers, The Software Processes, Software Myths.

PROCESS MODELS: A Generic Process Model, Waterfall Model, Incremental Process Models, Evolutionary Process Models, Spiral Model, the Unified Process, the Capability Maturity Model Integration (CMMI).

AGILE DEVELOPMENT: What is Agility? Agility and the Cost of Change, What is an Agile Process? Extreme Programming (XP), Other Agile Process Models, A Tool set for the Agile Process.

UNIT II **(11 Lectures)**

REQUIREMENTS ENGINEERING: Functional and Non-Functional Requirements, The Software requirements Document, Requirements Specification, requirements Engineering, Requirements Elicitation and Analysis, Requirement Validation, Requirement Management, System Modeling: Context Models, Interaction Models, Structural Models, Behavioral Model, Model-Driven Engineering.

DESIGN CONCEPTS: The Design Process, Design Concepts, The Design Models and Architectural Design: Software Architecture, Architectural Genres and Architectural Styles.

UNIT III **(12 Lectures)**

DESIGN AND IMPLEMENTATION: The Object Oriented Design with UML, Design Patterns, Implementation Issues, Open Source development. User Interface Design: The Golden Rules, User Interface Analysis and Design, Interface Analysis, Interface Design Steps, Design Evaluation.

SOFTWARE TESTING STRATEGIES: A Strategic approach to Software Testing, Strategic Issues and Test Strategies for Conventional Software, Validation Testing, System Testing, The Art of Debugging, White-Box Testing, Black Box Testing.

UNIT IV **(12 Lectures)**

PRODUCT METRICS: A Frame Work for Product Metrics, Metrics for the Requirements Model, Metrics for Design Model, Metrics for Source Code, Metrics for Testing

PROCESS AND PROJECT METRICES: Metrics in the Process and Project Domains, Software Measurements, Metrics for Software Quality, Risk Management: Risk verses Proactive Risk Strategies, Software Risks, Risk Identification, Risk Projection, Risk Refinements, Risk Mitigation Monitoring and Management (RMMM), The RMMM Plan.

UNIT V **(12 Lectures)**

QUALITY MANAGEMENT: Quality Concepts, Software Quality, Software Quality Dilemma, Achieving Software Quality, Review Techniques, Reviews: A Formal spectrum, Informal Reviews, Formal Technical Reviews.

SOFTWARE QUALITY ASSURANCE: Background Issues, Elements of Software Quality Assurance, Tasks, Goals and Metrics, Software Reliability, the ISO 9000 Quality Standards.

TEXT BOOK:

1.Roger S. Pressman (2011), Software Engineering, A Practitioner's approach, 7th edition, McGraw Hill International Edition, New Delhi.

2.Sommerville (2001), Software Engineering, 9th edition, Pearson education, India.

REFERENCE BOOKS:

1.K. K. Agarval, Yogesh Singh (2007),Software Engineering,3rd edition, New Age International ublishers, India.

2.Lames F. Peters, WitoldPedrycz(2000), Software Engineering an Engineering approach, John Wiely& Sons, New Delhi, India.

3.Shely Cashman Rosenblatt (2006), Systems Analysis and Design, 6thedition, Thomson Publications, India.

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

B. Tech. EEE VI/VII/VIII Semester **VCE-R15**

SCRIPTING LANGUAGES
(Open Elective)

Course Code: A3679

L	T	P	C
3	0	0	3

Course Overview:

This course will address the need for vertical open standards, domain knowledge and open source software skills for various industry verticals and drive to reduce the gap between industry requirement and availability of technical professionals for the same. This course provides the student with the insights into the world of open source software. Student will learn the Open source technologies like PHP, Perl, Python, MySQL technologies which helps him in developing applications (software) as part of project work and makes him industry ready.

Prerequisite(s):NIL

Course Outcomes:

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

CO1.Demonstrate knowledge about the advanced concepts of Linux OS like scheduling, cloning,signals.

CO2.Show skills to write PHP based GUI applications connecting toMYSQL.

CO3.Familiarize and define the programming syntax and constructs of LDAP connectivity inMySQL.

CO4.Analyze and implement Scripting applications using tuples, dictionaries and lists usingPython.

CO5.Develop the ability to exhibit knowledge of writing packages and modules usingPerl.

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

B. Tech. EEE VI/VII/VIII Semester **VCE-R15**

SCRIPTING LANGUAGES
(Open Elective)

Course Code: A3679

L	T	P	C
3	0	0	3

SYLLABUS

UNIT 1 **(13 Lectures)**

INTRODUCTION: Introduction to Open sources – Need of open Sources – Advantages of Open Sources – Applications of Open sources. Open Source operating systems: Linux: Introduction – General Overview – Kernel Mode and user mode **LINUX:** Process – Advanced Concepts – Scheduling – Personalities – Cloning – Signals – Development with Linux

UNIT 2 **(14 Lectures)**

PHP: What is PHP? - Basic Syntax of PHP – programming in web environment - Common PHP Script Elements - Using Variables - Constants – Data types - Operators; Statements - Working with Arrays - Using Functions – OOP - String Manipulation and Regular Expression

FILE AND DIRECTORY HANDLING - Including Files - File Access

WORKING WITH FORMS -Processing Forms -Form Validation – Introduction to advanced PHP concepts

UNIT 3 **(12 Lectures)**

MySQL: Introduction - Setting up an account - Starting, Terminating and writing your own MySQL Programs Record Selection Technology - Working with Strings - Date and Time - Sorting Query Results module - Generating Summary - Working with Metadata - Using Sequences – MySQL-and-Web

PHP AND SQL DATABASE: PHP and LDAP ; PHP Connectivity ; Sending and receiving emails - Retrieving data from MySQL - Manipulating data in MySQL using PHP

UNIT 4 **(13 Lectures)**

PYTHON: Syntax and style – Python Objects – Numbers _ Sequences – Strings – Lists and Tuples – Dictionaries – Conditionals and loops - Functions - File Handling – Exception – Handling Exception- Execution Environment

UNIT 5 **(13 Lectures)**

PERL: Perl back grounder- Perl overview-Perl parsing rules- Variables and Data – Statements and control structures – Subroutines, Packages, and Modules- Working with Files – Data Manipulation

TEXT BOOKS:

1.Remy Card, Eric Dumas and Frank Mevel, " The Linux Kernel Book ", Wiley Publications, 2003
2.Steve Surching , "MySQL Bible" , John Wiley, 2002

REFERENCE BOOKS:

1.Rasmus Lerdorf and Levin Tatroe, " Programming PHP", O'Reilly, 2002
2.Wesley J. Chun , " Core Python Programming", Prentice Hall, 2001
3.Martin C.Brown, "Perl: The Complete Reference", 2nd Edition , Tata McGraw-Hill Publishing Company Limited, Indian Reprint 2009.
4.Steven Holzner, "PHP: The Complete Reference", 2nd Edition, Tata McGraw-Hill Publishing Company Limited, Indian Reprint 2009.
Vikram Vaswani, "MYSQL: The Complete Reference", 2nd Edition, Tata McGraw-Hill Publishing Company Limited, Indian Reprint 2009.

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

B. Tech. EEE VI/VII/VIII Semester **VCE-R15**

DIGITAL ELECTRONICS
(Open Elective)

Course Code: A3476

L	T	P	C
3	0	0	3

Course Overview:

This course provides a modern introduction to logic design and the basic building blocks used in digital systems, in particular digital computers. It starts with a discussion of information representation and number systems, Boolean algebra, logic gates and minimization techniques. The second part of the course deals with combinational and sequential logic, where in the procedures to analyze and design the same will be discussed. Moreover, this course forms the basis for the study of advanced subjects like Computer Architecture and Organization, Microprocessors and Interfacing and Embedded systems.

Prerequisite(s):NIL

Course Outcomes:

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

CO1. Perform arithmetic operations on different number systems and to apply the principles of Boolean algebra to minimize logic expressions.

CO2. Use K-map and Tabulation method to minimize and optimize two-level logic functions up to five variables.

CO3. Analyze some basic components used in digital systems such as adder and subtractor, decoder, encoder, multiplexer, flip-flops.

CO4. Design various combinational PLDs such as ROMs, PALs, PALs and PROMs.

CO5. Develop digital systems using registers and counters such as shift registers, Ripple counters, synchronous counters.

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

B. Tech. EEE VI/VII/VIII Semester **VCE-R15**

DIGITAL ELECTRONICS
(Open Elective)

Course Code: A3476

L	T	P	C
3	0	0	3

SYLLABUS

UNIT-I **(11 Lectures)**

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

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 **(9 Lectures)**

GATE LEVEL MINIMIZATION: The k-map method, four-variable map, five-Variable map, Sum of Products and Product of Sums simplification, don't-care conditions, NAND and NOR implementation, AND-OR-INVERT,OR-AND-INVERT implementations, exclusive – OR function, The tabulation (Quine Mccluskey) method, determination and selection of Prime implicants.

UNIT-III **(14 Lectures)**

COMBINATIONAL LOGIC: Introduction, combinational circuits, analysis procedure, design procedure, binary adder, binary subtractor, BCD adder, binary multiplier, Magnitude comparator, decoder, encoders, multiplexers.

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-IV **(10 Lectures)**

SEQUENTIAL LOGIC: Classification of Sequential circuits (Synchronous, Asynchronous, Pulse mode, Level mode with examples), latches, Flip-Flops.

UNIT-V **(10 Lectures)**

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

TEXT BOOKS:

1.M. Morris Mano, Michael D. Ciletti (2008), *Digital Design*, 4th edition, Pearson Education/PHI, India.
2.Thomas L. Floyd (2006), *Digital fundamentals*, 9th edition, Pearson Education International.

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.
Donald D.Givone (2002), *Digital Principles and Design*, Tata McGraw Hill, India.

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

B. Tech. EEE VI/VII/VIII Semester **VCE-R15**

PRINCIPLES OF ANALOG AND DIGITAL COMMUNICATIONS

(Open Elective)

Course Code: A3477

L	T	P	C
3	0	0	3

Course Overview:

This course is useful to understand the basics of Signals, Systems, Random Variables and Communication. The course presents and integrates the basic concepts for both continuous-time and discrete signals and systems. This course provides a foundation in the theory and applications of random variables stochastic processes and an understanding of the mathematical techniques elating to random processes in the areas of signal processing, detection & estimation theory and communications. it gives the basics of Analog and Digital Communication and also gives the background required for advanced study on the course. This is accomplished by providing overviews of the necessary background in signal, system, probability, and random process theory required for the analog and digital communications. It gives more emphasis on stressing fundamental concepts. The topics in the course, more than enough to students needs.

Prerequisite(s):NIL

Course Outcomes:

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

CO1. **Analyze** linear and non - linear modulators and demodulators in time as well as frequency domain.

CO2. **Design** a linear and non linear modulators and demodulators for the analog signals.

CO3. **Outline** the basic concepts of digital communications with an insight into practical applications and Differentiatebetween PCM and DM and identify the applications of these modulation schemes in base band transmission.

CO4. **Estimate** a overall digital communication system for the improvement of the system performance.

CO5. **Analyze** the performance of a digital communication system by introducing various spread spectrum modulation techniques.

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

B. Tech. EEE VI/VII/VIII Semester **VCE-R15**

PRINCIPLES OF ANALOG AND DIGITAL COMMUNICATIONS

(Open Elective)

Course Code: A3477

L	T	P	C
3	0	0	3

SYLLABUS

UNIT - I **(11 Lectures)**

Introduction to communication system, need for modulation, Types of modulation techniques: AM, FM, PM, Generation and detection. Comparison of AM, FM, PM. Radio transmitters and receivers (TRF& Super heterodyne).

UNIT - II **(12 Lectures)**

Sources of Noise, Resistor Noise, Shot Noise, Calculation of Noise in a Linear System, Noise in AM Systems, Noise in Angle Modulation Systems, Comparison between AM and FM with respect to Noise, Threshold Improvement in Discriminators, Comparisons between AM and FM.

UNIT - III **(11 Lectures)**

Analog-to-Digital Conversion: Pulse modulation techniques, Sampling, Time Division Multiplexing, Pulse Amplitude Modulation, Pulse Width Modulation, Pulse Position Modulation, Digital Modulation Techniques: Pulse Code Modulation, Differential Pulse Code Modulation, Delta Modulation, Adaptive Delta Modulation, Continuously Variable Slope Delta Modulation, Companding, Noise in Pulse-Code and Delta-Modulation Systems.

UNIT - IV **(11 Lectures)**

Binary Phase-Shift Keying, Differential Phase-Shift Keying, Differentially Encoded PSK (DEPSK), Quadrature Phase-Shift Keying (QPSK), M-ary PSK, Quadrature Amplitude Shift Keying (QASK), Binary Frequency Shift-Keying, Similarity of BFSK and BPSK, M-ary FSK, Minimum Shift Keying (MSK), Duo-binary Encoding.

UNIT - V **(11 Lectures)**

Spread Spectrum Modulation: Direct Sequence (DS) Spread Spectrum, Use of Spread Spectrum with Code Division Multiple Access (CDMA), Ranging using DS Spread Spectrum, Frequency Hopping (FH) Spread Spectrum, Generation and Characteristics of PN Sequences, Acquisition (Coarse Synchronization)of a FH Signal, Tracking (Fine Synchronization) of a FH Signal, Acquisition (Coarse Synchronization) of a DS Signal, Tracking of a DS Signal.

TEXT BOOKS:

1. *Communication Systems*, Simon Haykins (2nd Edition).
2. *Analog and Digital Communication Systems* by Martin S. Roden, 3rd edition, Prentice Hall, 1994.
3. *Principles of Communications* By Taub and Schilling

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

B. Tech. EEE VI/VII/VIII Semester **VCE-R15**

TRANSDUCERS AND MEASUREMENTS

(Open Elective)

Course Code: A3478

L	T	P	C
3	0	0	3

Course Overview:

This course provides an overall understanding of the elements and processes, including sources of errors, and digitally acquiring these measurements. Along with an overview of instrumentation principles, the physical principles and electrical characteristics for several common instrument transducers are studied. The electronic signal conditioning circuits required converting the electrical changes in the transducers to signal which can be interpreted accurately by a microprocessor or an embedded controller are analyzed and designed effectively. This course also gives an integration of hardware and software in designing computer controlled processes and/or systems with the aid of sensors, transducers data acquisition board, and instrument control.

Prerequisite(s):NIL

Course Outcomes:

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

CO1. Aware the basic concepts of measurement parameters as well as instrument standards, characteristics and errors.

CO2. Construct and design various measuring devices like voltmeters, Ammeters, Ohmmeters, analog, digital multi-meters and analyze different types of cathode ray oscilloscopes.

CO3. Design different bridge networks and analyze balanced condition for finding out values of resistance, capacitance and inductance.

CO4. Analyze different physical parameters like pressure, force, velocity, acceleration, sound, torque, strain and stress etc. using non-electrical transducers.

CO5. Apply the principles and practice for instrument design and develop for real world problems.

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

B. Tech. EEE VI/VII/VIII Semester **VCE-R15**

TRANSDUCERS AND MEASUREMENTS

(Open Elective)

Course Code: A3478

L	T	P	C
3	0	0	3

SYLLABUS

UNIT - I

CHARACTERSTICS OF INSTRUMENTS: Block schematic of measuring system, Performance characteristics of instruments-static and dynamic characteristics, Errors in measurement.

MEASURING INSTRUMENTS:DC voltmeters- multirange, range extension, DC Ammeter- multi range, range extension, Aryton shunt, ohmmeters-series type and shunt type, AC Voltmeter, thermocouple type RF ammeter.

DIGITAL VOLTMETERS: Dual slope and Successive Approximation type DVM

UNIT – II

CATHODE RAY OSCILLOSCOPE (CRO): Introduction to CRT, vertical amplifiers, horizontal deflection system, simple CRO.

SPECIAL PURPOSE OSCILLOSCOPES: Dual beam CRO, Dual trace oscilloscope, sampling oscilloscope, analog storage oscilloscope, digital storage oscilloscope, measurement of phase and frequency (lissajous patterns).

UNIT - III

DC and AC BRIDGES: Measurement of resistance Wheat's stone bridge, Kelvin's double bridge, measurement of Inductance using Maxwell's inductance bridge, Anderson's bridge, Hay's bridge, measurement of capacitance using Schering bridge, Wagner's ground connection, errors and precautions in using bridges.

UNIT - IV

TRANSDUCERS-I: Introduction, classification, strain gauges, LVDT, Piezo electric transducers, OPAMP applications in measurement and transducer circuits, instrumentation amplifier, thermometers, thermocouples, thermistors, sensistors.

UNIT - V

TRANSDUCERS-II: Measurement of non electrical quantities- displacement, pressure, torque, vibration, pH, sound, velocity, humidity, speed, analog and digital data acquisition systems, interfacing and bus standards, programmable logic controllers and their industrial applications.

TEXT BOOKS:

1. K Sawhney (2007), Electrical and Electronic Measurements and Instrumentation, 18th edition, Dhanpat Rai & Co, New Delhi.
2. H.S.Kalsi, Electronic Instrumentation, 3rd edition, Tata McGraw-Hill Education

REFERENCE BOOKS:

1.D. Helfrick, W.D. Cooper (2002), Modern Electronic Instrumentation and Measurement Techniques, 5th edition, Prentice Hall of India, New Delhi.

2.David A. Bell (2003), Electronic Instrumentation & Measurements, 2nd edition, Prentice Hall of India, New Delhi.

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

B. Tech. EEE VI/VII/VIII Semester **VCE-R15**

INTERNET OF THINGS
(Open Elective)

Course Code: A3479

L	T	P	C
3	0	0	3

Course Overview:

The explosive growth of the "Internet of Things" is changing our world and the rapid drop in price for typical IoT components is allowing people to innovate new designs and products at home. In this course students will learn the importance of IoT in society, the current components of typical IoT devices and trends for the future. This course covers IoT design considerations, constraints and interfacing between the physical world to mobile device, how to make design trade-offs between hardware and software, and key components of networking to ensure that students understand how to connect their device to the Internet.

Prerequisite(s):

- Computer Architecture and Organization (A3508)
- Microprocessors and Microcontrollers (A3419)
- Embedded Systems (A3424)

Course Outcomes:

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

CO1. Explain the definition and usage of the term "The Internet of Things" in different contexts.

CO2. Understand where the IoT concept fits within the broader ICT industry and possible future trends.

CO3. Differentiate between the levels of the IoT stack and be familiar with the key technologies and protocols employed at each layer of the stack.

CO4. Design a simple IoT system comprising sensors, edge devices, wireless network connections and data analytics capabilities

CO5. Use the knowledge and skills acquired during the course to build and test a complete, working IoT system involving prototyping, programming and data analysis.

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

B. Tech. EEE VI/VII/VIII Semester **VCE-R15**

INTERNET OF THINGS
(Open Elective)

Course Code: A3479

L	T	P	C
3	0	0	3

SYLLABUS

UNIT – I **10 Lectures)**

INTRODUCTION & CONCEPTS: Introduction to Internet of Things, Physical Design of IoT, Logical Design of IoT, IoT Enabling Technologies, IoT Levels.

UNIT - II **(12 Lectures)**

DESIGN PRINCIPLES FOR CONNECTED DEVICES: Calm And Ambient Technology, Magic As Metaphor, Privacy, Keeping Secrets, Whose Data Is It Anyway?, Web Thinking For Connected Devices, Small Pieces, Loosely Joined, First Class Citizens On The Internet, Graceful Degradation.

UNIT - III **(11 Lectures)**

INTERNET PRINCIPLES: An overview on IP, TCP & UDP, IP Addresses, MAC Addresses, TCP & UDP Ports, Application Layer Protocols

UNIT - IV **(11 Lectures)**

PROTOTYPING EMBEDDED DEVICES: Electronics, Embedded Computing Basics, Arduino, Raspberry PI, Beagle Bone Black, Electronic IMP, and Other notable Platforms

UNIT - V **(12 Lectures)**

TECHNIQUES FOR WRITING EMBEDDED CODE: Memory management, Types of memory, Making the most use of RAM, Performance & battery life, Libraries, Debugging.

PROTOTYPE TO REALITY: Who is the Business model for IoT?, Funding an IoT startup.

TEXT BOOKS:

1. Adrian McEwen & Hakim Cassimally (2014), *Designing the Internet of Things*, John Wiley and Sons, UK.
2. Vijay Madisetti and Arshdeep Bahga, "Internet of Things (A Hands – on - Approach)", 1 st Edition,VPT, 2014.

REFERENCE BOOKS:

1. Jan Holler, Vlasios Tsiatsis , Catherine Mulligan, Stefan Avesand, Stamatis Karnouskos, David Boyle, "*From Machine – to - Machine to the Internet of Things: Introduction to a New Age of Intelligence*", 1st Edition, Academic Press, 2014.
2. Francis daCosta, "*Rethinking the Internet of Things: A Scalable Approach to Connecting Everything*", 1st Edition, Apress Publications, 2013.
3. Daniel Kellmereit, "*The Silent Intelligence: The Internet of Things*", 2013.

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

B. Tech. EEE VI/VII/VIII Semester **VCE-R15**

NANO TECHNOLOGY APPLICATIONS TO ELECTRICAL ENGINEERING

(Open Elective)

Course Code: A3276

L	T	P	C
3	0	0	3

Course Overview:

The course is designed to teach the elements of advanced science and technology used in nanotechnology materials and nano device fabrication. The topics taught include the fundamentals of: quantum mechanics, nano scale quantum structures, bulk semiconductor and epitaxial growth techniques, vacuum technology, semiconductor material characterization, defects in crystals, diffusion and implantation, wafer manufacturing, and processing.

Prerequisite(s):NIL

Course Outcomes:

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

CO1. Analyze the different forms of energy conversion methods conventional energy sources and sustainable renewable energy sources

CO2. Investigate different Nano materials and characteristics and applications in electrical energy storage and electrical energy applications

CO3. Evaluate micro fluid devices, Nano-engines, and energy conversion systems

CO4. Explore hydrogen storage systems .

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

B. Tech. EEE VI/VII/VIII Semester **VCE-R15**

NANO TECHNOLOGY APPLICATIONS TO ELECTRICAL ENGINEERING

(Open Elective)

Course Code: A3276

L	T	P	C
3	0	0	3

SYLLABUS

UNIT – I

INTRODUCTION : Nanotechnology and its role in sustainable energy - Energy conversion process, Direct and in-direct energy conversion - Materials for: Light emitting diodes, Batteries, Advance turbines, Catalytic reactors, Capacitors and Fuel cells. Energy challenges - Development and implementation of renewable energy technologies.

UNIT – II

RENEWABLE ENERGY CONVERSION AND STORAGE : Energy conversion and storage - Nano, micro, poly crystalline Silicon and amorphous Silicon for solar cells, Silicon-composite structure, Techniques for Si deposition. Micro-fuel cell technologies, integration and performance of micro-fuel cell systems.

UNIT – III

MICROFLUIDIC SYSTEMS-I : Nano-electromechanical systems and novel micro fluidic devices - Nano engines – Driving mechanisms. Power generation - Micro channel battery - Micro heat engine (MHE) fabrication – Thermo capillary forces –Thermo capillary pumping (TCP) - Piezoelectric membrane.

UNIT – IV

HYDROGEN STORAGE METHODS-I : Hydrogen storage methods - Metal hydrides and size effects - Hydrogen storage capacity -Hydrogen reaction kinetics - Carbon-free cycle.

UNIT – V

HYDROGEN STORAGE METHODS-II : Gravimetric and volumetric storage capacities – Hydriding / Dehydriding kinetics - High enthalpy of formation and thermal management during the hydriding reaction.

TEXT BOOKS:

1. J. Twidell and T. Weir, *Renewable Energy Resources*, E & F N Spon Ltd, London, (1986).
2. Martin A Green, *Solar cells: Operating principles, technology and system applications*, Prentice Hall Inc, Englewood Cliffs, NJ, USA, (1981).
3. H J Moller, *Semiconductor for solar cells*, Artech House Inc, MA, USA, (1993).
4. Ben G Streetman, *Solis state electronic device*, Prentice Hall of India Pvt Ltd., New Delhi (1995).

REFERENCE BOOKS:

1. M.A. Kettani ,*Direct energy conversion,* Addision Wesley Reading, (1970).
2. Linden ,*Hand book of Batteries and fuel cells*, Mc Graw Hill, (1984).
3. Hoogers ,*Fuel cell technology handbook*. CRC Press, (2003).
4. Vielstich, *Handbook of fuel cells: Fuel cell technology and applications*, Wiley, CRC Press, (2003).

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

B. Tech. EEE VI/VII/VIII Semester **VCE-R15**

INDUSTRIAL ELECTRONICS

(Open Elective)

Course Code: A3277

L	T	P	C
3	0	0	3

Course Overview:

The student is introduced to various electronic components and systems used in modern industry. Operational amplifier principles and applications including comparators (zero and nonzero crossing Detectors), voltage followers, inverting and non-inverting amplifiers. Subtraction, summing (mixer), difference and compound amplifiers and active filters. Operational amplifiers circuits are configured to make up complex analog circuits. Speed channels Filtering Noise using passive componentswill be explained. The design of Precession mechanical systems will be explained also the over view of micro controllers will be dealt.

Prerequisite(s):NIL

Course Outcomes:

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

CO1. Apply the knowledge of electronics in developing the controllers for industrial applications

CO2. Interpret system drawings, and design simple systems for sequential control systems involving valves and cylinders

CO3. Evaluate the operational characteristics the electrical and mechanical actuation systems

CO4. Construct a program and design a control system using microcontroller

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

B. Tech. EEE VI/VII/VIII Semester **VCE-R15**

INDUSTRIAL ELECTRONICS

(Open Elective)

Course Code: A3277

L	T	P	C
3	0	0	3

SYLLABUS

UNIT - I

INTRODUCTION : Definition – Trends - Control Methods: Standalone , PC Based Real Time Operating Systems, Graphical User Interface , Simulation

SIGNAL CONDITIONING : Introduction – Hardware - Digital I/O , Analog input – ADC , resolution , sped channels Filtering Noise using passive components – Resistors, capacitors - Amplifying signals using OP amps.

UNIT – II

PRECISION MECHANICAL SYSTEMS : Pneumatic Actuation Systems - Electro-pneumatic Actuation Systems - Hydraulic Actuation Systems - Electro-hydraulic Actuation Systems - Timing Belts – Ball Screw and Nut - Linear Motion Guides - Linear Bearings - Harmonic Transmission - Bearings- Motor / Drive Selection.

UNIT – III

ELECTRONIC INTERFACE SUBSYSTEMS : TTL, CMOS interfacing - Sensor interfacing – Actuator interfacing – solenoids , motors Isoation schemes- opto coupling, buffer IC's - Protection schemes – circuit breakers , over current sensing , resetable fuses , thermal dissipation - Power Supply - Bipolar transistors / mosfets

UNIT – IV

ELECTROMECHANICAL DRIVES : Relays and Solenoids - Stepper Motors - DC brushed motors – DC brushless motors - DC servo motors - 4-quadrant servo drives , PWM's - Pulse Width Modulation – Variable Frequency Drives, Vector Drives - Drive System load calculation.

UNIT – V

MICROCONTROLLERS OVERVIEW : 8051 Microcontroller , micro processor structure – Digital Interfacing - Analog Interfacing - Digital to Analog Convertors - Analog to Digital Convertors - Applications.Programming –Assembly , (LED Blinking , Voltage measurement using ADC).

TEXT BOOKS :

1. Mechatronics Electronics Control Systems in Mechanical and Electrical Engineering by W Bolton,Pearson Education Press, 3rd edition, 2005.
2. Mechatronics/M.D.Singh/J.G.Joshi/PHI.

REFERENCES :

1. Mechatronics Source Book by Newton C Braga, Thomson Publications, Chennai.
2. Mechatronics – N. Shanmugam / Anuradha Agencies Publisers.
3. Mechatronics System Design / Devdasshetty/Richard/Thomson.

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

B. Tech. EEE VI/VII/VIII Semester **VCE-R15**

SOLAR ENERGY AND APPLICATIONS

(Open Elective)

Course Code: A3278

L	T	P	C
3	0	0	3

Course Overview:

This is an engineering introduction to Solar energy technologies and potentials. The courseaims to introduce a general engineering/science audience to the basic concepts of solar energy. The concepts of Photo Voltaic cells and their properties will be explained. Applications of solar cells will be explained in detail also the environmental issues of solar systems will be explained.

Prerequisite(s):NIL

Course Outcomes:

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

CO1.Compare the present and future available electrical power from solar energy in the world based on the knowledge of global solar horizontal irradiation.

CO2.Assimilate and acquire the skills for design and engineering of solar thermal and solar photovoltaic technology and systems

CO3.Identify simple to complex problems involved in solar thermal energy conversion technique used in the liquid based solar heating and cooling systems for buildings/societal needs.

CO4.Examine a solar PV(Photo Voltaic) system components and their function by utilizing the previous literature knowledge on different Photovoltaic solar cells like crystalline, Multi-Crystalline, Amorphous and thin film

CO5.Analyze the techno economics interaction of developments in the solar energy systems

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

B. Tech. EEE VI/VII/VIII Semester **VCE-R15**

SOLAR ENERGY AND APPLICATIONS

(Open Elective)

Course Code: A3278

L	T	P	C
3	0	0	3

SYLLABUS

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 COLLECTORS: Flat plate and concentrating collectors, classification of concentrating collectors, orientation and thermal analysis, advanced collectors.

STORAGE AND APPLICATIONS: 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.

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. 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.

D. Yogi gosuami, Frank Kreith, Jan F. Kreider (2000), Principles of Solar Engineering, 2nd edition, Taylor & Francis, USA.

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

B. Tech. EEE VI/VII/VIII Semester **VCE-R15**

ENERGY MANAGEMENT AND AUDIT

(Open Elective)

Course Code: A3279

L	T	P	C
3	0	0	3

Course Overview:

Energy management can help industry control its operating costs. Energy management is also important for reducing local, regional and global emissions and can help mitigate the problem of global warming. This course will help industry professionals acquire the skills and techniques required to implement energy management. This course will also benefit researchers and students who are interested in working on energy management. In the context of the Energy Conservation Act 2001, the Bureau of Energy Efficiency has emphasised the importance of Energy Managers and Certified Energy Auditors. This course is designed to provide the background required for engineers to meet this role.

Prerequisite(s): Knowledge of Energy systems

Course Outcomes:

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

CO1 Analyze the influence of energy availability on the development of Industries and various other organizations.

CO2 Discuss the concepts and technologies used for energy conservation.

CO3 Develop methods for evaluating worth of project.

CO4 Investigate the schemes for demand side management.

CO5 Evaluate the VAR requirements for effective voltage control.

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

B. Tech. EEE VI/VII/VIII Semester **VCE-R15**

ENERGY MANAGEMENT AND AUDIT

(Open Elective)

Course Code: A3279

L	T	P	C
3	0	0	3

SYLLABUS

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.

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.

UNIT - IV

DEMAND SIDE MANAGEMENT: Concept and Scope of Demand Side Management, Evolution of Demand Side Management, DSM Strategy ,Planning, Implementation and its application. Customer Acceptance & its implementation issues. National and International Experiences with DSM.

UNIT - V

VOLTAGE AND REACTIVE POWER IN DISTRIBUTION SYSTEM: Voltage and reactive power calculations and control: Voltage classes and nomenclature, voltage drop calculations, Voltage control, VAR requirements and power factor, Capacitors unit and bank rating, Protection of capacitors and switching, Controls for switched capacitors and fields testing.

TEXT BOOKS:

1. W. R. Murphy, G. McKay (2008), *Energy Management,* 1st edition, B.S. Publications, New Delhi.
2. Tripathy S. C., "Electric Energy Utilization and conservation", Tata McGraw Hill.
3. Industrial Energy Conservation Manuals, MIT Press, Mass, 1982.

REFERENCE BOOKS:

1. B. Smith (2007), *Energy Management Principles*, 1st edition, Pergamon Press, Inc., England.
2. Energy Management Handbook, Edited by W.C.Turner, Wiley, New York, 1982.
3. IEEE Bronze Book, 'Recommended Practice for Energy Conservation and cost effective planning in Industrial facilities, IEEE Press

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

B. Tech. EEE VI/VII/VIII Semester **VCE-R15**

ELEMENTS OF MECHANICAL ENGINEERING

(Open Elective)

Course Code: A3376

L	T	P	C
3	0	0	3

Course Overview:

The course description is multidisciplinary nature of Natural Resources: Renewable and nonrenewable resource. Hydraulic Machines deals describes about the hydraulic turbines. The course is also describing about the various machine tool operations and joining processes.

Prerequisite(s):

- Environmental studies
- Metallurgy and Material science
- Production Technology-I
- Hydraulic Machines
- Refrigeration and Air Conditioning

Course Outcomes:

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

CO1. Distinguish renewable and non-renewable energy sources and the associated environmental issues.

CO2. Classify hydraulic turbines and gas turbines based on working principles.

CO3. Apply metal removal and joining processes to get the designed shape and size of products in manufacturing.

CO4. Make use of engineering materials such as ferrous & non-ferrous metals, alloys, composite for different applications.

CO5. Explain the basic concepts of refrigerants, refrigeration, air-condition system.

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

B. Tech. EEE VI/VII/VIII Semester **VCE-R15**

ELEMENTS OF MECHANICAL ENGINEERING

(Open Elective)

Course Code: A3376

L	T	P	C
3	0	0	3

SYLLABUS

UNIT - I

ENERGY RESOURCES: Non-renewable and renewable energy resources, solid, liquid and gaseous fuels, Calorific values of fuels, Combustion and combustion products of fuels,

ENERGY: Introduction and application of Energy sources like fossil fuels, Nuclear Fuels, Solar, Hydal, wind and bio fuels, Environmental issues like global warming and ozonedepletion.

UNIT – II

TURBINES:

Introduction Classification Efficiency, Principal and operation of pelton wheel Francis Turbine and Caplon Turbine

Gas Turbines: Classification, Working principles and Operations of Open cycle and closed cycle gas turbines.

UNIT - III:

MACHINE TOOL OPERATIONS:

Turning, facing, knurling, Thread cutting, Taper Turning by swiveling the compound rest, Drilling, Boring, Reaming, Tapping, Counter Sinking, Counter Boring, -Plain milling, End milling, Slot milling.

UNIT –IV:

ENGINEERING MATERIALS AND JOINING PROCESSES:

ENGINEERING MATERIALS: Types and applications of Ferrous & Nonferrous metals and alloys.

Composites: Introduction: Definition, Classification and applications

Joining Process: welding: Definition, classification of welding, Description of Electric Arc Welding and Oxy-Acetylene Welding, soldering , brazing, Differences between soldering, Brazing and Welding.

UNIT - V

REFRIGERATION AND AIR-CONDITIONING: Properties of refrigerants, list of commonly used refrigerants. Refrigeration –Definitions – Refrigerating effect, Ton of Refrigeration, COP, Relative COP, unit of Refrigeration. Principle and working of anvapor compression refrigeration and vapour absorption refrigeration systems. Principle and applications of air conditioners, Room air conditioner.

TEXT BOOKS:

5. G. D. Rai (2010), Non-Conventional Energy Sources, 2nd edition, Pearson, India.
6. Domkundwar, S. C. Arora (2009), A Course in Refrigeration and Air conditioning, 6th edition, Dhanpatrai Publications, New Delhi, India.
7. Ganesan (2011), Gas Turbines, 3rd edition, Tata McGraw-Hill education (P) Ltd, New Delhi, India.
8. R K Jain(2004) Production Technology, Khanna Publications.

REFERENCE BOOKS:

1. S. Trymbaka Murthy, “A Text Book of Elements of Mechanical Engineering”, 4th Edition, Universities Press (India) Pvt. Ltd., 2006.
2. K.P. Roy, S.K. Hajra Choudhury, Nirjhar Roy, “Elements of Mechanical Engineering”, Media Promoters & Publishers Pvt. Ltd.,Mumbai,7th Edition, 2012
3. Pravin Kumar, (2013), “Basic Mechanical Engineering”, Edition, Pearson.
4. B K Singh (2012), Elements by Mechanical Engineering, Published by Ane Books Pvt. Ltd.

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

B. Tech. EEE VI/VII/VIII Semester **VCE-R15**

BASIC THERMODYNAMICS AND HEAT TRANSFER

(Open Elective)

Course Code: A3377

L	T	P	C
3	0	0	3

Course Overview:

This course focuses on basic areas of the relationship between heat and work in a substance during different types of thermodynamic processes. Specifically, thermodynamics focuses largely on how a heat transfer is related to various energy changes within a system undergoing a thermodynamic process. The course is extended to study the Air standard cycles and various modes of heat transfer in detail.

Prerequisite(s):NIL

- THERMODYNAMICS
- HEAT TRANSFER

Course Outcomes:

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

CO1. Define the laws of thermodynamics and heat transfer.

CO2. Explain the basic concepts of thermodynamics and heat transfer.

CO3. Solve the problems by applying the knowledge of thermodynamic and heat transfer laws.

CO4. Evaluate the performance of thermodynamic cycles, heat engines and heat pumps.

CO5. Analyze heat transfer due to conduction, convection and radiation.

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

B. Tech. EEE VI/VII/VIII Semester **VCE-R15**

BASIC THERMODYNAMICS AND HEAT TRANSFER

(Open Elective)

Course Code: A3377

L	T	P	C
3	0	0	3

SYLLABUS

UNIT – I

BASIC CONCEPTS OF THERMODYNAMICS: Macroscopic and microscopic approaches, thermodynamic systems, boundary, surroundings, thermodynamic property, intensive and extensive properties, thermodynamic equilibrium, state, path, process and cycle, quasi static, reversible and irreversible processes, Energy and its forms, concepts of heat and work, Zeroth Law of thermodynamics.

UNIT – II

FIRST LAW OF THERMODYNAMICS: First law of thermodynamics, internal energy, enthalpy, PMM -I, Steady flow energy equation, Application of First law and Limitations of first law of thermodynamics.

SECOND LAW OF THERMODYNAMICS: Kelvin-Planck and Clausiusstatements, heat engine, heat pump, refrigerator, PMM-II, Carnot cycle, Carnot heat engine, Carnot theorem and its corollaries, Entropy.

UNIT – III

AIR STANDARD CYCLES: Otto, Diesel and Dual combustion cycles, description and representation on PV and TS diagrams, Thermal efficiency, mean effective pressures.

UNIT –IV

BASIC CONCEPTS OF HEAT TRASFER: Modes and mechanisms of heat transfer, Basic laws of heat transfer –Applications of heat transfer.

CONDUCTION HEAT TRANSFER: General heat conduction equation in Cartesian coordinates. Different forms of general equation – Steady state and Transient heat transfer – Initial and boundary conditions. One dimensional steady state heat conduction through Homogeneous slabs, Overall heat transfer coefficient.

UNIT –V

FORCED CONVECTION: Concepts of hydrodynamic and thermal boundary layer and use of empirical correlations for Flat plates.

FREE CONVECTION: Development of Hydrodynamic and thermal boundary layer along a vertical plate – Use of empirical relations for Vertical plates.

RADIATION HEAT TRANSFER: Introduction, properties and definitions, Laws of black-body radiation, Laws of Planck, Kirchoff, Lambert, Stefan and Boltzmann, Heat exchange between two black bodies, Emissivity, heat exchange between grey bodies.

TEXT BOOKS:

1. P. K. Nag (2012), *Engineering Thermodynamics*, 4th edition, Tata McGraw-Hill, New Delhi, India.
2. YUNUS A CENGEL, (2016*), Heat and mass transfer: fundamentals & applications*, 5th edition, TMH, New Delhi, India.

REFERENCE BOOKS:

1. J. B. Jones, R. E. Dugan (2009), *Engineering Thermodynamics*, 1st edition, Prentice Hall of India Learning, New Delhi, India.
2. M MRathod (2010), Thermal Engineering, Tata McGraw Hill, New Delhi, India.
3. M. Thirumaleshwar,(2014), Fundamentals of Heat & Mass Transfer, Second Edition, Pearson, India
4. R.C. Sachdeva, (2014), Fundamentals of Engineering, Heat & Mass Transfer, Third Edition, New Age, New Delhi.

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

B. Tech. EEE VI/VII/VIII Semester **VCE-R15**

MECHANICAL MEASUREMENTS AND INSTRUMENTATION

(Open Elective)

Course Code: A3378

L	T	P	C
3	0	0	3

Course Overview:

This course covers the terminology, concepts, principles and computations used by engineers and technicians to specify, analysis and maintain instrumentation and control systems. It emphasizes practices in industry concepts, so that students learn what aspects of plant design and control are critical. Practical examples have been used for many common pressure, level, temperature and flow measuring systems. Approaches are presented for measurement selection, process/modification, and control system design.

Prerequisite(s):NIL

Course Outcomes:

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

CO1. Identify the functional elements of generalized measuring system and the errors occurring in Instrumentation and provide the remedial measures
CO2. List various pressure measuring instruments and applications in real life
CO3. Evaluate the measuring instruments and to trace the standards used to the ultimate standards.
CO4. Analyze the measuring system for the measurement of Displacement, Temperature, Flow, Liquid level, Stress, Strain and humidity.
CO5. Classify the various types of humidity, acceleration and vibration measurements.

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

B. Tech. EEE VI/VII/VIII Semester **VCE-R15**

MECHANICAL MEASUREMENTS AND INSTRUMENTATION

(Open Elective)

Course Code: A3378

L	T	P	C
3	0	0	3

SYLLABUS

UNIT - I

INTRODUCTION: Definition, Basic principles of measurement, Measurement systems, generalized configuration and functional descriptions of measuring instruments, examples. Dynamic performance characteristics, sources of error, Classification and elimination of error.

MEASUREMENT OF DISPLACEMENT: Theory and construction of various transducers to measure displacement ,Piezoelectric, Inductive, capacitance, resistance, ionization and Photo electric transducers, Calibration procedures.

UNIT - II

MEASUREMENT OF PRESSURE: Introduction, classification, basic principles used of Manometers, Piston, Bourdon pressure gauges, Bellows, Diaphragm gauges. Low pressure measurement, Thermal conductivity gauges, ionization pressure gauges, McLeod pressure gauge.

UNIT - III

MEASUREMENT OF LEVEL: Direct method, Indirect methods, capacitative, ultrasonic, magnetic, Bubler level indicators.

FLOW MEASUREMENT: Rotameter, magnetic, Ultrasonic, Turbine flow meter, hot wire anemometer, Laser DopplerAnemometer (LDA).

MEASUREMENT OF SPEED: Mechanical Tachometers, Electrical tachometers, Stroboscope, Non-Contact type oftachometer.

UNIT - IV

STRESS STRAIN MEASUREMENTS: Introduction to stream and strain, electrical strain gauge, gaugefactor, method of usage of resistance strain gauge for bending compressive and tensile strains, usage for measuring torque, Strain gauge Rosettes.

MEASUREMENT OF TEMPERATURE: Classification , Ranges , Various Principles of measurement , Expansion, Electrical Resistance , Thermistor , Thermocouple , Pyrometers, Temperature Indicators.

UNIT - V

MEASUREMENT OF HUMIDITY: Moisture content of gases, sling psychrometer, Absorption psychrometer and Dew pointmeter.

MEASUREMENT OF ACCELERATION AND VIBRATION: Different simple instruments, Principles of Seismic instruments, Vibrometer and accelerometer.

TEXT BOOKS:

1. D.S. Kumar(2011), *Mechanical Measurements and Controls*, 4th edition, Metropolitan Book Co. Pvt Ltd., New Delhi, India**.**
2. A. K. Tayal (2004), *Instrumentation and mechanical Measurements,* 2nd edition, Galgotia Publications, New Delhi, India.

REFERENCE BOOKS:

1. Er. R. K. Jain (2011), *Mechanical and Industrial Measurements*, 12th edition, Khanna Publishers, New Delhi, India.
2. Chennakesava R. Alavala(2010), *Principles of Industrial Instrumentation and Control Systems*, 1st edition, Cengage Learning, New Delhi, India.
3. B. C. Nakra, K. K. Choudhary (2010*), Instrumentation, measurement and analysis*, 4th, Tata McGraw-Hill, New Delhi, India.

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

B. Tech. EEE VI/VII/VIII Semester **VCE-R15**

ENGINEERING OPTIMIZATION

(Open Elective)

Course Code: A3379

L	T	P	C
3	0	0	3

Course Overview:

Optimization involves finding the "best" solution according to specified criteria. In the context of engineering design, the "best" solution may refer to a minimum cost or weight, maximum quality or efficiency, or some other performance index pertaining to a disciplinary objective. However, determining the optimal design involves more than just the minimization or maximization of an objective function. Designers must also identify the design variables that represent the physical form of the system and the constraints that represent limitations on the design space. Typically, the problems of interest in engineering are of a nonlinear nature, in that the objective functions and constraints considered are nonlinear.

Prerequisite(s):

Mathematics, Numerical Methods

Course Outcomes:

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

CO1. Explain various optimization techniques.

CO2. Solve problems involving single variable and multi variables under constrained or unconstrained environments.

CO3. Examine the impact of various factors affecting the Linear programming problem and solution using sensitivity (Post Optimality) analysis, with the aid of Simplex Method, Revised Simplex Method, Dual Simplex Method etc.

CO4. Apply dynamic programming technique to find optimum solution for inventory, capital budgeting, resource allocation, Production planning and control problems etc.

CO5. Solve quadratic, geometric and non-linear programming problems using different methods.

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

B. Tech. EEE VI/VII/VIII Semester **VCE-R15**

ENGINEERING OPTIMIZATION
(Open Elective)

Course Code: A3379

L	T	P	C
3	0	0	3

SYLLABUS

UNIT I

OPTIMIZATION TECHNIQUE: Introduction, Single-Variable Optimization, Multivariable Optimization with No Constraints, Multivariable Optimization with Equality Constraints, Multivariable Optimization with Inequality Constraints, Convex Programming Problem.

UNIT II

LINEAR PROGRAMMING: Introduction, Revised Simplex Method, Duality in Linear Programming, Decomposition Principle, Sensitivity or Postoptimality Analysis, Transportation Problem, Karmarkar's Method, Quadratic Programming.

UNIT III

NON-LINEAR PROGRAMMING : Introduction, Unimodal Function, Unrestricted Search, Exhaustive Search, Dichotomous Search, Interval Halving Method, Fibonacci Method, Golden Section Method, Comparison of Elimination Methods, Quadratic Interpolation Method, Cubic Interpolation Method, Direct Root Methods, Rate of convergence, Design variables, Random search methods, Chrivariate methods, Powell's method, Newton's method, Marquard Method, Test function.

UNIT IV

GEOMETRIC PROGRAMMING : Introduction, Posynomial, Unconstrained Minimization Problem, Primal-Dual Relationship and Sufficiency Conditions in the Unconstrained Case,Constrained Minimization, Primal and Dual Programs in the Case of Less-Than Inequalities, Geometric Programming with Mixed Inequality Constraints, Complementary Geometric Programming, Applications of Geometric Programming.

UNIT V

DYNAMIC PROGRAMMING : Introduction, Multistage Decision Processes, Concept of Sub optimization and the Principle of Optimality, Computational Procedure in Dynamic Programming, The Calculus Method of Solution, The Tabular Method of Solution, Conversion of a Final Value Problem into an Initial Value Problem, Linear Programming as a Case of Dynamic Programming, Continuous Dynamic Programming, Applications.

TEXT BOOKS:

4. C B Gupta (2013), Optimization Techniques in Operations Research, 1st Edition, I K International Publications, New Delhi.
5. Singireshel S Rao (2011), Engineering Optimizations, 4th Edition, Elsevier Butterworth, Heineman, USA.

REFERENCES:

1. Jasibir Arora (2016), Introduction to Optimum Design, 4th Edition, Academic press in an Imprint of Elsevier, USA.
2. N V S Raju (2014), Optimization Methods for Engineering, 1st edition, PHI Publications, New Delhi.
3. K V Mittal (1996), Optimization Methods in Operations research and system analysis, 3rd Edition, New age Publications, New Delhi.
4. Edwin K, P Chang, Stanislaw H. Zak (2013), An Introduction to Optimization, 3rd Edition, Jhon Wiley, New York.

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

B. Tech. EEE VI/VII/VIII Semester **VCE-R15**

ENVIRONMENTAL POLLUTION AND MANAGEMENT

(Open Elective)

Course Code: A3176

L	T	P	C
3	0	0	3

Course Overview:

The course has been designed to improve the understanding of the students about different pollution control strategies and the skills of application of remediation techniques to combat pollution in three environmental compartments i.e. air, water and soil. The course will also be dealing about the sources of pollution in air, soil, water, solid-waste and noise and the impacts these sources on the environment and health. In addition, the students will be given the training to develop the particular skills required in pollution related structured research.

Prerequisite(s):NIL

Course Outcomes:

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

CO1. **Distinguish** between various modes of air pollution and their characteristic.

CO2. **Examine** air pollution sampling and classify its level.

CO3. **Evaluate** water quality and propose necessary measures.

CO4. **List** different standards laid by governing authorities.

CO5. **Summarize** functions carried out by controlling bodies.

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

B. Tech. EEE VI/VII/VIII Semester **VCE-R15**

ENVIRONMENTAL POLLUTION AND MANAGEMENT

(Open Elective)

Course Code: A3176

L	T	P	C
3	0	0	3

SYLLABUS

UNIT-I **(12 Lectures)**

Water pollution – sources & types of water pollution – physical, chemical & biological – effect of water pollution. Drinking water quality standards waste water treatment – primary, secondary, tertiary-water pollution prevention & control act – 1974.

UNIT-II **(12 Lectures)**

Air pollution –structure and composition of atmosphere – classification, sources & effects of air pollution – Acid rain –green house effect – global warming – Ozone depletion.

UNIT-III **(12 Lectures)**

Prevention and control of air pollution particulate control – settling chamber, scrubber, bag filter, cyclones electrostatic precipitators. Gaseous emission control methods. Air pollution prevention and control Act 1981.

UNIT-IV **(12 Lectures)**

Soil Pollution – soil pollutants – types – sources, effects & Control. Noise Pollution – sources effects & Control.

UNIT-V **(12 Lectures)**

Government Agencies & Programs – The Tiwari committee – creation of NCEPC, Department of Environment & Forest – Function of State Pollution Control Board.

TEXT BOOKS:

1. Rao, M. N and H.V.N. Rao (2005) Air Pollution, Tata McGraw – Hill Publishing Company Limited. New Delhi.
2. Kudesia, V.P and Ritu Kudesia (2005) Water Pollution, Pragati Prakashan Publication, Meerut.

REFERENCES

1. Sawyer, C. N., P.L McCarty and G.F. Perkin (1994) Chemistry for Environmental Engineers, II Edition. McGraw-Hill.
2. Sharma, B.K and H.Kaur (1994) Soil and Noise Pollution. Goel Publishing House, Meerut.
3. Kumarasawmy, K., A. Alagappa Moses and M. Vasanthy (2004) Environmental Studies (A Text Book for All Under Graduate Students) Bharathidasan University Publications.

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

B. Tech. EEE VI/VII/VIII Semester **VCE-R15**

REMOTE SENSING AND GIS
(Open Elective)

Course Code: A3177

L	T	P	C
3	0	0	3

Course Overview:

This course covers the study of elements in remote sensing process and steps involved in electromagnetic remote sensing process. This course also covers the principals of photometry and various concepts of and terminology of GIS and also includes how the data is presented and data base management system. In this course the applications of remote sensing and GIS in civil engineering.

Prerequisite(s):NIL

Course Outcomes:

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

CO1. **Explain** basics of Aerial Photography, Remote sensing and GIS.

CO2. **Describe** the working principle of interpretation of Aerial photographs and satellite.

CO3. **Utilize** knowledge about the principles and physics of Remote sensing and data acquisition

CO4. **Summarize** the data types, data storage and carry out the analysis of spatial and attribute data.

CO5. **Apply** applications of remote sensing and GIS in various fields.

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

B. Tech. EEE VI/VII/VIII Semester **VCE-R15**

REMOTE SENSING AND GIS
(Open Elective)

Course Code: A3177

L	T	P	C
3	0	0	3

SYLLABUS

UNIT – I **(12 Lectures)**

INTRODUCTION TO PHOTOGRAMMETRY: Principles & types of aerial photograph, geometry of vertical aerial photograph, Scale & Height measurement on single vertical aerial photograph, Height measurement based on relief displacement, Fundamentals of stereoscopy, fiducial points, parallax measurement using fiducial line.

UNIT – II **(12 Lectures)**

REMOTE SENSING: Basic concept of Remote sensing, Data and Information, Remote Sensing data collection, Remote sensing advantages & Limitations, Remote sensing process. Electro-magnetic Spectrum, Energy interactions with atmosphere and with earth surface features (Soil, Water, and Vegetation).

Indian Satellites and Sensors characteristics, Resolution, Map and Image and False color composite, introduction to digital data, elements of visual interpretation techniques.

UNIT – III **(12 Lectures)**

GEOGRAPHICAL INFORMATION SYSTEMS: Introduction to GIS; Components of a GIS; Geospatial Data: Spatial Data - Attribute data - joining Spatial and Attribute data; GIS operations: Spatial Data input-Attribute data Management - Data display - data exploration - Data Analysis.

COORDINATE SYSTEMS: Geographic Coordinate System: Approximation of Earth, Datum; Map Projections; Types of Map Projection parameters - Commonly used Map Projections - Projected coordinate Systems.

UNIT – IV **(10 Lectures)**

GIS SPATIAL ANALYSIS: Computational Analysis Methods (CAM), Visual Analysis Methods (VAM), Data storage-vector data storage, attribute data storage, overview of the data manipulation and analysis. Integrated analysis of the spatial and attribute data.

UNIT – V **(14 Lectures)**

APPLICATIONS : WATER RESOURCES APPLICATIONS - Surface water mapping - Flood and Drought impact assessment - Rainfall – Runoff relations - Watershed management for sustainable development and Watershed characteristics - TRANSPORTATION – shortest path- vehicle tracking – network travel cost – transportation master plan. DISASTER MANAGEMENT – ENVIRONMENTAL ENGINEERING – environmental impact assessment - site remediation – fire growth stimulation. AGRICULTURE.

TEXT BOOKS:

1. James B. Campbell, Randolph H. Wynne (2011), *Introduction to Remote Sensing, 5*th edition, Guilford Publications Inc., New York, USA.
2. L. R. A. Narayana (1999), *Remote Sensing and its applications,* Universities Press, India.
3. M. Anji Reddy (2001), *Remote Sensing and Geographical Information systems,* B. S. Publications, New Delhi, India.

REFERENCE BOOKS:

1. Thomas M. Lillesand, Ralph W. Kiefer (1994), *Remote Sensing and Image Interpretation*, Wiley & Sons, New Delhi, India.
2. Peter A. Burragh, Rachael (2011), *Principals of Geo physical Information Systems,* Oxford Press, India.
3. S. Kumar (2005), *Basics of remote sensing and GIS*, Laxmi Publications, New Delhi, India.

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

B. Tech. EEE VI/VII/VIII Semester **VCE-R15**

DISASTER MANAGEMENT

(Open Elective)

Course Code: A3178

L	T	P	C
3	0	0	3

Course Overview:

This course will introduce students to the vocabulary and core components of Disaster Management. We will discuss the importance of this growing field that is changing rapidly as a result of an increase in frequency, complexity, and severity of man-made, natural, and technological disasters. We will examine historical events that have changed the nature of the field, and introduce students to the leadership and management roles that have emerged as a result of these events taking place.

Prerequisite(s):NIL

- Environmental sciences

Course Outcomes:

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

CO1. **List out** different causes of Environmental hazards.

CO2. **Classify** environmental hazards and disasters, Endogenous hazards, exogenous hazards, infrequent events - Cumulative atmospheric hazards / disasters.

CO3. **Explain** different characteristics of hazards.

CO4. **Develop** Emerging approaches in Disaster management.

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

B. Tech. EEE VI/VII/VIII Semester **VCE-R15**

DISASTER MANAGEMENT
(Open Elective)

Course Code: A3178

L	T	P	C
3	0	0	3

SYLLABUS

UNIT–I **(12Lectures)**

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

UNIT – II **(12Lectures)**

TYPES OF ENVIRONMENTAL HAZARDS & DISASTERS: Natural hazards and Disasters – Man induced hazards & Disasters - Natural Hazards - Planetary Hazards / Disasters - Extra Planetary Hazards / disasters - Planetary Hazards - Endogenous Hazards - Exogenous Hazards

UNIT- III **(12Lectures)**

ENDOGENOUS HAZARDS: Volcanic eruption - Earthquakes - landslides - Volcanic Hazards / Disasters - Causes and distribution of Volcanoes - Hazardous effects of volcanic eruptions - Environmental impacts of volcanic eruptions - Earthquake Hazards / disasters - Causes of Earthquakes - Distribution of earthquakes - Hazardous effects of - earthquakes - Earthquake Hazards in India - Human adjustment, perception & mitigation of earthquake.

UNIT- IV **(13Lectures)**

Exogenous hazards / disasters - Infrequent events - Cumulative atmospheric hazards / disasters Infrequent events: Cyclones - Lightning – Hailstorms.

CYCLONES: Tropical cyclones & Local storms - Destruction by tropical cyclones & local stroms (causes, distribution human adjustment, perception & mitigation) Cumulative atmospheric hazards/ disasters :- Floods - Droughts - Cold waves - Heal waves Floods :- Causes of floods - Flood hazards India - Flood control measures (Human adjustment, perception & mitigation) Droughts :- Impacts of droughts - Drought hazards in India - Drought control measures - Extra Planetary Hazards / Disasters - man induced Hazards / Disasters - Physical hazards / Disasters - Soil erosion

SOIL EROSION: Mechanics & forms of Soil Erosion - Factors 7 causes of Soil Erosion - Conservation measures of Soil Erosion.

CHEMICAL HAZARDS / DISASTERS: Release of toxic chemicals, nuclear explosion - Sedimentation processes Sedimentation processes: - Global Sedimentation problems - Regional Sedimentation problems - Sedimentation & Environmental problems - Corrective measures of Erosion & Sedimentation

BIOLOGICAL HAZARDS / DISASTERS: Population Explosion

UNIT-V **(12Lectures)**

Emerging approaches in Disaster Management - Three stages
Pre-disaster Stage (preparedness)
Emergency Stage
Post Disaster stage – Rehabilitation

TEXT BOOKS:

1. Disaster Mitigation: Experiences And Reflections by Pradeep Sahni
2. Natural Hazards & Disasters by Donald Hyndman & David Hyndman - Cengage Learning

REFERENCE BOOKS:

1. R. B. Singh (Ed) Environmental Geography, Heritage Publishers New Delhi, 1990
2. Savinder Singh Environmental Geography, PrayagPustakBhawann 1997
3. Kates, B. I & White, G. F The Environment as Hazards, oxford, New York, 1978
4. R. B. Singh (Ed) Disaster Management, Rawat Publication, New Delhi, 2000
5. H. K. Gupta (Ed) Disaster Management, Universities Press, India, 2003
6. R. B. Singh, Space Technology for Disaster Mitigation in India (INCED), University of Tokyo, 1994
7. Dr.Satender, Disaster Management in Hills, Concept Publishing Co., New Delhi, 2003
8. S. Arya Action Plan For Earthquake, Disaster, Mitigation in V. K. Sharma (Ed) Disaster Management IIPA Publication New Delhi, 1994
9. R. K. Bhandani An overview on Natural & Manmade Disaster & their Reduction, CSIR, New Delhi
10. M. C. Gupta Manuals on Natural Disaster Management in india, National Centre for Disaster Management, IIPA, New Delhi, 2001.

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

B. Tech. EEE VI/VII/VIII Semester **VCE-R15**

CONSTRUCTING PLANNING AND MANAGEMENT

(Open Elective)

Course Code: A3179

L	T	P	C
3	0	0	3

Course Overview:

The construction management degree prepares you for a wide range of professional roles in the building and construction industry. This course is management-oriented and focuses on a broad range of interrelated disciplines including domestic, commercial and civil construction. You will be taught by a dedicated team of professionals with qualifications and experience in construction-related disciplines. Core subjects include construction technology, measurement and estimating, project management, contracts administration, building law and economics, and communication and computer skills.

Prerequisite(s):NIL

Course Outcomes:

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

CO1. **Improve** business and management skills in positions within the construction industry.

CO2. **Adapt** technical skills and knowledge in mathematics, science, construction, and technology in support of planning, analyzing, and solving construction problems.

CO3. **Utilize** industry resources including associations and organizations, professional publications, and governmental data to analyze, evaluate, and apply current trends within the industry.

CO4. **Make use of** decision-making in personal and professional endeavors.

CO5. **Design** a quality construction project from start to completion while maintaining budget, schedule, and safety requirements.

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

B. Tech. EEE VI/VII/VIII Semester **VCE-R15**

CONSTRUCTING PLANNING AND MANAGEMENT

(Open Elective)

Course Code: A3179

L	T	P	C
3	0	0	3

SYLLABUS

UNIT – I **(10Lectures)**

Contract management, project estimation, types of estimation, contract document, classification, bidding, and procurement process.

UNIT-II **(10 Lectures)**

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 – III **(12Lectures)**

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 – IV **(12Lectures)**

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 – V **(10Lectures)**

Construction claims, dispute and dispute resolution, and, source of claim, claim management, arbitration, project closure , construction closure and contract closure.

TEXT BOOKS:

1. Punmia, Khandelwal (2006), *Project planning and control with PERT and CPM*, 3rd edition, Laxmi Publications, New Delhi, India.
2. Construction project management-theory and practice, Nirajjha, Pearson education,2010.

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**,** Construction technology by subir k. Sarkar, subhajit saraswathi/oxford university press,2009

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

B. Tech. EEE VI/VII/VIII Semester **VCE-R15**

ENTREPRENEURSHIP
(Open Elective)

Course Code: A3076

L	T	P	C
3	0	0	3

Course Overview:

The course makes the students to learn the roles, characteristics, qualities, and functions of entrepreneur. It enables the students to know various Institutional support for setting up a business enterprise. Students would also understand the role, importance and functions of women entrepreneur and women entrepreneur development.

Prerequisite(s):NIL

Course Outcomes:

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

CO1 Understand the role, characteristics, qualities, and functions of entrepreneur and use this knowledge to become future entrepreneurs.

CO2 Understand various Institutional support for setting up a business enterprise and apply this knowledge while approaching these institutions for financial support.

CO3 Understand role, importance and functions of women entrepreneur and use this knowledge to become future women entrepreneurs.

CO4 Understand the concept of Project Management and steps in Project development and apply this knowledge while taking future project assignments.

CO5 Understand training programs and different training institutions to impart training and apply this knowledge to train existing and future entrepreneurs.

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

B. Tech. EEE VI/VII/VIII Semester **VCE-R15**

ENTREPRENEURSHIP
(Open Elective)

Course Code: A3076

L	T	P	C
3	0	0	3

SYLLABUS

UNIT - I

ENTREPRENEURSHIP: Importance and role 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, DIC, EntrepreneurshipDevelopmentInstitute, T-Hub (Telangana Hub).

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, Project life cycle-identification, Project formulation, Project report ,Project evaluation- profitability appraisal, social cost benefit analysis, feasibility analysis, financial analysis and project financing, Project implementation, Project completion.

UNIT - V

ENTREPRENEUR TRAINING: Designing appropriate training programmes to inculcate Entrepreneurial Spirit, significance of entrepreneurial training,Feedback and Performance of Trainees, NSIC,Pradhan Mantri Kaushal Vikas Yojana (PMKVY), Telangana Academy for Skill and Knowledge (TASK).

TEXT BOOKS:

4. 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.

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

B. Tech. EEE VI/VII/VIII Semester **VCE-R15**

HUMAN RESOURCE MANAGEMENT

(Open Elective)

Course Code: A3077

L	T	P	C
3	0	0	3

Course Overview:

The course makes the students to equip with basic concepts, function of HRM and Human Resource Planning. Students will be able to understand HR specific functions, importance of Industrial relations, Trade Union and Grievance redressal machinery.

Prerequisite(s):NIL

Course Outcomes:

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

CO1 **Identify** functions of Human Resource Management.

CO2 **Illustrate** the process of Recruitment and selection.

CO3 **Analyze** the needs and methods for training.

CO4 **Outline** the functional relationship with performance and compensation.

CO5 **Illustrate** the importance of Industrial relations through collective bargaining, trade unions and industrial settlement machinery.

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

B. Tech. EEE VI/VII/VIII Semester **VCE-R15**

HUMAN RESOURCE MANAGEMENT

(Open Elective)

Course Code: A3077

L	T	P	C
3	0	0	3

SYLLABUS

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: Job analysis- Job description, Job specification, Sources of Recruitment; Selection, process of selection and techniques, Retentionof 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

INDUSTRIAL RELATIONS: Components of Industrial Relation, Trade Unions, functions of Trade Union, Employee Participation, 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.

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

B. Tech. EEE VI/VII/VIII Semester **VCE-R15**

ORGANIZATION BEHAVIOR

(Open Elective)

Course Code: A3078

L	T	P	C
3	0	0	3

Course Overview:

The course makes the students to learn the concept organizational behaviour in its broadest multi – disciplinary context of Individual, group and organization. Insight on group behaviour and role of leadership theories related to behavioural perspectives would also be instilled in the students.

Prerequisite(s):NIL

Course Outcomes:

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

CO1. Understand approaches, opportunities and challenges of OB and use this knowledge to understand behaviour people in organizations.

CO2. Understand the importance of diversity in organizations as well as personality and perception of individual and use this knowledge for better understanding of human beings in organizations.

CO3. Understand the group behaviour and leadership styles exhibit by the managers and apply this knowledge to get the things done through subordinates efficiently and effectively.

CO4. Understand motivation theories and different Organization structures and apply this knowledge to create suitable organization structure for business as well as to get better work from employees.

CO5. Understand role of Conflict management, Stress management, Organization change and Self management and apply this knowledge for solving different problems of organizations.

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

B. Tech. EEE VI/VII/VIII Semester **VCE-R15**

ORGANIZATION BEHAVIOR

(Open Elective)

Course Code: A3078

L	T	P	C
3	0	0	3

SYLLABUS

UNIT-I

INTRODUCTION TO ORGANIZATIONAL BEHAVIOR: Foundation of O.B - Conceptual Model for O.B. – Organization System in Global Environment – Importance of Interpersonal Skills - Challenges & Opportunities for O.B- Developing O.B. Model – Approaches to O.B.

UNIT-II

INDIVIDUAL BEHAVIOR: Diversity – Biographical Characteristics - Ability – Implementing Diversity Management – Strategies – Attitudes & Job Satisfaction.

PERSONALITY: Theories of Personality –Perception – Process of Perception – Perception & Individual Decision Making – Motivation from concepts to Applications.

UNIT-III

GROUP BEHAVIOR: Foundations of Group Behaviour – Defining and Classifying Groups – Stages of Group Development – Group Properties – Roles – Norms – Status, Size and Cohesiveness – Group Decision Making – Understanding Work Teams – Types of Teams – Creating Effective Teams.

LEADERSHIP THEORIES: Leadership Theories – Challenges to Leadership Construct – Finding and Creating Effective Leaders – Power & Polities.

UNIT-IV

MOTIVATION THEORIES: Maslow's Hierarchy of Needs, Two- factor theory of Motivation, Alderfer's ERG theory, McClelland's need based Motivational Model, Douglas McGregor Theories of X and Y.

FOUNDATION OF ORGANIZATIONAL STRUCTURE: Nature of organizing, organizational levels, span of control and types of span of control, factors determining span, organizational structure, departmentation and types of departmentation, making organizing effective.

UNIT-V

ORGANIZATIONAL CULTURE AND CLIMATE: Conflicts management - Organization Change - Stress Management – Self Management – Managing Careers.

TEXT BOOKS:

1. Stephen P. Robbins, Timothy (2012)*, Organization Behaviour*,Ed. 14, Pearson Publications.
2. Mirza S Saiyadain (2011), *Organisation Behaviour*, TMH, New Delhi
3. Aryasri & VSP Rao (2009), *Management and Organisational Behaviour*, Excel Publications.

REFERENCE BOOKS:

1. Kavitha Singh (2009), *Organisational Behaviour*, Pearson Publictions
2. Aswathappa (2009), *Organisational Behaviour*,Himalaya Publictions
3. John M. Ivancevich (2009), *Organisational Behaviour & Management*, TMH, New Delhi
4. Koontz, Weihrich & Aryasri (2009), *Principles of Management*, TMH, New Delhi
5. Luthans, Fred (2009), *Organisational Behaviour*, 11/e, McGraw Hill, 2009.
6. Pierce and Gardner (2009), *Management and Organisational Behaviour: An Integrated Perspective*, Cengage
7. Deepak Kumar Bhattacharyya (2012), *Principles of Management-text and cases*, Pearson

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

B. Tech. EEE VI/VII/VIII Semester **VCE-R15**

LOGISTICS AND SUPPLY CHAIN MANAGEMENT

(Open Elective)

Course Code: A3079

L	T	P	C
3	0	0	3

Course Overview:

The course enables the students to identify the concepts of Supply chain management functions, drivers and different types of Logistics management. It would make the students to know the importance of Supply chain customer service and bench mark practices.

Prerequisite(s):NIL

Course Outcomes:

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

CO1.Understand Supply chain management functions, drivers and different types of Logistics and apply the knowledge in business environment.

CO2.Understand the importance of Supply chain customer service and bench mark practices and apply them in business environment.

CO3. Understand role of Sourcing and Distribution in supply chain and apply the knowledge in decision making process of organization.

CO4. Understand the importance of Co-ordination in supply chain and role of Information Technology in supply chain and use the knowledge to run the organization successfully.

CO5.Understand Global logistics & Global supply chain processes and strategies and use this knowledge to understand Global supply chain and logistics environment.

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

B. Tech. EEE VI/VII/VIII Semester **VCE-R15**

LOGISTICS AND SUPPLY CHAIN MANAGEMENT

(Open Elective)

Course Code: A3079

L	T	P	C
3	0	0	3

SYLLABUS

UNIT-I

INTRODUCTION: Supply Chain Management- Concept, Objectives, Scope and Functions of Supply Chain; Process view of a Supply Chain. Supply Chain Drivers - Facilities, Inventory, Transportation, Information, Sourcing, Pricing; Obstacles to Achieve Strategic fit, Logistics Management: Introduction, Difference between Logistics and Supply Chain; Inbound, Inter and Outbound Logistics; Integrated Logistics Management; 3PL, 4PL, Intermodal and Reverse Logistics.

UNIT-II

SUPPLY CHAIN CUSTOMER SERVICE - The Marketing and Logistics interface, Customer Service and Customer Retention, Service-Driven Logistics System, Setting customer Service Priorities and Service Standards.

BENCH MARKING: Objectives, Bench marking Cycle, Process and types, Setting Bench marking Priorities.

UNIT-III

SOURCING IN SUPPLY CHAIN: Role of Sourcing in Supply Chain Management, Supplier Scoring and Assessment; Supplier Selection and Controlling; The Procurement process, Sourcing Planning and Analysis; Global Sourcing.

NETWORK DESIGN IN SUPPLY CHAIN: The role of distribution in the Supply Chain Management, factors influencing distribution network design; Transportation Fundamentals: The role of Transportation in Supply Chain, Factors influencing Transportation Decisions, Modes of transportation, Transportation documentation.

UNIT-IV

COORDINATION IN SUPPLY CHAIN: Introduction, Lack of Supply Chain Coordination and the Bullwhip effect, Impact of Lack of Coordination, Obstacles to Coordination in Supply Chain, Managerial levers to achieve Coordination.

IT IN SUPPLY CHAIN: The role of IT in the Supply Chain, The Supply Chain IT framework; CRM, Internal SCM, SRM; The future of IT in Supply Chain, Supply Chain IT in Practice.

UNIT-V

GLOBAL LOGISTICS AND GLOBAL SUPPLY CHAIN: Logistics in Global Economy, Change in Global Logistics, Global Supply Chain business process; Global Strategy; Global Purchasing, Global SCM.

TEXT BOOKS:

1. K.Sridhara butt, "*Logistics and Supply Chain management",* Himalaya Publishers, New Delhi, 2009.

REFERENCE BOOKS:

1. Sunil Chopra and Peter Meindl, " *Supply Chain Management: Strategy, Planning & Operations",* Pearson Education, New Delhi, 2004.
2. Donald J Bowerfox and David J Closs, " *Logistics Management: The integrated Supply Chain Process",* TMH, 2003.
3. D.K.Agarwal, "Logistics and Supply Chain management*",* Mc millan Publishers, 2011
4. B.Rajasekhar, Acharyulu, "*Logistics and Supply Chain management",* Excel Books, New Delhi, 2009.

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

B. Tech. EEE VI/VII/VIII Semester **VCE-R15**

NATIONAL SERVICE SCHEME (NSS)

(Open Elective)

Course Code: A3080

L	T	P	C
3	0	0	3

Course Overview:

National Service Scheme, under the Ministry of Youth Affairs & Sports Govt. of India, popularly known as NSS was launched in Gandhiji's Birth Centenary Year 1969, in 37 Universities involving 40,000 students with primary focus on the development of personality of students through community service. Today, NSS has more than 3.2 million student volunteers on its roll spread over 298 Universities and 42 (+2) Senior Secondary Councils and Directorate of Vocational Education all over the country. From its inception, more than 3.75 crores students from Universities, Colleges and Institutions of higher learning have benefited from the NSS activities, as student volunteers.

Prerequisite(s):NIL

Course Outcomes:

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

CO1. Contrast the different types of NSS activities and financial pattern of expenditurein Community service.

CO2. Enhance the concept of youth, as an agent in social change.

CO3. Classify and explain the working of an organizational functionaries of NSS.

CO4. Design a system, component or process to meet the desired needs applicable to society , with realistic constraints such as economic, safety, manufacturability and sustainability etc., by youth – adult partnership.

CO5. Recognize the need for, and an ability to engage in society with lifelong learning capabilities with the concepts of volunteerism and its functions.

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

B. Tech. EEE VI/VII/VIII Semester **VCE-R15**

NATIONAL SERVICE SCHEME (NSS)

(Open Elective)

Course Code: A3080

L	T	P	C
3	0	0	3

SYLLABUS

Unit-01: INTRODUCTION AND BASIC CONCEPTS OF NSS

a) History, philosophy, aims & objectives of NSS

b) Emblem, flag, motto, song, badge etc.

c) Organizational structure, roles and responsibilities of various NSS functionaries

Unit-02: NSS PROGRAMMES AND ACTIVITIES

a) Concept of regular activities, special camping, Day Camps

b) Basis of adoption of village/slums, Methodology of conducting Survey

c) Financial pattern of the scheme

d) Other youth prog./schemes of GOI

e) Coordination with different agencies

f) Maintenance of the Diary

Unit-03: UNDERSTANDING YOUTH

a) Definition, profile of youth, categories of youth

b) Issues, challenges and opportunities for youth

c) Youth as an agent of social change

Unit-04: COMMUNITY MOBILISATION

a) Mapping of community stakeholders

b) Designing the message in the context of the problem and the culture of the community

c) Identifying methods of mobilization

d) Youth-adult partnership

Unit-05: VOLUNTTERISM AND SHRAMDAN

a) Indian Tradition of volunteerism

b) Needs & importance of volunteerism

c) Motivation and Constraints of Volunteerism

d) Shramdan as a part of volunteerism

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 written or by signs or by visible representation, assaults the officer-in-charge, or any person on duty in or outside the examination hall or any of his relations, or indulges in any other act of misconduct or mischief which result in damage to or destruction of property in the examination hall or any part of the College campus or engages in any other act which in the opinion of the officer on duty amounts to use of unfair means or misconduct or has the tendency to disrupt the orderly conduct of the examination.	In case of students of the college, they shall be expelled from examination halls and cancellation of their performance in that 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 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 UGC 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 to be University and an Autonomy College?

A Deemed to be University is fully autonomous to the extent of awarding its own Degree. A Deemed to be 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 performance, 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 an eye on the academics and keep its reports and recommendations every year. In addition to the 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 students with their final grades 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?
Students shall be permitted for re-evaluation after the declaration of end semester examination results within a stipulated period by paying prescribed fee. But there will not be any re-examination system.

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 grades will reflect the average performance of all the semesters put together in CGPA format.

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 internal and external examinations. All matters involving the conduct of examinations, spot valuations, tabulations, preparation of Grade Sheet 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 and posted 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 UG and 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.

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)

Undertaking by Students/Parents

"To make the students **attend** the classes regularly from the first day of starting of classes and be aware ofthe **College regulations**, the following Undertaking Form is introduced which should be signed by both**student and parent**. The same should be submitted to the College Administrative Office."

I, Mr. / Ms. ---------- joining I Semester / III Semester for theacademic year 2015-2016/ 2016-2017 in Vardhaman College of Engineering, Hyderabad, do hereby undertake and abide by the following terms, and I will bring the **ACKNOWLEDGEMENT** duly signed by me and my parent and submit it to the Admin Office.

1. I will **attend** all the classes from the **joining day** of the College as per the timetable. In case, I do not turn up even after two weeks of starting of classes, I shall be **ineligible** to continue for the current academic year.
2. I will be regular and punctual to all the classes (theory/practical/drawing) and secure overall attendance of **not less than 75%** as stipulated by College/JNTUH. I am fully aware that an overall attendance of less **than 65% will make me lose one year.**
3. I will compulsorily follow the **dress code** prescribed by the college.
4. I will conduct myself in a highly **disciplined** and decent manner both inside the classroom and on campus, failing which suitable action may be taken against me as per the rules and regulations of the College.
5. I will concentrate on my **studies** without wasting time in the Campus/Hostel/Residence and attend all the **tests** to secure more than the minimum prescribed Class/Sessional Marks in each subject. I will submit the **assignments** given in time to improve my performance.
6. I will not bring **Mobile Phone** to the College campus and also, I will not involve in any form of **ragging** inside or outside the campus. I am fully aware that bringing mobile phone to the campus is not permissible and involving in Ragging is an **offence** and punishable as per JNTUH/UGC rules and the law.
7. I will **pay** tuition fees, examination fees and any other **dues** within the stipulated time as required by the Institution/ authorities, failing which I will not be permitted to attend the classes.
8. I will **not cause or involve** in any sort of **violence or disturbance** both within and outside the college campus.
9. If I**absent myself continuously for 3 days**, my **parents** will have to meet the HODconcerned/ Principal.
10. I hereby **acknowledge** that I have **received** acopy of **R15 Academic Rules and Regulations, Syllabus copy** and hence, I shall **abide** by all the rules specified in it.

ACKNOWLEDGEMENT

I have carefully gone through the terms of the undertaking mentioned above and I understand that following these are for my/his/her own benefit and improvement. I also understand that if I/he/she fail to comply with these terms, shall be liable for suitable action as per College/JNTUH rules and the law. I undertake that I/he/she will strictly follow the above terms.

Signature of Student

Signature of Parent
Name & Address with Phone Number

-- STUDENT COPY --

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)

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Signature of Student

Signature of Parent
Name & Address with Phone Number

-- OFFICE COPY --