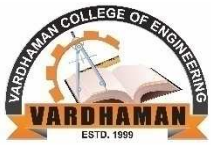

VARDHAMAN COLLEGE OF ENGINEERING

(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-R14)

CHOICE BASED CREDIT SYSTEM

B. Tech. - Regular Four Year Degree Program
(For batches admitted from the Academic Year 2014 - 2015)
&
B. Tech. - Lateral Entry Scheme
(For batches admitted from the Academic Year 2015 - 2016)

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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, A2001: Mathematics – I,A2501: Computer Programming, 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	**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

VARDHAMAN COLLEGE OF ENGINEERING

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DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

Vision:

To aim at inculcating the spirit of high ambitions, healthy attitudes, discipline and multidimensional excellence in the students and strive to mould them to scale new heights and get their mental horizons enlarged through value-based technical education and congenial study environment.

Mission:

To sharpen the inherent professional skills of our students to enable them compete in the complex world through our newly evolved quality management system and dedicated staff. The practical oriented education and the research tie-up with industries we provide, tend to promote the intellectual pursuits of the students.

Quality Policy:

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

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DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

Department Vision:

The vision of the Electrical and Electronics Engineering department is to build a research identity in all related areas of Electrical Engineering uniquely. Through core research and education, the students will be prepared as the best professional Engineers in the field of Electrical Engineering to face the challenges in such disciplines.

Department Mission:

The Electrical and Electronics Engineering Department supports the mission of the College through high quality teaching, research and services that provide students a supportive environment .The department will make the best effort to promote intellectual, ethical and technological environment to the students. The department invokes the desire and ability of life-long learning in the students for pursuing successful career in engineering.

Program Educational Objectives (PEOs)

PEO - I

To experience success in electrical and electronics engineering areas or other diverse fields that requires analytical and professional skills.

PEO – II

To stimulate students to contribute to their fields or professions and to excel them in professional ethics and leadership qualities.

PEO – III

To inculcate in students, professional attitude, effective communication skills and capability to succeed in multi-disciplinary and diverse fields.

PEO – IV

To promote students to continue their professional development including advanced education relevant to their career path and to create enthusiasm for life-long learning.

Program Outcomes (POs):

PO1: Ability to apply knowledge of mathematics, science, Computer Science, electronics and electrical engineering (Fundamental Engineering Analysis Skill).

PO2: Ability to design electrical and electronics circuits and conduct experiments with electrical engineering as well as to analyze and interpret data (Information Retrieval Skills).

PO3: Ability to design digital and analog system pertaining to electrical systems (Creative Skills).

PO4: Ability to visualize and work on multi-disciplinary tasks. (Team Work).

PO5: Ability to identify, formulate and solve engineering problems. (Engineering Problem Solving Skills).

PO6: An understanding of professional and ethical responsibility (Professional Integrity).

PO7: Ability to communicate effectively in both verbal and written form (Speaking / Writing Skills).

PO8: Ability to develop confidence for self-education and to understand the value of life-long learning (Continuing Education Awareness).

PO9: Ability to recognize the impact of engineering on society (Social Awareness).

PO10: Ability to acquire new knowledge to use modern engineering tools, soft wares and equipments to analyze problems necessary for engineering practice. (Practical Engineering Analysis Skills).

PO11. A Knowledge of contemporary issues to undertake innovative projects (Innovative Skills).An ability to apply design and development principles in the construction of software and hardware systems of varying complexity (Software hardware interface).

PO12. Ability to use the techniques and skills to face and succeed in competitive examinations like GATE, GRE, TOEFL, GMAT etc. (Successful Career and Immediate Employment)

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ACADEMIC REGULATIONS

B. Tech. - Regular Four Year Degree Program
(For batches admitted from the Academic Year 2014 - 2015)
&
B. Tech. - Lateral Entry Scheme
(For batches admitted from the Academic Year 2015 - 2016)

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 2014-2015 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 candidate seeking admission into the first year of four-year B. Tech. Degree Program should have

(i) Passed either Intermediate Public Examination (I.P.E) conducted by the Board of Intermediate Education, 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 theguidelines of APSCHE.

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

3.1.2. Admission Procedure:

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

(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 and examinations for all courses is English.

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 8 years for B.Tech. If a student fails to complete the academic program within the maximum duration as specified above, he / she will be required to withdraw from the program.

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

6.1.2. 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 shall follow semester pattern. An academic year shall consist of a first semester and a second semester and the summer term follows in sequence. Each semester shall be of 23 weeks duration and this period includes time for course work, examination preparation, and conduct of examinations. Each semester shall have a minimum of 85 working days for conducting classes. The academic calendar is shown in Table 1 is declared at the start of the semester.

The first and second semesters shall have the duration to accommodate a minimum of 16 instructional weeks per semester.

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

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

The Program of instruction consists of:

(i) A general core programme comprising Basic Sciences, Mathematics, Basic Engineering, Humanities, Social Sciences and Management.
(ii) An Engineering Core programme imparting to the student the fundamentals of engineering in the branch concerned.
(iii) An elective programme enabling the students to take up a group of departmental and interdepartmental courses of interest to him / her.

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

Every course of the B. Tech. 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.

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

Table 3: Group of courses

S. NO	GROUP OF COURSES	CATEGORY	RANGE OF TOTAL CREDITS
1	Humanities, Social Sciences and Management	HS	14
2	Basic Sciences	BS	26
3	Basic Engineering	BE	32
4	Core Engineering	CE	114
5	Professional Elective	PE	12
6	Inter Departmental Elective	IE	08
7	Mini Project	MP	02
8	Technical Seminar	TS	02
9	Comprehensive Viva	CV	02
10	Project Work	PW	08
		TOTAL	220

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 periods each of 60 minutes duration.

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

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

9.2. The four-year curriculum of any B. Tech. program of study shall have 220 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 168 credits.

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

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 and 75 marks for practical / computer aided engineering drawing lab. In addition, mini-project, technical seminar, comprehensive viva and project work shall be evaluated for 50, 50, 50 and 200 marks respectively.

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 4: Method of Evaluation

Mid Semester Test	20 Marks
Online Objective Test	05 Marks
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 20 marks to be answered in two hours duration. The first Mid Semester Test will be held in the 09th week with the announced schedule in the first two units of syllabus. The second Mid Semester Test will be held in the 18th week with the announced schedule in the last three units of syllabus. In case a student does not appear in the Mid Semester Test due to any reason whatsoever, will get zero marks(s).

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 half an hour duration. The Online Objective Test will be held in the 18^{th} week with the announced schedule in all the units of syllabus. In case a student does not appear in the Online Objective Test due to any reason whatsoever, will get zero marks(s).

10.1.3. 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 valued both internally and externally. If the difference between the first and second valuations is less than or equal to 15% of the maximum of the paper the better of the two valuations shall be awarded and if the difference between the first and second valuation is more than 15%, the chief examiner appointed has to discuss with the two valuers and have his own assessment of the script. The marks given by the chief examiner shall be final for award.

10.2 PRACTICAL

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

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

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

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 completed before the start of the VII semester. A report has to be submitted for assessment to an internal evaluation committee comprising Head of the Department or his / her nominee and two faculty of the department including the project supervisor for 50 marks. A minimum of 40% of maximum marks shall be obtained to earn the corresponding credits. The mini project and its report shall be evaluated in VII semester.

10.6 TECHNICAL SEMINAR

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

10.7 COMPREHENSIVE VIVA

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

10.8 PROJECT WORK

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

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

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.

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. MISSING EXAMINATION

A student who fails to attend a Mid Semester Test / Online Objective Test due to hospitalization or accident shall be permitted with prior approval of the HOD and the Principal to take up missing examination of the particular course, subject to payment of a prescribed fee for each missing examination. Students deputed for official programmes of the college are exempted from paying the fee for missing test. Such missing examinations should be completed outside the regular class hours within 7 working days of the respective examinations. Attendance will not be given for taking up missing examinations. The missing examinations are allowed only for Mid Semester Test / Online Objective Test and not for end semester final theory and practical examinations.

13. EVALUATION

Following procedure governs the evaluation.

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

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

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

14. PERSONAL VERIFICATION

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

15. 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.

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

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

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

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

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

iv. A student shall be promoted from IV semester to V semester of programme of study only if he fulfils the academic requirement of securing 40 out of 80 credits from the regular examinations held up to the end of III semester including supplementary examinations held up to the end of IV semester.

v. A student shall be promoted from VI semester to VII semester of programme of study only if he fulfils the academic requirements of securing 68 out of 136 credits, from the regular examinations held up to the end of V semester including supplementary examinations held up to the end of VI semester.

vi. A student shall register for all the 220 credits and earn at least 212 credits. Marks obtained in all the 212 credits shall be considered for the award of the class based on aggregate of marks.

vii. A student who fails to earn 212 credits as indicated in the course structure within eight academic years from the year of their admission shall forfeit their seat in B.Tech programme and their admission stands cancelled.

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

FOR LATERAL ENTRY STUDENTS (BATCHES ADMITTED FROM 2015–2016)

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

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

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

iv. A student shall be promoted from VI semester to VII semester only if he fulfils the academic requirements of securing 42 out of 84 credits from the regular examinations held up to the end of V semester including supplementary examinations held up to the end of VI semester.

v. A student shall register for all 168 credits and earn at least 160 credits. Marks obtained in all the 160 credits shall be considered for the award of the class based on aggregate of marks.

vi. A student who fails to earn 160 credits as indicated in the course structure within **six** academic years from the year of their admission shall forfeit their seat in B.Tech programme and their admission stands cancelled.

vii. Students who are detained for want of attendance (or) who have not fulfilled academic requirements (or)

who have failed after having undergone the course in earlier regulations (or) have discontinued and wish to continue the course are eligible for admission into the unfinished semester from the date of commencement of class work with the same (or) equivalent subjects as and when subjects are offered, and pursue the remaining course work with the academic regulations of the batch into which such students are readmitted. However, all such readmitted students shall earn all the credits of subjects they have pursued for completion of the course.

17. TRANSITORYREGULATIONS

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.

18. TRANSFER OF STUDENTS FROM OTHER COLLEGES/UNIVERSITIES

Transfer of students from the Constituent Colleges of *JNTUH* or from other Colleges/Universities shall be considered only on a case-to-case basis by the Academic Council of the Institute.

19. TRANSCRIPTS

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

20. AWARD OF DEGREE

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

20.1. For students admitted into B.Tech. Program (Batches admitted from 2014-2015)

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 220 credits and secure at least 212 credits with compulsory subjects as listed in the Table below.

Serial Number	Subject Particulars
1	All First Year Theory Subjects
2	All practical subjects
3	Industry oriented mini project
4	Comprehensive Viva-voce
5	Seminar
6	Project work

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

20.2. For lateral entry students (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 three academic years and not more than six academic years.
- The candidate shall register for 168 credits and secure at least 160 credits with compulsory subjects as listed in the Table below.

Serial Number	Subject Particulars

1	All practical subjects
2	Industry oriented mini project
3	Comprehensive Viva-voce
4	Seminar
5	Project work

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

20.3. 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 5:

Table 5: Declaration of Class is based on percentage of marks to be secured

Class Awarded	Grades to be Secured	
First Class with Distinction	70% and above	From the aggregate marks secured from 212 Credits for Regular Students and 160 Credits for Lateral Entry Students.
First Class	Below 70% but not less than 60%	
Second Class	Below 60% but not less than 50%	
Pass Class	Below 50% but not less than 40%	
Fail	Below 40%	

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

Table 6: Percentage Equivalence of Grade Points (For a 10-Point Scale)

Grade Points (GP)	Percentage of Marks
4.75	≥ 40 and < 45
5.25	≥ 45 and < 50
5.75	≥ 50 and < 55
6.25	≥ 55 and < 60
6.75	≥ 60 and < 65
7.25	≥ 65 and < 70
7.75	≥ 70 and < 75
8.25	≥ 75 and < 80
8.75	≥ 80 and< 85
9.25	≥ 85 and < 90
9.75	≥ 90 and < 95
10	≥ 95

21. ADDITIONAL ACADEMIC REGULATIONS

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

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

iii. When a component is cancelled as a penalty, he is awarded zero marks in thatcomponent.

22. REGISTRATION

22.1. 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.

22.2. 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.

22.3. 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.

22.4. 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.

23. 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.

24. 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.

25. 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 studentwill be withheld. The issue of the Degree is liable to be withheld in such cases.

26. 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.

27. 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.

28. 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.

29. 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.

30. 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.

31. AWARD OF A RANK UNDER AUTONOMOUS SCHEME

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

31.2. 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 attemptonly.

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

31.4. The number of Merit Ranks to be announced for any course / program / branch / specialisation will be asfollows:

3(Three) Merit Ranks if the AICTE sanctioned intake is less than or up to60.

4(Four) Merit Ranks if the AICTE sanctioned intake is greater than60.

5(Five) Merit Ranks if the AICTE sanctioned intake is greater than120.

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

32. CODE OF CONDUCT

32.1. Each student shall conduct himself / herself in a manner befitting his / her association withVCE.

32.2. He / she is expected not to indulge in any activity, which is likely to bring disrepute to thecollege.

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

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

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

32.6. 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 thecollege.

32.7. 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 collegehostel.

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

32.9. Attendance is not given to the student during the suspensionperiod

33. 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 andsatisfying 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 mind effectively.

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

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

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

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

34. 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 studentis 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 studentis 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 studentis 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-R14)

B. TECH. - ELECTRICAL AND ELECTRONICS ENGINEERING

REGULATIONS: VCE-R14

I SEMESTER

Code	Subject	Category	Periods per Week			Credits	Scheme of Examination Maximum Marks		
			L	T	P		Internal	External	Total
A2001	Mathematics-I	BS	3	1	-	4	25	75	100
A2005	Technical English	HS	4	-	-	4	25	75	100
A2004	Probability Theory and Numerical Methods	BS	3	1	-	4	25	75	100
A2201	Basic Electrical Engineering	BE	4	-	-	4	25	75	100
A2501	Computer Programming	BE	3	1	-	4	25	75	100
A2502	Computer Programming Lab	BE	-	-	3	2	25	50	75
A2009	English Language Communication Skills Lab	HS	-	-	3	2	25	50	75
A2306	Computer Aided Engineering Lab	BE	-	-	6	2	25	50	75
	TOTAL		**17**	**03**	**12**	**26**	**200**	**525**	**725**

II SEMESTER

Code	Subject	Category	Periods per Week			Credits	Scheme of Examination Maximum Marks		
			L	T	P		Internal	External	Total
A2006	Mathematics-II	BS	3	1	-	4	25	75	100
A2503	Data Structures Through C	BE	3	1	-	4	25	75	100
A2002	Engineering Physics	BS	4	-	-	4	25	75	100
A2003	Engineering Chemistry	BS	4	-	-	4	25	75	100
A2401	Electronic Devices	BE	3	1	-	4	25	75	100
A2008	Engineering Physics & Engineering Chemistry Lab	BS	-	-	3	2	25	50	75
A2504	Data Structures Through C Lab	BE	-	-	6	2	25	50	75
A2404	Electronic Devices Lab	BE	-	-	3	2	25	50	75
	TOTAL		**17**	**03**	**12**	**26**	**200**	**525**	**725**

III SEMESTER

Code	Subject	Category	Periods per Week			Credits	Scheme of Examination Maximum Marks		
			L	T	P		Internal	External	Total
A2010	Mathematics – III	BS	3	1	-	4	25	75	100
A2202	Network Analysis	CE	3	1	-	4	25	75	100
A2203	Electrical Machines-I	CE	4	-	-	4	25	75	100
A2204	Electro Magnetic Fields	CE	3	1	-	4	25	75	100
A2012	Managerial Economics and Financial Analysis	CE	4	-	-	4	25	75	100
A2406	Digital Logic Design	CE	4	-	-	4	25	75	100
A2205	Electric Circuits and Simulation Lab	CE	-	-	3	2	25	50	75
A2206	DC machines Lab	BE	-	-	3	2	25	50	75
	TOTAL		**21**	**03**	**06**	**28**	**200**	**550**	**750**

B. TECH - ELECTRICAL AND ELECTRONICS ENGINEERING

REGULATIONS: VCE-R14

IV SEMESTER

Code	Subject	Category	Periods per Week			Credits	Scheme of Examination Maximum Marks		
			L	T	P		Internal	External	Total
A2407	Signals and Systems	CE	4	-	-	4	25	75	100
A2415	Electronic Circuits	CE	3	1	-	4	25	75	100
A2207	Power System Generation	CE	4	-	-	4	25	75	100
A2208	Electrical Machines-II	CE	3	1	-	4	25	75	100
A2209	Control Systems	CE	3	1	-	4	25	75	100
A2011	Environmental Science	BS	4	-	-	4	25	75	100
A2210	AC Machines Lab	CE	-	-	3	2	25	50	75
A2211	Control Systems and Simulation Lab	CE	-	-	3	2	25	50	75
TOTAL			**21**	**03**	**06**	**28**	**200**	**550**	**750**

V SEMESTER

Code	Subject	Category	Periods per Week			Credits	Scheme of Examination Maximum Marks		
			L	T	P		Internal	External	Total
A2216	Electrical Measurements& Instrumentation	CE	3	1	-	4	25	75	100
A2418	Integrated Circuits Applications	CE	4	-	-	4	25	75	100
A2510	Computer Organization and Architecture	CE	3	1	-	4	25	75	100
A2217	Power System Transmission	CE	4	-	-	4	25	75	100
A2508	Object Oriented Programming through JAVA	CE	4	-	-	4	25	75	100
A2218	Power System Distribution	CE	3	1	-	4	25	75	100
A2219	Electrical Measurements Lab	CE	-	-	3	2	25	50	75
A2423	Electronic Circuits & Integrated Circuits Lab	CE	-	-	3	2	25	50	75
TOTAL			**21**	**03**	**06**	**28**	**200**	**550**	**750**

VI SEMESTER

Code	Subject	Category	Periods per Week			Credits	Scheme of Examination Maximum Marks		
			L	T	P		Internal	External	Total
A2015	Professional Ethics and Intellectual Property Rights	HS	4	-	-	4	25	75	100
A2220	Power Electronics	CE	3	1	-	4	25	75	100
A2221	Computer Methods in Power Systems	CE	4	-	-	4	25	75	100
A2419	Micro Processors and Interfacing	CE	3	1	-	4	25	75	100
A2222	Power System Operation and Control	CE	3	1	-	4	25	75	100
INTERDEPARTMENTAL ELECTIVE – I		HS	4	-	-	4	25	75	100
A2223	Power Electronics and Simulation Lab	CE	-	-	3	2	25	50	75
A2424	Micro Processors and Interfacing Lab	CE	-	-	3	2	25	50	75
TOTAL			**21**	**03**	**06**	**28**	**200**	**550**	**750**

B. TECH - ELECTRICAL AND ELECTRONICS ENGINEERING

REGULATIONS: VCE-R14

VII SEMESTER

Code	Subject	Category	Periods per Week			Credits	Scheme of Examination Maximum Marks		
			L	T	P		Internal	External	Total
A2224	High Voltage Engineering	CE	4	-	-	4	25	75	100
A2225	Power System Switchgear and Protection	CE	4	-	-	4	25	75	100
A2226	Utilization of Electrical Energy	CE	3	1	-	4	25	75	100
A2227	Power Semi Conductor Drives	CE	4	-	-	4	25	75	100
INTERDEPARTMENTAL ELECTIVE – II		IE	3	1	-	4	25	75	100
PROFESSIONAL ELECTIVE – I		PE	3	1	-	4	25	75	100
A2228	High Voltage Engineering Lab	CE	-	-	3	2	25	50	75
A2229	Power Semi Conductor Drives Lab	CE	-	-	3	2	25	50	75
A2236	Mini Project	MP	-	-	-	2	-	50	50
		TOTAL	**21**	**03**	**06**	**30**	**200**	**600**	**800**

VIII SEMESTER

Code	Subject	Category	Periods per Week			Credits	Scheme of Examination Maximum Marks		
			L	T	P		Internal	External	Total
A2237	High Voltage DC Transmission and FACTS	CE	3	1	-	4	25	75	100
PROFESSIONAL ELECTIVE – II		PE	3	1	-	4	25	75	100
PROFESSIONAL ELECTIVE – III		PE	3	1	-	4	25	75	100
A2238	Power Systems and Simulation Lab	CE	-	-	6	2	25	50	75
A2251	Technical Seminar	TS	-	-	6	2	50	-	50
A2252	Comprehensive Viva	CV	-	-	-	2	-	75	75
A2253	Project Work	PW	-	-	12	8	50	150	200
		TOTAL	**09**	**03**	**24**	**26**	**200**	**500**	**700**

B. TECH. - ELECTRICAL AND ELECTRONICS ENGINEERING

REGULATIONS: VCE-R14

ELECTIVES	
INTERDEPARTMENTAL ELECTIVE - I	
Code	**Subject**
A2514	Database Management Systems
A2605	Wireless and Mobile Computing
A2425	Embedded Systems
A2426	VLSI Design
A2351	Robotics
A2154	Air pollution and Control Methodologies
INTERDEPARTMENTAL ELECTIVE – II	
A2013	Management Science
A2016	Human Resource Management
A2017	Entrepreneurship
A2018	Business Communication
A2019	Project Planning and Management
A2020	Organizational Behavior
PROFESSIONAL ELECTIVE - I	
A2230	Process control
A2231	Advanced power system protection
A2232	Power system dynamics and stability
A2233	Advanced Control Systems
A2234	Renewable Energy Sources
A2235	Neural Networks & Fuzzy logic
PROFESSIONAL ELECTIVE - II	
A2239	Optimal Control Systems
A2240	Power System Transients
A2241	Power Quality
A2242	Dynamics of Electrical Machines
A2243	Digital Control Systems
A2244	Energy Management
PROFESSIONAL ELECTIVE - III	
A2245	Evolutionary Computation
A2246	Extra High Voltage AC Transmission
A2247	Machine Modelling and Analysis
A2248	Programmable Logic Controllers
A2249	Reliability Engineering
A2250	Distribution Automation

SYLLABI FOR
I SEMESTER

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

B. TECH. EEE I SEMESTER **VCE-R14**

MATHEMATICS – I

Course Code: **A2001**

L	T	P	C
3	1	-	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 first order 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 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 Solvethe 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 Evaluateline, surface and volume integrals using vector integral theorems.

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

B. TECH. EEE I SEMESTER **VCE-R14**

MATHEMATICS – I

Course Code: **A2001**

L	T	P	C
3	1	-	4

SYLLABUS

UNIT – I

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

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

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

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

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. Grewal B.S., (2012), *Higher Engineering Mathematics*, 42nd Edition, New Delhi, Khanna Publishers.
2. Ramana B.V., (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. Iyengar T.K.V., Krishna Gandhi B. & 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-R14**

TECHNICAL ENGLISH

Course Code: **A2005**

L	T	P	C
4	-	-	4

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 humsanity, love and service to mankindand be involved in community service.

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

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 SEMESTERVCE-R14

TECHNICAL ENGLISH

Course Code:**A2005**

L	T	P	C
4	-	-	4

SYLLABUS

UNIT – I

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

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

UNIT – II

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

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

UNIT – III

1. ***Bubbling Well Road*** from E*njoying Every Day English*

2. ***I Have a Dream*** **- by Martin Luther King** from *Inspiring Speeches and Lives*

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

UNIT – IV

Letters – Business Letters – Significance – Structure and Layout – Principles – Types and Samples – Claim Letters – Adjustment Letters – Sales Letters – Job Application Letters –Memos – Classification and Purpose – Style – E-mails E-mail Etiquettes – Sample E-mail Messages – Effectiveness and Security.

UNIT - V

Reports – Objectives – Characteristics of a Report – Types of Reports – Importance of Reports – Formats – Prewriting – Structure of Reports – Writing the Report – Visual Aids – Revising, Editing and Proofreading – Proof reading Symbols.

TEXT BOOKS:

1. Ramakrishna Rao. A (2009), *Enjoying Every Day English,* Hyderabad, Sangam Books.
2. YadavaRaju. B and 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-R14**

PROBABILITY THEORY AND NUMERICAL METHODS

Course Code: **A2004**

L	T	P	C
3	1	-	4

Course Overview:

Thecoursematterisdividedinto5chapterscoveringduly-recognizedareasoftheoryandstudy.This Course deals withmoreadvancedEngineeringMathematics and Statistics topicswhichprovidestudents withthe relevantmathematical and statistical toolsrequired inthe analysis of problems inengineeringandscientific professions.The topics coveredinclude probability, 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 calculaterelevant 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-R14**

PROBABILITY THEORY AND NUMERICAL METHODS

Course Code: **A2004**

L	T	P	C
3	1	-	4

SYLLABUS

UNIT-I

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

UNIT-II

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

UNIT-III

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

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

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-R14**

BASIC ELECTRICAL ENGINEERING

Course Code: **A2201**

L	T	P	C
4	-	-	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 tocalculate Current, Voltage and Power for complex circuits.

CO2. Analyze 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. Design two port networks, their equivalent circuits and obtain their parameters.

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

B. Tech. EEE I SEMESTERVCE-R14

BASIC ELECTRICAL ENGINEERING

Course Code:**A2201**

L	T	P	C
4	-	-	4

SYLLABUS

UNIT - I

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

UNIT - II

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

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

UNIT - III

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

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

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. A. Sudhakar, Shyammohan S. Palli (2003), *Electrical Circuits*, 2ndEdition, Tata Mc Graw Hill, New Delhi.
4. A. Chakrabarthy (2005), Circuit Theory, 4th Edition, Dhanpat Rai & Sons Publications, New Delhi.

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

B. Tech. EEE I SEMESTERVCE-R14

COMPUTER PROGRAMMING

Course Code:**A2501**

L	T	P	C
3	1	-	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-R14**

COMPUTER PROGRAMMING

Course Code: **A2501**

L	T	P	C
3	1	-	4

SYLLABUS

UNIT –I

INTRODUCTION TO COMPUTERS: Introduction to computers, computer systems, computingenvironments, computer languages, creating and running programs, algorithms, pseudo code, flow charts.

INTRODUCTION TO C LANGUAGE: Brief history of C, data types and sizes,declaration of variables, assigning values,basic structures of C program, C tokens: identifiers, keywords, constants, operators (arithmetic, relational, logical, increment and decrement, conditional and bitwise operators), special symbols, type conversions, operator associativity and precedence ,expressions and evaluation, input output statements.

UNIT –II

CONTROL STATEMENTS: Statements – selection statements (making decisions) - if and switch statements, repetition statements (loops) - while, do while and for statements, special control statements: return, break, continue and goto statements.

ARRAYS AND STRINGS: Introduction, one dimensional array: declaration, initialization, accessing array elements, working with one dimensional array – examples, character arrays, multi dimensional arrays – two dimensional and three dimensional array, string declaration and initialization, string manipulation functions, string input / output functions, string conversion functions: atoi(), atof(), atol().

UNIT –III

POINTERS: Basic concepts – understanding memory addresses, declaration, initialization, generic pointer, dangling pointer, wild pointer, pointer to pointer, pointer applications – arrays and pointers, pointer arithmetic, array of pointers, dynamic memory allocation.

FUNCTIONS: The concept of functions **–** designing structured programs, user defined functions, function declaration, inter function communication – function call, passing arguments, function prototypes, library functions, passingarrays to a function, passing pointers to a function, storage classes, scope rules related to statement blocks, recursive functions, comparing recursion and iteration

UNIT –IV

USER DEFINED DATA TYPES AND VARIABLES: Structure definition, initializing, assigning values, passing of structures asarguments, array of structures, pointers to structures, nested structures, unions definition, initialization, assigning values, nested unions, passing structures and unions to a function.

ENUMERATION AND PRE PROCESSOR DIRECTIVES AND BIT FIELDS

Enumeration types: enumeration declaration and its usage in C program, typedef,bit fields.

Preprocessor directives: #define, #include, #if, #else, #elif, #endif, #error, stringize(#),token parsing(##),parameterized macro

UNIT –V

CONSOLE AND FILE I/O: File, types of files, file structure, file attributes, file operations, working with text and binary files,standard I/O, formatted I/O, fflush(), sequential vs. random file access, random access to files of records,

COMMAND LINE ARGUMENTS AND VARIABLE NUMBERS OF ARGUMENTS: command line arguments: argc, argv[], copying file using command line argument, variable numbers of arguments: va_list, va_start(), va_arg(), va_end(),sample program using variable numbers of argument.

Text Books:

1. Pradip Dey and Manas Ghosh (2007), *Programming in C,* Oxford University Press.
2. Yashawanth Kanethkar (2008), *Let us C*, 8th Edition, Jones & Bartlett Publishers, India.

Reference Books:

1. Herbert Schildt (2000), *C: The Complete Reference*, 4th Edition, New Delhi, Osborne Mc Graw Hill.
2. B. W. Kerninghan and Dennis M. Ritche (1988), *The C Programming Language*, 2nd Edition, Prentice Hall Software Series, India.
3. B. A. Fouruzan and R. F. Gilberg (2006), *Computer Science: A structured programming approachusing C,* 3rdEdition, Thomson Publications, New Delhi.
4. Robert Hutchinson and Steven B. Just, *Programming using the C Language*, Mc Graw Hill.
5. Paul Deitel, Harvey Deital, *C How to Program*, 7th Edition, Pearson.

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

B. Tech. EEE I SEMESTERVCE-R14

COMPUTER PROGRAMMING LAB

Course Code:**A2502**

L	T	P	C
-	-	6	2

Course Outcomes:

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

CO1. Implement programs by selecting the right identifiers, data types and operatorsfor effective computation

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 union

CO5. Implement programs illustrating use of files

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

B. Tech. EEE I SEMESTERVCE-R14

COMPUTER PROGRAMMING LAB

Course Code:**A2502**

L	T	P	C
-	-	6	2

LIST OF EXPERIMENTS

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

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

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

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

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

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

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

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

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

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

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

12. To write a C program to read in two numbers, x and n, and then compute the sum of this geometric progression $1+x+x^2+x^3+\ldots x^n$
For example: if n is 3 and x is 5, then the program computes 1+5+25+125. Print x, n, the sum. Perform error checking. For example the formula does not make sense for negative Exponents – if n is less than 0. Have your program print an error message if n<0, then go back and read in the nest pair of numbers of without computing the sum. Are any values of x also illegal? If so, test for them too.

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

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

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

REFERENCE BOOKS:

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

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

B. Tech. EEE I SEMESTERVCE-R14

ENGLISH LANGUAGE COMMUNICATION SKILLS LAB

Course Code: **A2009**

L	T	P	C
-	-	3	2

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 their view point convincingly.

CO6. Debug erroneous programs related to the course

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

B. Tech. EEE I SEMESTERVCE-R14

ENGLISH LANGUAGE COMMUNICATION SKILLS LAB

Course Code: **A2009**

L	T	P	C
-	-	3	2

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

SYLLABUS

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

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

SUGGESTED SOFTWARE:

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

REFERENCE BOOKS:

1. Suresh Kumar. E. & Sreehari P.A., *(*2007), *Handbook for English Language Laboratories,* Cambridge University Press India Pvt. Ltd.
2. Mandal S. K., (2006), *Effective Communication & Public Speaking*, Jaico Publishing House.
3. Grant Taylor, (2004), *English Conversation Practice,* Tata McGraw Hill.
4. Balasubramanian .T, (2000), *A text book of English Phonetics for Indian Student, MacMillan* Publishers, India.

5. 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 SEMESTERVCE-R14

COMPUTER AIDED ENGINEERING DRAWING LAB

Course Code: **A2306**

L	T	P	C
-	-	3	2

Course Outcomes:

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

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 their view point convincingly.

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

B. Tech. EEE I SEMESTERVCE-R14

COMPUTER AIDED ENGINEERING DRAWING LAB

Course Code: **A2306**

L	T	P	C
-	-	3	2

SYLLABUS

UNIT - I

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

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

UNIT - II

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

UNIT - III

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

UNIT - IV

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

UNIT - V

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

TEXT BOOKS:

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

REFERENCE BOOKS:

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

SYLLABI FOR
II SEMESTER

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

B. Tech. EEE II SEMESTER **VCE-R14**

MATHEMATICS – II

Course Code: **A2006**

L	T	P	C
3	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 solve Partial 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)

II SEMESTER **VCE-R14**

MATHEMATICS – II

Course Code: **A2006**

L	T	P	C
3	1	-	4

SYLLABUS

UNIT – I

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

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

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

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

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, NewDelhi, S.Chand & Co. Ltd.

3. H K Dass, Er Rajnish Varma (2012), *Higher Engineering Mathematics*, Second Revised Edition, NewDelhi, S.Chand & Co. Ltd.

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

B. Tech. EEE II SEMESTER **VCE-R14**

DATA STRUCTURES Through C

Course Code: **A2503**

L	T	P	C
3	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 solve programming 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-R14**

DATA STRUCTURES THROUGH C

Course Code: A2503

L	T	P	C
3	1	-	4

SYLLABUS

UNIT – I

RECURSION AND SEARCHING TECHNIQUES: Recursion definition, design methodology and implementation of recursive algorithms, linear and binary recursion, and recursive algorithms for factorial function, GCD computation, Fibonacci sequence, Towers of Hanoi, tail recursion. List searches using linear search, binary search, Fibonacci search, analyzing search algorithms (Time and Space complexity definitions).

UNIT - II

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

UNIT - III

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

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

UNIT - IV

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

UNIT - V

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

GRAPHS: Basic concepts, Representations of Graphs: Using Linked list and adjacency matrix, graph algorithms (Prim's Algorithm & Kruskal's Algorithm), graph traversals (BFS & DFS)

Text Books:

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

REFERENCE BOOKS:

1. Seymour, Lipschutz (2005), Data Structures, Schaum's Outlines Series, Tata McGraw-Hill, India.
2. Debasis, Samanta (2009), Classic Data Structures, 2ndEdition, Prentice Hall of India, India.

3. G. A. V. Pai (2008), Data Structures and Algorithms: Concepts, Techniques and Applications, Tata McGraw-Hill Education, India.
4. A. M. Tanenbaum, Y. Langsam, M. J. Augustein (1991), Data Structures using C, Prentice Hall of India, New Delhi, India.

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

B. Tech. EEE II SEMESTER **VCE-R14**

ENGINEERING PHYSICS

Course Code: **A2002**

L	T	P	C
4	-	-	4

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 physicsis 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-raydiffraction 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-R14**

ENGINEERING PHYSICS

Course Code: A2002

L	T	P	C
4	-	-	4

SYLLABUS

UNIT - I

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

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

UNIT - II

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

NANOSCIENCE: Origin of Nanoscience, Nano scale, surface to volume ratio, Bottom-up and Top-down approaches; Synthesis: Solgel, Chemical vapour deposition, physical vapour deposition, pulsed laser vapour deposition methods; Applications of Nanomaterials .

UNIT - III

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

SEMICONDUCTOR PHYSICS: Intrinsic and Extrinsic Semiconductors, Carrier concentration of intrinsic semiconductors, Fermi level in Intrinsic and Extrinsic semiconductors (qualitative), Applications of Semiconductors (LED).

UNIT - IV

DIELECTRIC PROPERTIES: Electric dipole moment, dielectric constant, polarization, electric susceptibility, Piezoelectricity and Ferroelectricity, applications of piezoelectricity (transducers) and applications of ferroelectricity (Storage devices).

MAGNETIC PROPERTIES: Origin of magnetic moment, classification of magnetic materials on the basis of magnetic moment, hysteresis curve, soft and hard magnetic materials, Ferrites and their applications. Superconductivity, Meissner effect, applications of superconductors.

UNIT- V

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

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

TEXT BOOKS:

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

REFERENCE BOOKS:

1. C. Kittel (2009), Introduction to Solid State Physics, 8th edition, Wiley Eastern Publications, India.
2. A. J. Dekker (1999), Solid State Physics, Macmillan India Ltd, Chennai.

3. P.Sarah and M. Geetha (2012), Engineering Physics and Engineering Chemistry, VGS Booklinks, Hyderbad
3. M. Ratner, D. Ratner (2003), Nanotechnology, Pearson Edition, India.
4. P. Sarah (2008), Lasers & Optical Fiber communications, IK International (P) Ltd, New Delhi.

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

B. Tech. EEE II SEMESTER **VCE-R14**

ENGINEERING CHEMISTRY

Course Code: **A2003**

L	T	P	C
4	-	-	4

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 nonmetals 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 behavior, properties and applications of engineering substances.

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

II SEMESTER **VCE-R14**

ENGINEERING CHEMISTRY

Course Code: A2003

L	T	P	C
4	-	-	4

SYLLABUS

UNIT-I

ELECTROCHEMISTRY AND BATTERIES: Concept of Electrochemistry, Conductance of Electrolytic solution, Conductance-Specific, Equivalent and molar conductance, effect of dilution on electrolytic conductance. Ionic mobility, Numerical problems on conductance. Kohlrausch's Law: Applications, numerical problems. EMF: Galvanic Cells, Nernst equation, galvanic series, Numerical problems.

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.

UNIT-II

WATER TREATMENT: Introduction to Hardness: Causes, expression of hardness, units. Types of hardness, Estimation of hardness of water: EDTA method. Numerical problems. Treatment of water: Internal treatment & 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

HIGH POLYMERS: Types of Polymerization. Plastics: Thermoplastic resins & Thermo set resins. Compounding & fabrication of plastics. Preparation, properties and engineering applications of Plastics: polyethylene, Poly vinyl chloride, Polystyrene, Teflon, Nylon. Rubber: Natural rubber and vulcanization. Synthetic rubber: Buna-S, Buna-N , Thiokol rubbers. Fibers: Polyester- applications.

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. Nano materials: Introduction, preparation and applications of nanomaterial.

UNIT-IV

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

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.

MATERIAL CHEMISTRY: Cement: composition of Portland cement, 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.

TEXT BOOKS:

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

REFERENCEBOOKS:

1. Jain. P.C. & Monica Jain, (2008). Engineering Chemistry, Dhanpatrai Publishing Company.
2. Mishra. K.N., Mani R.P. & Rama Devi. B., (2009). Chemistry of Engineering Materials, CENGAGE learning.
3. Kuriacase J.C. & Rajaram J.(2004), Engineering Chemistry, Tata Mc.Graw Hills Co., New Delhi.

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

B. Tech. EEE II SEMESTER **VCE-R14**

ELECTRONIC DEVICES

Course Code: **A2401**

L	T	P	C
3	1	-	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 amplifierconfigurations.

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)

II SEMESTER **VCE-R14**

ELECTRONIC DEVICES

Course Code: A2401

L	T	P	C
3	1	-	4

SYLLABUS

UNIT – I

CONDUCTION IN SEMICONDUCTORS: Electrons and holes in an Intrinsic semiconductor, conductivity of a semiconductor, carrier concentrations in an intrinsic semiconductor, donor and acceptor impurities, charge densities in a semiconductor, Fermi level in intrinsic and extrinsic semiconductors, drift and diffusion currents, carrier lifetime, the continuity equation, the Hall effect and its applications.

UNIT – II

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

UNIT – III

SPECIAL DIODES: Zener diode**,** V-I characteristics of Zener diode, Tunnel diode, characteristics of a Tunnel diode, Varactor diode, Light Emitting Diode (LED) and Photo diode.

DIODE APPLICATIONS: Load line analysis, Diode configurations: series, parallel and series-parallel configuration, Block diagram of regulated power supply, characteristics of a rectifier circuits, half-wave rectifier, full-wave rectifier, bridge rectifier, harmonic components in rectifier circuits, Inductor filter, Capacitor filter, LC filter and CLC filter, voltage regulation using Zener diode.

UNIT – IV

BIPOLAR JUNCTION TRANSISTOR: Transistor construction, transistor operation, transistor current components, transistor as an amplifier, common base configuration, common emitter configuration, common collector configuration, analytical expressions for transistor characteristics.

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

SPECIAL DEVICES: Uni Junction Transistor (UJT)- Construction, operation and characteristics, Silicon Controlled Rectifier (SCR)- Construction, operation and characteristics, two transistor analogy of SCR.

UNIT – V

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

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

TEXT BOOKS:

1. Jacob Milliman, Christos C .Halkias, Satyabrata Jit (2011), *Electronic Devices and Circuits*, 3rd edition, Tata McGraw Hill, New Delhi.
2. Robert Boylestad, Lowis Nashelsky (1993), *Electronic Devices and Circuit Theory*, 5th edition, Prentice Hall of India, New Delhi, India.

REFERENCE BOOKS:

1. G. K. Mittal (1999), *Electronic Devices and Circuits*, 22nd edition, Khanna Publications, New Delhi.
2. David. A. Bell (1986), *Electronic Devices and Circuits,* 4th edition, Prentice Hall of India, New Delhi.
3. S. Shalivahanan, N. Suresh Kumar, A. Vallavaraj (2007), *Electronic Devices and Circuits*, 3rd edition, McGraw Hill, New Delhi, India.
4. Theodore. F. Bogart Jr, Jeffrey S. Beasley, Guillermo Rico (2004), *Electronic Devices and Circuits*, 6th edition Pearson Education,

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

B. Tech. EEE II SEMESTERVCE-R14

ENGINEERING PHYSICS AND ENGINEERING CHEMISTRY LAB

Course Code: **A2008**

L	T	P	C
-	-	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

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. 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 itrations for the estimation of strengths of solutions and hardness of water.

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

CO6. Estimate the percentage of yield of chemical substances by organic synthesis.

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

B. Tech. EEE II SEMESTER **VCE-R14**

ENGINEERING PHYSICS AND ENGINEERING CHEMISTRY LAB

Course Code:**A2008**

L	T	P	C
-	-	3	2

PHYSICS LAB:

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

CHEMISTRY LAB:

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

INSTRUMENTAL METHODS:

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

PHYSICAL PROPERTIES:

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

KINETICS:

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

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

B. Tech. EEE II SEMESTERVCE-R14

DATA STRUCTURES THROUGH C LAB

Course Code: **A2504**

L	T	P	C
0	0	6	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 SEMESTER **VCE-R14**

DATA STRUCTURES THROUGH C LAB

Course Code:**A2504**

L	T	P	C
-	-	6	2

Exercise 1:

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

Exercise 2:

Write recursive programme for the following

a) Write recursive C programme for calculation of Factorial of an integer

b) Write recursive C programme for calculation of GCD (n, m)

c) Write recursive C programme for Towers of Hanoi: N disks are to be transferred from peg S to peg D with Peg I as the intermediate peg.

Exercise 3:

a) Write C programs that use both recursive and non recursive functions to perform linear search for a Key value in a given list.

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

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

Exercise 4:

a) Write C programs that implement Bubble sort, to sort a given list of integers in ascending order

b) Write C programs that implement Quick sort, to sort a given list of integers in ascending order

c) Write C programs that implement Insertion sort, to sort a given list of integers in ascending order

Exercise 5:

a) Write C programs that implement heap sort, to sort a given list of integers in ascending order

b) Write C programs that implement radix sort, to sort a given list of integers in ascending order

c) Write C programs that implement merge sort, to sort a given list of integers in ascending order

Exercise 6:

a) Write C programs that implement stack (its operations) using arrays

b) Write C programs that implement stack (its operations) using Linked list

Exercise 7:

a) Write a C program that uses Stack operations to convert infix expression into postfix expression

a) Write C programs that implement Queue (its operations) using arrays.

b) Write C programs that implement Queue (its operations) using linked lists

Exercise 8:

a) Write a C program that uses functions to create a singly linked list

b) Write a C program that uses functions to perform insertion operation on a singly linked list

c) Write a C program that uses functions to perform deletion operation on a singly linked list

Exercise 9:

a) Adding two large integers which are represented in linked list fashion.

b) Write a C programme to reverse elements of a single linked list.

c) Write a C programme to store a polynomial expression in memory using linked list

d) Write a C programme to representation the given Sparse matrix using arrays.

e) Write a C programme to representation the given sparse matrix using linked list

Exercise10:

a) Write a C program to create a Binary Tree of integers

b) Write a recursive C program, for traversing a binary tree in preorder, inorder and postorder.

c) Write a non recursive C program, for traversing a binary tree in preorder, inorder and postorder.

d) Program to check balance property of a tree.

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

B. Tech. EEE II SEMESTERVCE-R14

ELECTRONIC DEVICES LABORATORY

Course Code: **A2404**

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 Transistorso 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 likeBJT 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 SEMESTER **VCE-R14**

ELECTRONIC DEVICES LABORATORY

Course Code: **A2404**

L	T	P	C
-	-	3	2

LIST OF EXPERIMENTS

PART - A: **ELECTRONIC WORKSHOP PRACTICE**

1. Identification, Specifications, Testing of R, L, C Components (Color Codes), Potentiometers, Switches (SPDT, DPDT, and DIP), Coils, Relays, Bread Boards, PCB's.
2. Identification, Specifications and Testing of Active Devices: Diodes, BJTs, JFETs, MOSFETs, Power Transistors, LED's, LCD's, SCR, UJT.
3. Study and operation ofMultimeters (Analog and Digital)Function GeneratorRegulated Power Supply (RPS)CRO.
4. Soldering Practice.

PART - B:

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

SYLLABI FOR
III SEMESTER

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

B. Tech. EEE III SEMESTER **VCE-R14**

MATHEMATICS - III

Course Code:**A2010**

L	T	P	C
3	1	-	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 conceptsof 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 totransform 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 SEMESTER **VCE-R14**

MATHEMATICS – III

(Semester-III: Common to ECE & EEE)

Course Code:**A2010**

L	T	P	C
3	1	-	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. Legendrepolynomials - 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) $\int_0^{2p} f(\cos\theta, \sin\theta)d\theta$ (b) $\int_{-\infty}^{\infty} f(x)dx$ (c) $\int_{-\infty}^{\infty} e^{imx} f(x)dx$ (d) Integration by indentation

TEXT BOOKS:

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

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

B. Tech. EEE III SEMESTER **VCE-R14**

NETWORK ANALYSIS

Course Code:**A2202**

L	T	P	C
3	1	0	4

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 circuitsand filter circuits.

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

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

CO4 **Examine** the behavior of circuit elements by drawing locus 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 SEMESTER **VCE-R14**

NETWORK ANALYSIS

Course Code: **A2202**

L	T	P	C
3	1	-	4

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 SEMESTER **VCE-R14**

ELECTRICAL MACHINES - I

Course Code:**A2203**

L	T	P	C
4	-	-	4

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 suitablemethod 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 SEMESTER **VCE-R14**

ELECTRICAL MACHINES - I

Course Code:**A2203**

L	T	P	C
4	-	-	4

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 excite and remedial measures.

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

UNIT - 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, 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 SEMESTER **VCE-R14**

ELECTRO MAGNETIC FIELDS

Course Code:**A2204**

L	T	P	C
3	1	-	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 electromagnetic 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 SEMESTER VCE-R14

ELECTRO MAGNETIC FIELDS

Course Code:**A2204**

L	T	P	C
3	1	-	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 a 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 McGrawHill 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 SEMESTER **VCE-R14**

MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS

Course Code: **A2012**

L	T	P	C
4	-	-	4

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 SEMESTER **VCE-R14**

MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS

Course Code: **A2012**

L	T	P	C
4	-	-	4

SYLLABUS

UNIT - I

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

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

UNIT - II

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

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

UNIT - III

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

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

UNIT - IV

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

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

UNIT - V

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

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

TEXT BOOKS:

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

REFERENCE BOOKS:

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

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

B. Tech. EEE III SEMESTER **VCE-R14**

DIGITAL LOGIC DESIGN

Course Code: **A2406**

L	T	P	C
4	-	-	4

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 Lab VIEW 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, code convertors, 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 SEMESTER **VCE-R14**

DIGITAL LOGIC DESIGN

(Common to ECE & EEE)

Course Code:**A2406**

L	T	P	C
4	-	-	4

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) technique, determination and selection of Prime Implicants.

UNIT - III

COMBINATIONAL LOGIC: Combinational circuits, analysis procedure, design procedure, binary adder, binary subtractor, BCD adder, binary multiplier, magnitude comparator, decoders, 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, counters 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 MACHINE (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 MACHINE (ASM): Salient features of the ASM chart-Simple examples-System design using data path and control subsystems-control implementations-examples of Weighing machine and Binary multiplier.

TEXT BOOKS:

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

2. Charles H. Roth (2004), Fundamentals of Logic Design, 5th Edition, Thomson, India.

REFERENCE BOOKS:

1. Zvi. Kohavi (2004), *Switching and Finite Automata Theory*, Tata McGraw Hill, India.

2. C. V. S. Rao (2009), *Switching and Logic Design*, 3rd Edition, Pearson Education, India.

3. Donald D. Givone (2002), *Digital Principles and Design*, Tata McGraw Hill, India

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

B. Tech. EEE III SEMESTER **VCE-R14**

ELECTRICAL CIRCUITS AND SIMULATION LAB

Course Code:**A2205**

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 portparameters 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 SEMESTER **VCE-R14**

ELECTRICAL CIRCUITS AND SIMULATION LAB

Course Code:**A2205**

L	T	P	C
-	-	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
    a. Transient analysis of RL circuit
    b. Transient analysis of RC circuit
    c. 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 SEMESTER **VCE-R14**

DC MACHINES LAB

Course Code: **A2206**

L	T	P	C
-	-	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 the knowledge of basic principles and construction of DC machines for various applications and parallel operation.

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.

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

B. Tech. EEE III SEMESTER **VCE-R14**

DC MACHINES LAB

Course Code: **A2206**

L	T	P	C
-	-	3	2

LIST OF EXPERIMENTS

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

SYLLABI FOR
IV SEMESTER

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

B. Tech EEE IV SEMESTER **VCE-R14**

SIGNALS AND SYSTEMS
(Common to ECE & EEE)

Course Code: A2407

L	T	P	C
4	-	-	4

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 SEMESTER **VCE-R14**

SIGNALS AND SYSTEMS
(Common to ECE & EEE)

Course Code: **A2407**

L	T	P	C
4	-	-	4

SYLLABUS

UNIT - I

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

FOURIER SERIES: Analogy between vectors and signals, some examples of orthogonal functions, relationship between trigonometric Fourier series and exponential Fourier series, representation of periodic function by Fourier series over the entire interval, convergence of Fourier series, alternate form of trigonometric series, symmetry conditions, complex Fourier spectrum.

UNIT - II

FOURIER TRANSFORMS: Fourier transform(FT), Fourier transform of standard signals, Properties of continuous Fourier transforms, Fourier transforms involving impulse function, Fourier transform of periodic signals, Hilbert transform and its properties.

UNIT - III

SIGNAL TRANSMISSION THROUGH LTI SYSTEMS: Classification of systems, discrete time LTI systems, continuous time LTI systems, properties of LTI system, Impulse response of a linear system, filter characteristics of LTI system, distortion less transmission.

CONVOLUTION AND CORRELATION OF SIGNALS: System analysis by convolution, graphical interpretation of convolution, Ideal differentiator and Integrator, response of linear system to derivative or integral function, signal comparison, correlation and convolution, some properties of correlation function, correlation functions for non finite energy signals.

UNIT - IV

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

UNIT - V

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

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.

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.
3. Charles L. Phillips, John M. Parr, Eve A. Riskin (2007), *Signals, Systems and Transforms*, Prentice Hall of India, New Delhi, India.

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

B. Tech EEE IV SEMESTER **VCE-R14**

ELECTRONIC CIRCUITS

Course Code:**A2415**

L	T	P	C
3	1	-	4

Course Outcomes:

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

CO1 Analyze amplifier circuits using small signal low frequency transistor models.

CO2 Identify the need and compare the performance of various power amplifiers.

CO3 Compare the concepts of positive and negative feedback and analyze its effects on the performance of amplifier circuits.

CO4 Design linear wave shaping circuits like high pass and low pass RC circuits for various input.

CO5 Signals and design non linear wave shaping circuits like clippers and clampers using diodes and transistors.

CO6 Generate various non sinusoidal signals using different multivibrators for various electronic applications.

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

B. Tech EEE IV SEMESTER **VCE-R14**

ELECTRONIC CIRCUITS

Course Code:**A2415**

L	T	P	C
3	1	-	4

SYLLABUS

UNIT - I

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

UNIT - II

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

UNIT - III

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

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

UNIT - IV

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

NON-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 - V

MULTIVIBRATORS: The stable state of a Bistablemultivibrator, design and analysis of fixed bias and self biasedBistablemultivibrator, Schmitt trigger circuit using transistors, Monostablemultivibrator, design and analysis of collector coupled and emitter coupled Monostablemultivibrator, Astablemultivibrator, design and analysis of collector coupled and emitter coupled Astablemultivibrator.

TEXTBOOKS:

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

REFERENCE BOOKS:

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

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

B. Tech EEE IV SEMESTER **VCE-R14**

POWER SYSTEM GENERATION

Course Code:**A2207**

L	T	P	C
4	-	-	4

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 generateElectricalpower.

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 SEMESTER **VCE-R14**

POWER SYSTEM GENERATION

Course Code:**A2207**

L	T	P	C
4	-	-	4

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

NUCLEARPOWER 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 RunningCosts. 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, DhanpatRai& 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 SEMESTER **VCE-R14**

ELECTRICAL MACHINES-II

Course Code:**A2208**

L	T	P	C
3	1	-	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 anyspecified 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 SEMESTER **VCE-R14**

ELECTRICAL MACHINES-II

Course Code:**A2208**

L	T	P	C
3	1	-	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 SEMESTER **VCE-R14**

CONTROL SYSTEMS

Course Code:**A2209**

L	T	P	C
3	1	-	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 Develop transfer functions and state space models of dynamical systems such aselectrical, electro-mechanical systems and components of control systems.

CO2 Analyze feedback characteristics, block diagrams and signal flow graphs, transient andsteady state behavior, controllability and observability 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 techniquessuch 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 SEMESTER **VCE-R14**

CONTROL SYSTEMS

Course Code:**A2209**

L	T	P	C
3	1	-	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 - II

REPRESENTATION OF TRANSFER FUNCTIONAND CONTROL DESIGN TECHNIQUES: Block diagram representation of systems considering electrical systems as examples. Block diagram reduction techniques.

SIGNAL FLOW GRAPH - Reduction using Mason's gain formula.

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, Lead-Lag Controllers design, PID Controllers-Effects of proportional derivative, proportional integral systems

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

TEXT BOOKS:

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

REFERENCE BOOKS:

1. K.Ogata(2008), Modern Control Engineering, 4th edition, Prentice Hall of India Pvt. Ltd, New Delhi.

2. N.K.Sinha (2008), Control Systems, 3rd edition, New Age International Limited Publishers, New Delhi.

3. Norman S. Nise, Control Systems Engineering, 5th edition,Wiley India Private Limited, New Delhi.

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

B. Tech EEE IV SEMESTER **VCE-R14**

ENVIRONMENTAL STUDIES

Course Code:**A2011**

L	T	P	C
4	-	-	4

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 SEMESTER **VCE-R14**

ENVIRONMENTAL STUDIES

Course Code:**A2011**

L	T	P	C
4	-	-	4

SYLLABUS

UNIT - I :

ENVIRONMENTAL SCIENCE INTRODUCTION AND NATURAL RESOURCES: INTRODUCTION: Multidisciplinary nature of Environmental Studies: Definition, Scope and Importance .Need for Public Awareness.

NATURAL RESOURCES: Renewable and non-renewable resources .Natural resources and associated problems: **Forest Resources: Use** and over – exploitation, deforestation, Timber extraction, Mining, dams and other effects on forest and tribal people.

Water resources: Use and over utilization of surface and ground water, floods, drought, conflicts over water, dams – benefits and problems.

Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources.

Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity.

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:

ECOSYSTEM AND BIODIVERSITY: Ecosystems: Concept of an ecosystem. Structure and function of an ecosystem. Producers, consumers and decomposers. Energy flow in the ecosystem. Ecological succession. Food chains, food webs and ecological pyramids. Introduction, types, characteristic features, structure and function of the following ecosystem:

Forest ecosystem, grassland Secosystem, 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-sports of biodiversity. Threats to biodiversity- habitat loss, poaching of wildlife, man -wildlife conflicts. Endangered and endemic species of India .Conservation of biodiversity- In-situ and Ex-situ conservation of biodiversity.

UNIT - III

ENVIRONMENTAL POLLUTION, GLOBAL ENVIRONMENTAL ISSUES AND CONTROL MEASURES : Environmental Pollution : Definition, Cause, effects and control measures of air pollution ,water pollution, soil pollution ,marine pollution ,noise pollution, thermal pollution and nuclear hazards

Solid waste Management: Causes, effects and control measures of urban and industrial wastes. Role of an individual in prevention of pollution. Pollution case studies.

Disaster management: floods, earthquake, cyclone and landslides. E-waste and plastic waste- recycling and reuse

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: Introduction: Clean development mechanism, carbon foot printing, carbon credits, 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:

ENVIRONMENTAL ETHICS, ENVIRONMENTAL IMPACT ASSESSMENT & ROLE OF NGOs. Environmental Ethics: Environment Protection Act. -Air (Prevention and Control of Pollution) Act. -Water (Prevention and control of Pollution) Act -Wildlife Protection Act -Forest Conservation Act -Issues involved in enforcement of environmental legislation. Public awareness.

Environmental Impact 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 BOOK

1. Erach Bharucha (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 BOOK

1.Anubha Kaushik(2006),Perspectives inEnvironmental Science, 3rd Edition, New Delhi, New age international.

2. Anji Reddy .M (2007), Textbook of Environmental Sciences and Technology, Hyderabad, BS Publications.

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

B. Tech EEE IV SEMESTER **VCE-R14**

AC MACHINES LAB

Course Code:**A2210**

L	T	P	C
-	-	3	2

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 suitable testing method for a given AC machine to calculate efficiency.

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

CO3.Apply the suitable test to calculate regulation of AC generators.

CO4.Analyse performance characteristics of AC machines by conducting suitable test.

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

B. Tech EEE IV SEMESTER **VCE-R14**

AC MACHINES LAB

Course Code:**A2210**

L	T	P	C
-	-	3	2

LIST OF EXPERIMENTS:

1. O.C. & S.C. Tests on Single phase Transformer.
2. Sumpner's test on a pair of single phase transformers.
3. Scott connection of transformers.
4. No-load & Blocked rotor tests on three phase Induction motor.
5. Regulation of a three phase alternator by synchronous impedancemethod.
6. V and Inverted V curves of a three phase synchronous motor.
7. Equivalent Circuit of a single phase induction motor.
8. Determination of $X_d$and X_q of a salient pole synchronous machine.
9. Separation of core losses of a single phase transformer.
10. Brake test on a three phase induction motor.
11. Synchronization of alternators.
12. Determination of sequence impedances of an alternator.

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

B. Tech EEE IV SEMESTER **VCE-R14**

CONTROL SYSTEMS AND SIMULATION LAB

Course Code: **A2211**

L	T	P	C
-	-	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

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B. Tech EEE IV SEMESTER **VCE-R14**

CONTROL SYSTEMS AND SIMULATION LAB

Course Code:**A2211**

L	T	P	C
-	-	3	2

LIST OF EXPERIMENTS

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

SYLLABI FOR
V SEMESTER

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)

B. Tech EEE V SEMESTER **VCE-R14**

ELECTRICAL MEASUREMENTS AND INSTRUMENTATION

Course Code: **A2216**

L	T	P	C
3	1	-	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 SEMESTER **VCE-R14**

ELECTRICAL MEASUREMENTS AND INSTRUMENTATION

Course Code: **A2216**

L	T	P	C
3	1	-	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

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-R14

INTEGRATED CIRCUITS APPLICATIONS

Course Code:**A2418**

L	T	P	C
4	-	-	4

Course Overview:

Integrated Circuit design can be divided into broad categories of digital and analog IC design. The physical world is inherently analog indicating that there is always need for analog circuitry. Today the growth of any industry is dependent upon electronics to a great extent. Integrated circuit is electronics and this course 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 circuitry. With modern digitization advantages we need to work with digital data and hence digital to analog and analog to digital converters are needed in connecting physical world to the more sophisticated digital world. This course focuses on analysis and design ADC and DAC circuits.

Prerequisite(s):

- Electronic Devices (A2401)
- Electronic Circuit Analysis (A2409)
- Basic Electrical Engineering (A2201)

Course Outcomes:

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

CO1. Summarize the basic information of Integrated circuit, Operational amplifier, block diagram andits characteristics.

CO2. Analyze and design linear applications like adder, Subtractor, instrumentation amplifier and etc, using Op-Amp.

CO3. Design, Construct and Analyze non-linear applications like multiplier, comparator and etc., using Op-Amp.

CO4. Operate 555 timers in different modes like Bistable, Monostable and Astable operations andstudy their applications and determine the lock range and capture range of PLL and use in various applications of communications.

CO5. Differentiate between fixed and variable voltage regulator ICs and also to design regulators fordifferent voltages and design, compare and contrast between A to D and D to A conversion techniques.

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

B. Tech. EEE V SEMESTERVCE-R14

INTEGRATED CIRCUITS APPLICATIONS

Course Code:**A2418**

L	T	P	C
4	-	-	4

SYLLABUS

UNIT - I **(10 Lectures)**

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

UNIT - II **(14 Lectures)**

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

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

UNIT - III **(10 Lectures)**

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

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

UNIT - IV **(12 Lectures)**

TIMER AND PHASE LOCKED LOOPS: Introduction to IC 555 timer, description of functional diagram, Monostable and Astableoperations and applications, Schmitt trigger, PLL - introduction, basic principle, phase detector/comparator, Voltage Controlled Oscillator (IC 566), low pass filter, monolithic PLL and applications of PLL.

UNIT - V **(10 Lectures)**

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

TEXT BOOKS:

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

REFERENCE BOOKS:

1. Sergio Franco (1997), Design with Operational Amplifiers and AnalogIntegratedCircuits, McGraw Hill, New Delhi.
2. Gray, Meyer (1995), Analysis and Design of Analog Integrated Circuits, Wiley International, New Delhi

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

B. Tech. EEE V SEMESTERVCE-R14

COMPUTER ORGANIZATION AND ARCHITECTURE

Course Code: **A2510**

L	T	P	C
3	1	-	4

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-R14

COMPUTER ORGANIZATION AND ARCHITECTURE

Course Code: **A2510**

L	T	P	C
3	1	-	4

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, Zvonks Vranesic, SafeaZaky (2002), Computer Organization, 5th edition, McGraw Hill, New Delhi, India.

REFERENCE BOOKS:

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

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

B. Tech. EEE V SEMESTERVCE-R14

POWER SYSTEM TRANSMISSION

Course Code:**A2217**

L	T	P	C
4	-	-	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:

After completing this course the student must demonstrate the knowledge and ability to:

- CO1 Apply the knowledge of electromagnetic fields to calculate the transmission line parameters.
- CO2 Analyze the performance the short, medium and long transmission lines.
- CO3 Examine the mechanical design of transmission lines, with the help of sag, tensioncalculations, stringing charts & sag template.
- CO4 Analyze important aspects of various types of overhead line insulators and undergroundcables.
- CO5 Analyze the voltage drop and power loss calculations for different scheme of connections inAC and DC distribution systems.

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

B. Tech. EEE V SEMESTERVCE-R14

POWER SYSTEM TRANSMISSION

Course Code:**A2217**

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

UNIT - II

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

UNIT - III

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

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

UNIT - IV

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

UNIT - V

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

TEXT BOOKS:

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

REFERENCE BOOKS:

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

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

B. Tech. EEE V SEMESTERVCE-R14

OBJECT ORIENTED PROGRAMMING THROUGH JAVA

Course Code:**A2508**

L	T	P	C
4	-	-	4

Course Overview:

This course teaches the fundamental ideas behind the object-oriented approach to programming; through the widely-used Java programming language. Concentrating on aspects of Java that best demonstrate object-oriented principles and good practice, you'll gain a solid basis for further study of the Java language, and of object-oriented software development. You'll be confident to write any complex application easily.

Prerequisite(s): Understand basic Object Oriented Concepts and Basic Programming Languages C, and C++

Course Outcomes:

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

CO1. Construct application programs using OOP principles.

CO2. Analyze the various concepts of OOP in problem solving.

CO3. Develop high speed and fault tolerant applications with multi-threading and exception handling.

CO4. Use collections framework API with reduced programming effort.

CO5. Perform file handling with Java IO API.

CO6. Implement rich GUI applications.

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

B. Tech. EEE V SEMESTERVCE-R14

OBJECT ORIENTED PROGRAMMING THROUGH JAVA

Course Code:**A2508**

L	T	P	C
4	-	-	4

SYLLABUS

UNIT - I

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

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

UNIT - II

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

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

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

UNIT - III

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

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

UNIT - IV

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

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

UNIT - V

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

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

TEXT BOOKS:

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

REFERENCE BOOKS:

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

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

B. Tech. EEE V SEMESTERVCE-R14

POWER SYSTEM DISTRIBUTION

Course Code:**A2218**

L	T	P	C
3	1	-	4

Course Overview:

Electrical Distribution Systems originates about the three-phase electrical distribution systems, Electrical load characteristics, Electric circuit calculations, Distribution economics, Distribution system planning, Distribution equipment, System protection and insulation coordination

Prerequisite(s): power systems

Course Outcomes:

CO1. Apply the basic knowledge for classification of distribution system, feeders, loads, protectingdevices & there co-ordination.

CO2. Calculation the voltage drip & power loss for various distribution systems.

CO3. Select on appropriate protecting device for any specific application.

CO4. Analyse the co-ordination characteristics of different protection devices.

CO5. Analyse the power factor correction & voltage control methods and tools.

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

B. Tech. EEE V SEMESTER **VCE-R14**

POWER SYSTEM DISTRIBUTION

Course Code: **A2218**

L	T	P	C
3	1	-	4

SYLLABUS

UNIT - I

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

UNIT - II

DISTRIBUTION FEEDERS & SUBSTATIONS: Design Considerations of Distribution Feeders: Radial and loop types of primary feeders, voltage levels, feeder loading; basic design practice of the secondary distribution system. Location of Substations: Rating of distribution substation, service area within primary feeders. Benefits derived through optimal location of substations.

UNIT - III

SYSTEM ANALYSIS: Voltage drop and power-loss calculations - Derivation for voltage drop and power loss in lines, manual methods of solution for radial networks, three phase balanced primary lines.

UNIT - IV

PROTECTION AND COORDINATION: Objectives of distribution system protection, types of common faults and procedure for fault calculations. Protective Devices: Principle of operation of Fuses, Circuit Reclosures, line sectionalizes, and circuit breakers Coordination of Protective Devices: General coordination procedure.

UNIT - V

COMPENSATION FOR POWER FACTOR IMPROVEMENT AND VOLTAGE CONTROL: Capacitive compensation for power-factor control. Different types of power capacitors, shunt and series capacitors, effect of shunt capacitors (Fixed and switched), Power factor correction, capacitor allocation - Economic justification - Procedure to determine the best capacitor location.

VOLTAGE CONTROL: Equipment for voltage control, effect of series capacitors, effect of AVB/AVR, line drop compensation.

TEXT BOOKS:

1. Turan Gonen (2007), Electric Power Distribution system Engineering, 5th edition, Tata McGraw Hill

   Book Company, New Delhi.

2. A.S. Pabla (2004), Electric Power Distribution, 5th edition, Tata McGraw Hill Education, New Delhi.

REFERENCE BOOKS:

1. S. Sivanagaraju, V. Sankar (2006), Electrical Power Distribution and Automation, 1st edition, Dhanpat Rai & Co, New Delhi, India.
2. S. Sivanagaraju, S. Satyanarayana (2008), Electric Power Transmission and Distribution, 1st edition, Pearson Education India, New Delhi.

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

B. Tech. EEE V SEMESTER **VCE-R14**

ELECTRICAL MEASUREMENTS LAB

Course Code:**A2219**

L	T	P	C
-	-	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, and energy meter and power factor meter.

Prerequisite(s): Nil

Course outcomes:

Upon the completion of course Students will be able to

CO1. Determine various unknown electrical parameters by using bridges

CO2. Measure active, reactive power and power factor by different methods

CO3. Assess percentage error of various measuring instruments.

CO4. Determine electrical parameters and characteristics by electrical instruments.

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

B. Tech. EEE V SEMESTER **VCE-R14**

ELECTRICAL MEASUREMENTS LAB

Course Code:**A2219**

L	T	P	C
-	-	3	2

LIST OF EXPERIMENTS:

1. Calibration and Testing of Single Phase Energy Meter.
2. Calibration of Dynamometer Power Factor Meter.
3. Measurement of 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. Schering Bridge & Anderson Bridge.
7. Calibration of LPF wattmeter by Phantom testing.
8. Dielectric Oil Testing using H.T testing Kit.
9. Measurement of Iron loss in a bar specimen using a wattmeter.
10. LVDT characteristics and Calibration
11. Resistance strain gauge - strain measurements and Calibration
12. Transformer turns ratio measurement using a.c. bridge

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

B. Tech. EEE V SEMESTER **VCE-R14**

ELECTRONIC CIRCUITS AND INTEGRATED CIRCUITS LAB

Course Code: **A2423**

L	T	P	C
-	-	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

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B. Tech. EEE V SEMESTER **VCE-R14**

ELECTRONIC CIRCUITS AND INTEGRATED CIRCUITS LAB

Course Code: **A2423**

L	T	P	C
-	-	3	2

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

PART - A:

ELECTRONIC CIRCUITS

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

PART - B:

IC APPLICATIONS

1. Measurement of IC741 op-amp parameters.
2. 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

SYLLABI FOR
VI SEMESTER

B. Tech. EEE VI SEMESTER **VCE-R14**

PROFESSIONAL ETHICS & INTELLECTUAL PROPERTY RIGHTS

Course Code:**A2015**

L	T	P	C
4	-	-	4

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. Can take all the necessary precautions while conducting the experiments, which may reduceThe risk.

CO5. Understands the importance of risk evacuation system in reality and takes the utmostresponsibility while handling the risky situations.

(AUTONOMOUS)

B. Tech. EEE VI SEMESTER **VCE-R14**

PROFESSIONAL ETHICS & INTELLECTUAL PROPERTY RIGHTS

Course Code:**A2015**

L	T	P	C
4	-	-	4

SYLLABUS

UNIT-I

ENGINEERINGETHICS: 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.

HUMAN

VALUES: Morals,valuesandethics,integrity,workethic,servicelearning,civicvirtue,respectforothers,livingpeacefully,caring,sharing,honesty,courage,valuingtime,co-operation,commitment,empathy,self-confidence,characterandspirituality.

UNIT - II

ENGINEERINGAS SOCIAL EXPERIMENTATION: Engineering as experimentation, engineers as responsible experimenters, codes of ethics, abalanced outlook on law, the challenger case study.

UNIT - III

SAFETY, RESPONSIBILITIES AND

RIGHTS: Safetyandrisk,assessmentofsafetyandrisk,riskbenefitanalysisandreducingrisk,theThreeMileIslandandChernobylcasestudies.Collegialityandloyalty,respectforauthority,collectivebargaining,confidentiality,conflictsofinterest,occupationalcrime,professionalrights,employeerights.

UNIT - IV

INTRODUCTION TO INTELLECTUAL PROPERTY: Introduction,types of intellectualproperty, internationalorganizations,agenciesandtreaties,importanceofintellectualpropertyrights.

TRADEMARKS:Purposeandfunctionoftrademarks,acquisitionoftrademarkrights,protectablematter,selectingandevaluatingtrademarks, trademarkregistrationprocess.

UNIT - V

LAW OF COPY RIGHTS

:Fundamentalsofcopyrightlaw,originalityofmaterial,rightsofreproduction,rightstoperformthe work publicly, copy right ownership issues,copy rightregistration, notice of copy right.

LAW OF PATENTS: Foundationofpatentlaw,patentsearchingprocess,ownershiprightsandtransfer.

NEW DEVELOPMENTS IN INTELLECTUAL PROPERTY: Trademarklaw;Copyrightlaw and Patentlaw, Trade secretslaw, Intellectualproperty audits.

TEXT BOOKS:

1. MikeMartin,RolandSchinzinger(1996),*EthicsinEngineering*,McGraw-Hill,New York.
2. GovindarajanM,NatarajanS,SenthilKumarV.S(2004),*EngineeringEthics*,PrenticeHallofIndia, NewDelhi,India.
3. Deborah.E.Bouchoux(2009*), Intellectualproperty*,Cengagelearning,India.
4. Deborah.E.Bouchoux(2001),*Protectingyourcompaniesintellectualproperty*,AMACOM,USA.

REFERENCE BOOKS:

1. CharlesD.Fleddermann(2004),*EngineeringEthics*,PearsonEducation/PrenticeHall,NewJersey.
2. CharlesE Harris,MichaelS.Protchard,MichaelJ Rabins(2000),*EngineeringEthics - Concepts and Cases*,WadsworthThompsonLearning,UnitedStates.
3. JohnRBoatright(2003), *EthicsandtheConductofBusiness*, PearsonEducation, NewDelhi.
4. EdmundGSeebauerandRobertLBarry,(2001),*FundamentalsofEthicsforScientistsandEngineers,*OxfordUniversityPress,NewYork.

(AUTONOMOUS)

B. Tech. EEE VI SEMESTER **VCE-R14**

POWER ELECTRONICS

Course Code:**A2220**

L	T	P	C
3	1	-	4

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 convertersand 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 a 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 SEMESTER **VCE-R14**

POWER ELECTRONICS

Course Code:**A2220**

L	T	P	C
3	1	-	4

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, numerical problems.

UNIT - III

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

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

UNIT - IV

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

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

UNIT - V

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

TEXT BOOKS:

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

REFERENCE BOOKS:

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

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

B. Tech. EEE VI SEMESTER **VCE-R14**

COMPUTER METHODS IN POWER SYSTEMS

Course Code:**A2221**

L	T	P	C
4	-	-	4

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 modelling 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

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B. Tech. EEE VI SEMESTER **VCE-R14**

COMPUTER METHODS IN POWER SYSTEMS

Course Code:**A2221**

L	T	P	C
4	-	-	4

SYLLABUS

UNIT - I

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

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 busses (Derivations and Numerical Problems without mutual coupling)

UNIT - II

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

UNIT - III

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

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

UNIT - IV

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

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

UNIT - V

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

TEXT BOOKS:

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

REFERENCE BOOKS:

1. Hadi Saadat (2007), Power System Analysis, 5th edition, Tata McGraw Hill Publications, New Delhi.

2. I. J. Nagrath, D. P. Kothari (2005), Modern Power system Analysis, 3rd edition, Tata McGraw Hill Publications, New Delhi, India.

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

B. Tech. EEE VI SEMESTER **VCE-R14**

MICROPROCESSORS AND INTERFACING

Course Code: **A2419**

L	T	P	C
3	1	-	4

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:

Upon successful completion of this course, the 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 SEMESTER **VCE-R14**

MICROPROCESSORS AND INTERFACING

Course Code: **A2419**

L	T	P	C
3	1	-	4

SYLLABUS

UNIT - I **(10 Lectures)**

INTRODUCTION: 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 **(12 Lectures)**

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

UNIT - III **(12 Lectures)**

8086 MEMORY INTERFACING: 8086 addressing and address decoding, Interfacing RAM, ROM, EPROM to 8086.

8086 DIGITAL I/O INTERFACING: 8255 programmable Peripheral Interface, various modes of operation and interfacing to 8086, seven segment LED displays, stepper motor, D/A converter interfacing, Direct Memory Access (DMA) Data Transfer (8257).

UNIT - IV **(12 Lectures)**

INTERRUPTS AND PROGRAMMABLE INTERRUPT CONTROLLERS:8086 Interrupts and Interrupt Responses introduction to DOS and BIOS interrupts. 8259Apriority InterruptController.

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

UNIT – V **(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.

8051 DIGITAL INTERFACING: InterfacingDC motor, Interfacing 4*4 Matrix Keypad, Interfacing to Alphanumeric Displays (LCD) & A/D converter interfacing, Serial Data Transfer.

Text Books:

1. Douglas V. Hall (2007), *Microprocessors Interface*, 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. A. K. Ray, K M Bhurchandi (2006), Advanced Microprocessors and Peripherals, 2nd Edition, Tata McGraw Hill, New Delhi.
3. Deshmukh (2004), *Microcontrollers*, Tata McGraw Hill Edition, New Delhi.

Other Related Reference Books/Materials:

1 Muhammad Ali Mazidi, Janice Gillispie Mazidi& Rolin D.McKinley, *The 8051 Microcontroller and Embedded Systems using Assembly & C*, 2nd edition, Pearson Education, India.

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

B. Tech. EEE VI SEMESTER **VCE-R14**

POWER SYSTEM OPERATION AND CONTROL

Course Code:**A2222**

L	T	P	C
3	1	-	4

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 reactivepower compensation.

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

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

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B. Tech. EEE VI SEMESTER **VCE-R14**

POWER SYSTEM OPERATION AND CONTROL

Course Code:**A2222**

L	T	P	C
3	1	-	4

SYLLABUS

UNIT - I

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

UNIT - II

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

UNIT - III

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

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

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

UNIT - IV

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

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

UNIT - V

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

TEXT BOOKS:

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

REFERENCE BOOKS:

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

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

B. Tech. EEE VI SEMESTER **VCE-R14**

POWER ELECTRONICS AND SIMULATION LAB

Course Code:**A2223**

L	T	P	C
-	-	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.

Prerequisite(s): Nil

Course Outcomes:

Upon the completion of course Students will be able to

CO1. Apply the knowledge of Matlab/ Simulink tool 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 SEMESTER **VCE-R14**

POWER ELECTRONICS AND SIMULATION LAB

Course Code:**A2223**

L	T	P	C
-	-	3	2

SYLLABUS

LIST OF EXPERIMENTS:

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

VARDHAMAN COLLEGE OF ENGINEERING

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B. Tech. EEE VI SEMESTER **VCE-R14**

MICROPROCESSORS AND INTERFACING LAB

Course Code: **A2424**

L	T	P	C
-	-	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 and these programs will be compile and debug those programs using the Microsoft Macro Assembler (MASM). 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 (A2406)
- Computer Organization and Architecture (A2510)
- Microprocessors and Interfacing (A2419)

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

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B. Tech. EEE VI SEMESTER **VCE-R14**

MICROPROCESSORS AND INTERFACING LAB

Course Code: **A2424**

L	T	P	C
-	-	3	2

SYLLABUS

PART - A

MICROPROCESSOR 8086 PROGRAMMING USING MASM:

1. Programs involving data Transfer Instructions
    a. Byte and word transfer in different addressing modes
    b. Block move without overlapping
    c. Block move with overlapping
    d. Block interchanging
2. Programs involving arithmetic and logical operations like addition and subtraction of multi-precision numbers
    a. Addition and Subtraction of Multi precision numbers
    b. Multiplication and division of signed and unsigned Hexadecimal numbers
    c. ASCII adjustment instructions
    d. Code Conversion
    e. Arithmetic program to find square, cube, LCM, GCD and factorial
3. Programs involving bit manipulation instructions like checking
    a. If given data is positive or negative
    b. If given data is odd or even
    c. Logical ones and zeros in a given data
    d. 2 out of 5 code
    e. Bit wise palindrome
    f. Nibble wise palindrome
4. Programs involving Branch / Loop instructions like:
    a. Programs on arrays: addition/subtraction of N nos., finding largest/smallest no., ascending/descending order, etc.
    b. Near and Far Conditional and Unconditional jumps, Calls and Returns
5. Programs on String Manipulations like string transfer, string reversing, searching for a character in a string, palindrome etc.
6. Programs involving on Software Interrupts
7. Programs to use DOS interrupt INT 21H Function calls for:
    a. Reading a Character from Keyboard, Buffer Keyboard input
    b. Display of characters/String on console
    c. Creation of a new file, read/write from a file,
    d. Read system date, set system date, read system time, set system time

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.

SYLLABI FOR
VII SEMESTER

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

B. Tech. EEE VII SEMESTER **VCE-R14**

HIGH VOLTAGE ENGINEERING

(Professional elective –III)

Course Code:**A2224**

L	T	P	C
4	-	-	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 used for all electrical apparatus and their breakdownmechanism.

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 SEMESTER **VCE-R14**

HIGH VOLTAGE ENGINEERING

(Professional elective –III)

Course Code:**A2224**

L	T	P	C
4	-	-	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 SEMESTER **VCE-R14**

POWER SYSTEM SWITCHGEAR AND PROTECTION

Course Code:**A2225**

L	T	P	C
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Course Overview:

This course introduces all varieties of circuit breakers and relays for protection of Generators, Transformers and feeder bus bars from over voltages and other hazards. It 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 SEMESTER **VCE-R14**

POWER SYSTEM SWITCHGEAR AND PROTECTION

Course Code:**A2225**

L	T	P	C
4	-	-	4

SYLLABUS

UNIT - I

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

UNIT - II

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

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

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

UNIT - III

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

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

UNIT - IV

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

UNIT - V

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

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

TEXT BOOKS:

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

REFERENCE BOOKS:

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

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

B. Tech. EEE VII SEMESTER **VCE-R14**

UTILIZATION OF ELECTRICAL ENERGY

Course Code:**A2226**

L	T	P	C
3	1	-	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 SEMESTER **VCE-R14**

UTILIZATION OF ELECTRICAL ENERGY

Course Code:**A2226**

L	T	P	C
3	1	-	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 SEMESTER **VCE-R14**

POWER SEMICONDUCTOR DRIVES

Course Code:**A2227**

L	T	P	C
4	-	-	4

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 SEMESTER **VCE-R14**

POWER SEMICONDUCTOR DRIVES

Course Code:**A2227**

L	T	P	C
4	-	-	4

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 and Problems.

UNIT - II

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

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

UNIT - III

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

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

UNIT - IV

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

UNIT - V

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

TEXT BOOKS:

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

REFERENCE BOOKS:

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

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

B. Tech. EEE VII SEMESTER **VCE-R14**

HIGH VOLTAGE ENGINEERING LAB

Course Code:**A2228**

L	T	P	C
-	-	3	2

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.

Prerequisite(s): Nil

Course Outcomes:

Upon the completion of course Students will be able to

CO1. Analyze the breakdown characteristics and strengths of sphere to sphere, plane to plane and plane to point geometries.

CO2. Apply the knowledge of IDMT characteristics on fuses and miniature circuit breakers.

CO3. Evaluate resistances and resistivity of copper, brass, steel and earth.

CO4. Analyze Ferranti effect, LG fault, ABCD and image parameters of 400km transmission line.

CO5. Analyze the electric field in electrolytic bath using electrodes.

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

B. Tech. EEE VII SEMESTER **VCE-R14**

HIGH VOLTAGE ENGINEERING LAB

Course Code:**A2228**

L	T	P	C
-	-	3	2

SYLLABUS

LIST OF EXPERIMENTS:

1. Plotting of e-fields using Electrolytic Bath
2. Measurement of Earth Resistivity
3. Breakdown Characteristic of Sphere-Sphere Field Geometry
4. Breakdown Characteristic of Plane-Point Geometry
5. Breakdown Characteristic of Plane-Plane Geometry
6. Determination of ABCD Parameters for a Long Transmission Line
7. Determination of Image Parameters of a Long Transmission Line
8. Measurement of Low resistances (Mill Volt Drop Test)
9. Ferranti Effect of a long Transmission Line
10. Line-Ground Fault of a Long Transmission Line
11. Inverse Definite Minimum Time Characteristics of Fuse
12. IDMT characteristics of miniature circuit breaker

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

B. Tech. EEE VII SEMESTER **VCE-R14**

POWER SEMICONDUCTOR DRIVES LAB

Course Code: **A2229**

L	T	P	C
-	-	3	2

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 SEMESTER **VCE-R14**

POWER SEMICONDUCTOR DRIVES LAB

Course Code:**A2229**

L	T	P	C
-	-	3	2

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 DC motor using MOSFET based Buck Boost Converter

SYLLABI FOR
VIII SEMESTER

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

B. Tech. EEE VIII SEMESTER **VCE-R14**

HIGH VOLTAGE DC TRANSMISSION AND FACTS

Course Code:**A2237**

L	T	P	C
3	1	-	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 analysed on a typical large systems with the main control loops. The interactions with AC systems through controls and harmonics are analysed. 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. Differentiate HVDC and FACTS applications.

CO3. Analyze the components and subsystems for any HVDC & AC power systems.

CO4. Apply the knowledge of HVDC/FACTS devices to address a power quality issues related to power system.

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

B. Tech. EEE VIII SEMESTER **VCE-R14**

HIGH VOLTAGE DC TRANSMISSION AND FACTS

Course Code:**A2237**

L	T	P	C
3	1	-	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. Design of High pass filters.

UNIT - IV

FACTS CONCEPTS: Transmission interconnections, power flow in an AC System, loading capability limits, Power flow and Dynamic stability considerations, importance of controllable parameters Opportunities for FACTS, basic types of FACTS controllers, benefits from FACTS controllers.

UNIT - V

STATIC SHUNT COMPENSATORS: Objectives of shunt compensation, mid point voltage regulation for line segmentation, End of line voltage support to prevent voltage instability, improvement of transient stability, Power oscillation damping. Methods of controllable var generation: variable impedance type static var generators TCR and TSR, TSC, FC-TCR, TSC-TCR

STATIC SERIES COMPENSATORS: Concept of series capacitive compensation, improvement of transient stability, power oscillation damping, functional requirements, GTO thyristor controlled series capacitor (GSC), thyristor switched series capacitor (TSSC), and thyristor controlled series capacitor (TCSC).

TEXT BOOKS:

1. K. R. Padiyar (2005), HVDC Power Transmission Systems: Technology and system Interactions, 1st edition, New AgeInternational (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 VIII SEMESTER **VCE-R14**

POWER SYSTEMS AND SIMULATION LAB

Course Code:**A2238**

L	T	P	C
-	-	6	2

SYLLABUS

LIST OF EXPERIMENTS:

1. Verification of Ferranti Effect on a Transmission Line using PSCAD
2. Simulation of Mid-Point Compensation using PSCAD
3. End Point Compensation Under Light-Load using PSCAD
4. Line Compensation Under Lagging PF Conditions using PSCAD
5. Simulation of load Compensation using PSCAD
6. Study of LG,LL,LLG,LLL and LLLG faults using PSCAD
7. Characteristic study of Circuit breaker using PSCAD
8. Construct a power flow study on given power system network using Gauss–Seidal Method using MATLAB
9. MATLAB program for building Y-Bus algorithm
10. Simulation of Single Area load frequency problem using MATLAB
11. Experimental Verification With Short (80KM) Transmission Line
12. Experimental Verification with medium (320KM) Transmission Line

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

B. Tech. EEE VI SEMESTER **VCE-R14**

DATABASE MANAGEMENT SYSTEMS

(Interdepartmental Elective - I)

Course Code: **A2514**

L	T	P	C
4	-	-	4

SYLLABUS

Course Overview:

This course introduces the core principles and techniques required in the design and implementation of database systems. This course focus on relational database management systems, including database design theory: 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 databases like distributed database, and intelligent database, Client/Server. Students undertake a semester project to design and build a simple database system and demonstrate competence with the fundamental tasks involved with modeling, designing, and implementing a DBMS. It also provides students with theoretical knowledge and practical skills in the use of databases and database management systems in information technology applications.

Prerequisite(s): Understand basic concepts of operating system and programming language

Course Outcomes:

Upon the completion of course Students will be able to

CO1. Design and implement a database schema for a given problem domain..

CO2. Construct Queries in Relational algebra, relational calculus and SQL.

CO3. Apply Normalization techniques to reduce data redundancy in data base..

CO4. Analyze various transaction control and recovery methods to keep data base consistent.

CO5. Construct the file of data records by using appropriate storage and access structure.

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

B. Tech. EEE VI SEMESTER **VCE-R14**

DATABASE MANAGEMENT SYSTEMS

(Interdepartmental Elective - I)

Course Code: **A2514**

L	T	P	C
4	-	-	4

SYLLABUS

UNIT - I

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

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

UNIT - II

THE RELATIONAL MODEL: Introduction to the relational model, integrity constraints over relations, enforcing integrity constraints, querying relational data, logical database design: E-R to relational, introduction to views, destroying/altering tables and views.

RELATIONAL ALGEBRA AND CALCULUS:Preliminaries, relational algebraoperators, relational calculus - tuple and domain relational calculus, expressive power of algebra and calculus.

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

UNIT - III

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

UNIT - IV

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

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

UNIT - V

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

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

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

TEXT BOOKS:

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

REFERENCE BOOKS:

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

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

B. Tech. EEE VI SEMESTER **VCE-R14**

WIRELESS AND MOBILE COMPUTING

(Interdepartmental Elective - I)

Course Code: **A2605**

L	T	P	C
4	-	-	4

SYLLABUS

UNIT - I

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

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

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

UNIT - II

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

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

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

UNIT - III

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

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

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

UNIT - IV

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

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

UNIT - V

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

TEXT BOOKS:

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

REFERENCE BOOKS:

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

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

B. Tech. EEE VI SEMESTER **VCE-R14**

EMBEDDED SYSTEMS

(Interdepartmental Elective - I)

Course Code: **A2425**

L	T	P	C
4	-	-	4

Course Overview:

An embedded system is a computer system designed for specific control functions within a larger system, often with real-time computing constraints. It is embedded as part of a complete device often including hardware and mechanical parts. By contrast, a general-purpose computer, such as a personal computer (PC), is designed to be flexible and to meet a wide range of end-user needs. Embedded systems control many devices in common use today.

Prerequisite(s): Digital Logic, Programming of Digital Systems, C programming experience, Computer Organization, operating systems.

Course Outcomes:

CO1. Complete design of an embedded system with functional requirements for hardware and software components including processor, networking components, and sensors, along with applications, subsystem interfaces, networking, and firmware.

CO2. Understand operating system architecture and develop applications that use the standard Real Time Operating System (RTOS).

CO3. Design and implement software systems to provide an interface between hardware peripheral sensors and systems.

CO4. Complete system design for measurement of embedded system operating characteristics (for example, latency and reliability) and to determine system performance relative to functional requirements.

CO5. Develop software systems for measurement of embedded system operating characteristics (for example, latency, data transport rate, error rate).

CO6. Ability to use a real-time operating system as a tool in the development of real-time application software.

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

B. TECH. EEE VI SEMESTER **VCE-R14**

EMBEDDED SYSTEMS

(Interdepartmental Elective - I)

Course Code: **A2425**

L	T	P	C
4	-	-	4

SYLLABUS

UNIT - I

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

UNIT - II

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

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

UNIT - III

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

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

UNIT - IV

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

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

UNIT - V

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

TEXT BOOKS:

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

REFERENCE BOOKS:

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

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

B. Tech. EEE VI SEMESTERVCE-R14

VLSI DESIGN

(INTERDEPARTMENTAL ELECTIVE - I)

Course Code: **A2426**

L	T	P	C
4	-	-	4

Course Overview:

This course gives knowledge about the design, analysis, simulation of circuits used as building blocks in VeryLarge ScaleIntegration (VLSI) devices. It gives knowledge about different processes used for fabrication of an IC. It explains the characteristics of MOS transistor and its device equations. It gives detailed study on design Rules, stick diagrams, logic gates, types of delays,fan-in, fan-out which effects the action of a MOS.The Course also focuses on CMOS testing principles and testing methods used for system level and chip level.

Prerequisite(s): Electronic devices, DLD

Course Outcomes:

After completing this course the student must demonstrate the knowledge and ability to:

CO1. Construct circuits in CMOS design style and analyze the DC characteristics and switching characteristics of CMOS.

CO2. Identify the various IC fabrication methods.

CO3. Develop the stick diagrams and layouts of CMOS circuits and Estimate the Resistance,Inductance and Capacitance in CMOS circuits.

CO4. Design different types if CMOS logic structures.

CO5. Analyze/Distinguish various methods available for the testing of combinational and sequential circuits.

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

B. Tech. EEE VI SEMESTER **VCE-R14**

VLSI DESIGN

(Interdepartmental Elective - I)

Course Code: **A2426**

L	T	P	C
4	-	-	4

SYLLABUS

UNIT - I

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

UNIT - II

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

UNIT - III

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

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

UNIT - IV

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

UNIT - V

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

TEXT BOOKS:

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

REFERENCE BOOKS:

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

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

B. Tech. EEE VI SEMESTER **VCE-R14**

ROBOTICS

(Interdepartmental Elective - I)

Course Code: **A2351**

L	T	P	C
4	-	-	4

Course Overview:

This course introduces students to the basics, types and elements of robots. The course exposes students to the theoretical concepts of robot kinematics and dynamics as well as the merger of this for implementation. Programming and path planning concepts gives the perception on control of robotics. The concepts on actuators and sensor gives clear understanding and design ability for mobility systems. It gives an overview on application of robotics in manufacturingindustry.

Prerequisites (s): Basic knowledge on Linear Algebra, Kinematics and Dynamics.

Course Outcomes:

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

CO1. Explain the basic concepts and components of a robotic system.
CO2. Compute the forward and inverse kinematics of robots.
CO3. Utilize the key concepts of programming and program the robot path with obstacle avoidance.
CO4. Identify the use of actuators and sensors for robot mobility system.
CO5. Interpret the various applications of robots in Modern Manufacturing Systems.

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

B. Tech. EEE VI SEMESTER **VCE-R14**

ROBOTICS

(Interdepartmental Elective - I)

Course Code: **A2351**

L	T	P	C
4	-	-	4

SYLLABUS

UNIT - I

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

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

UNIT - II

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

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

UNIT - III

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

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

UNIT - IV

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

UNIT - V

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

TEXT BOOKS:

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

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

B. Tech. EEE VI SEMESTER **VCE-R14**

AIR POLLLUTION AND CONTROL METHODOLOGIES

(Interdepartmental Elective - I)

Course Code: **A2154**

L	T	P	C
4	-	-	4

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 air pollution. The course will also be dealing about the sources of air pollution, the impact of these sources on the environment and health.

Prerequisite(s): Environmental Science

Course Outcomes:

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

CO1. Identify various methods of air pollution analysis

CO2. Develop air pollution sampling and measurement

CO3. Interpret air pollution related regulations

CO4. Create the mechanisms of pollutant transport/dispersion in the atmosphere - use air dispersion models to predict pollution impact

CO5. Design sampling methods for air sampling - design/select systems for controlling particulate pollutants - design/select systems for controlling gaseous pollutant

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

B. Tech. EEE VI SEMESTER **VCE-R14**

AIR POLLLUTION AND CONTROL METHODOLOGIES

(Interdepartmental Elective - I)

Course Code: **A2154**

L	T	P	C
4	-	-	4

SYLLABUS

UNIT - I

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

UNIT - II

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

UNIT - III

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

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

UNIT - IV

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

UNIT - V

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

TEXT BOOKS:

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

REFERENCE BOOKS:

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

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

B. Tech. EEE VI SEMESTER **VCE-R14**

MANAGEMENT SCIENCE

(Interdepartmental Elective -II)

Course Code: **A2013**

L	T	P	C
3	1	-	4

Course Overview:

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 successful completion of this course students will able to:

CO1. Apply the conceptual knowledge of management and organization in work environment.

CO2. Take decisions relating to location of plant and layout of plant.

CO3. Conduct work study techniques for increased productivity and also able to control quality of products.

CO4. Manage human resources efficiently and effectively with best HR practices.

CO5. Plan and control projects through network analysis techniques.

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

B. Tech. EEE VI SEMESTER **VCE-R14**

MANAGEMENT SCIENCE

(Interdepartmental Elective -II)

Course Code: **A2013**

L	T	P	C
3	1	-	4

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 VI SEMESTER **VCE-R14**

HUMAN RESOURCE MANAGEMENT

(Interdepartmental Elective - II)

Course Code: **A2016**

L	T	P	C
3	1	-	4

Course outcomes:

At the end of the course students will be able to

CO1. Handle HR functions effectively in the real life with the knowledge of HRM concepts

CO2. Demonstrate how the HR manager is playing proactive role in business to meet global business challenges.

CO3. Apprise the performance of the employees by using different methods

CO4. Take decisions relating to compensation and conflict resolution

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

B. Tech. EEE VII SEMESTER **VCE-R14**

HUMAN RESOURCE MANAGEMENT

(Interdepartmental Elective - II)

Course Code: **A2016**

L	T	P	C
3	1	-	4

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: Process and Sources of Recruitment; Selection, process of selection and techniques, Retention of Employees.

UNIT - III

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

UNIT - IV

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

UNIT - V

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

TEXT BOOKS:

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

REFERENCE BOOKS:

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

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

B. Tech. EEE VII SEMESTER **VCE-R14**

ENTERPRENEURSHIP

(Interdepartmental Elective - II)

Course Code:**A2017**

L	T	P	C
3	1	-	4

Course Outcomes:

On successful completion of this course student able to:

CO1. Understand the role, characteristics, qualities and functions of entrepreneur and use thisknowledge to become future entrepreneurs.

CO2. Various Institutional supports for setting up a business enterprise.

CO3. Role, importance and functions of women entrepreneur and women entrepreneur development.

CO4. Concept of Project Management and steps in Project development.

CO5. Training programs to inculcate entrepreneurial spirit and different training institutions to impart training to entrepreneurs.

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

B. Tech. EEE VII SEMESTER **VCE-R14**

ENTREPRENEURSHIP

(Interdepartmental Elective - II)

Course Code:**A2017**

L	T	P	C
3	1	-	4

SYLLABUS

UNIT - I

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

UNIT - II

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

UNIT - III

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

UNIT - IV

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

UNIT - V

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

TEXT BOOKS:

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

REFERENCE BOOKS:

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

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

B. Tech. EEE VII SEMESTER **VCE-R14**

BUSINESS COMMUNICATION

(Interdepartmental Elective - II)

Course Code:**A2018**

L	T	P	C
3	1	-	4

Course Overview :

The aim of this course is to develop students communication skills in the English language that will enable them to function effectively in a business environment. The course content focuses on selected written and oral forms of communication related to topics and issues critical to students of Business Studies.

Course Outcomes:

On successful completion of this course student able to:

CO1. Apply business communication strategies and principles to prepare effective communication for domestic and international business situations.
CO2. Participate in team activities that lead to the development of collaborative work skills.
CO3. Select appropriate organizational formats and channels used in developing and presenting business messages.
CO4. Communicate via electronic mail, Internet, and other technologies.
CO5. Deliver an effective oral business presentation.

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

B. Tech. EEE VII SEMESTER **VCE-R14**

BUSINESS COMMUNICATION

(Interdepartmental Elective - II)

Course Code:**A2018**

L	T	P	C
3	1	-	4

SYLLABUS

UNIT - I

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

UNIT - II

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

UNIT - III

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

UNIT - IV

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

UNIT - V

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

TEXT BOOKS:

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

REFERENCE BOOKS:

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

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

B. Tech. EEE VII SEMESTER **VCE-R14**

PROJECT PLANNING AND MANAGEMENT

(Interdepartmental Elective - II)

Course Code:**A2019**

L	T	P	C
3	1	-	4

Course Overview:

Project planning is at the heart of the project life cycle, and tells everyone involved where you're going and how you're going to get there. The planning phase is when the project plans are documented, the project deliverables and requirements are defined, and the project schedule is created. It involves creating a set of plans to help guide your team through the implementation and closure phases of the project. The plans created during this phase will help you manage time, cost, quality, changes, risk, and related issues. They will also help you control staff and external suppliers to ensure that you deliver the project on time, within budget, and within schedule.

Project management is a start-to-finish approach to getting things done and making projects more successful. It's a profession, but it's also a set of techniques that anyone can apply to achieve goals and manage project work more effectively. Project management can be used to guide small, simple projects as well as complex enterprise-wide initiatives.

Prerequisite(s):

- NIL

Course Outcomes:

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

1. **Develop** an evidenced based project management plan which addresses all elements of the project development life cycle
2. **Analyze** and synthesize project management theory and apply this knowledge in project management
3. Critically **evaluate** decision making and its impact on project success
4. **Apply** effective team work and communication skills to develop and communicate a feasible and strategic project plan
5. **Demonstrate** effective project execution and control techniques that result in successful projects

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

B. Tech. EEE VII SEMESTER **VCE-R14**

PROJECT PLANNING AND MANAGEMENT

(Interdepartmental Elective - II)

Course Code:**A2019**

L	T	P	C
3	1	-	4

SYLLABUS

UNIT - I

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

UNIT - II

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

UNIT - III

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

UNIT - IV

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

UNIT - V

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

TEXT BOOKS:

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

REFERENCE BOOKS:

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

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

B. Tech. EEE VII SEMESTER **VCE-R14**

ORGANIZATIONAL BEHAVIOR

(Interdepartmental Elective - II)

Course Code:**A2020**

L	T	P	C
3	1	-	4

Course Outcomes:

CO1. Knows how people behave under a variety of conditions and contribute towards achievement oftheir goals.

CO2. Learns the factors to motivate people and leadership styles exhibit by the managers to get thethings done through subordinates.

CO3. Able to understand the managerial strategies in achieving the goals of organizations.

CO4. Able to understand organizations and its structures.

CO5. Understand stress management and conflict resolution mechanism to resolve differencesamong people in organizations.

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

B. Tech. EEE VII SEMESTER **VCE-R14**

ORGANIZATIONAL BEHAVIOR

(Interdepartmental Elective - II)

Course Code:**A2020**

L	T	P	C
3	1	-	4

SYLLABUS

UNIT - I

NATURE AND IMPORTANCE OF 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 Behavior – 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.

UNIT - IV

LEADERSHIP THEORIES: Leadership Theories – Challenges to Leadership Construct – Finding and Creating Effective Leaders – Power & Polities.

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.

UNIT - V

Foundation of Organizational Structure: Nature of organizing, organizational levels and span of control and types of span of control, factors determining span, organizational structure, departmentation and types of departmentation, making organizing effective.

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 VII SEMESTERVCE-R14

PROCESS CONTROL

(Professional Elective –I)

Course Code: **A2230**

L	T	P	C
3	1	-	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.

Prerequisite(s): Nil

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 varioustechniques.

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 SEMESTER VCE-R14

PROCESS CONTROL

(Professional elective –I)

Course Code:**A2230**

L	T	P	C
3	1	-	4

SYLLABUS

UNIT -I

Process DynamicsProcess 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 SettingsEvaluation 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 ElementI/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 SystemFeed 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 SEMESTER VCE-R14

ADVANCED POWER SYSTEM PROTECTION

(Professional elective –I)

Course Code: **A2231**

L	T	P	C
3	1	-	4

SYLLABUS

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. Analyze different digital relay techniques

CO4. Apply advanced protection schemes for different electrical equipment.

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

B. Tech. EEE VII SEMESTER VCE-R14

ADVANCED POWER SYSTEM PROTECTION

(Professional elective –I)

Course Code: **A2231**

L	T	P	C
3	1	-	4

SYLLABUS

UNIT - I

INTRODUCTION TO PROTECTIVE RELAYS: Primary and back up protection, current transformers for protection, potential transformer, review of electromagnetic relays static relays. Over current relays time current characteristic, current setting time setting, directional relay, static over current relays.

UNIT - II

DISTANCE PROTECTION - I: Impedance, reactance, mho, angle impedance relays. Input quantities for various types of distance relays, effect of arc resistance on the performance of distance relays, selection of distance relays. MHO relay with blinders, quadrilateral relay, elliptical relay. Restricted mho, impedance directional, reactance relays. Swivelling characteristics.

UNIT - III

DISTANCE PROTECTION - II: Compensation for correct distance measurement, reduction of measuring units switched schemes. Pilot relaying schemes.

DISTANCE PROTECTION - III: Wire pilot protection, circulating current scheme, balanced voltage scheme, transley scheme, carrier current protection, phase comparison carrier current protection, carrier aided distance protection.

UNIT - IV

DIGITAL RELAYING TECHNIQUES: Digital relaying algorithms, differential equation technique, discrete Fourier transform technique, Walsh-Hadamard transform technique, rationalized Harr transform technique, removal of dc offset.

UNIT - V

MICROPROCESSOR BASED PROTECTIVE RELAYS: Over current, directional, impedance, reactance relays. Generalized mathematical expressions for distance relays, mho and offset mho relays, quadrilateral relay. Microprocessor implementation of digital distance relaying algorithms.

TEXT BOOKS:

1. Badri Ram, D. N. Vishwakarma (2007), *Power System Protection & Switchgear*, 1st edition, Tata McGraw Hill Publications, New Delhi.
2. T. S. Madhava Rao (2008), *Power System Protection Static Relays*, 2nd edition, Tata McGraw Hill Publications, New Delhi.

REFERENCE BOOKS:

1. B. Ravindra Nath, M. Chandra (2005), *Power System Protection & Switchgear*, 1st edition, New age International (P) Ltd, New Delhi.

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

B. Tech. EEE VII SEMESTER VCE-R14

POWER SYSTEM DYNAMICS AND STABILITY

(Professional Elective -II)

Course Code:**A2232**

L	T	P	C
3	1	-	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 toinstability.

CO3. **Analyze** the generator excitation, prime mover controls and recognize their role in powersystem stability control.

CO4. **Compare** different types of power system stabilities and methods to improve overall systemstability.

CO5. **Evaluate** the power system behavior under small signal, transient and voltage instabilityconditions using PSCAD simulation.

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

B. Tech. EEE VII SEMESTER VCE-R14

POWER SYSTEM DYNAMICS AND STABILITY

(Professional Elective -II)

Course Code:**A2232**

L	T	P	C
3	1	-	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, Std. 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 TS 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.

2. Prabha Kundur, Power System Stability and Control, Tata McGraw Hill

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

B. Tech. EEE VII SEMESTER **VCE-R14**

ADVANCED CONTROL SYSTEMS

(Professional Elective - I)

Course Code:**A2233**

L	T	P	C
3	1	-	4

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:

CO1.Develop the mathematical modelling 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 VII SEMESTER **VCE-R14**

ADVANCED CONTROL SYSTEMS

(Professional Elective - I)

Course Code:**A2233**

L	T	P	C
3	1	-	4

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 VII SEMESTER **VCE-R14**

RENEWABLE ENERGY SOURCES

(Professional Elective - I)

Course Code:**A2234**

L	T	P	C
3	1	-	4

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.

Prerequisite(s): Nil

Course Outcomes:

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. Apply energy storage methods in renewable energy systems.

CO4. Analyse Renewable energy systems for various environmental conditions.

CO5. Categorize various energy conversion systems and their limitations.

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

B. Tech. EEE VII SEMESTER **VCE-R14**

RENEWABLE ENERGY SOURCES

(Professional Elective - I)

Course Code:**A2234**

L	T	P	C
3	1	-	4

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.

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

UNIT-II

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-III

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-IV

GEOTHERMAL ENERGY: Resources, types of wells, methods of harnessing the energy, potential in India.
OCEAN ENERGY: OTEC, Principles utilization, setting of OTEC plants, thermodynamic cycles.

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

UNIT-V

DIRECT ENERGY CONVERSION: Need for DEC, Carnot cycle, limitations, principles of DEC.

TEXT BOOKS:

1. 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 VII SEMESTER **VCE-R14**

NEURAL NETWORKS AND FUZZY LOGICS

(Professional Elective - I)

Course Code: **A2235**

L	T	P	C
3	1	-	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 be able to

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 VII SEMESTER **VCE-R14**

NEURAL NETWORKS AND FUZZY LOGICS

(Professional Elective - I)

Course Code: **A2235**

L	T	P	C
3	1	-	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 VIII SEMESTER **VCE-R14**

OPTIMAL CONTROL SYSTEMS

(Professional Elective - II)

Course Code:**A2239**

L	T	P	C
3	1	-	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 VIII SEMESTER **VCE-R14**

OPTIMAL CONTROL SYSTEMS

(Professional Elective - II)

Course Code:**A2239**

L	T	P	C
3	1	-	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 –Firstedition, 1970.

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

B. Tech. EEE VIII SEMESTER **VCE-R14**

POWER SYSTEM TRANSIENTS

(Professional Elective -II)

Course Code:**A2240**

L	T	P	C
3	1	-	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.

Prerequisite(s): Nil

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 powersystem.

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 between voltage transients on closing and reclosing lines and examine theswitching surges on integrated system.

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

B. Tech. EEE VIII SEMESTER **VCE-R14**

POWER SYSTEM TRANSIENTS

(Professional Elective -II)

Course Code:**A2240**

L	T	P	C
3	1	-	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 VIII SEMESTER **VCE-R14**

POWER QUALITY

(Professional Elective - II)

Course Code: **A2241**

L	T	P	C
3	1	-	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.

Prerequisite(s): Nil

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 reduceflickers.

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 VIII SEMESTER **VCE-R14**

POWER QUALITY

(Professional Elective - II)

Course Code: **A2241**

L	T	P	C
3	1	-	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 VIII SEMESTER **VCE-R14**

DYNAMICS OF ELECTRICAL MACHINES

(Professional Elective - II)

Course Code:**A2242**

L	T	P	C
3	1	-	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

Prerequisite(s): Nil

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 DCand 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 electricalsystems for steady state analysis.

CO4. **Analyze** the steady state and transient behavior of separately excited DC generators and DCmotors.

CO5. **Apply** the theory of machine dynamics to formulate the equations for the dynamical behavior ofinduction machines and analyze its behavior during starting, braking and accelerating.

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

B. Tech. EEE VIII SEMESTER **VCE-R14**

DYNAMICS OF ELECTRICAL MACHINES

(Professional Elective - II)

Course Code:**A2242**

L	T	P	C
3	1	-	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. Vedam Subramanyam (2008), Thyristor Control of Electric Drives, 1st edition, Tata McGraw Hill Education, New Delhi.

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

B. Tech. EEE VIII SEMESTER **VCE-R14**

DIGITAL CONTROL SYSTEMS

(Professional Elective - II)

Course Code:**A2243**

L	T	P	C
3	1	-	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.

Prerequisite(s): Nil

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 VIII SEMESTER **VCE-R14**

DIGITAL CONTROL SYSTEMS

(Professional Elective - II)

Course Code:**A2243**

L	T	P	C
3	1	-	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 use of the Bilinear Transformation and Routh Stability criterion.

UNIT - V

DESIGN OF DISCRETE TIME CONTROL SYSTEM BY CONVENTIONAL METHODS: Transient and steady state response Analysis, Design based on the frequency response method, Bilinear Transformation and Design procedure in the W - plane, Lead, Lag and Lead - Lag compensators and digital PID controllers.

STATE FEEDBACK CONTROLLERS AND OBSERVERS: Design of state feedback controller through pole placement, Necessary and sufficient conditions, Ackerman's formula. State Observers – Full order and Reduced order observers.

TEXT BOOKS:

1. K. Ogata (2011), Discrete-Time Control systems, 2nd edition, Pearson Education / Prentice Hall of India, New Delhi.
2. Kuo (2003), Digital Control Systems, 2nd edition, Oxford University Press, New Delhi.

REFERENCE BOOKS:

1. M. Gopal (2009), Digital Control and State Variable Methods, 3rd edition, Tata McGraw Hill Publications, New Delhi.

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

B. Tech. EEE VIII SEMESTER **VCE-R14**

ENERGY MANAGEMENT

(Professional Elective - II)

Course Code:**A2244**

L	T	P	C
3	1	-	4

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:

Analyze the influence of energy availability on the development of Industries and various other organizations.

CO1. Analyze the concepts and technologies used for energy conservation.

CO2. Develop methods for evaluating worth of project.

CO3. Analyze schemes for demand side management.

CO4. Evaluate the VAR requirements for effective voltage control.

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

B. Tech. EEE VIII SEMESTER **VCE-R14**

ENERGY MANAGEMENT

(Professional Elective - II)

Course Code:**A2244**

L	T	P	C
3	1	-	4

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.

UNIT - IV

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

UNIT - V

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

TEXT BOOKS:

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

REFERENCE BOOKS:

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

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

B. Tech. EEE VIII SEMESTER **VCE-R14**

EVOLUTIONARY COMPUTATION

(Professional Elective - III)

Course Code:**A2245**

L	T	P	C
3	1	-	4

Course Overview:

Computational systems inspired by natural evolution; natural and artificial evolution, evolutionary; chromosome representations; search operators; co-evolution; constraint handling techniques; niching and speciation; genetic programming; classifier systems and theoretical foundations; implementation of selected algorithms

Prerequisite(s):

- Knowledge of neural networks

Course Outcomes:

After completing this course the student must demonstrate the knowledge and ability 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 neuralnetworks.

CO4. Analyses and evaluate particle swarm optimizations and its characteristics.

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

B. Tech. EEE VIII SEMESTER **VCE-R14**

EVOLUTIONARY COMPUTATION

(Professional Elective - III)

Course Code:**A2245**

L	T	P	C
3	1	-	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

TEXT 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 Mathematica. Morgan Kaufmann

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

B. Tech. EEE VII SEMESTER **VCE-R14**

EXTRA HIGH VOLTAGE AC TRANSMISSION

(Professional Elective - III)

Course Code:**A2246**

L	T	P	C
3	1	-	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

Prerequisites(s): Nil

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 variousparameters 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 andother compensating devices**.**

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

B. Tech. EEE VII SEMESTER **VCE-R14**

EXTRA HIGH VOLTAGE AC TRANSMISSION

(Professional Elective - III)

Course Code:**A2246**

L	T	P	C
3	1	-	4

SYLLABUS

UNIT - I

PRELIMINARIES: Necessity of EHV AC transmission, advantages and problems. Power handling capacity and line losses- mechanical considerations, resistance of conductors, properties of bundled conductors, bundle spacing and bundle radius with examples.

LINE AND GROUND REACTIVE PARAMETERS: Line inductance and capacitances, sequence inductances and capacitances, modes of propagation, ground return with examples.

UNIT - II

VOLTAGE GRADIENTS OF CONDUCTORS: Electrostatics: field of sphere gap, field of line changes and properties. Charge , potential relations for multi-conductors, surface voltage gradient on conductors. Distribution of voltage gradient on sub-conductors of bundle with examples.

UNIT - III

CORONA EFFECTS - I: Power loss and audible noise (AN): corona loss formulae, charge voltage diagram, generation, characteristics and limits. Measurements of AN, relation between 1-phase and 3-phase AN levels with examples.

CORONA EFFECTS - II: Radio interference (RI) : corona pulses generation, properties, limits. Frequency spectrum, modes of propagation, excitation function, measurement of RI, RIV and excitation functions with examples.

UNIT - IV

ELECTRO STATIC FIELD: Electrostatic field: calculation of electrostatic field of EHV/AC lines, effect on humans, animals and plants , electrostatic induction in un energized circuit of double-circuit line, electromagnetic interference with examples.

TRAVELING WAVE THEORY: Traveling wave expression and solution, source of excitation, terminal conditions. Open circuited and short-circuited end, reflection and refraction coefficients. Lumped parameters of distributed lines-generalized constants, No load voltage conditions and charging current.

UNIT - V

VOLTAGE CONTROL: Power circle diagram and its use, voltage control using synchronous condensers. Cascade connection of shunt and series compensation. Sub synchronous resonance in series capacitor , compensated lines, static VAR compensating system.

TEXT BOOKS:

1. Rakosh Das Begamudre (2011), Extra High Voltage AC Transmission Engineering, 4th edition, New Age International (P) Ltd, New Delhi.

REFERENCE BOOKS:

1. S. Rao (2009), EHVAC - HVDC transmission and Distribution Engineering, 3rd edition, Khanna Publishers, New Delhi.

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

B. Tech. EEE VII SEMESTER **VCE-R14**

MACHINE MODELLING AND ANALYSIS

(Professional Elective - III)

Course Code:**A2247**

L	T	P	C
3	1	-	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 SEMESTER **VCE-R14**

MACHINE MODELLING AND ANALYSIS

(Professional Elective - III)

Course Code:**A2247**

L	T	P	C
3	1	-	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, Numerical problems. Mathematical model of D.C. shunt motor and D.C. Compound motor in state variable form. Transfer function of the motor, Numerical Problems.

UNIT - III

TRANSFORMATIONS: Linear transformation, Phase transformation (a, b, c to a, p, o), Active transformation (a, p, o to d, q).

MODELLING OF THREE PHASE INDUCTION MACHINES: Circuit model of a 3 - 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 VIII SEMESTER **VCE-R14**

PROGRAMMABLE LOGIC CONTROLLERS

(Professional Elective - III)

Course Code:**A2248**

L	T	P	C
3	1	-	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.

Prerequisite(s): Nil

Course Outcomes:

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. Analyze PLC functions and Data Handling Functions and their operations.

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

B. Tech. EEE VIII SEMESTER **VCE-R14**

PROGRAMMABLE LOGIC CONTROLLERS

(Professional Elective - III)

Course Code:**A2248**

L	T	P	C
3	1	-	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 RESISTERS: 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 VIII SEMESTER **VCE-R14**

RELIABILITY ENGINEERING
(Professional Elective - III)

Course Code:**A2249**

L	T	P	C
3	1	-	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 engineering knowledge 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/tie-set methods.

CO4. Describe the reliability functions with their relationships and Markov modeling

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)

B. Tech. EEE VIII SEMESTER **VCE-R14**

RELIABILITY ENGINEERING
(Professional Elective - III)

Course Code:**A2249**

L	T	P	C
3	1	-	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 function in terms of the Hazarad rate, Hazard models.

FAILURES: Causes of failures, types of failures, Modes of failure, Bath tub curve, Effect of preventive maintenance. Measures of reliability: mean time to failure and mean time between failures.

UNIT - III

CLASSIFICATION OF ENGINEERING SYSTEMS: Series, parallel, series-parallel, parallel-series and non-series-parallel configurations. Expressions for the reliability of the basic configurations.

RELIABILITY LOGIC DIAGRAMS: Reliability evaluation of Non-series-parallel configurations: minimal tie-set, minimal cut-set and decomposition methods. Deduction of the minimal cut sets from the minimal path sets.

UNIT - IV

DISCRETE MARKOV CHAINS: General modeling concepts, stochastic transitional probability matrix, time dependent probability evaluation and limiting state probability evaluation. Absorbing states.

CONTINUOUS MARKOV PROCESSES: Modeling concepts, State space diagrams, Stochastic Transitional Probability Matrix, Evaluating limiting state Probabilities. Reliability evaluation of repairable systems.

UNIT - V

SERIES SYSTEMS AND PARALLEL SYSTEM: Series systems, parallel systems with two and more than two components, Network reduction techniques. Minimal cut set/failure mode approach.

TEXT BOOKS:

1. Roy Billinton, Ronald. N. Allan (2009), Reliability Evaluation of Engineering Systems, 4th edition, Plenum Press, New York, USA.
2. Hoang Pham (2003), Handbook of Reliability Engineering, 1st edition, Springer Verlag, New York.

REFERENCE BOOKS:

1. Charles E. Ebeling (2010), An Introduction to Reliability and Maintainability Engineering, 3rd edition, Tata McGraw Hill Edition, New Delhi.

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)

B. Tech. EEE VIII SEMESTER **VCE-R14**

DISTRIBUTION AUTOMATION
(Professional Elective - III)

Course Code:**A2250**

L	T	P	C
3	1	-	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.

Prerequisite(s): Nil

Course Outcomes:
Upon the completion of course Students will be able to

CO1. Analyze the Operational & Maintenance benefits, financial benefits and Customer relatedbenefits.

CO2. Apply the knowledge of supervisory control and data acquisition (SCADA) and energymanagement 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 SEMESTER **VCE-R14**

DISTRIBUTION AUTOMATION

(Professional Elective - III)

Course Code:**A2250**

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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, Informationmanagement, system reliability management, system efficiency management, voltage management, Loadmanagement.

UNIT-III

COMMUNICATION SYSTEMS FOR DA

DA communication requirements, Communication reliability, Cost effectiveness, Data rateRequirements, Two way capability, Ability to communicate during outages and faults, Ease ofoperation and maintenance, Conforming to the architecture of data flowCommunication systems used in DA: Distribution line carrier (Power line carrier), Ripplecontrol, Zero crossing technique, telephone, cable TV, Radio, AM broadcast, FM SCA, VHFRadio, 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, Interruptionrelated savings, Customer related savings, Operational savings, improved operation, Functionbenefits, Potential benefits for functions, and function shared benefits, Guidelines for formulationof estimating equations Parameters required, economic impact areas, Resources for determiningbenefits 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, Projectload growth, Develop Alternatives, Calculate operating and maintenance costs, Evaluatealternatives. Economic comparison of alternate plans, Classification of expenses and capitalexpenditures, Comparison of revenue requirements of alternative plans, Book Life and Continuingplant analysis, Year by year revenue requirement analysis, short term analysis, end of studyadjustment, 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 – GreenRobert Wilson, CRC Press
2. Electric Power Distribution Automation, Dr. M. K. Khedkar, Dr. G.M.Dhole

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 --