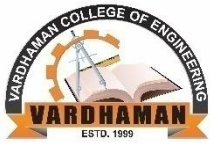

VARDHAMAN COLLEGE OF ENGINEERING

(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

ELECTRONICS AND COMMUNICATION ENGINEERING

(Accredited by NBA)

ACADEMIC REGULATIONS
COURSE STRUCTURE (VCE-R15)

CHOICE BASED CREDIT SYSTEM

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

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PRELIMINARY DEFINITIONS AND NOMENCLATURES

- "Autonomous Institution / College" means an institution / college designated as autonomous institute / college by University Grants Commission (UGC), as per the UGC Autonomous College Statutes.
- "Academic Autonomy" means freedom to a College in all aspects of conducting its academic programs, granted by the University for promoting excellence.
- "Commission" means University Grants Commission.
- "AICTE" means All India Council for Technical Education.
- "University" means Jawaharlal Nehru Technological University Hyderabad.
- "College" means Vardhaman College of Engineering, Hyderabad unless indicated otherwise by the context.
- "Program" means:
  - Bachelor of Technology (B. Tech.) Degree program
  - UG Degree Program: B. Tech.
- "Branch" means specialization in a program like B. Tech. Degree program in Civil Engineering,B. Tech. Degree program in ELECTRONICS AND COMMUNICATION ENGINEERING etc.
- "Course" or "Subject" means a theory or practical subject, identified by its course-number and course-title, which is normally studied in a semester. For example, A4001: Linear Algebra and Ordinary Differential Equations, A4501: Programming for Problem Solving, etc. The description of allocation of course code is mentioned in the table 1.

Table 1: Course Code Description

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

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

FOREWORD

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

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

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

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

PRINCIPAL

VARDHAMAN COLLEGE OF ENGINEERING
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Vision:

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

Mission:

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

Quality Policy:

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

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

Department Vision:

To produce competent engineers with social responsibility to address the global challenges in the field of Electronics and Communication Engineering.

Department Mission:

- Promote active learning strategies to facilitate student centric learning
- Provide self-learning capabilities to enhance employability and entrepreneurial skills
- Inculcate human values and ethics to make learners sensitive towards societal issues
- Strengthen core competencies among the learners through experiential curriculum.

Program Educational Objectives (PEOs)

PEO1: Graduates will be able to foster continuing education with their existing knowledge in the field of Electronics and Communication Engineering.

PEO2: Graduates will be able to evolve with the ever changing global technological advancements and cater to the needs of the society.

PEO3: Graduates will be able to demonstrate leadership skills to address issues in a responsive, ethical and innovative manner.

PEO4: Graduates will be able to excel in career while contributing to the growth of their organization.

Program Outcomes (POs):

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

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

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

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

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

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

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

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

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

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

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

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

Program Specific Outcomes:

PSO1: Apply the knowledge of domain specific skill set for the design and analysis of components in VLSI and Embedded systems.

PSO2: Demonstrate the technical competency and use appropriate techniques in the realization of advanced communication systems.

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ACADEMIC REGULATIONS

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

For pursuing undergraduate Bachelor Degree Program of study in Engineering (B. Tech.) offered by Vardhaman College of Engineering under Choice Based Credit System (CBCS)and herein after Vardhaman College of Engineering is referred to as VCE.

1. APPLICABILITY

All the rules specified herein, approved by the Academic Council, will be in force and applicable to students admitted from the academic year 2015-2016 onwards. Any reference to "College" in these rules and regulations stands for Vardhaman College of Engineering.

2. EXTENT

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

3. ADMISSION

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

3.1.1. Eligibility:

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

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

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

3.1.2. Admission Procedure:

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

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

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

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

3.2.1. Eligibility:

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

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

4. PROGRAMS OFFERED

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

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

5. MEDIUM OF INSTRUCTION

The medium of instruction is English for all the courses.

6. DURATION OF THE PROGRAMS

6.1. Minimum Duration

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

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

6.2. Maximum Duration

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

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

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

7. SEMESTER STRUCTURE

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

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

Table 2: Academic Calendar

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

8. PROGRAM STRUCTURE

The Program of instruction consists of:

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

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

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

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

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

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

Table 3: Group of courses

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

9. CREDIT BASED SYSTEM

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

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

Table 4: Credit Representation

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

9.2. The four-year curriculum of any B. Tech. program of study shall have 192 credits in total. The exact requirements of credits for each course will be as recommended by the Board of Studies concerned and approved by the Academic Council.

In the case of lateral entry students, B. Tech. program for III, IV, V, VI VII and VIII semesters of study shall have a total 144 credits.

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

10. METHOD OF EVALUATION

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

10.1 Theory Courses

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

Table 5: Method of Evaluation

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

10.1.1. Mid Semester Test

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

10.1.2. Online Objective Test

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

10.1.3. Mid Marks

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

10.1.4. End Semester Examination

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

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

10.2 Practical

Practical shall be evaluated for 100 marks, out of which 75 marks shall be for external examination and 25 marks for internal. The 25 internal marks are distributed as 15 marks for day-to-day evaluation and 10 marks for internal examination. The external end - examination shall be conducted by the teacher concerned and an external examiner from outside the college.

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

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

10.5 Mini Project

The mini project in an industry shall be carried out during the summer break for a minimum of 4 weeks after the VI Semester and shall be completed before the start of the VII semester. A report has to be submitted for assessment to an internal evaluation committee comprising Head of the Department or his nominee and two faculty members of the department including the project supervisor for 100 marks. A minimum of 40% of maximum marks shall be obtained to earn the corresponding credits. The mini project and its report shall be evaluated in VII semester.

10.6 Technical Seminar

The seminar shall have two components; one chosen by the student from the course-work without repetition and another approved by the faculty supervisor. The other component is suggested by the supervisor and can be a reproduction of the concept in any standard research paper or an extension of concept from earlier course work. A hard copy of the information on seminar topic in the form of a report is to be submitted for evaluation along with presentation. The presentation of the seminar shall be made before an internal evaluation committee comprising the Head of the Department or his nominee, seminar supervisor and a senior faculty of the department. The two components of the seminar are distributed between two halves of the semester and are evaluated for 100 marks each. The average of the two components shall be taken as the final score. A minimum of 40% of maximum marks shall be obtained to earn the corresponding credits.

10.7 Project Work

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

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

11. ATTENDANCE REQUIREMENTS TO APPEAR FOR THE END SEMESTER EXAMINATION

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

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

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

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

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

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

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

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

12. EVALUATION

Following procedure governs the evaluation.

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

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

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

13. REVALUATION

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

14. SUPPLEMENTARY EXAMINATION

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

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

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

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

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

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

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

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

iv. A student shall be promoted from I Year to II Year program of study only if he fulfills the academic requirement of securing **24 out of 48** credits from the regular examinations held till the end of I year II semesterincluding supplementary examinations.

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

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

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

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

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

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

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

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

iv. A student shall be promoted from II Year to III Year program of study only if he fulfills the academic requirement of securing **24 out of 48** credits from the regular examinations held till the end of II year II semester including supplementary examinations held till the end of II year II semester.

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

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

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

16. TRANSITORY REGULATIONS

Students who are detained for lack of attendance (or) who have not fulfilled academic requirements (or) who have failed after having undergone the course in earlier regulations (or) have discontinued and wish to continue the course are eligible for admission into the unfinished semester from the date of commencement of class work with the same (or) equivalent subjects as and when subjects are offered, and pursue the remaining course work with the academic regulations of the batch into which such students are readmitted. A regular student has to satisfy all the eligibility requirements within the maximum stipulated period of eight years, and a lateral entry student within six years, for the award of the B. Tech. Degree.

17. TRANSFER OF STUDENTS FROM OTHER COLLEGES/UNIVERSITIES

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

18. TRANSCRIPTS

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

19. AWARD OF DEGREE

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

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

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

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

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

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

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

19.3. Award of class

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

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

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

19.4. Letter Grade and Grade Point

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

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

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

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

Percentage of marks = (CGPA-0.5) X 10

SEMESTER GRADE POINT AVERAGE (SGPA)

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

$$SGPA\ (S_i) = \sum (C_i \times G_i) / \sum C_i$$

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

CUMULATIVE GRADE POINT AVERAGE (CGPA)

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

$$CGPA = \sum (C_i \times S_i) / \sum C_i$$

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

20. ADDITIONAL ACADEMIC REGULATIONS

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

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

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

21. REGISTRATION

21.1. Each student has to compulsorily register for course work at the beginning of each semester as per the schedule mentioned in the Academic Calendar IN PERSON. It is absolutely compulsory for the student to register for courses in time. IN ABSENTIA registration will not be permitted under any circumstance.

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

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

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

22. TERMINATION FROM THE PROGRAM

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

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

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

23. CURRICULUM

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

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

24. WITHHOLDING OF RESULTS

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

25. GRIEVANCES REDRESSAL COMMITTEE

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

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

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

26. MALPRACTICE PREVENTION COMMITTEE

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

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

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

Any action on the part of student at the examination like trying to get undue advantage in the performance at examinations, trying to help another, or derive the same through unfair means is punishable according to the

provisions contained hereunder. The involvement of the Staff who are in-charge of conducting examinations, evaluating examination papers and preparing/keeping records of documents relating to the examinations, in such acts (inclusive of providing incorrect or misleading information) that infringe upon the course of natural justice to one and all concerned at the examination shall be viewed seriously and will be recommended for appropriate punishment after thorough enquiry.

27. AMENDMENTS TO REGULATIONS

The Academic Council of Vardhaman College of Engineering reserves the right to revise, amend, or change the regulations, scheme of examinations, and/or syllabi or any other policy relevant to the needs of the society or industrial requirements etc., without prior notice.

28. STUDENTS' FEEDBACK

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

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

29. GRADUATION DAY

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

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

30. AWARD OF A RANK UNDER AUTONOMOUS SCHEME

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

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

31. CODE OF CONDUCT

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

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

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

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

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

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

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

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

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

32. OTHER ISSUES

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

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

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

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

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

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

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

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

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

33. GENERAL

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

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

MALPRACTICES RULES
DISCIPLINARY ACTION FOR / IMPROPER CONDUCT IN EXAMINATIONS

	Nature of Malpractices/Improper conduct	Punishment
	If the student:	
1. (a)	Possesses or keeps accessible in examination hall, any paper, note book, programmable calculators, Cell phones, pager, palm computers or any other form of material concerned with or related to the subject of the examination (theory or practical) in which he is appearing but has not made use of (material shall include any marks on the body of the student which can be used as an aid in the subject of the examination)	Expulsion from the examination hall and cancellation of the performance in that subject only.
(b)	Gives assistance or guidance or receives it from any other student orally or by any other body language methods or communicates through cell phones with any student or persons in or outside the exam hall in respect of any matter.	Expulsion from the examination hall and cancellation of the performance in that subject only of all the students involved. In case of an outsider, he will be handed over to the police and a case is registered against him.
2.	Has copied in the examination hall from any paper, book, programmable calculators, palm computers or any other form of material relevant to the subject of the examination (theory or practical) in which the student is appearing.	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the student has already appeared including practical examinations and project work and shall not be permitted to appear for the remaining examinations of the subjects of that Semester/year. The Hall Ticket of the student is to be cancelled and sent to the University.
3.	Impersonates any other student in connection with the examination.	The student who has impersonated shall be expelled from examination hall. The student is also debarred and forfeits the seat. The performance of the original student, who has been impersonated, shall be cancelled in all the subjects of the examination (including practical's and project work) already appeared and shall not be allowed to appear for examinations of the remaining subjects of that semester/year. The student is also debarred for two consecutive semesters from class work and all University examinations. The continuation of the course by the student is subject to the academic regulations in connection with forfeiture of seat. If the imposter is an outsider, he will be handed over to the police and a case is registered against him.
4.	Smuggles in the Answer book or additional sheet or takes out or arranges to send out the question paper during the examination or answer book or additional sheet, during or after the examination.	Expulsion from the examination hall and cancellation of performance in that subject and all the other subjects the student has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The student is also debarred for two consecutive semesters from class work and all University examinations. The continuation of the course by the student is subject to the academic regulations in connection with forfeiture of seat.
5.	Uses objectionable, abusive or offensive language in the answer paper or in letters to the examiners or writes to the examiner requesting him to award pass marks.	Cancellation of the performance in that subject.
6.	Refuses to obey the orders of the Chief Superintendent/Assistant – Superintendent / any officer on duty or misbehaves or creates disturbance of any kind in and around the examination hall or organizes a walk out or instigates others to walk out,	In case of students of the college, they shall be expelled from examination halls and cancellation of their performance in that subject and all other subjects the student(s) has (have) already appeared and shall not be permitted to appear for the

	or threatens the officer-in charge or any person on duty in or outside the examination hall of any injury to his person or to any of his relations whether by words, either spoken or written or by signs or by visible representation, assaults the officer-in-charge, or any person on duty in or outside the examination hall or any of his relations, or indulges in any other act of misconduct or mischief which result in damage to or destruction of property in the examination hall or any part of the College campus or engages in any other act which in the opinion of the officer on duty amounts to use of unfair means or misconduct or has the tendency to disrupt the orderly conduct of the examination.	remaining examinations of the subjects of that semester/year. The students also are debarred and forfeit their seats. In case of outsiders, they will be handed over to the police and a police case is registered against them.
7.	Leaves the exam hall taking away answer script or intentionally tears of the script or any part thereof inside or outside the examination hall.	Expulsion from the examination hall and cancellation of performance in that subject and all the other subjects the student has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The student is also debarred for two consecutive semesters from class work and all University examinations. The continuation of the course by the student is subject to the academic regulations in connection with forfeiture of seat.
8.	Possess any lethal weapon or firearm in the examination hall.	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the student has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The student is also debarred and forfeits the seat.
9.	If student of the college, who is not a student for the particular examination or any person not connected with the college indulges in any malpractice or improper conduct mentioned in clause 6 to 8.	Student of the colleges expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the student has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The student is also debarred and forfeits the seat. Person(s) who do not belong to the College will be handed over to police and, a police case will be registered against them.
10.	Comes in a drunken condition to the examination hall.	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the student has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year.
11.	Copying detected on the basis of internal evidence, such as, during valuation or during special scrutiny.	Cancellation of the performance in that subject and all other subjects the student has appeared including practical examinations and project work of that semester/year examinations.
12.	If any malpractice is detected which is not covered in the above clauses 1 to 11 shall be reported to the University for further action to award suitable punishment.	

COURSE STRUCTURE (VCE-R15)

B. TECH.- ELECTRONICS AND COMMUNICATION ENGINEERING

REGULATIONS: VCE-R15

I SEMESTER

Code	Course	Category	Periods per Week			Credits	Scheme of Examination Maximum Marks		
			L	T	P		Internal	External	Total
A3001	Mathematics – I	BS	4	1	0	4	25	75	100
A3002	Engineering Physics	BS	3	1	0	3	25	75	100
A3003	Engineering Chemistry	BS	3	1	0	3	25	75	100
A3501	Computer Programming	BE	4	0	0	4	25	75	100
A3201	Basic Electrical Engineering	BE	4	1	0	4	25	75	100
A3007	Engineering Physics and Engineering Chemistry Lab	BS	0	0	3	2	25	75	100
A3502	Computer Programming through C Lab	BE	0	0	3	2	25	75	100
A3306	Computer Aided Engineering Drawing Lab	BE	0	0	3	2	25	75	100
	TOTAL		18	04	09	24	200	600	800

II SEMESTER

Code	Course	Category	Periods per Week			Credits	Scheme of Examination Maximum Marks		
			L	T	P		Internal	External	Total
A3005	Technical English	HS	3	0	0	3	25	75	100
A3006	Mathematics – II	BS	4	1	0	4	25	75	100
A3004	Probability Theory and Numerical Methods	BS	3	1	0	3	25	75	100
A3503	Data Structures	BE	4	1	0	4	25	75	100
A3401	Electronic Devices and Circuits	BE	4	1	0	4	25	75	100
A3008	English Language Communication Skills Lab	HS	0	0	3	2	25	75	100
A3504	Data Structures Lab	BE	0	0	3	2	25	75	100
A3403	Electronic Devices and Circuits Lab	BE	0	0	3	2	25	75	100
	TOTAL		18	04	09	24	200	600	800

III SEMESTER

Code	Course	Category	Periods per Week			Credits	Scheme of Examination Maximum Marks		
			L	T	P		Internal	External	Total
A3009	Mathematics – III	BS	4	0	0	4	25	75	100
A3010	Environmental Science	BS	3	0	0	3	25	75	100
A3404	Digital Logic Design	BE	3	1	0	3	25	75	100
A3405	Signals and Systems	CE	3	1	0	3	25	75	100
A3406	Random Signals and Stochastic Processes	CE	3	1	0	3	25	75	100
A3407	Electronic Circuit Analysis	CE	4	1	0	4	25	75	100
A3408	Simulation Lab	CE	0	0	3	2	25	75	100
A3409	Electronic Circuit Analysis Lab	CE	0	0	3	2	25	75	100
	TOTAL		20	04	06	24	200	600	800

B. TECH.- ELECTRONICS AND COMMUNICATION ENGINEERING

REGULATIONS: VCE-R15

IV SEMESTER

Code	Course	Category	Periods per Week			Credits	Scheme of Examination Maximum Marks		
			L	T	P		Internal	External	Total
A3011	Managerial Economics and Financial Analysis	HS	3	0	0	3	25	75	100
A3508	Computer Organization and Architecture	CE	3	0	0	3	25	75	100
A3213	Principles of Electrical Engineering	CE	3	1	0	3	25	75	100
A3410	Electromagnetics and Transmission Lines	CE	4	1	0	4	25	75	100
A3411	Pulse and Digital Circuits	CE	4	1	0	4	25	75	100
A3412	Analog Communications	CE	3	1	0	3	25	75	100
A3413	Pulse and Digital Circuits Lab	CE	0	0	3	2	25	75	100
A3414	Analog Communications Lab	CE	0	0	3	2	25	75	100
A3021	Gender Sensitization	AC	0	3	0	0	25*	50*	75*
	TOTAL		**20**	**07**	**06**	**24**	**200**	**600**	**800**

V SEMESTER

Code	Course	Category	Periods per Week			Credits	Scheme of Examination Maximum Marks		
			L	T	P		Internal	External	Total
A3212	Control Systems	CE	3	1	0	3	25	75	100
A3415	Digital Communications	CE	4	0	0	4	25	75	100
A3416	Digital Design through Verilog HDL	CE	3	1	0	3	25	75	100
A3417	Antennas and Wave Propagation	CE	4	0	0	4	25	75	100
A3418	Integrated Circuit Analysis	CE	3	1	0	3	25	75	100
A3419	Microprocessors and Microcontrollers	CE	3	1	0	3	25	75	100
A3421	Integrated Circuit Analysis and HDL Lab	CE	0	0	3	2	25	75	100
A3422	Microprocessors and Interfacing Lab	CE	0	0	3	2	25	75	100
A3012	Professional Ethics and Human Values	AC	3	0	0	0	25*	75*	100*
	TOTAL		**23**	**04**	**06**	**24**	**200**	**600**	**800**

VI SEMESTER

Code	Course	Category	Periods per Week			Credits	Scheme of Examination Maximum Marks		
			L	T	P		Internal	External	Total
A3519	Computer Networks	CE	3	1	0	3	25	75	100
A3424	Embedded Systems	CE	3	1	0	3	25	75	100
A3425	CMOS VLSI Design	CE	3	1	0	3	25	75	100
	Open Elective – I	OE	3	0	0	3	25	75	100
	Professional Elective - I	PE	4	0	0	4	25	75	100
	Professional Elective - II	PE	4	0	0	4	25	75	100
A3426	Embedded Systems Lab	CE	0	0	3	2	25	75	100
A3427	CMOS VLSI Lab	CE	0	0	3	2	25	75	100
A3013	Intellectual Property Rights	AC	3	0	0	0	25*	75*	100*
	TOTAL		**23**	**03**	**06**	**24**	**200**	**600**	**800**

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

B. TECH.- ELECTRONICS AND COMMUNICATION ENGINEERING

REGULATIONS: VCE-R15

VII SEMESTER

Code	Course	Category	Periods per Week			Credits	Scheme of Examination Maximum Marks		
			L	T	P		Internal	External	Total
A3428	Electronic Measurements and Instrumentation	CE	3	1	0	3	25	75	100
A3429	Microwave Engineering	CE	3	1	0	3	25	75	100
A3430	Digital Signal Processing	CE	3	1	0	3	25	75	100
	Open Elective - II	OE	3	0	0	3	25	75	100
	Professional Elective – III	PE	4	0	0	4	25	75	100
	Professional Elective – IV	PE	4	0	0	4	25	75	100
A3431	Digital Communications and Microwave Engineering Lab	CE	0	0	2	1	25	75	100
A3432	Digital Signal Processing Lab	CE	0	0	2	1	25	75	100
A3433	Mini Project	MP	0	0	0	2	100	0	100
TOTAL			20	03	04	24	300	600	900

VIII SEMESTER

Code	Course	Category	Periods per Week			Credits	Scheme of Examination Maximum Marks		
			L	T	P		Internal	External	Total
A3014	Management Science	HS	3	0	0	3	25	75	100
	Open Elective – III	OE	3	0	0	3	25	75	100
	Professional Elective – V	PE	4	0	0	4	25	75	100
A3434	Technical Seminar	TS	0	0	3	2	100	0	100
A3435	Project Work	PW	0	0	20	12	50	150	200
TOTAL			10	0	23	24	225	375	600

B. TECH - ELECTRONICS AND COMMUNICATION ENGINEERING

REGULATIONS: VCE-R15

Professional Elective - I			
Code	**Course**	**Code**	**Course**
A3451	Digital System Design	A3453	Advanced Microprocessors and Microcontrollers
A3452	Data Communications	A3553	Artificial Intelligence and Neural Networks
Professional Elective - II			
Code	**Course**	**Code**	**Course**
A3454	Low Power VLSI Design	A3456	Real Time Operating Systems
A3455	Satellite Communications	A3608	Information Security
Professional Elective - III			
Code	**Course**	**Code**	**Course**
A3457	CPLD and FPGA Architectures and Applications	A3459	Embedded Software Design
A3458	Radar Systems	A3460	Optical Communications
Professional Elective - IV			
Code	**Course**	**Code**	**Course**
A3461	Design of Fault Tolerant Systems	A3463	Digital Image Processing
A3462	Cellular and Mobile Communications	A3525	Cloud Computing
Professional Elective – V			
Code	**Course**	**Code**	**Course**
A3464	Wireless Communications and Networks	A3466	DSP Processors and Architectures
A3465	RF Circuit Design	A3564	Bag Data Analytics
Open Electives			
Code	**Course**	**Code**	**Course**
A3576	Fundamentals of Database Management Systems	A3577	Fundamentals of Image Processing
A3578	Operating System Fundamentals	A3579	JAVA programming
A3676	Cyber Laws	A3677	E-Commerce Trends
A3678	Principles of Software Engineering	A3679	Scripting Languages
A3476	Digital Electronics	A3477	Principles of Analog and Digital Communications
A3478	Transducers and Measurements	A3479	Communication Networking Devices
A3276	Nano Technology Applications to Electrical Engineering	A3277	Industrial Electronics
A3278	Solar Energy and Applications	A3279	Energy Management and Audit
A3376	Elements of Mechanical Engineering	A3377	Basic Thermodynamics and Heat Transfer
A3378	Mechanical Measurements and Instrumentation	A3379	Engineering Optimization
A3176	Environmental pollution and management	A3177	Remote sensing and GIS
A3178	Disaster Management	A3179	Constructing planning and management
A3076	Entrepreneurship Development	A3077	Human Resource Management
A3078	Organization Behavior	A3079	Logistics and Supply Chain Management
A3080	National Service Scheme (NSS)	A3680	Python for Data Science
A3081	Basic Program in Entrepreneurship		

Course Categories

HS	–	Humanities and Social Sciences	**BS**	–	Basic Sciences
BE	–	Basic Engineering	**CE**	–	Core Engineering
AC	–	Audit Course	**OE**	–	Open Elective
PE	–	Professional Elective	**MP**	–	Mini Project
TS	–	Technical Seminar	**PW**	–	Project Work

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

SYLLABI FOR
I SEMESTER

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)

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

MATHEMATICS - I

Course Code: A3001

L	T	P	C
4	1	0	4

Course Overview:

This course offers more advanced topics of mathematics, required to analyze the problems in engineering. Topics to be covered in this course include: Differential equations and their applications, Functions of single, several variables and their applications, Multiple integrals, Laplace transforms and its applications to ordinary differential equations, Vector differential and integral calculus. The mathematical skills derived from this course provides necessary base to analytical and design concepts occurring in the program.

Prerequisite(s):NIL

Course Outcomes:

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

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

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

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

CO4. Apply Laplace transforms to solve differential equations.

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

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)

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

MATHEMATICS - I

Course Code: A3001

L	T	P	C
4	1	0	4

SYLLABUS

UNIT – I **(12 Lectures)**

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

UNIT – II **(11 Lectures)**

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

UNIT – III **(13 Lectures)**

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

UNIT – IV **(10 Lectures)**

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

UNIT-V **(10 Lectures)**

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

TEXT BOOKS:

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

REFERENCE BOOKS:

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

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)

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

ENGINEERING PHYSICS

Course Code: A3002

L	T	P	C
3	1	0	3

Course Overview:

Engineering Physics prepares students to apply physics to tackle engineering challenges. In this course, fundamental physics is combined with problem solving and engineering skills, which then has broad applications. This course provides the background that most engineering fields require. The syllabus is designed to provide a broad foundation as well as interdisciplinary knowledge for continuous innovation occurring with technology.

Prerequisite(s):NIL

Course Outcomes:

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

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

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

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

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

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

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)

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

ENGINEERING PHYSICS

Course Code: A3002

L	T	P	C
3	1	0	3

SYLLABUS

UNIT - I **(10 Lectures)**

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

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

UNIT - II **(8 Lectures)**

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

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

UNIT - III **(8 Lectures)**

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

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

UNIT - IV **(8 Lectures)**

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

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

UNIT - V **(8 Lectures)**

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

FIBER OPTICS: Principle of optical fiber, acceptance angle, Numerical aperture, types of optical fibers, attenuation of signal in optical fibers, Functioning of Optical Fiber communication system, applications of optical fibers.

TEXT BOOKS:

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

REFERENCE BOOKS:

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

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)

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

ENGINEERING CHEMISTRY

Course Code: A3003

L	T	P	C
3	1	0	3

Course Overview:

This course emphasizes a strong background in physical chemistry infused with an orientation towards the materials technology. A course that focuses on the general applications of chemical principles to the analysis and evaluation of engineering problems such as Water and its treatment for various purposes, engineering materials such as plastics, composites and non-conventional energy sources, batteries and fuel cells.

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)

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

ENGINEERING CHEMISTRY

Course Code: A3003

L	T	P	C
3	1	0	3

SYLLABUS

UNIT – I **(11 Lectures)**

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

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

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

UNIT – II **(8 Lectures)**

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

UNIT – III **(10 Lectures)**

ENGINEERING MATERIALS:

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

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

UNIT – IV **(7 Lectures)**

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

UNIT – V **(7 Lectures)**

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

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

TEXT BOOKS:

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

REFERENCE BOOKS:

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

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)

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

COMPUTER PROGRAMMING

Course Code: A3501

L	T	P	C
4	0	0	4

Course Overview:

The course is a Basic Engineering course for all computing aspiring students. It is designed to provide a comprehensive study of the C programming language that covers the fundamental principles of computer programming, 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 console and file I/O systems are explained with the wide variety of examples and applications. It stresses the strengths of C, which provide students with the means of writing efficient, maintainable and reusable code to solve mathematical, engineering and simple data processing problems.

Prerequisite(s):NIL

Course Outcomes:

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

CO1. Write algorithm and draw corresponding flowchart for simple problems besides explaining functions 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 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. ECE I Semester **VCE-R15**

COMPUTER PROGRAMMING

Course Code: A3501

L	T	P	C
4	0	0	4

SYLLABUS

UNIT – I **(15 Lectures)**

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

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

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

UNIT – II **(14 Lectures)**

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

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

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

UNIT – III **(12 Lectures)**

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

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

UNIT – IV **(09 Lectures)**

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

UNIT – V **(08 Lectures)**

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

TEXT BOOKS:

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

REFERENCE BOOKS:

1. Herbert Schildt (2013), *C: The Complete Reference*, 4th Edition, Mc Graw Hill Education (India) Pvt Ltd.
2. B. W. Kerninghan, Dennis M. Ritche (1988), *TheC Programming Language*, 2nd edition, Prentice Hall Software Series, India.
3. Stephen G. Kochan (2014), *Programming in C*, 4th Edition, Addison-Wesley Professional.

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)

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

BASIC ELECTRICAL ENGINEERING

Course Code: **A3201**

L	T	P	C
4	1	0	4

Course Overview:

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

Prerequisite(s): NIL

Course Outcomes:

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

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

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

CO3. Apply the 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. ECE I Semester **VCE-R15**

BASIC ELECTRICAL ENGINEERING

Course Code: **A3201**

L	T	P	C
4	1	0	4

SYLLABUS

UNIT - I **(11 Lectures)**

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

UNIT – II **(11 Lectures)**

ANALYSIS OF ELECTRICAL CIRCUITS: Mesh analysis: mesh equations by inspection method, super mesh analysis, nodal analysis: nodal equations by inspection method, 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 **(11 Lectures)**

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

POWER AND POWER FACTOR: Concept of power factor, real and reactive powers, J notation, complex and polar forms of representation, complex power.

UNIT – IV **(12 Lectures)**

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

UNIT – V **(11 Lectures)**

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

TEXT BOOKS:

1. William H. Hayt, Jack E. Kemmerly, Steven M. Durbin (2006), *Engineering Circuits Analysis*, 7th Edition, Mc Graw Hill, New Delhi.
2. Joseph Edminister (2001), *Electric Circuits*, 6th Edition Schaum's Outlines, Tata Mc Graw Hill, New Delhi.

REFERENCE BOOKS:

1. Van Valkenburg, M. E. (1974), *Network Analysis*, 3rd Edition, Prentice Hall of India, New Delhi.
2. Wadhwa C. L (2009), *Electric Circuits Analysis,* New Age International Publications, New Delhi.
3. Sudhakar, Shyammohan S. Palli (2003), *Electrical Circuits*, 2nd Edition, Tata Mc Graw Hill, New Delhi.
4. Chakrabarthy (2005), Circuit Theory, 4th Edition, Dhanpat Rai & Sons Publications, New Delhi.

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)

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

ENGINEERING PHYSICS AND ENGINEERING CHEMISTRY LAB

Course Code: **A3007**

L	T	P	C
0	0	3	2

Course Overview:

This laboratory course deals with understanding the fundamental physical and chemical properties of materials. The course helps to learn the methodology of investigating problems in physics and also provides to gain knowledge in different techniques and working principles related to devices and components. The course also makes the students familiar with instrumental methods in chemistry, physical properties of liquids and organic synthesis of drugs. This basic knowledge will enable the scientific fervour to solve the societal issues.

Prerequisite(s):NIL

Course Outcomes:

Upon 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 fibres.

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

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

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)

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

ENGINEERING PHYSICS AND ENGINEERING CHEMISTRY LAB

Course Code: **A3007**

L	T	P	C
0	0	3	2

LIST OF EXPERIMENTS

LIST OF EXPERIMENTS (ENGINEERING PHYSICS LAB):

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

LIST OF EXPERIMENTS (ENGINEERING CHEMISTRY LAB):

INSTRUMENTAL METHODS:

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

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

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

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

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

DEMONSTRATION EXPERIMENTS

1. Preparation of Thiokol rubber

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)

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

COMPUTER PROGRAMMING THROUGH C LAB

Course Code: **A3502**

L	T	P	C
0	0	3	2

Course Overview:

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

Prerequisite(s):NIL

Course Outcomes:

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

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

CO5. Implement programs illustrating use of files

CO6. Debug erroneous programs related to the course

VARDHAMAN COLLEGE OF ENGINEERING
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B. Tech. ECE I Semester **VCE-R15**

COMPUTER PROGRAMMING THROUGH C LAB

Course Code: **A3502**

L	T	P	C
0	0	3	2

LIST OF EXPERIMENTS

Week – 1 (Operators)

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

Week – 2 (if and switch statements)

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

Week – 3 (Loops)

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

Week – 4 (Loops)

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

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

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

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

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

Week – 5 (Arrays)

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

Week – 6 (Strings)

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

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

Week – 7 (Functions)

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

Week – 8 (Pointers)

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

Week – 9 (Command line arguments)

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

Week – 10 (Structure and Union)

10. Write C programs for the following:
    a) Read the full name and date of birth of a person and display the same using nested structure.
    b) Create a Student structure containing name, rollNo and grade as structure members. Display the name, rollNo and grade of n students by using array of structures concept.
    c) Create a union named Item that contains, itemName, itemPrice and itemQuantity as members and find the size of the union and number of bytes reserved for it.

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

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

Week – 12 (Files)

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

Week – 13 (Additional Programs)

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

REFERENCE BOOKS:

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

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)

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

COMPUTER AIDED ENGINEERING DRAWING LAB

Course Code: **A3306**

L	T	P	C
0	0	3	2

Course Overview:

This course is an introduction to the students about Engineering drawings that are usually created in accordance with standardized conventions for layout, nomenclature, interpretation, appearance, size, etc. The drawing techniques are emphasized to portray the objects graphically in different views. In the end, the student is capable of drawing different components with the aid of computer without using conventional drawing tools like mini drafter. The use of AUTOCAD provides enhanced graphics capabilities in conceptualizing the ideas to create or modify design very easily and perform animation using various colors, fonts and aesthetic features.

Prerequisite(s):NIL

Course Outcomes:

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

CO1. Use AUTO CAD commands for Computer Aided Drafting and Designing.

CO2. Represent the objects using different types of lines and dimensioning rules.

CO3. Analyze the objects such as points, lines and planes held in different orientations using CAD tools.

CO4. Convert isometric projections to orthographic projections and vice-versa.

CO5. Analyze regular solids held in different orientations using CAD tools.

VARDHAMAN COLLEGE OF ENGINEERING
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B. Tech. ECE I Semester **VCE-R15**

COMPUTER AIDED ENGINEERING DRAWING LAB

Course Code: **A3306**

L	T	P	C
0	0	3	2

LIST OF EXPERIMENTS

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, Projection of straight lines at different positions with respect to Reference Planes, Traces of lines, Skew lines.

UNIT - III

PROJECTION OF PLANES: Types of planes, projection of planes, Planes inclined to single Reference Plane, Inclined to both Reference Planes, Traces of plane.

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 Axonometric Projection, Theory of Isometric Projection, Isometric Drawing, Non-Isometric drawing, Isometric views to orthographic views of simple objects.

TEXT BOOKS:

1. N. D. Bhatt, V. M. Panchal (2012), *Engineering Drawing***,** 49th Edition, Charotar Publishing House, Gujarat.
2. C M Agrawal, Basant Agrawal (2013) *Engineering Drawing*, 2nd Edition, Tata McGraw Hill, India.

REFERENCE 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, ZahidAkhtar 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 McGraw Hill, India.

SYLLABI FOR
II SEMESTER

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)

B. Tech. ECE II Semester **VCE-R15**

TECHNICAL ENGLISH

Course Code: **A3005**

L	T	P	C
3	0	0	3

Course Overview:

The purpose of Technical English course is to equip students with Reading and Writing skills. As part of developing Reading comprehension, the students are trained to develop the sub skills of Reading, which include skimming, Scanning, Understanding Discourse markers, Understanding the organization of a text etc. In terms of developing writing skills, the focus is on facilitating students with the skills required to write effective formal letters, job application letters and Technical reports. In order to augment these skills, the course contents include teaching Grammar and vocabulary. Consequently, the students will be trained to apply these skills to their technical courses.

Prerequisite(s):NIL

Course Outcomes:

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

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

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

CO3. Apply the 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. ECE II Semester **VCE-R15**

TECHNICAL ENGLISH

Course Code: **A3005**

L	T	P	C
3	0	0	3

SYLLABUS

UNIT – I **(8 Lectures)**

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

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

Grammar **:** Articles – Prepositions

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

Writing **:** Paragraph Writing.

UNIT - II **(8 Lectures)**

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

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

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

word substitutes

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

UNIT - III **(8 Lectures)**

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

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

Grammar **:** Tenses, Question Tags

Vocabulary **:** Technical Vocabulary, Word formation with Prefixes and Suffixes- Synonyms and Antonyms Morphemes

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

UNIT - IV **(8 Lectures)**

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

Grammar **:** Active and Passive Voice

Vocabulary **:** Synonyms and Antonyms, Words often confused/mis-spelt

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

UNIT - V **(10 Lectures)**

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

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

Vocabulary **:** One wordsubstitutes and Technical Vocabulary

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

TEXT BOOKS:

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

REFERENCE BOOKS:

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

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)

B. Tech. ECE II Semester **VCE-R15**

MATHEMATICS – II

Course Code: **A3006**

L	T	P	C
4	1	0	4

Course Overview:

This course offers more advanced topics of Mathematics, required to analyze the problems in engineering. Topics to be covered in this course include: solution of system of linear equations, Eigen values and Eigen vectors, quadratic forms, partial differential equations, Fourier series, Fourier transforms and Z - transforms. The mathematical skills derived from this course provides necessary base to analytical and design concepts occurring in the program.

Prerequisite(s):

- Mathematics – I (A3001)

Course Outcomes:

Upon successful completion of this course, student 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)

B. Tech. ECE II Semester **VCE-R15**

MATHEMATICS – II

Course Code: **A3006**

L	T	P	C
4	1	0	4

SYLLABUS

UNIT – I **(11 Lectures)**

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

UNIT – II **(12 Lectures)**

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

UNIT – III **(10 Lectures)**

PARTIAL DIFFERENTIAL EQUATIONS: Formation of partial differential equation by elimination of arbitrary constants and arbitrary functions - Solutions of first order linear (Lagrange) equation and nonlinear (standard type) equations - Equations reducible to standard forms - Method of separation of variables for second order equations.

UNIT – IV **(10 Lectures)**

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

UNIT – V **(13 Lectures)**

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

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

TEXT BOOKS:

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

REFERENCE BOOKS:

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

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)

B. Tech. ECE II Semester **VCE-R15**

PROBABILITY THEORY AND NUMERICAL METHODS

Course Code: **A3004**

L	T	P	C
3	1	0	3

Course Overview:

The coursedealswithmoreadvancedengineeringmathematical topicswhichprovidestudentswiththe relevantmathematicaltoolsrequired to analyze the problems being met with the professions of science and engineering.The topicscoveredareprobability, randomvariables anddistributions,solutions of algebraic andtranscendentalequations, besidesinterpolation,curve fitting,numerical integrationandnumericalsolutionof ordinarydifferentialequations.Themathematicalskills sustained from thiscourse forma suitable baseto analyticaland design conceptsencountered in engineering profession.

Prerequisite(s):NIL

Course Outcomes:

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

CO1. Solve real world problems using the theory of probability.

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

CO3. Develop appropriate Numerical methods to approximate a function.

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

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

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)

B. Tech. ECE II Semester **VCE-R15**

PROBABILITY THEORY AND NUMERICAL METHODS

Course Code: **A3004**

L	T	P	C
3	1	0	3

SYLLABUS

UNIT-I **(8 Lectures)**

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

UNIT-II **(8 Lectures)**

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

UNIT-III **(12 Lectures)**

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

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

UNIT-IV **(8 Lectures)**

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

UNIT-V **(8 Lectures)**

NUMERICAL SOLUTION OF ORDINARY DIFFERENTIAL EQUATIONS: Single step methods: Taylor's series method - Euler's and modified Euler's Methods - Fourth order Runge-Kutta method for solving first order equations – Multistep method: Adam's bash forth Predictor and Corrector method.

TEXT BOOKS:

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

REFERENCE BOOKS:

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

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)

B. Tech. ECE II Semester **VCE-R15**

DATA STRUCTURES

Course Code: **A3503**

L	T	P	C
4	1	0	4

Course Overview:

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

Prerequisite(s):

- Computer Programming (A3501)

Course Outcomes:

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

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

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

CO3. Illustrate the application of linear stack and queue.

CO4. Exhibit the skills of demonstrating use of linked list.

CO5. Design novel solutions for simple real life problems using the concept of nonlinear data structures.

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)

B. Tech. ECE II Semester **VCE-R15**

DATA STRUCTURES

Course Code: **A3503**

L	T	P	C
4	1	0	4

SYLLABUS

UNIT – I **(12 Lectures)**

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

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

UNIT – II **(12 Lectures)**

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

UNIT – III **(10 Lectures)**

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

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

UNIT – IV **(12 Lectures)**

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

UNIT – V **(12 Lectures)**

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

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

TEXT BOOKS:

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

REFERENCE BOOKS:

1. Horowitz, Ellis, Sahni, Sartaj, Anderson-Freed, Susan (2008), *Fundamentals of Data Structure in C*, 2nd Edition, University Press, India.
2. Richard F. Gilberg, Behrouz A. Forouzan (2012), *Data Structures: A Pseudo code approach with C*, 2nd Edition, CENGAGE Learning, India.
3. G. A. V. Pai (2008), *Data Structures and Algorithms: Concepts, Techniques and Applications*, McGraw-Hill Education, India.

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)

B. Tech. ECE II Semester **VCE-R15**

ELECTRONIC DEVICES AND CIRCUITS

Course Code: **A3401**

L	T	P	C
4	1	0	4

Course Overview:

This course covers fundamental topics that are common to a wide variety of electronic devices, circuits and systems. The topics include right from the inception of evolution of semiconductor devices to their real time applications. This course starts with basics of semiconductors, review the operation and characteristics of semiconductor devices (namely, semiconductor diodes, BJTs, JFETs and MOSFETs), and build-up to the construction of electronic circuits like rectifiers with and without filters, biasing circuits and transistor amplifiers. 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 behavior of diodes and transistors.

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

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

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

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

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)

B. Tech. ECE II Semester **VCE-R15**

ELECTRONIC DEVICES AND CIRCUITS

Course Code: **A3401**

L	T	P	C
4	1	0	4

SYLLABUS

UNIT - I **(11 Lectures)**

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

UNIT – II **(12 Lectures)**

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

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

UNIT - III **(10 Lectures)**

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

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

UNIT - IV **(11 Lectures)**

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

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

UNIT - V **(12 Lectures)**

SINGLE STAGE AMPLIFIERS: Transistor as an amplifier, Classification of amplifiers, Transistor hybrid model, the h-parameters, analysis of a transistor amplifier circuit (CE, CB, CC) using h-parameters, simplified Common Emitter hybrid model.

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

TEXT BOOKS:

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

REFERENCE BOOKS:

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

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)

B. Tech. ECE II Semester **VCE-R15**

ENGLISH LANGUAGE COMMUNICATION SKILLS LAB

Course Code: **A3008**

L	T	P	C
0	0	3	2

Course Overview:

The basic idea behind offering English as a practical subject at the undergraduate level is to acquaint the students with a language that enjoys currently as a lingua franca of the globe. In the ELCS lab the students are trained in Communicative English Skills: phonetics, word accent, word stress, rhythm and intonation, making effective oral presentations- both extempore and Prepared- seminars, presenting techniques of writing, role play, telephonic skills, asking for and giving directions, information transfer, debates, description of person, place, objects etc. The lab encourages students to work in a group, engage in peer-reviews and inculcate team spirit through various exercises related to grammar, vocabulary, listening and pronunciation etc.

Prerequisite(s):NIL

Course Outcomes:

Upon successful completion of this course, student 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. ECE II Semester **VCE-R15**

ENGLISH LANGUAGE COMMUNICATION SKILLS LAB

Course Code: **A3008**

L	T	P	C
0	0	3	2

LIST OF EXPERIMENTS

a. Computer Assisted Language Learning (CALL) Lab

b. Interactive Communication Skills (ICS) Lab

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

Exercise – I

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

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

Exercise – II

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

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

Exercise - III

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

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

Exercise – IV

CALL Lab: Intonation and Common errors in Pronunciation.

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

Exercise – V

CALL Lab: Neutralization of Mother Tongue Influence and Conversation Practice

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

Suggested Softwares:

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

REFERENCE BOOKS:

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

VARDHAMAN COLLEGE OF ENGINEERING
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B. Tech. ECE II Semester **VCE-R15**

DATA STRUCTURES LAB

Course Code: **A3504**

L	T	P	C
0	0	3	2

Course Overview:

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

Prerequisite(s):NIL

Course Outcomes:

Upon successful completion of this course, student 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 potential benefits of each one over the other

CO3. Illustrate about linear data structures like stacks and queues representations and operations and apply 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 non linear data structures.

CO5. Debug erroneous programs related to the course.

VARDHAMAN COLLEGE OF ENGINEERING
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B. Tech. ECE II Semester **VCE-R15**

DATA STRUCTURES LAB

Course Code: **A3504**

L	T	P	C
0	0	3	2

LIST OF EXPERIMENTS

Week- 1: (Recursion function)

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

Week- 2: (Searching Techniques)

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

Week-3: (Sorting Techniques)

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

Week-4: (Sorting Techniques)

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

Week-5: (Sorting Techniques)

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

Week- 6: (Linked List)

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

Week-7: (Linked List)

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

Week- 8: (Stack)

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

Week-9: (Stack)

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

Week-10: (Queue)

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

Week-11: (Trees)

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

Week-12: (Graphs)

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

Week-13: (Additional Programs)

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

REFERENCE BOOKS:

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

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)

B. Tech. ECE II Semester **VCE-R15**

ELECTRONIC DEVICES AND CIRCUITS LAB

Course Code: **A3403**

L	T	P	C
0	0	3	2

Course Overview:

The electronic devices and circuits laboratory is one of the first electronics and communication engineering laboratory course that a student will undergo. The students become familiar with laboratory test and measuring instruments such as CRO, regulated power supply, function generator, ammeter, voltmeter and digital 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, student 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 various electronic devices so as to realize the applications like switching, regulation and amplification.

CO3. Design 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 the given transistor.

CO5. Analyze the transient and frequency response of single stage amplifier circuits.

VARDHAMAN COLLEGE OF ENGINEERING
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B. Tech. ECE II Semester **VCE-R15**

ELECTRONIC DEVICES AND CIRCUITS LAB

Course Code: **A3403**

L	T	P	C
0	0	3	2

LIST OF EXPERIMENTS

PART - A: ELECTRONIC WORKSHOP PRACTICE

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

PART - B:

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

SYLLABI FOR
III SEMESTER

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)

B. Tech. ECE III Semester **VCE-R15**

MATHEMATICS - III

Course Code: **A3009**

L	T	P	C
4	0	0	4

Course Overview:

This is an advanced undergraduate course in mathematics focusing on the theory of functions of a complex variable with geometric emphasis. Topics include special functions, functions of complex variables, elementary functions, conformal mapping, complex integration, complex power series and calculus of residues. The mathematical skills derived from this course form a necessary base to analyze and design concepts in future course of study.

Prerequisite(s):NIL

Course Outcomes:

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

CO1. Evaluate improper integrals using beta and gamma functions; distinguish the concepts of Bessel and Legendre functions

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

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

CO4. Develop analytic functionin 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
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B. Tech. ECE III Semester **VCE-R15**

MATHEMATICS - III

Course Code: **A3009**

L	T	P	C
4	0	0	4

SYLLABUS

UNIT - I **(14 Lectures)**

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

UNIT - II **(10 Lectures)**

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 **(11 Lectures)**

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 **(10 Lectures)**

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 **(11 Lectures)**

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

TEXT BOOKS:

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

REFERENCE BOOKS:

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

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)

B. Tech. ECE III Semester **VCE-R15**

ENVIRONMENTAL SCIENCE

Course Code: **A3010**

L	T	P	C
3	0	0	3

Course Overview:

Environmental study is interconnected; interrelated and interdependent subject. Hence, it is multidisciplinary in nature. The present course is framed by expert committee of UGC under the direction of Honorable Supreme Court to be as a core module syllabus for all branches of higher education and to be implemented in all universities over India. The course is designed to create environmental awareness and consciousness among the present generation to become environmental responsible citizens. The course description is: multidisciplinary nature of environmental studies, Natural Resources: Renewable and non-renewable resources; Ecosystems; Biodiversity and its conservation; Environmental Pollution; Social Issues and the Environment; Human Population and the Environment; pollution control acts . 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, student 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 knowledgeof Environmentalethics to maintain harmonious relation between nature and human being.

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

VARDHAMAN COLLEGE OF ENGINEERING
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B. Tech. ECE III Semester **VCE-R15**

ENVIRONMENTAL SCIENCE

Course Code: **A3010**

L	T	P	C
3	0	0	3

SYLLABUS

UNIT – I **(7 Lectures)**

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

NATURAL RESOURCES:Renewable and non-renewable resources.Natural resources and associated problems.

FOREST RESOURCES: 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 **(7 Lectures)**

ECOSYSTEMS: Concept of an ecosystem. Structure and function of an ecosystem. Producers, consumers and decomposers. Energy flow in the ecosystem. Ecological succession. Food chains, food webs and ecological pyramids. Introduction, types, characteristic features, structure and function of the following ecosystem:Forest ecosystem, grassland ecosystem, desert ecosystem, aquatic ecosystems

BIODIVERSITY AND ITS CONSERVATION:Introduction. Definition: genetic, species and ecosystem diversity. Value of BIODIVERSITY: consumptive use, productive use, social, ethical, aesthetic and option values. Biodiversity at global, National and local levels. India as a mega diversity nation.Hot-spots of biodiversity. Threats to biodiversity- habitat loss, poaching of wildlife, man -wildlife conflicts. Endangered and endemic species of India.Conservation of biodiversity- In-situ and Ex-situ conservation of biodiversity.

UNIT - III **(12 Lectures)**

ENVIRONMENTAL POLLUTION: Definition, Cause, effects and control measures of air pollution, water pollution, soil pollution, marine pollution, noise pollution,thermal pollution and nuclear hazards, Ill effects of fireworks.

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 **(8 Lectures)**

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

UNIT – V **(8 Lectures)**

ENVIRONMENTALETHICS: Environment Protection Act. -Air (Prevention and Control of Pollution) Act. -Water (Prevention and control of Pollution) Act -Wildlife Protection Act -Forest Conservation Act -Issues involved in enforcement of environmental legislation. Public awareness.

ENVIRONMENTAL IMPACT ASSESSMENT: Conceptual facts of EIA, Baseline date acquisition, planning and management of impact studies, operational aspects of EIA, methods for impact identification, prediction of impacts (air, water, noise, soil, biological and socio- economics). Environmental Management Plan. Role of NGOs in creating awareness among people regarding environmental issues.

TEXT BOOKS:

1. 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 BOOKS:

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

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)

B. Tech. ECE III Semester **VCE-R15**

DIGITAL LOGIC DESIGN

Course Code: **A3404**

L	T	P	C
3	1	0	3

Course Overview:

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

Prerequisite(s):NIL

Course Outcomes:

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

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

CO2. Make useof Boolean algebra postulates-map and tabulation methods to minimize Boolean functions and to implement with logic gates.

CO3. Construct and Analyze various combinational and sequential circuits used in digital systems suchas adders, subtractors, code-convertors, decoders,encoders, multiplexers, flip flops, registers and counters.

CO4. Design various PLDs such as ROMs, PALs, PLAs and PROMs

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

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)

B. Tech. ECE III Semester **VCE-R15**

DIGITAL LOGIC DESIGN

Course Code: **A3404**

L	T	P	C
3	1	0	3

SYLLABUS

UNIT-I **(11 Lectures)**

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

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

UNIT-II **(9 Lectures)**

GATE LEVEL MINIMIZATION: The k-map method, four-variable map, five-Variable map, Sum of Products and Product of Sums simplification, don't-care conditions, NAND and NOR implementation, AND-OR-INVERT,OR-AND-INVERT implementations, exclusive – OR function,The tabulation(Quine Mccluskey) method, determination and selection of Prime implicants.

UNIT-III **(14 Lectures)**

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

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 **(10 Lectures)**

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

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

UNIT-V **(12 Lectures)**

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

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

TEXT BOOKS:

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

REFERENCE BOOKS:

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

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)

B. Tech. ECE III Semester **VCE-R15**

SIGNALS AND SYSTEMS

Course Code: **A3405**

L	T	P	C
3	1	0	3

Course Overview:

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

Prerequisite(s):

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

Course Outcomes:

Upon successful completion of this course, 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. ECE III Semester **VCE-R15**

SIGNALS AND SYSTEMS

Course Code: **A3405**

L	T	P	C
3	1	0	3

SYLLABUS

UNIT - I **(12 Lectures)**

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

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

UNIT - II **(12 Lectures)**

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

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

UNIT - III **(10 Lectures)**

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

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

UNIT - IV **(12 Lectures)**

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

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

UNIT - V **(10 Lectures)**

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

Z - TRANSFORMS: The Z - Transform, The Region of Convergence (ROC) for Z - transform and its properties, properties of Z -transform, constraints on ROC for various classes of signals, transfer function, causality and stability, Inverse Z- transform using various methods.

TEXT BOOKS:

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

REFERENCE BOOKS:

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

VARDHAMAN COLLEGE OF ENGINEERING
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B. Tech. ECE III Semester **VCE-R15**

RANDOM SIGNALS AND STOCHASTIC PROCESSES

Course Code: **A3406**

L	T	P	C
3	1	0	3

Course Overview:

This course provides a foundation in the theory and applications of probability and stochastic processes and to understand the mathematical techniques relating to random processes in the areas of signal processing, detection & estimation theory, and communications. Topics include the axioms of probability, random variables, and distribution functions; functions and sequences of random variables; stochastic processes; and representations of random processes. This course also focuses on the application of statistical techniques to the study of random signals and noise and concepts like noise figure, noise temperature etc., to evaluate the performance of given communication system.

Prerequisite(s):NIL

Course Outcomes:

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

CO1. Recall various probability concepts and apply the knowledge of probability to find cumulative distribution function and Probability density functions of random variables.

CO2. Extend the concept of single random variable to multiple random variables so as to tackle practical statistical communication problems.

CO3. Classify the different types of random processes to apply to real physical world problems.

CO4. Identify the importance of correlation function and its relation to power spectral density.

CO5. Estimate the performance of linear time invariant systems in terms of noise factor, noise band width noise temperature and extend each to cascaded systems.

VARDHAMAN COLLEGE OF ENGINEERING
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B. Tech. ECE III Semester **VCE-R15**

RANDOM SIGNALS AND STOCHASTIC PROCESSES

Course Code: **A3406**

L	T	P	C
3	1	0	3

SYLLABUS

UNIT - I **(12 Lectures)**

RANDOM VARIABLES: Definition of a random variable, classification of random variables, distribution and density functions-Gaussian, uniform, exponential, binomial, Poisson, Rayleigh, conditional distribution and density functions.

OPERATIONS ON SINGLE RANDOM VARIABLE: Expectation, moments, variance and skew, Chebyshev's inequality, Markov's inequality, characteristic function, moment generating function,Transformations of single random variable (monotonic and non-monotonic).

UNIT - II **(14 Lectures)**

MULTIPLE RANDOM VARIABLES: Joint distribution function, properties of joint distribution, marginal distribution functions, joint density function, properties of joint density function, conditional distribution and density point conditioning, interval conditioning, statistical independence, sum of two random variables, sum of several random variables, central limit theorem (without proof).

OPERATIONS ON MULTIPLE RANDOM VARIABLES: Expected value of a function of random variable, joint moments about the origin, joint central moments, joint characteristic functions, jointly Gaussian random variables, two random variables case, N random variable case, properties,multiple random variables, linear transformations of Gaussian random variables.

UNIT - III **(10 Lectures)**

RANDOM PROCESS - TEMPORAL CHARACTERISTICS: Random process concept, classification of random processes, distribution and density functions, concept of stationary and statistical independence. first-order stationary processes, second- order and wide-sense stationary, N^{th}-Order and strict-sense stationarity, time averages and ergodicity, mean-ergodic processes, correlation-ergodic processes, autocorrelation function and its properties, cross-correlation function and its properties, covariance functions.

UNIT - IV **(10 Lectures)**

RANDOM PROCESS-SPECTRAL CHARACTERISTICS: Power spectrum, properties, relationship between power spectrum and autocorrelation function, cross-power density spectrum, properties, relationship between cross-power spectrum and cross-correlation function.

UNIT - V **(10 Lectures)**

NOISE: Types of noise, Resistive noise, Shot noise, extra-terrestrial noise, arbitrary noise sources, white noise, narrow band noise: In-phase and quadrature phase components and its properties, modelling of noise sources, average noise bandwidth, effective noise temperature, average noise figures.

TEXT BOOKS:

1. Peyton Z. Peebles (2009), *Probability Random variables and Random signal principles* 4th Edition, Tata McGraw Hill, New Delhi, India.
2. Athanasios Papoulis, Unni Krishna Pillai (2002), *Probability, Random variables and stochastic processes*, 4th Edition, Tata McGraw Hill, New Delhi, India.

REFERENCE BOOKS:

1. Henry Stark, John W. Woods (2009), *Probability and Random processes with applications to signal processing,* 3rd Edition, Pearson Education, India.
2. R. P. Singh, S. D. Sapre (2007), *Communication Systems Analog & Digital, 2nd Edition,* Tata McGraw Hill, New Delhi, India.
3. Simon Haykin(2009),*Communication Systems, 2nd Edition,* John Wiley, India.

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)

B. Tech. ECE III Semester **VCE-R15**

ELECTRONIC CIRCUIT ANALYSIS

Course Code: **A3407**

L	T	P	C
4	1	0	4

Course Overview:

This course covers topics of the electronic circuits that are used as basic building blocks for various electronic systems. The topics include right from the inception of designing of electronic circuits such as small signal amplifiers, large signal amplifiers, feedback amplifiers, tuned amplifiers and oscillator for building real time applications. This course starts with the recall of the operation and characteristics of semiconductor devices (namely, semiconductor diodes, BJTs, JFETs and MOSFETs), and leads to more advanced topics in analog circuit design. It also provides a basis for students to design various electronic circuits as per the requirement of the applications and makes the student to analyze and design electronic systems as per the given specifications.

Prerequisite(s):NIL

Course Outcomes:

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

CO1. Classify various amplifiers based on the applications and compare its characteristics

CO2. Analyze amplifier circuits using small signal low frequency and high frequency transistor models

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

CO4. Identify the need and compare the performance of various power amplifiers and tuned amplifiers

CO5. Design analog circuits such as voltage amplifiers, oscillators, power amplifiers and tuned amplifiers using discrete components

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)

B. Tech. ECE III Semester **VCE-R15**

ELECTRONIC CIRCUIT ANALYSIS

Course Code: **A3407**

L	T	P	C
4	1	0	4

SYLLABUS

UNIT - I **(10 Lectures)**

REVIEW OF SINGLE STAGE AMPLIFIERS: Analysis of CE amplifier using h parameter model,Millers theorem and its dual, analysis of CE amplifier with un-bypassed R_E, frequency response of amplifier.

MULTISTAGE AMPLIFIERS: Cascading transistor amplifiers, methods of couplings, choice of transistor configuration in a cascade amplifier, distortion in amplifiers, band-pass of cascaded stages, RC coupled amplifier, CE -CB amplifier, CE-CC amplifier, Darlington connection, multistage amplifier using JFET (CS - CS), .

UNIT – II **(12 Lectures)**

TRANSISTOR AT HIGH FREQUENCIES: Hybrid-pi (π) common emitter transistor model, hybrid - π conductances and capacitances, validity of hybrid- π model, variation of hybrid – π parameters, the CE short circuit current gain, current gain with resistive load, gain-bandwidth product.

UNIT - III **(12 Lectures)**

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 **(12 Lectures)**

LARGE SIGNAL AMPLIFIERS: Introduction, classification of power amplifiers, power amplifier versus voltage amplifier, series fed class A power amplifier, transformer coupled class A power amplifier, class B power amplifier - push pull and complementary symmetry configurations, thermal stability, heat sink.

UNIT - V **(10 Lectures)**

TUNED AMPLIFIERS: Introduction, classification of small signal tuned amplifiers, **s**ingle tuned capacitance coupled amplifier, tapped single tuned capacitance coupled amplifier, **s**ingle tuned inductively coupled amplifier, double tuned amplifier (Qualitative treatment only).

TEXT BOOKS:

1. Jacob Milliman, Christos C. Halkias, Chetan D. Parikh (2011), *Integrated Electronics-Analog and Digital Circuits and Systems,* 2nd edition, Tata McGraw Hill Education Private Limited, New Delhi.
2. G. K. Mithall (1998), *Electronic Devices and Circuits*, Khanna Publishers, 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.

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)

B. Tech. ECE III Semester **VCE-R15**

SIMULATION LAB

Course Code: **A3408**

L	T	P	C
0	0	3	2

Course Overview:

The course will give the fundamental knowledge and practical abilities in MATLAB required to effectively utilize this tool in technical numerical computations and visualization in other courses. In this course students will learn how to use MATLAB as an effective tool and they are required to show their innovativeness in science and engineering. Simulation laboratory also consists of another computer aided design tool called NI LabVIEW which is used for implementation of combinational and sequential logic circuits. The laboratory comprises of the application of four years of study of Electronics & Communication Engineering.

Prerequisite(s):NIL

Course Outcomes:

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

CO1. Apply the Basics of MATLAB to analyze the generation and transformations of Various Signals and Sequences.

CO2. Determine the Convolution and Correlation between Signals and sequences in real time scenario using MATLAB.

CO3. Verification of Linearity and Time Invariance Properties of a given Continuous/Discrete System using MATLAB

CO4. Design various number systems conversions and digital logic design circuits using LabVIEW.

CO5. Analyze the functionality of Combinational circuits and Sequential Circuits using LabVIEW.

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)

B. Tech. ECE III Semester **VCE-R15**

SIMULATION LAB

Course Code: **A3408**

L	T	P	C
0	0	3	2

LIST OF EXPERIMENTS

PART - A: List of Experiments using MATLAB

1. Introduction to MATLAB - getting started with MATLAB
2. Operators and Elementary Operations
   a. Arithmetic
   b. Relational
   c. Logical
   d. Bit-wise Operations
3. Elementary Mathematics
   a. Arithmetic - Operators, cumulative sums and products, rounding and remainder
   b. Trigonometry - Sine, cosine, and related functions, with results in radians or degrees
   c. Exponents and Logarithms - Exponential, logarithm, power and root functions
   d. Complex Numbers - Real and imaginary components, phase angles
   e. Discrete Math - Prime factors, factorials, permutations, LCM and GCD
   f. Polynomials - Curve fitting, roots, partial fraction expansions
   g. Special Functions - Bessel, Legendre, elliptic, error, gamma and other functions
4. Plotting Graphs both 2-D and 3-D
   a. Plotting Basics
   b. Line Plots
   c. Pie Charts, Bar Plots, and Histograms
   d. Discrete Data Plots
5. Programming Scripts and Functions
   a. Control Flow - Conditional statements, loops, branching
   b. Scripts
   c. Functions
   d. Debugging
   e. Coding and Productivity Tips
   f. Programming Utilities

PART - B: List of Experiments using NI LabVIEW

1. Introduction to NI LabVIEW
2. Number based conversions
3. Realization of logic gates
4. Implementation and verification of adders and subtractors
5. Implementation and verification of multiplexers
6. Implementation and verification of decoders and encoders
7. Implementation and verification of magnitude comparators
8. Implementation and verification of flip-flops
9. Implementation and verification of registers
10. Implementation and verification of counters

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)

B. Tech. ECE III Semester **VCE-R15**

ELECTRONIC CIRCUIT ANALYSIS LAB

Course Code: **A3409**

L	T	P	C
0	0	3	2

Course Overview:

The electronic circuit analysis lab gives an insight into the design and analysis of various electronic circuits which are basic building blocks for the Electronics and Communication Engineering. The students will become familiar with the design of various amplifier and oscillators using BJTs and JFETs. The exposure of the students to CAD tools like multisim makes them to design and analyze frequency response and this knowledge will enable them to design, construct and test major electronic circuits leading to mini/major projects.

Prerequisite(s):NIL

Course Outcomes:

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

CO1. Design small signal amplifiers for given specifications using hardware circuit and compare results with Multisim software.

CO2. Interpret different types of negative feedback amplifiers with the help of Multisim software and compare the results with the hardware circuit.

CO3. Make use of Multisim circuit design software and hardware circuit for the implementation of oscillators like RC, LC for given specifications.

CO4. Compare the conversion efficiency of power amplifiers using hardware circuit and Multisim circuit design software.

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)

B. Tech. ECE III Semester **VCE-R15**

ELECTRONIC CIRCUIT ANALYSIS LAB

Course Code: **A3409**

L	T	P	C
0	0	3	2

LIST OF EXPERIMENTS

DESIGN AND SIMULATION USING MULTISIM AND TESTING IN THE HARDWARE LABORATORY:

1. Single state CE and CS amplifiers
2. Two Stage RC Coupled Amplifiers
3. Cascode Amplifier
4. Darlington Pair Configuration
5. CS – CS Amplifier
6. Voltage Series Feedback Amplifier.
7. Current Shunt Feedback Amplifier
8. Colpitt's Oscillator.
9. Hartley Oscillator.
10. RC Phase Shift Oscillator.
11. Wein bridge Oscillator.
12. Class A Power Amplifier (Transformer less).
13. Class B Complementary Symmetry Push Pull Amplifier.
14. Single Tuned Voltage Amplifier.

SYLLABI FOR
IV SEMESTER

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)

B. Tech. ECE IV Semester **VCE-R15**

MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS

Course Code: **A3011**

L	T	P	C
3	0	0	3

Course Overview:

This Course is designed in such a way that it gives an overview of concepts of Economics. Managerial Economics enables students to understand micro environment in which markets operate how price determination is done under different kinds of competitions. Financial Analysis gives clear idea about concepts and conversions accounting procedures along with introducing students to fundamentals of ratio analysis and interpretation of financial statements.

Prerequisite(s):NIL

Course Outcomes:

Upon successful completion of this course, student 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. ECE IV Semester **VCE-R15**

MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS

Course Code: **A3011**

L	T	P	C
3	0	0	3

SYLLABUS

UNIT – I **(12 Lectures)**

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

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

UNIT – II **(10 Lectures)**

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

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

UNIT – III **(8 Lectures)**

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

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

UNIT – IV **(10 Lectures)**

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

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

UNIT – V **(12 Lectures)**

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

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

TEXT BOOK:

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

REFERENCE BOOKS:

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

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)

B. Tech. ECE IV Semester **VCE-R15**

COMPUTER ORGANIZATION AND ARCHITECTURE

Course Code: **A3508**

L	T	P	C
3	0	0	3

Course Overview:

The course gives a bottom up view of how a computer works. It begins with a overview of digital logic, and the goal of this course is to develop a clear understanding of the basic organization of computing systems. It covers logical basis of computer structure, machine representation of instructions and data, flow of control and basic machine instructions then builds up the main architectural and system elements of a typical modern computer. We use a specific RISC computer architecture, MIPS, to illustrate the main concepts and processor pipeline designs and memory hierarchy systems

Prerequisite(s):

- Computer Programming (A3501)

Course Outcomes:

Upon successful completion of this course, 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. Analyze the microprogram control formats and 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
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B. Tech. ECE IV Semester **VCE-R15**

COMPUTER ORGANIZATION AND ARCHITECTURE

Course Code: **A3508**

L	T	P	C
3	0	0	3

SYLLABUS

Unit – I **(10 Lectures)**

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 **(9 Lectures)**

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 **(9 Lectures)**

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 **(9 Lectures)**

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 **(8 Lectures)**

MULTIPROCESSORS: Characteristics of multiprocessors, interconnection structures, inter processor arbitration, inter processor 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.

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)

B. Tech. ECE IV Semester **VCE-R15**

PRINCIPLES OF ELECTRICAL ENGINEERING

Course Code: **A3213**

L	T	P	C
3	1	0	3

Course Overview:

This course covers basic electrical concepts like magnetic circuits, and its analogous quantities in electric circuits. In addition to that analysis of AC and Dc transient circuits is carried out. This course also deals with analysis of different electrical machines viz. Dc Generators, Dc Motors, Transformers, Three phase and single phase Induction motors.

Prerequisite(s):

- Basic Electrical Engineering (A3201)

Course Outcomes:

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

CO1. Apply the knowledge of magnetic circuits to different electrical machines.

CO2. Analyze the DC and AC transient behavior of series, parallel circuits.

CO3. Calculate losses and efficiencies of different electrical machines.

CO4. Evaluate the performance of different electrical machines with the help of suitable tests.

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)

B. Tech. ECE IV Semester **VCE-R15**

PRINCIPLES OF ELECTRICAL ENGINEERING

Course Code: **A3213**

L	T	P	C
3	1	0	3

SYLLABUS

UNIT - I **(9 Lectures)**

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

UNIT - II **(10 Lectures)**

D.C AND A.C TRANSIENT ANALYSIS: Transient response of R-L, R-C, R-L-C circuits (Series and parallel combinations) for DC and AC excitations – Initial conditions, solution using differential equation.

UNIT - III **(10 Lectures)**

D.C GENERATORS: Principle of operation of DC Machines, EMF equation, types of generators, magnetization and load characteristics of DC generators.

D.C. MOTORS: Types of DC motors, characteristics of DC motors, losses and efficiency, Swinburne's test, speed control of DC shunt motor, flux and armature voltage control methods.

UNIT - IV **(10 Lectures)**

TRANSFORMERS: Principle of operation of single phase transformer, types, constructional features, phasor diagram on no load and load, equivalent circuit, losses and efficiency of transformer and regulation, OC and SC tests, predetermination of efficiency and regulation.

UNIT - V **(9 Lectures)**

THREE PHASE INDUCTION MOTORS: Principle of operation of three phase induction motors, slip ring and squirrel cage motors, slip-torque characteristics, efficiency calculation,starting methods.

TEXT BOOKS:

1. Sudhakar, Shyammohan S. Palli (2008), Circuit and Networks, Tata McGraw Hill, New Delhi, India.
2. L. Theraja, A. K. Theraja (2011), A Text book of Electrical Technology (Volume-II), 4th edition, S. Chand Publications, New Delhi, India.

REFERENCE BOOKS:

1. Joseph A. Edminister (2002), Schaums outline of Electrical Circuits, 4thedition, McGraw Hill Publications, India.
2. J. B. Gupta (2006), Theory and Performance of Electrical Machines, S. K. Kataria & Sons, New Delhi.

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)

B. Tech. ECE IV Semester **VCE-R15**

ELECTROMAGNETICS AND TRANSMISSION LINES

Course Code: **A3410**

L	T	P	C
4	1	0	4

Course Overview:

This course deals with two things one in electromagnetic theory and the other one is transmission line theory. The electromagnetic theory is divided into two points: The static electromagnetic and the time varying electromagnetic. The physical laws like Gauss law, the Ampere's law and the Faraday's law are discussed in detail. At low frequencies the circuit approach is adequate but as the frequency increases the inadequacy of circuit approach forces us to follow the electromagnetic field approach. At higher frequencies, the circuit approach cannot accommodate the space constraint and hence transmission line approach has to be used to solve the electrical problems related to networks.

Prerequisite(s):

- Mathematics – III (A3009)

Course Outcomes:

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

CO1. Apply Vector calculus to static electric – Magnetic fields in different engineering situation.

CO2. Apply the concepts of time varying EM fields to obtain Maxwell equations and analyze its application in EM wave propagation

CO3. Examine the phenomena of wave propagation through boundaries of different media.

CO4. Design the stub elements for impedance matching and analyze the characteristics of transmission line using smith chart.

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)

B. Tech. ECE IV Semester **VCE-R15**

ELECTROMAGNETICS AND TRANSMISSION LINES

Course Code: **A3410**

L	T	P	C
4	1	0	4

SYLLABUS

UNIT - I **(12 Lectures)**

ELECTROSTATICS: Introduction to Co-ordinate Systems and Transformations, Coulomb's law, Electric field intensity, Field due to different charge distributions, Electric flux and Flux density, Gauss law and its applications, Electric potential, relation between electric field and potential, Maxwell's equations for electrostatic fields, energy density and illustrative problems. Convection and conduction currents, Continuity equation, relaxation time, poisons and Laplace equations, Capacitance – Parallel plate, coaxial, spherical capacitors, Illustrative problems.

UNIT - II **(10 Lectures)**

MAGNETO STATICS: Biot-Savarts law, Amperes circuital law and applications, Magnetic flux and magnetic flux density, Maxwell's equations for magneto static fields, magnetic Scalar and vector potentials, amperes force law, inductances and magnetic energy, illustrative problems.

UNIT - III **(14 Lectures)**

TIME VARYING FIELDS & MAXWELLS EQUATIONS: Faradays law, Inconsistency of Amperes law and displacement current density, Maxwell's equations in differential, integral and word statements.

BOUNDARY CONDITIONS: Conditions at a boundary surface: dielectric-dielectric and dielectric – conductor interfaces, illustrative problems.

UNIT - IV **(12 Lectures)**

EM WAVE CHARACTERISTICS: Wave motion in free space, perfect, Lossy dielectrics and good conductors, Poynting theorem, polarization, reflection and refraction of plane waves- normal and oblique incidence (perpendicular and parallel polarizations).

UNIT - V **(10 Lectures)**

TRANSMISSION LINES: Transmission line types, parameters, equations, Infinite line concepts, distortion, condition for distortion less, lossless and minimum attenuation, loadings, Input impedance relations of open and short circuited transmission lines, reflection coefficient and VSWR, Smith chart configuration and applications, Single stub and double stub matching, illustrative problems.

TEXT BOOKS:

1. Matthew N. O. Sadiku (2008), *Elements of Electromagnetics*, 4rd edition, Oxford University Press, New Delhi.
2. Umesh Sinha, Satya Prakashan (2001), *Transmission Lines & Networks*, Tech India Publications, India.

REFERENCE BOOKS:

1. William H. Hayt Jr. , John A. Buck (2006), *Engineering Electromagentics*, 7th edition, Tata McGraw Hill, India.
2. E. C. Jordan, K. G. Balmain(2000), *Electromagnetic Waves and Radiating Systems*, 2nd edition, Prentice Hall of India, New Delhi.
3. John. D. Kraus (2007), *Electromagnetics*, 6th edition, McGraw Hill, New Delhi.
4. Nanapeneni Narayana Rao(2006), *Elements of Engineering Electromagnetics*, 6th edition, Pearson Education, India.

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)

B. Tech. ECE IV Semester **VCE-R15**

PULSE AND DIGITAL CIRCUITS

Course Code: **A3411**

L	T	P	C
4	1	0	4

Course Overview:

This course will cover the mathematical and theoretical foundations of digital electronics and pulse techniques. The switching characteristics of junction diodes and transistors are covered. Mathematical analysis of linear and nonlinear wave shaping circuits is dealt in detail so as to apply in the electronics and communication systems. The generation of non-sinusoidal wave forms by multivibrator circuits and their design is covered extensively. The basic operating principle of unidirectional and bi directional sampling gates is discussed for the transmission of signals. The theory regarding logic families which include the design of logic gates for different various digital applications is covered.

Prerequisite(s):

- Electronic Devices and Circuits (A3401)
- Mathematics – II (A3006)

Course Outcomes:

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

CO1. Apply the knowledge of Kirchhoff's voltage and Current laws to design various linear and nonlinear circuits

CO2. Analyze Quantitatively and qualitatively the physical behaviour of active and passive elements and relate the theory to the evolution of analog and digital circuits.

CO3. Design different multi-vibrators, time base generators and sampling gates by making use of semiconductor diodes and transistors.

CO4. Compare and contrast different types of logic families and interpret their use in various applications.

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)

B. Tech. ECE IV Semester **VCE-R15**

PULSE AND DIGITAL CIRCUITS

Course Code: **A3411**

L	T	P	C
4	1	0	4

SYLLABUS

UNIT - I **(11 Lectures)**

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, attenuators, RL and RLC circuits and their response for step input, ringing circuit.

UNIT - II **(10 Lectures)**

SWITCHING CHARACTERISTICS OF DEVICES: Diode as a switch, Piece wise linear characteristics of a diode, diode switching times, temperature variation of saturation parameters, design of transistor as a switch, transistor-switching times, and transistor in saturation.

NON-LINEAR WAVE SHAPING : Diode clippers, transistor clippers, clipping at two independent levels, emitter coupled clipper, comparators, applications of voltage comparators, clamping operation, clamping circuits using diode with different inputs, clamping circuit theorem, practical clamping circuits, effect of diode characteristics on clamping voltage.

UNIT - III **(14 Lectures)**

BISTABLE MULTIVIBRATORS: The stable state of a bistable multivibrator, design and analysis of fixed bias and self biased bistable multivibrator, emitter coupled bistable multivibrator, direct binary, and Schmitt trigger circuit using transistors.

MONOSTABLE AND ASTABLE MULTIVIBRATORS: Monostable multivibrator, design and analysis of collector coupled and emitter coupled monostable multivibrator, triggering of monostable multivibrator, astable multivibrator, collector coupled and emitter coupled astable multivibrator.

UNIT - IV **(10 Lectures)**

TIME BASE GENERATORS: General features of a time base signal, methods of generating time base waveform, miller and bootstrap time base generators – basic principles, transistor miller time base generator, transistor bootstrap time base generator, current time base generators, methods of linearity improvements.

UNIT - V **(11 Lectures)**

SAMPLING GATES: Basic operating principles of sampling gates, Unidirectional diode gate, Bi-directional sampling gates using transistors, Reduction of pedestal in gate circuit, four diode sampling gate, an alternate form of four diode gate, six diode sampling gate, , Chopper Amplifier, Sampling Scope.

LOGIC FAMILIES: Realization of Logic Gates (OR, AND, NOT) Using Diodes & Transistors, DCTL, RTL, DTL, TTL, ECL, CML, CMOS logic family and comparison of logic families.

TEXT BOOKS:

1. Jacob Millman, Herbert Taub, Mothiki S. Prakash Rao (2008), *Pulse, Digital and Switching Waveforms*, 3rd edition, Tata McGraw Hill, New Delhi.

REFERENCE BOOKS:

1. David A. Bell (2002), *Solid state pulse circuits,* 4th edition, Prentice Hall of India, New Delhi, India.
2. Anand Kumar (2005), *Pulse and Digital Circuits*, Prentice Hall of India, India.
3. Mothiki S. Prakash Rao (2006), *Pulse and Digital Circuits*, Tata McGraw Hill, India.

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)

B. Tech. ECE IV Semester **VCE-R15**

ANALOG COMMUNICATIONS

Course Code: **A3412**

L	T	P	C
3	1	0	3

Course Overview:

In this course, an introduction to analog (classical) communications is present, with emphasis on Amplitude Modulation (AM), Frequency Modulation (FM) and Pulse modulation techniques and analyzing all the modulation schemes in time-domain and in frequency-domain. This course aims at developing statistical techniques and skills needed to evaluate the performance of analog communication systems in the presence of noise and realize these skills through a simple communication systems design. This course focuses on the design of analog communication systems for a given channel by choosing the suitable modulation and demodulation schemes.

Prerequisite(s):

- Signals and Systems(A3405)
- Random Signals and Stochastic Processes (A3406)

Course Outcomes:

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

CO1. Analyze linear and non - linear modulators and demodulators in time as well as frequency domain.

CO2. Design a linear and non-linear modulators and demodulators.

CO3. Determine the fundamental communication system parameters like power and bandwidth etc.

CO4. Evaluate the communication system performance in presence of the noise.

B. Tech. ECE IV Semester **VCE-R15**

ANALOG COMMUNICATIONS

Course Code: **A3412**

L	T	P	C
3	1	0	3

SYLLABUS

UNIT - I **(12 Lectures)**

AM and DSBSC modulation: Introduction to communication system, need for modulation, Amplitude modulation- time domain and frequency domain of AM signals-power relations in AM, Generation of AM waves, square law modulator , Switching modulator, Detection of AM waves: Square law detector, Envelope detector.

Double sideband suppressed carrier modulation: Time domain and frequency domain description, balanced modulator, Ring modulator, Coherent detection of DSBSC modulated waves, Costas loop.

UNIT - II **(11 Lectures)**

SSB and VSB:SSB modulation frequency domain description, frequency discrimination method for generation of AM SSB modulated wave, time domain description, phase discrimination method for generating SSB, Demodulation of SSB waves.

Vestigial sideband modulation: frequency description, Generation of VSB modulated wave, Time domain description, Envelope detection of VSB wave plus carrier, Comparison of AM techniques, Applications of different AM systems, Frequency division multiplexing.

UNIT - III **(12 Lectures)**

Angle Modulation: Basic concepts of Frequency Modulation: Single tone frequency modulation, Spectrum analysis of sinusoidal FM wave, Narrow band FM, Wideband FM, Constant Average Power, Transmission Bandwidth of FM Wave –Comparison of FM&AM

Generation and Demodulation of FM: Direct method: Parametric variation method: Varactor Diode, Reactance Modulator, Indirect Method: Armstrong Method, detection of FM waves: Balanced Frequency Discriminator, Zero crossing Detector, Phase locked loop**.**

UNIT - IV **(10 Lectures)**

Noise: Introduction, Noise in DSBSC, Noise in SSBSC, Noise in AM, Noise in FM, Threshold effect in Angle Modulation System, Pre-emphasis & de-emphasis.

Pulse Modulation: Analog pulse modulation, Types of Pulse modulation, PAM (Single polarity, double polarity) Generation & demodulation of PWM, Generation and demodulation of PPM.

UNIT - V **(10 Lectures)**

Transmitters and Receivers: Transmitters Classification of Transmitters, AM transmitter, Effect of feedback on performance of AM transmitter, FM Transmitter, frequency stability in FM transmitter.

Receivers: Introduction, TRF receiver, Super heterodyne receiver, Receiver characteristics, Local oscillator, Image frequency, Choice of IF, , AGC, FM Receiver, Amplitude limiting, Comparison with AM Receiver.

TEXT BOOKS:

1. S.S.Haykin, *Communication Systems*, 2nd Edition, Wiley Eastern.
2. Taub and schilling, *Principles of Communication Systems*, Tata McGraw-Hill

REFERENCE BOOKS:

1. George Kennedy, *Electronic Communication Systems*, Tata McGraw-Hill.
2. B.P.Lathi, *Modern Digital and Analog Communication Systems*, BPB.
3. A.B.Carlson, *Communication Systems*, Mc.Graw-Hill.
4. G.K. Mithal, Radio Engineering – Principles of Communications.

(AUTONOMOUS)

B. Tech. ECE IV Semester **VCE-R15**

PULSE AND DIGITAL CIRCUITS LAB

Course Code: **A3413**

L	T	P	C
0	0	3	2

Course Overview:

This lab course deals with active and passive devices and circuit configurations used for the generation and processing of pulse, digital and switching waveforms. These non-sinusoidal signals find extensive application in fields such as computers, control systems, counting and timing systems, data processing systems, digital instrumentation, pulse communications, RADAR, telemetry, television, and in many areas of experimental research. This lab focuses on the practical methods and techniques for the generation of variety of waveforms and applying them to various circuits in real time to study the response.

Prerequisite(s):

- Electronic Devices Lab(A2404)

Course Outcomes:

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

CO1. Interpret the output response of linear circuits and nonlinear circuits so as to realize the applications like High pass RC circuits, Low pass RC circuit, Clippers, Clampers and etc.

CO2. Conduct experiments to design and demonstrate various multivibrator and sampling gates using analog components.

CO3. Implement and Examine logic gates and flip flops using discrete components.

CO4. Demonstrate the use of Multisim software and Realize analog and digital circuits using PSPICE tool.

VARDHAMAN COLLEGE OF ENGINEERING
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B. Tech. ECE IV Semester **VCE-R15**

PULSE AND DIGITAL CIRCUITS LAB

Course Code: **A3413**

L	T	P	C
0	0	3	2

LIST OF EXPERIMENTS

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

PART - A

Testing in the Hardware Laboratory: (Any 6 Experiments)

1. Linear wave shaping – High Pass RC circuits
2. Linear wave shaping – Low Pass RC circuits
3. Non Linear wave shaping – Clippers.
4. Non Linear wave shaping – Clampers
5. Bistable Multivibrator.
6. Schmitt Trigger.
7. Monostable Multivibrator.
8. Astable Multivibrator.
9. Realization of Logic Gates using discrete components.

PART - B

Design and Simulation in Simulation Laboratory using Multisim Software

A) Any three circuits from hardware laboratory
B) Any three of the following

1. Transistor as a switch.
2. Sampling Gates.
3. Bootstrap sweep circuit.
4. Miller Sweep circuit.
5. UJT Relaxation Oscillator.

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)

B. Tech. ECE IV Semester **VCE-R15**

ANALOG COMMUNICATIONS LAB

Course Code: **A3414**

L	T	P	C
0	0	3	2

Course Overview:

Analog communications lab involves analyzing the transferring of analog signals through different types of modulators. And also observing the same signal at different types of demodulators. in this course first, a theory is given to represent signal in time and frequency domain.Then experimentation and observation of modulation techniques are given. In this lab course all the analog modulation techniques like AM,DSBSC,SSBSC,FM,TDM are observed practically. This lab course aims at developing statistical techniques, skills needed to evaluate the performance of analog communication system in the presence of noise in free space and realize these skills to design a practical transmitter and receiver.

Prerequisite(s):

Course Outcomes:

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

CO1. Generate time domain waveforms and Evaluate fundamental communication system parameters such as modulation index, bandwidth, and frequency deviation for analog communication system.

CO2. Design pre-emphasis and de-emphasis filters to improve the efficiency of a frequency modulation system.

CO3. Analyze Automatic gain control mechanism and realize squelch action using AGC.

CO4. Implement phase locked loop concept to construct frequency multiplier.

CO5. Implement the fundamental communication system blocks using MATLAB.

VARDHAMAN COLLEGE OF ENGINEERING
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B. Tech. ECE IV Semester **VCE-R15**

ANALOG COMMUNICATIONS LAB

Course Code: **A3414**

L	T	P	C
0	0	3	2

LIST OF EXPERIMENTS

Note: Minimum 12 Experiments to be conducted:

All these Experiments are to be simulated first either using MATLAB, SCILAB, OCTAVE, LAB VIEW or any other simulation package and then to be realized in hardware.

Minimum Twelve experiments to be conducted:

1. Amplitude Modulation and Demodulation
2. DSB-SC Modulator & Detector
3. SSB-SC Modulator & Detector (Phase Shift Method)
4. Frequency Modulation and Demodulation
5. Study of Spectrum analyzer and analysis of AM and FM Signals
6. Pre-emphasis and De-emphasis
7. Time Division Multiplexing & De-multiplexing
8. Verification of Sampling Theorem
9. Pulse Amplitude Modulation & Demodulation
10. Pulse Width Modulation & Demodulation
11. Pulse Position Modulation & Demodulation
12. Frequency synthesizer
13. AGC Characteristics
14. PLL as FM Demodulator

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)

B. Tech. ECE IV Semester **VCE-R15**

GENDER SENSITIZATION

Course Code: **A3021**

L	T	P	C
0	3	0	0

Course Overview:

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

Course Outcomes:

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

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

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

CO3. Take part in house work, in order to allow for equality and share equal family spaces.

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

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

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

VARDHAMAN COLLEGE OF ENGINEERING
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B. Tech. ECE IV Semester **VCE-R15**

GENDER SENSITIZATION

Course Code: **A3021**

L	T	P	C
0	3	0	0

1. **Gender Sensitization: Why should we study it?**

2. **Socialization: Making Women, Making Men**
   Introduction
   Preparing for womanhood
   Growing up male
   First lessons in caste
   Different masculinities

3. **Just Relationships: Being Together as Equals**
   Mary Kom and Onler
   Love and Acid just do not mix
   Love letters
   Mothers and fathers
   Further Reading: Rosa Parks-The Brave heart

4. **Missing Women: Sex Selection and Its Consequences**
   Declining Sex Ratio
   Demographic Consequences

5. **Gender Spectrum: Beyond the Binary**
   Two or Many?
   Struggles with Discrimination

6. **Additional Reading: Our Bodies, Our Health**

7. **Housework: The Invisible Labour**
   "My Mother doesn't work"
   "Share the load"

8. **Women's Work: Its Politics and Economics**
   Fact and fiction
   Unrecognized and unaccounted work
   Further Reading: wages and conditions of work.

9. **Sexual Harassment: Say No!**
   Sexual harassment, not eve-teasing
   Coping with everyday harassment
   Further Reading: "Chupulu"

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

11. Thinking about Sexual Violence

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

12. Knowledge: Through the Lens of Gender

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

13. Whose History? Questions for Historians and Others

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

TEXT BOOK:

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

ADDITIONAL RESOURCES:

1. www.worldofequals.org.in

SYLLABI FOR
V SEMESTER

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)

B. Tech. ECE V Semester **VCE-R15**

CONTROL SYSTEMS

Course Code: **A3212**

L	T	P	C
3	1	0	3

Course Overview:

From this course student can understand the principles and applications of control system in daily life. This course will introduce time-domain systems dynamic control fundamentals and their design issues. Emphasis will be on linear, time-invariant, multi-input multi-output continuous time systems. Topics include open and closed-loop state-space representations, analytical solutions, computer simulations, stability, controllability, observability, and controller/observer design.

Prerequisite(s):

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

Course Outcomes:

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

CO1. Develop the fundamentals of various types of control systems and also to determine the transfer function of mechanical and electrical systems.

CO2. Evaluate the transfer function by using block diagram reduction technique and masons gain formula and also to analyze the transfer function of servo motors.

CO3. Analyze the time response of first, second-order systems and concept of stability and also apply the different methods to find the stability of system like R-H criteria and root locus.

CO4. Examine the stability of control system by using different techniques like bode, polar and nyquist plot.

CO5. Design a lag, lead and lead-lag compensators and PID controllers and also to solve state transition matrices, state space models of time invariant systems.

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)

B. Tech. ECE V Semester **VCE-R15**

CONTROL SYSTEMS

Course Code: **A3212**

L	T	P	C
3	1	0	3

SYLLABUS

UNIT - I **(10 Lectures)**

BASICS IN CONTROL SYSTEM AND TRANSFER FUNCTION: Introduction of Control Systems, Various types of systems (Open Loop and closed loop) and their differences, Feed-Back Characteristics of control system-Effects of feedback.

MATHEMATICAL MODELS: Differential equations, Translational and Rotational mechanical systems, Force – Voltage analogy, Force – Current analogy.

UNIT - II **(10 Lectures)**

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

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

UNIT - III **(14 Lectures)**

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 **(12 Lectures)**

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 **(10 Lectures)**

COMPENSATORS AND CONTROLLERS: Compensation techniques **–** Lag, Lead, Lead-Lag Compensators, PID Controllers**.**

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

TEXT BOOKS:

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

REFERENCE BOOKS:

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

VARDHAMAN COLLEGE OF ENGINEERING
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B. Tech. ECE V Semester **VCE-R15**

DIGITAL COMMUNICATIONS

Course Code: **A3415**

L	T	P	C
4	0	0	4

Course Overview:

This course provides complete knowledge of sampling, quantization and encoding to convert the analog signals in to digital form. Various analog to digital conversion techniques like PCM and Delta Modulation along with the refined forms like DPCM and ADM are also discussed. In addition to baseband transmission of digital data over the channel, carrier modulation schemes like ASK, FSK, PSK, DPSK and QPSK are analyzed. It focuses on source coding techniques like Huffman coding, Shannon fano coding for reducing redundant data and channel coding techniques such as linear block codes, cyclic codes and convolution codes for error detection and correction.

Prerequisite(s):

- Signals and Systems (A3405)
- Random Signals and Stochastic Processes (A3406)
- Analog Communications (A3412)

Course Outcomes:

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

CO1. Develop the basic concepts of modulation, sampling, need for digital data transmission with an insight into practical applications.

CO2. Compare and contrast ask, fsk, psk digital carrier modulation schemes in terms of occupied bandwidth, complexity etc., and extend these into qpsk, mpsk, qam for improved spectral efficiency.

CO3. Apply the basics of information theory to calculate channel capacity and other measures.

CO4. Analyze the differences between the usage of systematic linear block codes and convolutional codes for non-burst and burst channel applications

CO5. Distinguish between source coding and channel coding for optimization of discrete memory less source and for error-free transmission of data over channel.

VARDHAMAN COLLEGE OF ENGINEERING
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B. Tech. ECE V Semester **VCE-R15**

DIGITAL COMMUNICATIONS

Course Code: **A3415**

L	T	P	C
4	0	0	4

SYLLABUS

UNIT - I **(13 Lectures)**

INTRODUCTION: Introduction, elements of a digital communication system, PCM, quantization noise and SNR, Non uniform quantization, DPCM, DM, ADM, comparison of PCM and DM systems, noise in PCM systems, Noise in DM Systems, Concept of ISI.

UNIT - II **(11 Lectures)**

DIGITAL CARRIER MODULATION SCHEMES: Introduction to Band pass Transmission**,** Generation and detection(coherent and non coherent) of binary ASK signalling schemes, binary PSK signalling schemes, binary FSK signalling schemes, DPSK, QPSK. Matched filter, Optimum Receiver, probability of error for ASK, FSK and PSK, comparison of digital modulation schemes-bandwidth requirements.

UNIT - III **(12 Lectures)**

INFORMATION THEORY: Introduction, measure of information, Entropy, Rate of information, Joint entropy and conditional entropy, Discrete memory less channels,mutual information, channel capacity, Shannon's theorem.

SOURCE CODING: Source coding theorem, Shannon - fano coding, Huffman coding, efficiency calculations.

CAPACITY OF GAUSSIAN CHANNEL: Continuous channel, Shannon Hartley theorem, bandwidth-S/N trade off.

UNIT - IV **(10 Lectures)**

LINEAR BLOCK CODES: Matrix description of Linear Block codes, Error detection and error correction capabilities of Linear block codes, single error correcting Hamming codes, Binary cyclic codes, Algebraic structure of cyclic codes, encoding and decoding using (n-k) bit shift register, syndrome calculation, error detection and error correction.

UNIT - V **(10 Lectures)**

CONVOLUTIONAL CODES: Encoding of convolutional codes, time domain approach, transform domain approach. Graphical approach: code tree, trellis and state diagram, maximum likelihood decoding of convolutional codes, sequential decoding of convolutional codes.

TEXT BOOKS:

1. K. Sam Shanmugam (2006), *Digital and Analog Communication Systems*, John Wiley & Sons, New Delhi.
2. Simon Haykin(1988), *Digital Communications*, John Wiley & Sons, New Delhi.

REFERENCE BOOKS:

1. R.P.Singh and S.D.Sapre, *Communication Systems*, second edition, Tata McGraw Hill Publishing Company Limited, New Delhi
2. John G. Proakis (2001), *Digital Communications,* 4th edition, Tata McGraw Hill Publishing Company Limited, New Delhi.
3. Amitabha Bhattacharya (2006), *Digital Communication*, Tata McGraw Hill Publishing Company Limited, New Delhi.

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)

B. Tech. ECE V Semester **VCE-R15**

DIGITAL DESIGN THROUGH VERILOG HDL

Course Code: **A3416**

L	T	P	C
3	1	0	3

Course Overview:

This course introduces how to realize digital design using verilog language. As the size and complexity of digital systems increase, more computer aided design (CAD) tools are introduced into the hardware design process. Growth of design automation tools is largely due to hardware description languages (HDLs) and design methodologies that are based on these languages. One of the most widely used HDLs is the Verilog HDL. Because of its wide acceptance in digital design industry, Verilog has become a must-know for design engineers and students in computer-hardware-related fields.

Prerequisite(s):

- Computer Programming (A3501)
- Digital Logic Design (A3404)

Course Outcomes:

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

CO1. Apply the knowledge of HDL concepts to FPGA and ASIC design flow.

CO2. Develop all digital electronic circuits using different HDL abstraction level.

CO3. Test for the functionality of combinational and sequential circuits using EDA tools

CO4. Evaluate the performance of digital electronic circuits in view of real time scenario.

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)

B. Tech. ECE V Semester **VCE-R15**

DIGITAL DESIGN THROUGH VERILOG HDL

Course Code: **A3416**

L	T	P	C
3	1	0	3

SYLLABUS

UNIT – I **(10 Lectures)**

INTRODUCTION TO VLSI DESIGN: Introduction, conventional approach to digital design, VLSI/ASIC design flow, Role of HDL.

INTRODUCTION TO VERILOG: Verilog as HDL, Emergence of HDLs, Capabilities of Verilog HDL, Levels of Design Description, Hierarchical Modelling Concepts.

LANGUAGE CONSTRUCTS AND CONVENTIONS: Introduction, Keywords, Identifiers, White Space Characters, Comments, Numbers,Strings, Logic Values, Strengths, Data Types, Scalars, Vectors and Arrays, Memories, Expressions, Operands and Operators, Parameters,System Tasks, Compiler Directives, Modules and Ports, Modelling Styles.

UNIT – II **(12 Lectures)**

GATE LEVEL MODELLING: Introduction**,** Gate Types – AND/OR Gates, BUF/NOT Gates, Tri-state Gates, Array of Instances of Gate Primitives, Net Delays and Gate Delays, Rise, Fall and Turn-off Delays, Min/Typ/Max Values, Delay Examples, Strengths andContention Resolution,Verilog Design Examples Using Gate Level Modelling.

UNIT – III **(12 Lectures)**

DATA FLOW MODELLING: Introduction, Continuous Assignments, Delays, Expressions, Operands and Operators, Operator Types, Verilog Design Examples Using Data Flow Modelling.

SWITCH LEVEL MODELLING: Introduction, Switch-Modelling Elements – MOS Switches, CMOS Switches, Bidirectional Switches, Power and Ground, Resistive Switches, Delay Specification on Switches, Verilog Design Examples Using Switch Level Modelling.

UNIT – IV **(12 Lectures)**

BEHAVIORAL MODELLING: Introduction,Structures Procedures – Initial and Always Statements, Procedural Assignments, Timing Controls, Conditional Statements, Multiway Branching, Loops, Sequential and Parallel Blocks, Generate Blocks, Procedural Continuous Assignments, Test Benches, Verilog Design Examples Using Behavioral Modelling.

UNIT – V **(10 Lectures)**

TASKS, FUNCTIONS AND USER DEFINED PRIMITIVES: Differences between Tasks and Functions, Declaration and Invocation, Examples, UDP Basics, Combinational UDPs, Sequential UDPS.

DESIGN EXERCISES: Design using Finite State Machine (Moore and Mealy Machines).

TEXT BOOKS:

1. T. R. Padmanabhan, B. Bala Tripura Sundari (2004), *Design through Verilog HDL*, Wiley & Sons Education, IEEE Press, USA.
2. Samir Palnitkar (2013), Verilog HDL – A Guide to Digital Design and Synthesis, 2nd Edition, Pearson Education, New Delhi, India

REFERENCE BOOKS:

1. Michael D. Ciletti (2005), *Advanced Digital Design with Verilog HDL*, Prentice Hall of India, New Delhi.
2. Stephen. Brown, Zvonko Vranesic (2005), *Fundamentals of Logic Design with Verilog,* Tata McGraw Hill, India.
3. J. Bhaskar (2003)*, A Verilog Primier,* 2nd edition*,* BS Publications, India.

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)

B. Tech. ECE V Semester **VCE-R15**

ANTENNAS AND WAVE PROPAGATION

Course Code: **A3417**

L	T	P	C
4	0	0	4

Course Overview:

The basic objective of antennas and wave propagation is communication of information from source to destination and to understand the basic theory of electromagnetic waves traveling from transmitter to receiver. This course explains how antenna converts the electrical energy into the electromagnetic energy and vice versa. This course also explains the various types of transmitting and receiving antennas recently in use. This also explores the theory and practice of antenna engineering, including a range of antenna types, applications, and electromagnetic properties from basics to state of the art. This course explains design metrics of various antennas in wide spectrum of frequencies, with primary emphasis on VHF, UHF, and microwave regions. The student also learns the various propagation mechanisms/impairments and the basic models of propagation. Atmospheric and weather effects are also reviewed.

Prerequisite(s):

- Electromagnetic Waves and Transmission Lines (A3410).

Course Outcomes:

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

CO1. Analyze various antennas like wire antennas, Aperture, Array and Microstrip.

CO2. Develop the basic skills necessary for designing a wide variety of practical antennas and antennas arrays.

CO3. Test the designed and fabricated antennas for their specifications.

CO4. Evaluate different wave propagation techniques to explain the wireless communication mechanism / modes.

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)

B. Tech. ECE V Semester **VCE-R15**

ANTENNAS AND WAVE PROPAGATION

Course Code: **A3417**

L	T	P	C
4	0	0	4

SYLLABUS

UNIT - I **(16 Lectures)**

ANTENNA BASICS: Introduction, Radiation Mechanism – single wire, 2 wires, dipoles, Current Distribution on a thin wire antenna. Basic Antenna Parameters -Patterns, Beam widths, Beam Area, Radiation Intensity, Beam Efficiency, Directivity, Gain and Resolution, Antenna Apertures, Antenna efficiency, Effective Height, Related Problems. Retarded vector potentials, Short Electric Dipole-Field, radiation resistance, Thin linear antenna ,half wave dipole-Field, current pattern, Power Radiated, radiation resistance, Beam widths, Directivity, Effective Area and Effective Height, Radiation Resistance at a point which is not current maximum.

UNIT - II **(10 Lectures)**

LOOP ANTENNAS, ANTENNA ARRAYS: The Small Loop, Comparison of far fields of small loop and short dipole, Loop antenna general case, Far field pattern of circular loop antenna with uniform current, small loop as special case, Radiation resistance of loop, Directivity of circular loop antenna with uniform current.

ANTENNA ARRAYS: Two element arrays, Multiplication of patterns, Linear Array with n -isotropic point sources of equal amplitude and spacing (Broadside, End fire Arrays), EFA with Increased Directivity, Scanning Arrays, N element linear array and directivity, Binomial Arrays- Uniform spacing and Non-uniform Amplitude.

UNIT - III **(10 Lectures)**

NON-RESONANT RADIATORS, BROADBAND ANTENNAS

Long wire antennas, V-antennas, Rhombic Antennas and Design Relations, Travelling wave antenna.

BROAD BAND ANTENNAS: The Helical Antennas - Significance, Geometry, helix modes, Practical design considerations for Monofilar axial mode helical antenna, linear polarization with monofilar axial mode helical antenna.

UNIT - IV **(12 Lectures)**

VHF, UHF AND MICROWAVE ANTENNAS: Dipole array with Parasitic Elements, Folded Dipoles & their characteristics, Yagi-Uda Antenna, Reflector Antennas : Flat Sheet and Corner Reflectors, Paraboloidal Reflectors – Beam formation, Types of parabolic reflectors, F/D Ratio, Spill Over, Back Lobes, Aperture Blocking, Feed systems, Off-set Feeds, Cassegrain Feeds, Horn Antennas – Types, Optimum Horns, Design Characteristics of Pyramidal Horns; Lens Antennas – principle, types of lens antenna, non metallic dielectric lens antenna, primary feed and its uses, E –plane metal plate lens antenna, Antenna Measurements – Patterns measurement-arrangement for radiation pattern, Distance requirements, Directivity and Gain Measurements, Introduction to Microstrip antennas.Design and Analysis of Basic Antennas using HFSS.

UNIT - V **(12 Lectures)**

WAVE PROPAGATION: Introduction, classification, modes of Propagation, Ground Wave Propagation– Characteristics, Parameters, Wave Tilt, Flat and Spherical Earth Considerations. Sky Wave Propagation – Formation of Ionospheric Layers and their Characteristics, Mechanism of Reflection and Refraction, Critical Frequency, Virtual Height, MUF– Calculations, LUHF, Skip Distance, Optimum working Frequency, Ionospheric Abnormalities, Ionospheric Absorption, multi-hop propagation, Space Wave Propagation – LOS, Tropospheric Wave Propagation – Radius of Curvature of path, Effective Earth's Radius, Effect of Earth's Curvature, Field Strength Calculations, Duct Propagation(M-curves).

TEXT BOOKS:

1. John D. Kraus, Ronald J. Marhefka , Ahmad S Khan, *Antennas and Wave propagation* , 4th edition, Tata McGraw Hill,New Delhi, India.
2. C. A. Balanis (2001), *Antenna Theory*, 2nd Edition, John Wiley & Sons, India.

REFERENCE BOOKS:

1. K. D. Prasad, SatyaPrakashan, *Antennas and Wave Propagation*, Tech India Publications, New Delhi
2. E. C. Jordan, K. G. Balmain, *Electromagnetic Waves and Radiating Systems*, 2nd edition, PHI.
3. Robert. E. Collin, *Antennas and Radiowave Propagation*, McGraw Hill,New Delhi, India.

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)

B. Tech. ECE V Semester **VCE-R15**

INTEGRATED CIRCUIT ANALYSIS

Course Code:**A3418**

L	T	P	C
3	1	0	3

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 and Circuits (A3401)
- Electronic Circuit Analysis (A3407)
- Basic Electrical Engineering (A3201)

Course Outcomes:

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

CO1. Apply the knowledge of Kirchoff's Voltage and Current Law for solving Linear and Non-Linear Applications.

CO2. Design various mathematical operation circuits using IC741 Integrated Circuits.

CO3. Analyze various applications constructed using Integrated Circuits such IC 741 Op-Amp and IC 555 & 565 Timers and also regulator ICs 78XX, 79XX and 723.

CO4. Design various timing applications using IC555 Timer & IC565 Phase Locked Loop Integrated Circuits.

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)

B. Tech. ECE V Semester **VCE-R15**

INTEGRATED CIRCUIT ANALYSIS

Course Code:**A3418**

L	T	P	C
3	1	0	3

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, ACamplifier, 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 andallpass 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, DACand 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. Sergio Franco (1997), *Design with Operational Amplifiers and Analog Integrated Circuits*, McGraw Hill, New Delhi.

REFERENCE BOOKS:

1. Gray, Meyer (1995), *Analysis and Design of Analog Integrated Circuits*, Wiley International, New Delhi
2. Ramakant A. Gayakwad, (2012), *OP-AMP and Linear Integrated Circuits*, 4th edition, Prentice Hall / Pearson Education, NewDelhi.

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)

B. Tech. ECE V Semester **VCE-R15**

MICROPROCESSORS AND MICROCONTROLLERS

Course Code: **A3419**

L	T	P	C
3	1	0	3

Course Overview:

This course provides a comprehensive introduction to microprocessors, microcontrollers (8051) and their architectures with an emphasis on its interfacing with external devices. Focus is on 8086 microprocessor family which includes internal architecture, pin diagram, instruction set, register organization, addressing modes, operating modes, interrupt structure, assembly language programming and etc. Various aspects of hardware design, such as interfacing of memory and different types of I/O devices will be covered in detailed. It also emphasis on 8051 microcontrollers, 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 concepts. 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, 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. ECE V Semester **VCE-R15**

MICROPROCESSORS AND MICROCONTROLLERS

Course Code: **A3419**

L	T	P	C
3	1	0	3

SYLLABUS

UNIT - I **(11 Lectures)**

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

UNIT - II **(14 Lectures)**

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

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

UNIT - III **(12 Lectures)**

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

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

UNIT - IV **(10 Lectures)**

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

UNIT – V **(10 Lectures)**

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

Text Books:

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

Reference Books:

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

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)

B. Tech. ECE V Semester **VCE-R15**

INTEGRATED CIRCUIT ANALYSIS AND HDL LAB

Course Code: **A3421**

L	T	P	C
0	0	3	2

Course Overview:

This Lab course covers an insight into the design of various hardware usage and software coding. The students will become familiar with the design of various circuits using IC 741, IC555, IC 565. The exposure of the students to XILINX tool makes them to design, simulate and verify digital operations and this knowledge will enable them to design, construct and test different circuits leading to mini or major projects.

Prerequisite(s):

- Digital Logic Design (A3404)
- Electronic Circuit Analysis Lab (A3409)
- Pulse and Digital Circuits Lab (A3413)

Course Outcomes:

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

CO1. Interpret the output response of linear Operational Amplifiers so as to realize the applications like Adders, Subtractions, Integrators, filters and etc.

CO2. Design and implement various applications using Analog ICs to demonstrate a given application / problem statement.

CO3. Demonstrate the use of Xilinx software and Realize basic digital Circuits using Verilog HDL.

CO4. Program and synthesize a given application / problem statement using EDA tools.

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)

B. Tech. ECE V Semester **VCE-R15**

INTEGRATED CIRCUIT ANALYSIS AND HDL LAB

Course Code: **A3421**

L	T	P	C
0	0	3	2

LIST OF EXPERIMENTS

PART - A: LINEAR INTEGRATED CIRCUITS

1. Measurement of IC741 op-amp parameters.
2. Basic applications (Adder, Subtractor, Comparator) of IC741 op-amp.
3. Integrator and Differentiator using IC 741 op-amp.
4. Active Low Pass and High Pass Butterworth filters (1^{st} and 2^{nd} order).
5. RC Phase Shift and Wien Bridge Oscillators using IC 741 op-amp.
6. IC555 timer in Astable and Monostable operation.
7. Schmitt trigger circuits using IC741 op-amp and IC555 timer.
8. Operation of Phase Locked Loop using IC565.
9. Voltage regulator IC723, three terminal voltage regulators- 7805, 7809, 7912.
10. A/D Converter using IC 741 op amp.
11. D/A Converter using IC 741 op amp.

PART - B: HDL CODING AND SIMULATION

Construct Verilog Design Modules demonstrating the use of following Verilog HDL and Modelling Styles:

1. Gate Level Modelling (Structural Modelling)
   a) Adders
   b) Decoders
   c) Multiplexers
2. Behavioral Modelling
   a) Flip-Flops
   b) Counters
   c) Shift Registers
3. Dataflow Modelling
   a) ALU
   b) Comparator
   c) Code Converters
4. User Defined Primitives (UDPs)
   a) Combinational UDPs
   b) Sequential UDPs
5. Functions and Tasks
   a) Adder
   b) Parity Generator
6. Design of Finite State Machines (Mealy and Moore Machines)- Sequence Detector

VARDHAMAN COLLEGE OF ENGINEERING
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B. Tech. ECE V Semester **VCE-R15**

MICROPROCESSORS AND INTERFACING LAB

Course Code:**A3422**

L	T	P	C
0	0	3	2

Course Overview:

The Microprocessor and Interfacing lab course is designed to train students to develop programs to be executed on 8086 microprocessor based system and design system hardware through experiments conducted individually on various interfacing components like ADC, DAC, Keyboard etc. In this course students will write all standalone programs in assembly language compile and debug those programs using the assembler. All the interfacing experiments will be conducted using trainer kits and interfacing modules. This Lab provides students with the opportunity to gain experience in microprocessor-based system design, assembly language programming and I/O interfacing to microprocessors.

Prerequisite(s):

- Digital Logic Design (A3404)
- Computer Organization and Architecture (A3508)
- Microprocessors and Interfacing (A3419)

Course Outcomes:

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

CO1. Describe the interaction between CPU, memory and I/O ports in various applications.

CO2. Master the assembly level programming language using 8086 instruction set.

CO3. Analyze how different I/O devices can be interfaced to processor and will explore several techniques of interfacing.

CO4. Design a simple microprocessor based system with functional requirements for hardware and software components for few input and output devices.

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)

B. Tech. ECE V Semester **VCE-R15**

MICROPROCESSORS AND INTERFACING LAB

Course Code:**A3422**

L	T	P	C
0	0	3	2

LIST OF EXPERIMENTS

PART - A

MICROPROCESSOR 8086 PROGRAMMING USING ASSEMBLER:

1. Programs involving data Transfer Instructions.
2. Programs involving arithmetic and logical operations like addition and subtraction of multi-precision numbers.
3. Programs involving bit manipulation instructions like checking.
4. Programs involving Branch / Loop instructions.
5. Programs on String Manipulations like string transfer, string reversing, searching for a character in a string, palindrome etc.
6. Programs involving on Software Interrupts.
7. Programs to use DOS interrupt INT 21H Function calls.

PART – B

INTERFACING 8086 TO OTHER PERIPHERAL USING TRAINER KITS:

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

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)

B. Tech. ECE V Semester **VCE-R15**

PROFESSIONAL ETHICS AND HUMAN VALUES

Course Code:**A3012**

L	T	P	C
3	0	0	0

Course Overview:

The objective of this course on 'Professional Ethics and Human Values' are to understand the moral values that ought to guide the Engineering profession, resolve the moral issues in the profession, and justify the moral judgment concerning the profession. It is intended to develop a set of beliefs, attitudes, and habits that engineers should display concerning morality.

Course Outcomes:

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

CO1. Adapt engineering ethics to overcome various moral dilemmas after choosing engineering as profession.

CO2. evelop awareness on different human values, such as love, empathy, honesty, etc. to lead a successful life.

CO3. now the responsibilities of the engineer towards the society.

CO4. List out and practice the safety procedures to avert the risks at work place.

CO5. Determine various roles of engineer and help them to make the world a better place.

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)

B. Tech. ECE V Semester **VCE-R15**

PROFESSIONAL ETHICS AND HUMAN VALUES

Course Code:**A3012**

L	T	P	C
3	0	0	0

SYLLABUS

UNIT - I

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

UNIT - II

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

UNIT - III

ENGINEERING AS SOCIAL EXPERIMENTATION: Engineering as experimentation - Engineering Projects VS. Standard Experiments **-** Engineers as responsible experimenters – Codes of ethics - Industrial Standards - A balanced outlook on law- The challenger case study.

UNIT - IV

SAFETY, RESPONSIBILITIES AND RIGHTS: Safety and risk- Assessment of safety and risk- Risk benefit analysis and reducing risk- Three Mile Island and Chernobyl case study - Collegiality and loyalty -Respect for authority - Collective bargaining – Confidentiality- Conflicts of interest - Occupational crime - Professional Rights- Employee rights- Intellectual Property Rights (IPR) discrimination.

UNIT - V

GLOBAL ISSUES: Multinational Corporation's -Environmental ethics-computer ethics -weapons development, Engineers as managers - consulting engineers-engineers as expert witnesses and advisors, Moral leadership - sample code of Ethics (Specific to a particular Engineering Discipline).

TEXT BOOKS:

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

REFERENCE BOOKS:

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

SYLLABI FOR
VI SEMESTER

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)

B. Tech. ECE VI Semester **VCE-R15**

COMPUTER NETWORKS

Course Code: **A3519**

L	T	P	C
3	1	0	3

Course Overview:

The growing importance of Internetworking in recent years and their use in every field has made Computer Networks a central issue for modern systems. The course introduces the basic concepts of networks and some of the issues of Network Security. The main objective of the course is to enable students to know the functions of various layers of a network model. Topics covered in the course include Introduction to networks, physical layer, data link layer, medium access sub layer, network layer, transport layer and application layer.

Prerequisite(s):

- Computer Organization and Microprocessors (A3507)
- Operating Systems (A3515)

Course Outcomes:

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

CO1. Distinguish the terminology and concepts of OSI reference model and the TCP/IP reference model and functions of each layer.

CO2. Experiment the different types of network topologies, protocols, network devices and their functions within a network.

CO3. Compare the concepts of protocols, network interfaces and design/performance issues in LAN and WAN.

CO4. Understand and building the skills of sub netting and routing mechanisms, familiarity with basic protocols of computer networks and how they can be used to assist in network design and implementation.

CO5. Discriminate deficiencies in existing protocols and then go on to formulate new and better protocols.

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)

B. Tech. ECE VI Semester **VCE-R15**

COMPUTER NETWORKS

Course Code: **A3519**

L	T	P	C
3	1	0	3

SYLLABUS

UNIT-I **(9 Lectures)**

INTRODUCTION: Network applications, network hardware, network software, reference models: OSI, TCP/IP, Internet, Connection oriented network - X.25, Frame Relay.(T1: Ch-1)

THE PHYSICAL LAYER: Theoretical basis for communication, guided transmission media, wireless transmission, mobile telephone system.(T1: Ch-2)

UNIT-II **(11 Lectures)**

THE DATA LINK LAYER: Design issues, Error detection and correction, Elementary data link protocols, Sliding window protocols, example data link protocols-HDLC, the data link layer in the internet.(T1: Ch-3)

THE MEDIUM ACCESS SUBLAYER: Channel allocations problem, multiple access protocols, Ethernet.(T1: Ch-4)

UNIT-III **(14 Lectures)**

THE NETWORK LAYER: Network layer design issues, Routing algorithms, Congestion control algorithms, Internetworking, The Network layer in the internet (IPv4 and IPv6), Quality of Service.(T1: Ch-5)

UNIT-IV **(9 Lectures)**

THE TRANSPORT LAYER: Transport service, elements of transport protocol, Simple Transport Protocol, Internet transport layer protocols: UDP and TCP. (T1: Ch-6)

UNIT-V **(9 Lectures)**

THE APPLICATION LAYER: Domain Name System, Electronic Mail, World Wide Web: Architectural overview, Dynamic web document and http.(T1: Ch-7)

APPLICATION LAYER PROTOCOLS: Simple Network Management Protocol, File Transfer Protocol, Simple Mail Transfer Protocol, Telnet. (T1: Ch-7)

TEXT BOOK(S):

1. A.S. Tanenbaum (2011), *Computer Networks*, 5th Edition, Pearson Education/ PHI. New Delhi, India.
2. Behrouz A. Forouzan (2006), *Data communication and Networking*, Tata McGraw-Hill, India.

REFERENCE BOOK(S):

1. Michael A. Gallo, William M. Hancock, (2007), *Computer Communications and Networking Technologies*, Ceneage Learning.
2. Thomson Fitz Gerald, Dennis (2009), *Business Data Communications & Networking*, 10th Edition, John Willeysons, USA.
3. William Stallings (2006), *Cryptography and Network Security*, 4th Edition, Pearson Education, India.

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)

B. Tech. ECE VI Semester **VCE-R15**

EMBEDDED SYSTEMS

Course Code: **A3424**

L	T	P	C
3	1	0	3

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. This course will expose students to the field of embedded systems, and will provide a knowledge foundation which will enable students to pursue subsequent courses in real-time embedded systems software and computer design. Students will become familiar with the associated technical vocabulary and will learn about potential career opportunities in the field of embedded system design. An opportunity to develop an embedded system from the ground up, starting with electronic components and data sheets, and progressing through construction of hardware and implementation of firmware (phases of embedded system development and debugging tools) and to learn how information gained in multiple other core engineering courses comes together to be applied to real-world design. By the end of the course students will mastered in the basics of embedded system design and programming, this will help to prepare for cutting edge careers in industry and research.

Prerequisite(s):

- Digital Logic Design (A3404)
- Computer Organization and Architecture (A3508)
- Microprocessors and Interfacing (A3419)

Course Outcomes:

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

CO1. Apply an appropriate software tools to provide an interface between hardware peripherals and systems.
CO2. Interpret the need for RISC type computing system for advanced embedded applications.
CO3. Design the subsystems and integrate for a complete system to perform complex tasks.
CO4. Develop a product with functional requirements using optimal hardware and software components.
CO5. Identify a suitable firmware to meet real time computing constraints of an embedded system.

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)

B. Tech. ECE VI Semester **VCE-R15**

EMBEDDED SYSTEMS

Course Code: **A3424**

L	T	P	C
3	1	0	3

SYLLABUS

UNIT - I **(11 Lectures)**

EMBEDDED COMPUTING: Introduction, complex systems and microprocessor, the embedded system design process and formalisms for system design with a design example (GPS NAVIGATION SYSTEM).

MULTIPROCESSORS: Consumer Electronics Architecture, Cell Phones, Audio Players, Digital Still Cameras.

UNIT - II **(12 Lectures)**

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 u-COS (open source).

UNIT - III **(10 Lectures)**

ARM ARCHITECTURE:ARM Design Philosophy, Registers, Program Status Register, Instruction Pipeline, Interrupts and Vector Table, Architecture Revision, ARM Processor Families.

UNIT - IV **(12 Lectures)**

ARM PROGRAMMING MODEL:

INSTRUCTION SET: Data Processing Instructions, Addressing Modes, Branch, Load, Store Instructions, PSR Instructions, Conditional Instructions.

THUMB INSTRUCTION SET: Register Usage, Other Branch Instructions, Data Processing Instructions, Single - Register and Multi Register Load - Store Instructions, Stack, Software Interrupt Instructions

UNIT - V **(12 Lectures)**

ARM PROGRAMMING:

Simple C Programs using Function Calls, Pointers, Structures, Integer and Floating Point Arithmetic, Assembly Code using Instruction Scheduling, Register Allocation, Conditional Execution and Loops.

MEMORY MANAGEMENT:

Cache Architecture, Polices, Flushing and Caches, MMU, Page Tables, Translation, Access Permissions, Context Switch.

TEXT BOOKS:

1. Wayne Wolf (2008), *Computers as Components-principles of embedded computer system design*, Elseveir, New Delhi, India.
2. David E. Simon (1999), *An Embedded Software Primer*, Pearson Education, India.
3. Andrew N. Sloss, Dominic Symes and Chris Wright (2008), *ARM Systems Developer's Guides -Designing & Optimizing System software*, Elsevier, New Delhi, 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. James A Langbridge, *Professional Embedded ARM development*, Wrox™ (A WILEY BRAND).
4. Jonathan W. Valvano – Brookes/ Cole (1999), *Embedded Microcomputer Systems and Real Time Interfacing*, Thomas Learning.

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)

B. Tech. ECE VI Semester **VCE-R15**

CMOS VLSI DESIGN

Course Code: **A3425**

L	T	P	C
3	1	0	3

Course Overview:

This course gives knowledge about the design, analysis, simulation of circuits used as building blocks in Very Large Scale Integration (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 and Circuits (A3401)
- Digital Logic Design (A3404)
- Digital Design Through Verilog HDL (A3416)

Course Outcomes:

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

CO1. Understand electrical properties of transistors and make use of fabrication steps to build CMOS circuits.

CO2. Analyze the characteristics of CMOS circuits to examine electrical behaviour of digital circuits.

CO3. Experiment with various CMOS logic structures to model any digital circuit.

CO4. Determine the leakage issues in CMOS logic structures to assess the performance of a CMOS circuit.

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)

B. Tech. ECE VI Semester **VCE-R15**

CMOS VLSI DESIGN

Course Code: **A3425**

L	T	P	C
3	1	0	3

SYLLABUS

UNIT - I **(10 Lectures)**

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

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

UNIT - II **(11 Lectures)**

THE CMOS INVERTER: ANALYSIS AND DESIGN: Basic Circuit and DC Operation- DC Characteristics ,Noise Margins, Layout Considerations, Inverter Switching Characteristics-Switching intervals, High-to-Low Time, Low-to-High Time, Maximum Switching Frequency, Transient Effects on the VTC, RC Modelling, Propagation Delay, Use of the Step-Input Waveform, Output Capacitance, Inverter Design-DC Design, Transient Design, Power Dissipation, Driving Large Capacitive Loads, Problems.

UNIT – III **(14 Lectures)**

STATIC LOGIC GATES: Complex Logic Functions, CMOS NAND Gate-DC Characteristics, Transient Characteristics, Design, N-Input NAND, CMOS NOR Gate-DC Transfer characteristic, Transient Times, Design, N-Input NOR, Comparison of NAND and NOR Gates, Layout, Complex Logic Gates- Examples of Complex Logic Gates, Logic Design Techniques, FET Sizing and Transient Design, Exclusive OR and Equivalence Gates, Adder Circuits, SR and D-type Latch, The CMOS SRAM Cell-Receiver Latch, Schmitt Trigger Circuits, Tri-State Output Circuits, Pseudo-nMOS Logic Gates- Complex Logic in Pseudo-nMOS, Simplified XNOR Gate, Compact XOR and Equivalence Gates, Problems.

UNIT - IV **(10 Lectures)**

TRANSMISSION GATE LOGIC CIRCUITS: Basic Structure- The TG as a Tri-State Controller, Electrical Analysis- Logic 1 Transfer, Logic 0 Transfer, RC Modelling- TG Resistance Estimate, Equivalent Resistance, TG Capacitances, Layout Considerations, TG-Based Switch Logic Gates-Basic Multiplexors, OR Gate, XOR and Equivalence, Transmission-gate Adders, TG Registers, The D-type Flip-Flop, nFET-Based Storage Circuits, Transmission Gates in Modern Design, Problem.

UNIT-V **(11 Lectures)**

DYNAMIC LOGIC CIRCUIT CONCEPTS: Charge Leakage- Junction Reverse Leakage Currents, Charge Leakage Analysis, Subthreshold Leakage, pFET Leakage Characteristics, Junction Leakage in TGs, Charge Sharing- RC Equivalent, The Dynamic RAM Cell- Cell Design and Array Architecture, DRAM Overhead Circuit, Clocks and Synchronization-Shift Register, TGs as Control Elements, Extension to General Clocked Systems, Clocked-CMOS, Clock Generation Circuits, Problems.

TEXT BOOKS:

1. John .P. Uyemura (2011), *CMOS LOGIC CIRCUIT DESIGN*, Springer International Edition, India.
2. Eugena D.Fabricius, *Introduction to VLSI Design*,McGraw-Hill, (1990).

Reference Books:

1. Neil H. E. Weste, Kamran Eshraghian (2001), *Principles of CMOS VLSI Design* – A System Perspective, 2nd Edition,Pearson Education Asia, India.
2. Kenneth William Martin (2000), *Digital Integrated Circuit Design*- Oxford University Press.

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)

B. Tech. ECE VI Semester **VCE-R15**

DIGITAL SYSTEM DESIGN
(Professional Elective-1)

Course Code: **A3451**

L	T	P	C
4	0	0	4

Course Overview:

In the past few years, reliable hardware system design has become increasingly important in the computer industry. Digital Circuit Testing and Testability is an easy to use introduction to the practices and techniques in this field. Extensive discussions of test generation, fault modelling for classic and new technologies, simulation, fault simulation, design for testability, built-in self-test, and diagnosis are given.

Pre-requisites:

- Computer Programming (A3501)
- Digital Logic Design (A3404)

Course Outcomes:

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

CO1. Analyze the timing concepts of combinational and sequentialcircuits.

CO2. Develop and synthesis the HDL code for combinational and sequential circuits.

CO3. Design the CPLD and FPGA based combinational and sequential circuits.

CO4. Apply various test algorithms for diagnosing faults in combinational and memory.

CO5. Make use of the diverse combinational and sequential logics implementation in real time.

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)

B. Tech. ECE VI Semester **VCE-R15**

DIGITAL SYSTEM DESIGN
(Professional Elective-1)

Course Code: **A3451**

L	T	P	C
4	0	0	4

SYLLABUS

UNIT - I **(10 Lectures)**

COMBINATIONAL LOGIC DESIGN PRINCIPLES: Introduction, combination circuit analysis, combination circuit synthesis, circuit descriptions and designs, circuit manipulations, combination circuit minimization, Karnaugh maps, minimizing sum of products, programmed minimization methods, timing hazards-static hazards using maps, dynamic hazards, designing hazard free circuits.

UNIT - II **(14 Lectures)**

COMBINATIONAL LOGIC DESIGN PRACTICES I: Introduction, timing concepts-timing diagrams, specifications, analysis, analysis tools, propagation delay, combinational; PLDs-PLAs, PLA devices, CPLDs, CMOS PLD circuits, device programming and testing, decoders-binary decoders using HDL.

COMBINATIONAL LOGIC DESIGN PRACTICES II: Applications of encoders, three state devices, multiplexers, comparators, adders, subtractors and ALUs.

UNIT - III **(12 Lectures)**

SEQUENTIAL LOGIC DESIGN PRINCIPLES: Introduction, latches and flip-flops, clocked synchronous state machine analysis, design, designing state machines using state diagrams, synthesis using transition lists, decomposing state machines using HDL.

TIMING ISSUES: Introduction, feedback sequential circuit analysis, design, sequential circuit design with HDL, timing issues setup time, hold time and clock skew.

UNIT - IV **(13 Lectures)**

DESIGNING WITH PROGRAMMABLE LOGIC DEVICES: Design with FPGA's, one hot state assignment, state transition table, state assignment for FPGA's, problem of initial state assignment for one hot encoding, state machine (SM) charts, derivation of SM charts, realization of SM charts.

UNIT - V **(11 Lectures)**

FAULT MODELLING: Logic fault model, fault detection and redundancy, fault equivalence and fault location, fault dominance, single stuck at fault model, multiple stuck at fault models, bridging fault model.

TEST PATTERN GENERATION: Fault diagnosis of combinational circuits by conventional methods, path sensitization techniques, Boolean difference method, Kohavi algorithm, test algorithms, D algorithm, PODEM, random testing, transition count testing, signature analysis and test bridging faults.

TEXT BOOKS:

1. John F. Wakerly (2006), *Digital Design Principles and Practices*, 4th Edition, Pearson Education, India.
2. M. L. Bushnell, V. D. Agrawal (2005), *Essentials of Electronic Testing For Digital, Memory and Mixed-Signal VLSI Circuits*, Springer Science, New York.

REFERENCE BOOKS:

1. Miron Abramovici, Melvin A. Breuer, Arthur. D Friedman (1994), *Digital Systems Testing and Testable Design*, IEEE Press, USA.
2. Z. Kohavi (2001) *Switching and Finite Automata Theory*, 2nd Edition, Tata Mc graw Hill, New Delhi.
3. Morris Mano, Michael D. Ciletti (2008), *Digital Design,* 4th Edition, Prentice Hall of India, New Delhi.
4. Samuel C. Lee (1976), *Digital Circuits and Logic Design,* Prentice Hall of India, New Delhi.

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)

B. Tech. ECE VI Semester **VCE-R15**

DATA COMMUNICATIONS
(Professional Elective - I)

Course Code: **A3452**

L	T	P	C
4	0	0	4

Course Overview:

One of the most important developments in computing is the interconnection of computers. Data communication system describes this exciting technology. This course is designed to introduce the fundamental concept of electronic communication system, data systems, and networks.This course examines the underlying technology that makes data communication possible and also provides extensive coverage of wide range of data communication and networking issues.This includes data communications components, networking protocol architecture (OSI/TCP/IP), data transmission, modulation schemes, transmission media (Guided and Un-Guided), multiplexing (TDM,FDM,WDM), telephone instruments and signals, telephone circuits, cellular telephone concepts and systems, data communication system codes, error control and data formats, data link control protocols. This course may cover real world examples of data communication involving modems, DSL, and cell phones.

Pre-requisites:

- Digital communications(A3415)

Course Outcomes:

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

CO1. Develop basic concepts of data communications and compare digital data transmission techniques in terms of data rate, probability of error.

CO2. Compare diverse modulation techniques to develop a communication system model to increase the spectral efficiency.

CO3. Apply the fundamentals of data link layer for error detection, correction and flow control techniques on a Communication system

CO4. Analyze the application of network topologies for current and future applications to support the Quality of Service requirements

CO5. Design a functional setup of network environment with all the necessary data communication components, procedures and techniques

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)

B. Tech. ECE VI Semester **VCE-R15**

DATA COMMUNICATIONS
(Professional Elective - I)

Course Code: **A3452**

L	T	P	C
4	0	0	4

SYLLABUS

UNIT –I **(10 Lectures)**

INTRODUCTION TO DATA COMMUNICATIONS AND NETWORKING: Standards Organizations for DataCommunications, Layered Network Architecture, Open Systems Interconnection, Data Communications Circuits, Serial and parallel Data Transmission, Data communications Circuit Arrangements, Data communications Networks, Alternate Protocol Suites.

SIGNALS, NOISE, MODULATION AND DEMODULATION: Signal Analysis, Electrical Noise and Signal-to-Noise Ratio,Analog Modulation Systems, Information Capacity, Bits, Bit Rate, Baud, and M-array Encoding, Digital Modulation.

UNIT – II **(10 Lectures)**

METALLIC CABLE TRANSMISSION MEDIA: Metallic Transmission Lines, Transverse Electromagnetic Waves,Characteristics of Electromagnetic Waves, Transmission Line Classifications, Metallic Transmission Line Types, MetallicTransmission Line Equivalent Circuit, Wave Propagation on Metallic Transmission Lines, Metallic Transmission Line Losses.

UNIT – III **(12 Lectures)**

DIGITAL TRANSMISSION: Pulse Modulation, Pulse code Modulation, Dynamic Range, Signal Voltage - to –Quantization Noise Voltage Ratio, Linear Versus Nonlinear PCM Codes, PCM Line Speed, Delta Modulation PCM and Differential PCM.

MULTIPLEXING AND T CARRIERS: Time-Division Multiplexing, T1 Digital Carrier System, North American Digital Multiplexing Hierarchy, Digital Line Encoding, T Carrier systems, European Time- Division Multiplexing, Statistical Time-Division Multiplexing, Frame Synchronization, Frequency- Division Multiplexing, Wavelength- Division Multiplexing, Synchronous Optical Network

UNIT – IV **(12 Lectures)**

DATA COMMUNICATIONS CODES, ERROR CONTROL, AND DATA FORMATS: Data Communications Character Codes, Bar Codes, Error Control, Error Detection, Error Correction, Character Synchronization.

DATA LINK PROTOCOLS: Data Link Protocol Functions, Character and Bit- Oriented Protocols, Data Transmission Modes, Asynchronous Data Link Protocols, Synchronous Data Link Protocols, Synchronous Data Link Control, High Level Data Link Control.

UNIT-V **(12 Lectures)**

DATA COMMUNICATIONS EQUIPMENT: Digital Service Unit and Channel Service Unit, Voice- Band Data Communication Modems, Bell Systems- Compatible Voice- Band Modems, Voice- Band Modern Block Diagram, Voice-Band Modem Classifications, Asynchronous Voice-Band Modems, Synchronous Voice-Band Modems, Modem Synchronization, ITU-T Voice- Band Modem Specifications, 56K Modems, Modem Control: The AT Command Set, Cable Modems, Probability of Error and Bit Error Rate.

TELEPHONE INSTRUMENTS AND SIGNALS: The Subscriber Loop, Standard Telephone Set, Basic Telephone Call Procedures, Call Progress Tones and Signals, Cordless Telephones, Caller ID, Electronic Telephones, Paging systems.

TEXT BOOKS:

1. Wayne Tomasi (2005), *Introduction to Data Communications and Networking*, Pearson Education, India.

REFERENCE BOOKS:

1. Behrouz A Forouzan (2007), *Data Communications and Networking*, 4th edition, Tata McGraw Hill, India.
2. Michael A. Gallo, Bill Hancock, William M. Hancock (2001), *Computer Communications and Networking Technologies*, 2nd edition, Brooks / Cole, USA
3. Fred Halsall, Lingana Gouda Kulkarni(2006), *Computer Networking and the Internet*, 5th edition, Pearson Education India.

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)

B. Tech. ECE VI Semester **VCE-R15**

ADVANCED MICROPROCESSORS & MICROCONTROLLERS
(Professional Elective - I)

Course Code: **A3453**

L	T	P	C
4	0	0	4

Course Overview:

This course provides a detailed understanding on advanced microprocessors (80386, Pentium 4), microcontrollers (PIC, PSoC) and their architectures with an emphasis on its interfacing with external devices. Focus is on 80386, Pentium 4 microprocessor which includes internal architecture, pin diagram, instruction set, register organization, address modes,Memory Subsystem, Hyper threading, interrupt structure, assembly language programming and etc. Various aspects of hardware design, such as interfacing of memory and different types of I/O devices will be covered in detailed. It also emphasis on different Exception and Interrupt Handling schemes. This course will be useful to students to carryout complex embedded systems project.

Prerequisite(s):

- Digital Logic Design (3404)
- Computer Organization and Architecture (A3508)
- Microprocessors and Interfacing (A3419)

Course Outcomes:

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

CO1. Introduce the fundamentals of advanced microprocessors (80386, Pentium 4), microcontrollers (PIC, ARM) through internal architecture, pin description, memory organization and instruction set.

CO2. Exhibit the knowledge of understanding various addressing modes, data transfer instructions, stack, program counter, registers and their operations to enable writing high level language programs.

CO3. Design electrical circuitry to the microprocessors (80386, Pentium 4), microcontrollers (PIC, ARM) I/O ports in order to interface the processor to external devices.

CO4. Comprehend the basic requirements and layout for building a microcomputer and applying those concepts to achieve a dedicated “embedded” controller as a component of a larger system.

CO5. Acquire knowledge on both hardware and software aspects of advanced microprocessor-based system by implementing real time projects.

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)

B. Tech. ECE VI Semester **VCE-R15**

ADVANCED MICROPROCESSORS & MICROCONTROLLERS
(Professional Elective - I)

Course Code: **A3453**

L	T	P	C
4	0	0	4

SYLLABUS

UNIT-I **(11 Lectures)**

80386 MICRO PROCESSORS: Introduction to 80386, Salient features of 80386, Architecture and Signal Description of 80386, Register Organization of 80386, Addressing Modes. Data Types of 80386, Real Address mode of 80386, Protected mode of 80386, Segmentation Paging, Virtual 8086 Mode, Enhanced Instruction set of 80386, the Co-processor 80387.

UNIT-II **(12Lectures)**

PENTIUM 4: Salient features of Pentium 4, Instruction Translation for Pentium 4, Instruction Translation Look aside Buffer and Branch Prediction, Rapid Execution Module, Memory Subsystem, Hyper threading Technology Hyper threading in Pentium, Extended Instruction set in Advanced Pentium Processors, Instruction Set.

UNIT-III **(11 Lectures)**

PLC MICROCONTROLLER: Introduction, Architectural Overview, Memory Organization, Data Memory and Flash Memory, Interrupts and Reset, I/O Ports, Timer, Analog to Digital I/O.

UNIT-IV **(11 Lectures)**

FUNDAMENTALS OF PSOC: Introduction to PSOC, PSOC Architecture, PSOC as a Single-Chip solution for Embedded System Design, Analog Controller Block in PSOC, Digital Controller Block in PSOC, H/W Programming Through PSOC Creator, I/O Pin Configurability.

UNIT-V **(10 Lectures)**

EXCEPTION AND INTERRUPT HANDLING: Exception Handling, Interrupts, Interrupt Handling schemes, Firmware and Boot loader, Examples, Cache Architecture, Cache Policy.

Text Books:

1. AK. Ray, K. M. Bhurchandi *"Advanced Microprocessors and Peripherals",* 2" Edition, Tata McGraw Hill, 2006.(For Unit I,II)
2. Bamett, Cox & O'Cull *"Embedded C Programming and the Microchip PlC"* Thomson India Edition, 2007.(For Unit III)
3. Robert Ashby, Newens "*The PSOC Controller"*, Paper Black Edition.

References:

1. Steve Heath *"Embedded Systems Design",* 2" Edition, Elsevier, 2008.
2. Arnold S. Berger*," Embedded Systems Design-An Introduction to Processes*, Tools, & Techniques", CMP Books, 2005.

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)

B. Tech. ECE VI Semester **VCE-R15**

ARTIFICIAL INTELLIGENCE AND NEURAL NETWORKS
(Professional Elective - I)

Course Code: **A3553**

L	T	P	C
4	0	0	4

Course Overview:

This course will introduce the basic principles in artificial intelligence and neural networks research. It will cover simple representation schemes, problem-solving paradigms, constraint propagation, and search strategies and also covers the basic neural network architectures and learning as well as reasoning algorithms for applications in pattern recognition, image processing, and computer vision. The students will have a chance to try out several of these models on practical problems and develop expert systems.

Course Outcomes:

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

CO1. Analyze and apply the basic the concepts of artificial intelligence and the use of agents into the real world scenario

CO2. Identify, analyze, formulate and solve complex problems by using various search techniques.

CO3. Explore with a better understanding of logic programming skills and resolve problems related to reasoning.

CO4. Design, construct and evaluate a neural network based system, with various learning process models

CO5. Plan and design an expert system.

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)

B. Tech. ECE VI Semester **VCE-R15**

ARTIFICIAL INTELLIGENCE AND NEURAL NETWORKS
(Professional Elective - I)

Course Code: **A3553**

L	T	P	C
4	0	0	4

SYLLABUS

UNIT- I **(12 Lectures)**

INTRODUCTION TO ARTIFICIAL INTELLIGENCE: Problem and search- what is AI technique, criteria for success. (T1, Ch-1)

PROBLEM SPACE AND SEARCH: Defining the problem as a state space search, production systems problem characteristics. (T1, Ch-2)

HEURISTIC SEARCH TECHNIQUES: Generate test, Hill Climbing, BFS, ProblemReduction Constraint Satisfaction. (T1, Ch-3)

UNIT- II **(12 Lectures)**

KNOWLEDGE REPRESENTATION ISSUES: Representation and mapping, Issues in knowledge Representation. (T1, Ch-4)

REPRESENTING KNOWLEDGE USING RULES: Procedural verses Declarative knowledge, logic programming, Forward and backward, Matching, Control Knowledge. (T1, Ch-6)

SYMBOLIC REASONING UNDER UNCERTAINTY: Introduction to non-monotonic reasoning, Logic for non-monotonic Reasoning. Implementation Issue, Implementation of DFS, Implementation of BFS(T1, Ch-7), The min-max search Procedure, Adding alpha-beta Cutoffs(T1, Ch-12), Connectionist AI and Symbolic AI (T1, Ch-18).

UNIT – III **(12 Lectures)**

BASICS OF ARTIFICIAL NEURAL NETWORK: Characteristics of Neural Networks, artificial neural network: terminology, models of neurons: McCulloch Pitts model, Perceptron model, Adaline model (T3, Ch-1).

FUNCTIONAL UNITS FOR ANN FOR PATTERN RECOGNITION TASK: Pattern recognition problem, Basic functional units, PR by functional units. (T3, Ch-3)

FEEDFORWARD NEURAL NETWORKS: SUPERVISED LEARNING - I: Perceptrons - Learning and memory (T4, Ch-5, 5.1), Learning algorithms (T4, Ch-5, 5.3), Error correction and gradient decent rules (T4, Ch-5,5.4), Perceptron learning algorithms(T4, Ch-5,5.7).

UNIT – IV **(13 Lectures)**

SUPERVISED LEARNING – II :Back propagation and Beyond: Multilayered network architectures(T4, Ch-6,6.1), Back propagation learning algorithm(T4, Ch-6,6.2), Example applications of feed forward neural networks. (T4, Ch-6,6.3)

ATTRACTOR NEURAL NETWORKS: Introduction(T4, Ch-10,10.1), Associative learning(T4, Ch-10,10.2), Hopfield network(T4, Ch-10,10.5), Error performance in Hopfield networks(T4, Ch-10,10.11), simulated annealing(T4, Ch-10,10.14), Boltzmann machine (T4, Ch-10,10.15), bidirectional associative memory(T4, Ch-10,10.16), bam stability analysis(T4, Ch-10,10.18), error correction in bams (T4, Ch-10,10.19).

UNIT – V **(6 Lectures)**

PLANNING: The Blocks World, Components of a Planning System, Goal Stack Planning, Nonlinear Planning Using Constraint Posting, Hierarchical Planning, Reactive Systems, Other Planning Techniques(T1, Ch-13).

EXPERT SYSTEMS: An introduction to Expert System, Architecture of Expert System, Knowledge Acquisition, Application Area of Expert System (T6).

TEXT BOOK(S):

1. Rich knight (2002), *Artificial Intelligence*, 2nd edition, Tata McGraw-Hill, New Delhi.
2. B. Yegnanarayana (2001), *Artificial Neural Networks*, Prentice Hall of India, New Delhi.
3. Satish Kumar (2004), *Neural Networks A classroom Approach*, Tata McGraw Hill Publication, New Delhi.
4. Peter Jackson(1999), *Introduction to Expert Systems*, 3rd Edition, Pearson Education Private Limited, India.

REFERENCE BOOK(S):

1. S.N. SIVANANDAM, S SUMATHI, S N DEEPA,(2006), Introduction to Neural networks using Matlab-6. Tata McGraw-Hill, New Delhi.
2. Patrick Henry Winston (2001), Artificial Intelligence, 3rd edition, Pearson Education Private Limited, India.
3. P. H. Winston, Artificial Intelligence, Third Edition, Pearson Education.
4. G.F. Luger, Artificial Intelligence, Fourth Edition, Pearson Education.
5. P. Jackson, Introduction to Expert Systems, Third Edition, Pearson Education
6. N. J. Nilsson, Principles of Artificial Intelligence, First Edition, Springer-Verlag
7. N.P. Padhy, Artificial Intelligence and Intelligent Systems, First Edition, Oxford Univ. Press
8. Robert J. Schalkolf, Artificial Intelligence: an Engineering approach, 1990, McGraw Hill

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)

B. Tech. ECE VI Semester **VCE-R15**

LOW POWER VLSI DESIGN
(PROFESSIONAL ELECTIVE – II)

Course Code: **A3454**

L	T	P	C
4	0	0	4

Course Overview:

Low–power VLSI circuit design is a dynamic research area driven by the growing reliance on battery–powered portable computing and wireless communications products. It has become critical to the continued progress of high–performance and reliable microelectronic systems. The course addresses the concepts, principles and techniques to reduce the power in VLSI systems. It covers the concepts of Low Power VLSI Design are Sources of Power Dissipation. Estimate power in CMOS circuits, Statistical Techniques, Synthesis for Low Power, Design and test of low - voltage CMOS circuits, low energy computing, and software design for low power. The knowledge gained in this course enable students to design some essential low power elements of complex systems.

Prerequisite(s):

- Electronic Devices and Circuits (A3401)
- CMOS VLSI Design (A3425)

Course Outcomes:

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

CO1. Recognize the importance of low power circuit design and identify related limits.

CO2. Analyze power dissipation using various approaches in low power circuit design.

CO3. Examine the effect of different modelling techniques on power dissipation of a CMOS circuit.

CO4. Estimate the sources of energy dissipation in CMOS logic circuits and SRAM cells.

CO5. Develop power efficient logic circuits using latest techniques.

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)

B. Tech. ECE VI Semester **VCE-R15**

LOW POWER VLSI DESIGN
(PROFESSIONAL ELECTIVE – II)

Course Code: **A3454**

L	T	P	C
4	0	0	4

SYLLABUS

UNIT - I **(12 Lectures)**

PHYSICS OF POWER DISSIPATION IN CMOS: Introduction, sources of power dissipation, designing for low power. Physics of power dissipation in MOSFET devices-MIS structure, long channel and sub-micron MOSFET, Gate induced Drain leakage, Power dissipation in CMOS-Short circuit dissipation, dynamic dissipation, and load capacitance. Low power VLSI design limits-Principles of Low power design, hierarchy of limits, fundamental limits, material, device, circuit and system limits.

UNIT - II **(12 Lectures)**

POWER ESTIMATION IN CMOS CIRCUITS: Introduction, modelling of signals, signal probability calculations- signal probability using binary decision diagrams, probabilistic techniques for signal activity estimation- switching activity in combinational logic, derivation of activities for static CMOS from signal probabilities, switching activity in sequential circuits and an approximation method.

STATISTICAL TECHNIQUES: Estimating Average Power In Combinational and sequential circuits, estimation of glitching.Power- delay monte-carlo and models techniques, sensitivity analysis, power estimation using input vector compaction and power description in domino CMOS circuits.

UNIT - III **(10 Lectures)**

SYNTHESIS FOR LOW POWER: Behavioral, level transforms, Algorithm level transforms, power-constrained least squares optimization for adaptive and non-adaptive filters, circuit activity driven architectural transformations, architecture driven voltage scaling, power optimization using operation reduction and substitution, pre-computation, based optimization logic level and circuit level optimization for low power.

UNIT - IV **(12 Lectures)**

DESIGN AND TEST OF LOW - VOLTAGE CMOS CIRCUITS: Introduction, circuit design styles, leakage current in deep sub - micrometer transistors, device design issues, minimizing short channel effect ,low voltage circuit design techniques using reverse Vgs ,Steeper sub threshold swing and multiple threshold voltages, Testing with elevated intrinsic leakage , multiple supply voltages.

UNIT - V **(10 Lectures)**

LOW ENERGY COMPUTING USING ENERGY RECOVERY TECHNIQUES: Energy dissipation in transistor channel, using an RC model energy recovery circuit design, designs with partially reversible logic.Energy recovery in adiabatic logic and SRAM core, design of Peripheral circuits, level shifter and I/O Buffer, supply clock generation.

SOFTWARE DESIGN FOR LOW POWER: Introduction, sources of software power dissipation, software power estimation and optimization.

TEXT BOOKS:

1. Kaushik Roy, Sharat C. Prasad (2000), *Low-Power CMOS VLSI Circuit Design*, Wiley India, New Delhi.
2. Anantha P. Chandrakasan, Robert W. Brodersen (1998), *Low - Power CMOS Design,* IEEE Press, USA.

REFERENCE BOOKS:

1. Christian Piguet (2006), *Low-Power CMOS Circuits: Technology, Logic Design and CAD Tools*, CRC Taylor& Francis, USA.
2. Shin-ichi Minato (1995), *Binary Decision Diagrams and Applications for VLSI CAD*, The Springer Engineering and Computer International Series, USA.

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)

B. Tech. ECE VI Semester **VCE-R15**

SATELLITE COMMUNICATIONS
(Professional Elective – II)

Course Code: **A3455**

L	T	P	C
4	0	0	4

Course Overview:

This course deals with transfer of information globally with the help of satellites. This course presents the fundamentals of satellite communications link design and provides an overview of practical considerations. Topics include satellite orbits, link analysis, antenna and payload design, interference and propagation effects, modulation techniques, coding, multiple accesses, and earth station design, low earth orbit and geostationary satellite systems, satellite navigation & the global positioning system.

Prerequisite(s):

- Analog Communications(A3412)
- Digital Communications (A3415)
- Antennas and wave propagation (A3417)

Course Outcomes:

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

CO1. Identify different types of satellites and analyze the orbital mechanics, launching methods.

CO2. Classify different satellite subsystems and evaluate link budget for a satellite

CO3. Compare and contrast the radio propagation channels for Earth station -satellite and various multiple access techniques used for satellite communication applications

CO4. Analyze the principles of low earth orbit and geo stationary satellite systems.

CO5. Interpret the impact of GPS Navigation, NGSO constellation design for tracking and launching

VARDHAMAN COLLEGE OF ENGINEERING
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B. Tech. ECE VI Semester **VCE-R15**

SATELLITE COMMUNICATIONS
(Professional Elective – II)

Course Code: **A3455**

L	T	P	C
4	0	0	4

SYLLABUS

UNIT - I **(12 Lectures)**

INTRODUCTION: Origin of satellite communications, Historical background, basic concepts of satellite communications, frequency allocations for satellite services, applications, future trends of satellite communications.

ORBITAL MECHANICS AND LAUNCHERS: Orbital Mechanics look angle determination, orbital perturbations, orbit determination, launches and launch vehicles, orbital effects in communication systems performance.

UNIT – II **(12 Lectures)**

SATELLITE SUBSYSTEMS: Attitude and orbital control system, Telemetry, Tracking, command and monitoring, power systems, communication subsystems, satellite antenna equipment reliability and space qualification.

SATELLITE LINK DESIGN: Basic transmission theory, system noise temperature and G/T ratio, design of down links, uplink design, design of satellite links for specified C/N, system design example.

UNIT -III **(12 Lectures)**

MULTIPLE ACCESS: Frequency division multiple access (FDMA) Intermodulation, calculation of C/N, Time Division multiple access (TDMA) frame structure, examples. Satellite switched TDMA onboard processing, DAMA, code division multiple access (CDMA), spread spectrum transmission and reception.

EARTH STATION TECHNOLOGY: Introduction, transmitters, receivers, Antennas, tracking systems, terrestrial interface, primary power test methods.

UNIT- IV **(12 Lectures)**

LOW EARTH ORBIT AND GEO -STATIONARY SATELLITE SYSTEMS: Orbit consideration, coverage and frequency considerations, delay and throughput considerations, system considerations, operational NGSO constellation designs.

UNIT – V **(12 Lectures)**

SATELLITE NAVIGATION & THE GLOBAL POSITIONING SYSTEM: Radio and satellite navigation, GPS position location principles, GPS receivers and codes, satellite signal acquisition, GPS navigation message, GPS signal levels, GPS receiver operation, GPS C/A code accuracy, differential GPS.

TEXT BOOKS:

1. *Satellite communications*: -Timothi Pratt, Charles Bostian and Jeremy Allnutt, WSE, Wiley publications, 2nd Edition, 2003.
2. *Satellite communications Engineering* -Wilbur L.Prichard, Robert A. Nelson & Henry G.Suyderhoud, 2nd Edition, Pearson Publications, 2003.

REFERENCES:

1. *Satellite communications*: Design principles M. Richharia, BS publications, 2 nd Edition, 2003.
2. *Satellite communications* - D.C.Agarwal, Khanna publications, 5 th Ed.
3. *Fundamentals of Satellite communications* - K.N.Raja rao, PHI, 2004.

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)

B. Tech. ECE VI Semester **VCE-R15**

REAL TIME OPERATING SYSTEMS
(Professional Elective – II)

Course Code: **A3456**

L	T	P	C
4	0	0	4

Course Overview:

Real Time Software Designers must be familiar with Computer Architecture and Organization, Operating Systems, Software related to embedded systems, Programming Languages(C, Assembly Language) and Compilation Techniques. This Course provides an overview of these techniques from the perspective of the real-time system designer. It covers techniques for Scheduling, Resource Access Control and Validation that are likely to be used in real-time computing and communication systems. It also provides the core elements for those who are building practical real time applications. Practical experience is gained during student work exercises.

Prerequisite(s):

- Operating system Fundamentals (A3578)
- Computer Programming (A3501)

Course Outcomes:

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

CO1. Compare and contrast a Real Time Operating System & other Operating System and also rectify the Real Time Design Issues

CO2. Design the applications to run in parallel either using Process or Threads

CO3. Develop a Practical Real Time System by using optimal core elements

CO4. Identify the Scheduling Schemes for Packet Switching Networks and Protocols for the Broadcast Networks

CO5. Test for the Performance Analysis of different Real Time Systems which are available in market

VARDHAMAN COLLEGE OF ENGINEERING
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B. Tech. ECE VI Semester **VCE-R15**

REAL TIME OPERATING SYSTEMS
(Professional Elective – II)

Course Code: **A3456**

L	T	P	C
4	0	0	4

SYLLABUS

UNIT - I **(11 Lectures)**

BASIC REAL-TIME CONCEPTS: Terminology, Real-Time System Design Issues, Example Real-Time Systems, Common Misconceptions, Brief History; Hard Vs Soft Real-Time Systems.

A REFERENCE MODEL OF REAL TIME SYSTEMS: Processors and Resources, Temporal Parameters of Real Time Work Load, Periodic Task Model Precedence Constraints and Data Dependency, Functional Parameters, Resource Parameters of Jobs and Parameters of Resources, Typical Real Time Applications.

UNIT - II **(12 Lectures)**

REAL-TIME KERNELS: Pseudo kernels, Interrupt-Driven Systems, Preemptive-Priority Systems, Hybrid Systems, The Task-Control Block Model, Theoretical Foundations of Real-Time Operating Systems.

INTERTASK COMMUNICATION AND SYNCHRONIZATION: Buffering Data, Time-Relative Buffering, Ring Buffers, Mailboxes, Queues, Critical Regions, Semaphores, Other Synchronization Mechanisms, Deadlock, Priority Inversion.

UNIT - III **(11 Lectures)**

REAL TIME SCHEDULING: Commonly used Approaches to Real Time Scheduling, Clock Driven Scheduling, Priority Driven Scheduling; Scheduling Aperiodic and Sporadic jobs in priority driven systems.

MEMORY MANAGEMENT: Process Stack Management , Run-Time Ring Buffer, Maximum Stack Size, Multiple-Stack Arrangements ,Memory Management in the Task-Control-Block Model ,Swapping, Overlays, Block or Page Management , Replacement Algorithms , Memory Locking Working Sets ,Real-Time Garbage Collection , Contiguous File Systems ,Building versus Buying Real-Time Operating Systems, Selecting Real-Time Kernels .

UNIT - IV **(11 Lectures)**

HADRWARE CONSIDERATIONS TO REAL TIME SYSTEMS: Basic Architecture ,Hardware Interfacing , Central Processing Unit, Memory , Input/output , Enhancing Performance , Other Special Devices , Non Von-Neumann Architectures.

UNIT - V **(11 Lectures)**

REAL TIME COMMUNICATION: Model of Real Time communication, Priority based service disciplines for switched networks, Weighted Round Robin Service disciplines, Medium Access-Control protocols of Broadcast networks, internet and Resource Reservation Protocols, Real Time Protocol, Communication in Multicomputer Systems.

CASE STUDIES: Threads ,POSIX Mutexes and Condition ,POSIX Semaphores ,Using Semaphores and Shared Memory ,POSIX Messages ,Real-Time POSIX Signals ,Clocks and Timers ,Asynchronous Input and Output , POSIX Memory Locking.

TEXT BOOKS:

1. Liu, Jane W. S. (2009), *Real-Time Systems*, 8th edition, Pearson Education, India.
2. A. Phillip Laplante (2004)*, Real Time Systems Design and Analysis,* 3rd edition, John Wiley and Sons, India.

REFERENCE BOOKS:

1. C. M. Krishna, Kang G. Shin (2010), *Real Time Systems*, Tata McGraw-Hill, New Delhi.
2. K. V. K. K. Prasad (2005), *Embedded / Real Time Systems*, Dreamtech Press, New Delhi.
3. Sri Ram V. Iyer, Pankaj Gupta (2004), *Embedded Real Time Systems Programming*, Tata McGraw-Hill, New Delhi, India.

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)

B. Tech. ECE VI Semester **VCE-R15**

INFORMATION SECURITY
(Professional Elective – II)

Course Code: **A3608**

L	T	P	C
4	0	0	4

Course Overview:

The course Overview is to provide security importance of information systems, and their use to support safety-critical applications, has made information security a central issue for modern systems. This course introduces the technical and policy foundations of information security. The main objective of the course is to enable students to reason about information systems from a security engineering perspective. Topics covered in the course include elementary cryptography; access control; common software vulnerabilities; common network vulnerabilities; digital rights management; policy and export control law; privacy; management and assurance; and special topics in information security. Hackers defense, attacks defense, systems and programs security, network and web security, worms and viruses, and other Internet secure applications.

Prerequisite(s):

- Probability Theory and Numerical Methods (A3004)
- Computer Networks (A3S19)

Course Outcomes:

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

CO1. Demonstrate the concept and principle of security Attacks, Services, Mechanisms, Conventional encryption algorithms (DES, AES, Triple DES, RC4) and public key algorithms RSA.

CO2. Expertise in Message authentication, Hash function and Public key encryption.

CO3. Apply Cryptographic algorithms to encrypt the given message.

CO4. Evaluate impact of the security attacks in real time applications and able to perform security vulnerability tests in real time applications

CO5. Understand the security vulnerabilities in existing Cryptograph algorithms

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)

B. Tech. ECE VI Semester **VCE-R15**

INFORMATION SECURITY
(Professional Elective – II)

Course Code: **A3608**

L	T	P	C
4	0	0	4

SYLLABUS

UNIT-I **(13 Lectures)**

INTRODUCTION: Computer Security Concepts, 051 security architecture, Security Attacks, Security Services, Security mechanisms, A model for network security. (T1: Chapter-1)

BLOCK CIPHER AND DATA ENCRYPTION STANDARDS: Block Cipher Principles, Data Encryption Standards, the Strength of DES, Differential and Linear Cryptanalysis. (T1: Chapter-3)

UNIT-II **(14 Lectures)**

ADVANCED ENCRYPTION STANDARDS: Triple DES, AES, block Cipher Modes of Operation, Stream Cipher, and RC4. (T1: Chapter-S)

PUBLIC-KEY CRYPTOGRAPHY AND RSA: Principles Public key crypto Systems the RSA algorithm, Key Management, Diffie-Hellman Key Exchange. (T1: Chapter- 9)

UNIT-III **(13 Lectures)**

MESSAGE AUTHENTICATION AND HASH FUNCTIONS: Authentication Requirement, Authentication Function, Message Authentication Code, HMAC, Hash Function, SHA-S12.(T1:Chapter-ll)

DIGITAL SIGNATURE: Digital Signature, Authentication Protocols, Digital Signature Standard. (T1:Chapter-13)

UNIT-IV **(13 Lectures)**

AUTHENTICATION APPLICATIONS: Kerberos, X.509 Authentication Service, Public Key Infrastructure. (T1: Chapter-14)

EMAIL SECURITY: Pretty Good Privacy (PGP) and S/MIME. (T1: Chapter-1S)

IP SECURITY: Overview, IP Security Architecture and Services, Authentication Header, Encapsulating Security Payload. (T1: Chapter-16)

UNIT-V **(10 Lectures)**

WEB SECURITY: Requirements, Secure Socket layer (SSl) and Transport layer Security (TlS), Secure Electronic Transaction (SET). (T1: Chapter-17)

FIREWALLS AND INTRUSION DETECTION: Firewall design Principles, Trusted Systems. (T1: Chapter-20)

TEXT BOOK(S):

1. William Stallings (2010), *Cryptography and Network Security: Principles and Practice,* 4th edition, Pearson Education, India.
2. Charlie Kaufman (2011), *Network Security: Private Communication in a Public World,* 2nd edition, Prentice Hall of India, New Delhi.

REFERENCE BOOK(S):

1. William Stallings (2013), *Network Security Essentials (Applications and Standards),* Pearson Education, Sth edition, India.
2. Atul Kahate (2014), *Cryptography and Network Security,* 2nd edition, Tata Mc Grawhill, India.
3. Robert Bragg, Mark Rhodes (2004), *Network Security: The Complete Reference,* Tata Mc Grawhill, India.

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)

B. Tech. ECE VI Semester **VCE-R15**

EMBEDDED SYSTEMS LAB

Course Code: **A3426**

L	T	P	C
0	0	3	2

Course Overview:

Embedded Systems are very important in the present automation world and is increasingly pervading all aspects of engineering. Many of the latest products in consumer electronics, home security and industrial automation are because of the advancements in the embedded system design techniques. Embedded system is a combination of hardware and software designed for a dedicated application. Since embedded system is designed aiming a single application its size, cost and power consumption should be low. The selection of microcontroller, other hardware and software play a vital role in the overall system performance. This lab handles a range of experiments, from 8051 to all the way to projects using Advanced Risk Machines (ARM). Students make extensive use of ARM platforms, interfacing them with external hardware for course projects

Prerequisite(s):

- Digital Logic Design (A3404)
- Computer Organization and Architecture (A3508)
- Microprocessors and Interfacing Laboratory (A3422)

Course Outcomes:

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

CO1. Identify the functionality of development boards to implement embedded applications.

CO2. Compile bug free assembly or C language programs for microcontrollers to a required task.

CO3. Design an electronic circuit for diverse I/O devices used in real time embedded applications.

CO4. Develop a product with all sub systems of functional requirements in optimal hardware and software components.

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)

B. Tech. ECE VI Semester **VCE-R15**

EMBEDDED SYSTEMS LAB

Course Code: **A3426**

L	T	P	C
0	0	3	2

LIST OF EXPERIMENTS

PART – A

Programs based on 8051 Microcontroller Development Tools:

1. Find GCD and LCM for given two byte length numbers.
2. BCD to seven segments.
3. Generation of 5ms delay with and without interrupt for timer.
4. Counting no of pulses in the external clock using counter.
5. Send a string serially with 9600 baud rate& receive a string serially and storing in internal RAM.
6. 16*2 LCD display interfacing.
7. Matrix keypad interfacing
8. ADC interfacing.
9. Stepper motor interfacing.
10. Interfacing of Temperature sensor and Relay control.

PART – B

Programs based on ARM Microcontroller Development Tools:

1. Using of more complex memory and branch type instructions such as LDMFD/STMFD, B and BL.
2. Basic reg/mem visiting and simple arithmetic/logic computing.
3. Changing ARM state mode by using MRS/MMSR instruction and specify a start address of the text segment by using command line.
4. Write and debug simple C language program using KEIL IDE.
5. Write a delay function using C language.
6. Write a random number generation function using assembly language. Call this function from a C program to produce a series of random numbers and save them in the memory.
7. Configure and read/write the memory space. Use assembly and C language to read/write words, half-words, bytes, half bytes from/to RAM.

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)

B. Tech. ECE VI Semester **VCE-R15**

CMOS VLSI LAB

Course Code: **A3427**

L	T	P	C
0	0	3	2

Course Overview:

This course gives knowledge about the design, analysis, simulation of circuits used as building blocks in Very Large Scale Integration (VLSI) devices. It enables the students to draw layouts, perform physical verification, placement & routing for various circuits involving CMOS gates, latches and etc. Students can apply the concepts learnt in the lectures towards design of actual VLSI subsystem all the way from specification, modelling, synthesis and physical design. This lab provides hands-on experience on implementation of digital and analog circuit designs which are required for development of various projects and research work.

Prerequisite(s):

- Electronic Devices and Circuits (A3401)
- Digital Logic Design (A3404)
- CMOS VLSI Design (A3425)

Course Outcomes:

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

CO1. Apply the knowledge of advanced concepts of circuit design to optimize digital/analog circuits.

CO2. Analyze the characteristics of CMOS based analog and digital circuits.

CO3. Construct the layouts for complex CMOS logic circuits by following design rules.

CO4. Evaluate the performance of analog/digital circuits in terms of power, speed and area.

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)

B. Tech. ECE VI Semester **VCE-R15**

CMOS VLSI LAB

Course Code: **A3427**

L	T	P	C
0	0	3	2

LIST OF EXPERIMENTS

PART - A

It is expected that every student learn simulation-using SPICE and should conduct any six of the following experiments.

1. Introduction to SPICE and its importance in designing of VLSI circuits
2. Simulation of RC circuit and ladder connected RC network
3. Simulation of RL circuit and ladder connected RL network
4. Simulation of RLC circuit and ladder connected RLC network
5. Simulation of Tree and Mesh RLC network
6. Simulation of CS and CD Amplifier
7. Simulation of basic analog circuits: Inverter and Differential amplifier
8. Simulation of NMOS and PMOS
9. Simulation of CMOS circuit design (DC and transient analysis)
    a. CMOS Inverter
    b. CMOS NOR/NAND gates
10. System Level Design using PLL

PART- B

It is expected that every student learn synthesis on Cadence and should conduct all the following experiments.

1. Introduction to layout Design Rules.
2. Layout, Physical Verification, Placement & Route for Complex Design, Static Timing Analysis, IR drop analysis and crosstalk analysis of the following
    a. Basic logic gates
    b. CMOS Inverter
    c. CMOS NOR/NAND gates
    d. CMOS XOR and MUX gates
    e. CMOS 1-bit full adder
    f. Static/Dynamic logic circuit
    g. Latch
    h. Pass transistor
3. Layout of any combinational circuit (complex CMOS logic gate) Learning about data paths.

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)

B. Tech. ECE VI Semester **VCE-R15**

INTELLECTUAL PROPERTY RIGHTS

Course Code: **A3013**

L	T	P	C
3	0	0	0

Course Overview:

The course on Intellectual Property Rights covers all aspects of creations of the intellect: Images, names, inventions, literary works, artistic works etc. It also addresses new and upcoming areas of Intellectual Property (IP) like Biotechnology, Domain Names, Creative Commons, etc. This course has been designed to give the students a holistic understanding of the subject. What is IP? How is it created? How is it protected? - are a few of the key questions which will be discussed during this course. The course is designed to introduce fundamental aspects of Intellectual Property Rights to students who are going to play a major role in development and management of innovative projects in industries. The course introduces all aspects of the IPR Acts. The course is designed for raising awareness of a multidisciplinary audience and has been categorized under 'General'.

Course Outcomes:

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

CO1. Enumerate the basics of the four primary forms of intellectual property rights.

CO2. Infer the basic principles and sources of intellectual property rights as well as examine how these have changed and are changing as a result of globalization.

CO3. Explain the different forms of intellectual property protection in terms of their key differences and similarities.

CO4. Sketch the process to acquire different intellectual property rights i.e., trademarks, copy rights, patents, and trade secrets.

CO5. Examine the new developments in IPR.

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)

B. Tech. ECE VI Semester **VCE-R15**

INTELLECTUAL PROPERTY RIGHTS

Course Code: **A3013**

L	T	P	C
3	0	0	0

SYLLABUS

UNIT - I

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

UNIT - II

TRADE MARKS: Purpose and function of trademarks, acquisition of trade mark rights, protectable matter, selecting and evaluatingtrademarks, trade mark registration process.

UNIT - III

LAW OF COPY RIGHTS : Fundamental of copy right law, originality of material, rights of reproduction, rights to perform the workpublicly, copy right ownership issues, copy right registration, notice of copy right, international copy right law.

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

UNIT - IV

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

UNFAIR COMPETITION: Misappropriation right of publicity, false advertising.

UNIT - V

NEW DEVELOPMENT OF IPR: Geographical indication, Geographical indication protection, Importance to protect geographical indications, Biotechnology Research and Intellectual Property Rights Management, Intellectualproperty audits.

TEXT BOOKS:

1. Deborah. E. Bouchoux 4th Edition (2012*), Intellectual property*, Cengage learning, India.
2. T. M Murray and M.J. Mehlman, Encyclopedia of Ethical, Legal and Policy issues in Biotechnology, John Wiley & Sons 2000

REFERENCE BOOKS:

1. Prabudda ganguli (2003), *Intellectual property right*, Tata McGraw Hill Publishing company ltd., India.
2. P.N. Cheremisinoff, R.P. Ouellette and R.M. Bartholomew, Biotechnology Applications and Research, Technomic Publishing Co., Inc. USA, 1985
3. P. Narayanan; Law of Copyright and Industrial Designs; Eastern law House, Delhi, 2010

SYLLABI FOR
VII SEMESTER

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)

B. Tech. ECE VII Semester **VCE-R15**

ELECTRONIC MEASUREMENTS AND INSTRUMENTATION

Course Code: **A3428**

L	T	P	C
3	1	0	3

Course Overview:

This course provides an overall understanding of the elements and processes, including sources of errors, and digitally acquiring these measurements. Along with an overview of instrumentation principles, the physical principles and electrical characteristics for several common instrument transducers are studied. The electronic signal conditioning circuits required for converting the electrical changes in the transducers to signal which can be interpreted accurately by a microprocessor or an embedded controller are analyzed effectively. This course also gives an integration of hardware and software in designing computer controlled processes and/or systems with the aid of sensors, transducers, data acquisition board, and instrument control.

Prerequisite(s):

- Knowledge of basic Electronic devices
- Knowledge of Pulse & Digital Circuits

Course Outcomes:

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

CO1. Apply the acquired knowledge of measuring instruments to design various measuring devices.

CO2. Identify different Oscilloscopes for the measurement of various signals.

CO3. Analyze various bridge circuits for the measurement of physical quantities to minimize errors in measurements.

CO4. Classify different Transducers based on their principles and apply them in Mini Projects.

CO5. Inspect Data Acquisition Systems and to apply for Instrumentation in industrial applications.

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)

B. Tech. ECE VII Semester **VCE-R15**

ELECTRONIC MEASUREMENTS AND INSTRUMENTATION

Course Code: **A3428**

L	T	P	C
3	1	0	3

SYLLABUS

UNIT - I **(12 Lectures)**

CHARACTERSTICS OF INSTRUMENTS: Block schematic of measuring system, Performance characteristics of instruments-static and dynamic characteristics, Errors in measurement.

MEASURING INSTRUMENTS:DC voltmeters- multirange, range extension, solid state and differential voltmeters, DC Ammeter- multi range, range extension, Aryton shunt, ohmmeters-series type and shunt type,AC Voltmeter,thermocouple type RF ammeter, multimeter for voltage, current and resistance measurements.

DIGITAL VOLTMETERS: Dual slope and Successive Approximation type DVM

UNIT – II **(12 Lectures)**

CATHODE RAY OSCILLOSCOPE (CRO): Introduction to CRT, vertical amplifiers, horizontal deflection system, simple CRO.

SPECIAL PURPOSE OSCILLOSCOPES: Dual beam CRO, Dual trace oscilloscope, sampling oscilloscope, analog storage oscilloscope, digital storage oscilloscope, measurement of phase and frequency (lissajous patterns).

UNIT - III **(10 Lectures)**

DC and AC BRIDGES: Measurement of resistance Wheat's stone bridge, Kelvin's double bridge, measurement of Inductance using Maxwell's inductance bridge, Anderson's bridge, Hay's bridge, measurement of capacitance using Schering bridge, Wagner's ground connection, errors and precautions in using bridges.

UNIT - IV **(12 Lectures)**

TRANSDUCERS: Introduction, classification, strain gauges, LVDT, piezo electric transducers, OPAMP applications in measurement and transducer circuits, instrumentation amplifier, thermometers, thermocouples, thermistors, sensistors.

UNIT - V **(10 Lectures)**

MEASUREMENT OF NON - ELECTRICAL QUANTITIES: Measurement of displacement, pressure, torque, vibration, pH, sound, velocity, humidity, speed, analog and digital data acquisition systems, interfacing and bus standards, programmable logic controllers and their industrial applications.

TEXT BOOKS:

1. K Sawhney (2007), *Electrical and Electronic Measurements and Instrumentation*, 18th edition, Dhanpat Rai & Co, New Delhi.
2. H.S.Kalsi, *Electronic Instrumentation*, 3rd edition, Tata McGraw-Hill Education

REFERENCE BOOKS:

1. D. Helfrick, W.D. Cooper (2002), *Modern Electronic Instrumentation and Measurement Techniques*, 5th edition, Prentice Hall of India, New Delhi.
2. David A. Bell (2003), *Electronic Instrumentation & Measurements*, 2nd edition, Prentice Hall of India, New Delhi.
3. D.V.S Murthy (2004), *Transducers and Instrumentation* 1st edition Prentice Hall of India, New Delhi.

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)

B. Tech. ECE VII Semester **VCE-R15**

MICROWAVE ENGINEERING

Course Code: A3429

L	T	P	C
3	1	0	3

Course Overview:

The subject microwave engineering may also be referred to as applied Electromagnetics. The importance of microwaves started way back in World War II period and later expanded its ways out to domestic (microwave oven), military, commercial, satellite and etc. This subject starts with the definition of microwave frequency range, its applications and its importance in modern era. The microwave transmission lines like waveguides (rectangular), micro-strips etc. and the various microwave components like T-junctions, circulator, isolator etc. are discussed in detail to enable the student to design microwave sub-systems and systems

Prerequisite(s):

- Electromagnetic Theory and Transmission Lines(A3410)
- Mathematics –I, II and III (A3001, A3006 and A3009)

Course Outcomes:

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

CO1. Apply the concepts of electromagnetic field theory to analyze different types of microwave transmission lines

CO2. Estimate the S-Matrix of various microwave components from the knowledge of microwave measurement techniques

CO3. Compare the performance characteristics of various microwave tubes and solid state devices

CO4. Design the cavity resonators for a given Q-factor at various microwave frequencies

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)

B. Tech. ECE VII Semester **VCE-R15**

MICROWAVE ENGINEERING

Course Code: A3429

L	T	P	C
3	1	0	3

SYLLABUS

UNIT - I **(19 Lectures)**

MICROWAVE TRANSMISSION LINES: Introduction, Microwave Spectrum and Bands, Applications of Microwaves. Rectangular Waveguides –solution of Wave Equations in Rectangular Coordinates, TE/TM mode analysis, Expressions for Fields, Characteristic Equation and Cut-off Frequencies, Filter characteristics, Dominant and Degenerate Modes, Sketches of TE and TM mode fields in the cross-section, Mode Characteristics – Phase and Group Velocities, Wavelengths and Impedance Relations Related Problems Rectangular Guide- Power Transmission and Power Losses Impossibility of TEM mode. Microstrip Lines– Introduction, Zo Relations, Effective Dielectric Constant, Losses, Q factor. Cavity Resonators– Introduction, Rectangular Cavities, Dominant Modes and Resonant Frequencies, Q factor and Coupling Coefficients. Related Problems.

UNIT - II **(11 Lectures)**

WAVEGUIDE COMPONENTS AND APPLICATIONS: Coupling Mechanisms – Probe, Loop, Aperture types. Waveguide Discontinuities – Waveguide windows, Tuning Screws and Posts, Matched Loads. Waveguide Attenuators – Resistive Card, Rotary Vane types; Waveguide Phase Shifters – Dielectric, Rotary Vane types. Waveguide Multiport Junctions – E plane and H plane Tees, Magic Tee, Hybrid Ring; Directional Couplers – 2 Hole, Bethe Hole types. Related Problems Ferrites– Composition and Characteristics, Faraday Rotation; Ferrite Components – Gyrator, Isolator, Circulator. Scattering Matrix– Significance, Formulation and Properties. S Matrix Calculations for – 2 port Junction, E plane and H plane Tees, Magic Tee, Directional Coupler, Circulator and Isolator. Related Problems.

UNIT - III **(12 Lectures)**

MICROWAVE TUBES: Limitations and Losses of conventional tubes at microwave frequencies. Microwave tubes – O type and M type classifications. O-type tubes : 2 Cavity Klystrons – Structure, Re-entrant Cavities, Velocity Modulation Process and Applegate Diagram, Bunching Process and Small Signal Theory – Expressions for o/p Power and Efficiency. Reflex Klystrons – Structure, Applegate Diagram and Principle of working, Mathematical Theory of Bunching, Power Output, Efficiency, Oscillating Modes and o/p Characteristics, Effect of Repeller Voltage on power O/P. Related Problems. HELIX TWTS: Significance, Types and Characteristics of Slow Wave Structures; Structure of TWT and Amplification Process (qualitative treatment), Suppression of Oscillations, Gain Considerations.

UNIT - IV **(10 Lectures)**

M-TYPE TUBES:Introduction, Cross-field effects, Magnetrons – Different Types, 8-Cavity Cylindrical TravellingWave Magnetron – Hull Cut-off and Hartree Conditions, Modes of Resonance and PI-Mode Operation, Separation of PI-Mode, o/p characteristics.

MICROWAVE SOLID STATE DEVICES: Introduction, Classification, Applications. TEDs – Introduction, Gunn Diode – Principle, RWH Theory, Characteristics, Basic Modes of Operation, Gunn Oscillation Modes. LSA mode Avalanche Transit Time Devices.

UNIT - V **(8 Lectures)**

MICROWAVE MEASUREMENTS: Description of Microwave Bench – Different Blocks and their Features, Precautions; Microwave Power Measurement – Bolometers. Measurement of Attenuation, Frequency standing wave measurements – measurement of low and High VSWR, Cavity Q. Impedance Measurements. Introduction to Network Analyser.

Text Books :

1. Samuel Y. Liao (1994), *Microwave Devices and Circuits*, 3rd edition, Prentice Hall of India, New Delhi.
2. Sa R. E. Collin (2002), *Foundations for Microwave Engineering,* 2nd edition, IEEE Press, John Wiley, India.
3. M. Kulkarni (1998), *Micro Wave and Radar Engineering,* Umesh Publications, New Delhi.

REFERENCE BOOKS:

1. M. L. Sisodia, G. S. Raghuvanshi (1995), *Microwave Circuits and Passive Devices,* Wiley Eastern Ltd., New Age International Publishers Ltd.
2. Peter A. Rizzi (1999), *Microwave Engineering Passive Circuits*, Prentice Hall of India, New Delhi.
3. Herbert J. Reich, J. G. Skalnik, P. F. Ordung, H. L. Krauss (2004), *Microwave Principles,* CBPublishers.

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)

B. Tech. ECE VII Semester **VCE-R15**

DIGITAL SIGNAL PROCESSING

Course Code: A3430

L	T	P	C
3	1	0	3

Course Overview:

This course introduces fundamental concepts, algorithms and applications of digital signal processing. Starting from a description of how signals can be represented as digital waveforms and how systems may be modelled as digital filters; the course investigates the processing and analysis of signals using the most common approaches and algorithms. The familiarity with the Fourier and Laplace transforms and concepts such as linearity and shift invariance is used in the description and analysis of linear analog systems. This idea is extended to the field of discrete time systems. Major parts of the course will concentrate on signal analysis using Fourier transforms, linear system analysis, Filter design and a few more advanced topics. While this course deals largely with the theory of DSP, we will use a powerful software package, MATLAB, to look at applications of this theory, particularly Fourier analysis and digital filter design

Prerequisite(s):

- Signals and Systems (A3405).
- Mathematics - II (A3006).

Course Outcomes:

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

CO1. Interpret Digital Signal Processing using concepts of Discrete time signals and systems, LSI, stability and causality, discrete time systems described by difference equations

CO2. Interpret Frequency domain representation of discrete time signals and systems using Fourier series and Fourier transforms, Discrete Fourier transforms, Fast Fourier transforms (FFT).

CO3. Interpret applications of Z-Transform: Stability, Realization of Digital Filters: Structures for FIR systems: Direct form structure, Cascade form structures.

CO4. Interpret design of FIR digital filters: Symmetric and antisymmetric FIR filters, Design of linear phase FIR Digital Filters using Windows, Design of linear phase FIR Digital Filters

CO5. Interpret design of IIR Digital Filters: IIR filter design by Approximation of Derivatives, IIR filter design by impulse invariance, IIR filter design by bilinear transformation

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)

B. Tech. ECE VII Semester **VCE-R15**

DIGITAL SIGNAL PROCESSING

Course Code: A3430

L	T	P	C
3	1	0	3

SYLLABUS

UNIT - I **(12 Lectures)**

INTRODUCTION TO DIGITAL SIGNAL PROCESSING: Discrete time signals & systems, linear shift invariant systems, stability and causality, discrete time systems described by difference equations, frequency domain representation of discrete time signals and systems.

UNIT - II **(15 Lectures)**

FOURIER SERIES AND FOURIER TRANSFORMS: Discrete Fourier series representation of periodic sequences, Properties of discrete Fourier series, Discrete Fourier transforms: frequency domain sampling, , linear convolution of sequences using DFT, Computation of DFT, Relationship of DFT to other transforms, Properties of DFT, Fast Fourier transforms (FFT) - Radix-2 FFT algorithm, Radix-4 FFT algorithms, Inverse FFT.

UNIT - III **(15 Lectures)**

APPLICATIONS OF Z-TRANSFORM: Review of Z-Transforms, Discrete Time Transfer Function, Stability: Constraints of poles and Eigen Values, Test for common factors, Schur-Cohn Stability criterion, Schur - Cohn-Fujiware Stability Criterion, Jury-Marden Stability Criterion, Lyapunov Stability Criterion, Time Domain and Frequency domain analysis

REALIZATION OF DIGITAL FILTERS: Structures for FIR systems: Direct form structure, Cascade form structures, Structures for IIR systems: Direct form structures, Signal flow graphs and transposed structures, cascade form structures, Parallel form structures.

UNIT - IV **(7 Lectures)**

DESIGN OF FIR DIGITAL FILTERS: Symmetric and antisymmetric FIR filters, Design of linear phase FIR Digital Filters using Windows, Design of linear phase FIR Digital Filters by Frequency Sampling method.

UNIT - V **(8 Lectures)**

DESIGN OF IIR DIGITAL FILTERS: IIR filter design by Approximation of Derivatives, IIR filter design by impulse invariance, IIR filter design by bilinear transformation, Characteristics of commonly used analog filters (Butter worth and Chebyshev), Frequency transformations, comparison of IIR & FIR filters.

TEXT BOOKS:

1. John G. Proakis, Dimitris G. Manolakis (2007), *Digital Signal Processing, Principles, Algorithms, and Applications*, Pearson Education / PHI, India.
2. Andreas Antoniou (2008), *Digital Signal Processing,* Tata McGraw Hill, New Delhi.

REFERENCE BOOKS:

1. M. H. Hayes (2007), Schaums Outlines of *Digital Signal Processing*, Tata McGraw Hill, India.
2. C. Britton Rorabaugh (2005), *Digital Signal Processing Primer*, Tata McGraw Hill, New Delhi.
3. Robert J. Schilling, Sandra L. Harris (2007), *Fundamentals of Digital Signal Processing using Matlab*, Thomson Publications,India.
4. Alan V. Oppenheim, Ronald W. Schafer (2006), *Digital Signal Processing,* Prentice Hall of India, New Delhi.

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)

B. Tech. ECE VII Semester **VCE-R15**

CPLD AND FPGA ARCHITECTURES AND APPLICATIONS
(Professional Elective - III)

Course Code: A3457

L	T	P	C
4	0	0	4

Course Overview:

The increasing complexity of digital systems has led to development of modern methodologies in digital design, simulation and production. Collectively known as Electronic Design Automation (EDA), key elements include graphics-based design entry and verification, hardware description languages (HDLs), application specific integrated circuits (ASICs), complex programmable logic devices (CPLDs) and field programmable gate arrays (FPGAs). This subject introduces the electronic design automation process using the current technology in graphical tools for EDA. It will show how digital systems can be described as a hierarchical structure of block diagrams, state machines, flow charts, truth tables and HDL code (VHDL/VERILOG). Designs can then be extensively simulated to check their integrity, and finally compiled and synthesized in a CPLD or FPGA. Hands-on practical work in laboratory classes, assignments and a team project form a major part of the learning in this subject.

Course Outcomes:

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

CO1. Classify various PLDs based on the applications and compare its architectures.

CO2. Identify the technical problem and apply the knowledge to formulate the solutions in various engineering fields related to PLDs.

CO3. Distinguish between the concept of SRAM and Anti-fuse based FPGA architectures.

CO4. Make use of various techniques to implement the digital logic circuits using different FPGA architectures.

CO5. Experiment with the EDA tools to meet the major goals like size, speed and power consumption.

VARDHAMAN COLLEGE OF ENGINEERING
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B. Tech. ECE VII Semester **VCE-R15**

CPLD AND FPGA ARCHITECTURES AND APPLICATIONS
(Professional Elective - III)

Course Code: A3457

L	T	P	C
4	0	0	4

SYLLABUS

UNIT - I **(12 Lectures)**

INTRODUCTION TO PROGRAMMABLE LOGIC ARCHITECTURES: Introduction, Simple Programmable Logic Devices – Read Only Memories, Programmable Logic Arrays, Programmable Array Logic, Programmable Sum-of-products Arrays, PAL fuse matrix and, Combinational Outputs, PAL Outputs with programmable polarity, PAL devices with programmable polarity, universal PAL and generic array logic. complex programmable logic devices: Architectures- Altera series – Max 5000/7000 series and Altera FLEX logic – 10000 series CPLD, AMD's – CPLD (Mach 1 to 5); Cypres FLASH 370 Device Technology, Lattice LSI's Architectures – 3000 Series – Speed Performance and in system programmability.

UNIT - II **(12 Lectures)**

FPGA BASED SYSTEMS: Introduction, Basic Concepts, Digital Design and FPGAs, FPGA - Based System Design.

FPGA FABRICS: Introduction, FPGA architectures, SRAM based FPGAs, permanently programmed FPGAs. Chip input/output, circuit design of FPGA fabrics, architecture of FPGA fabrics.

UNIT - III **(12 Lectures)**

COMBINATIONAL LOGIC: The logic design process, combinational network delay, power and energy optimization, arithmetic logic.

SEQUENTIAL MACHINES: Introduction, the sequential machine design process, sequential design styles, rules for clocking, performance analysis.

UNIT - IV **(12 Lectures)**

LOGIC IMPLEMENTATION USING FPGAs: Syntax directed translation, logic implementation by macro, logic synthesis, technology independent and dependent logic optimizations, physical design for FPGAs, logic design process revisited.

UNIT - V **(8 Lectures)**

FINITE STATE MACHINE: State Transition table, state assignment for FPGAs, hazard and one hot encoding.

CASE STUDIES: Case studies Xilinx XC4000 and ALTERA's FLEX 8000.

TEXT BOOKS:

1. Wayne Wolf (2004), *FPGA Based System Design*, Pearson Education, New Delhi.
2. Robert Dueck (2000), *Digital design With CPLD Applications and VHDL*, Thomson Learning, USA.
3. P. K. Chan, S. Mourad (1994), *Digital Design Using Field Programmable Gate Array*, Prentice Hall of India.

REFERENCE BOOKS:

1. S. Trimberger, Edr. (1994), *Field Programmable Gate Array Technology*, Kluwer Academic Publications, New Dehi.
2. John F. Wakerly (), *Digital Design*, 3rd Edition, Prentice Hall of India, New Delhi.
3. J. Old Field, R. Dorf (1995), *Field Programmable Gate Arrays*, John Wiley & Sons, New York.
4. S. Brown, R. Francis, J. Rose, Z. Vransic (1992), *Field Programmable Gate Array*, Kluwer Academic Publications, New Dehi, India.

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)

B. Tech. ECE VII Semester **VCE-R15**

RADAR SYSTEMS
(Professional Elective - III)

Course Code: A3458

L	T	P	C
4	0	0	4

Course Overview:

This course introduces the student to the fundamentals of radar system engineering. The radar range equation in its many forms is developed and applied to different situations. Radar transmitters, antennas, and receivers are covered. The concepts of matched filtering and Phased Arrays are introduced. The fundamentals of radar target detection in a noise background are discussed. Target radar cross-section models are addressed, as well as the effects of the operating environment, including propagation and clutter. MTI and pulsed Doppler processing and performance are addressed. Range, angle, and Doppler resolution/accuracy, as well as fundamental tracking concepts, will also be discussed.

Prerequisite(s):

- Antennas & Wave Propagation
- Analog & Digital Communications

Course Outcomes:

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

CO1. Describes about radar fundamentals

CO2. Classify pulsed and continuous types of radars Doppler Effect and the concepts of continuous wave radars

CO3. Discuss the operation of MTI and pulse Doppler radar. Examine the various tracking mechanisms as applicable to radar systems

CO4. Analyze the detection of radar signals in noise. Demonstrate the noise figure and radar receiver

VARDHAMAN COLLEGE OF ENGINEERING
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B. Tech. ECE VII Semester **VCE-R15**

RADAR SYSTEMS
(Professional Elective - III)

Course Code: A3458

L	T	P	C
4	0	0	4

SYLLABUS

UNIT - I **(10 Lectures)**

INTRODUCTION: Basic principle of operation of RADAR, radar equation, block diagram of a pulse radar, radar frequencies ,applications of radar, prediction of range performance, minimum detectable signal, receiver noise, signal-to-noise ratio, integration of radar pulses, radar cross section of targets, transmitter power, pulse repetition frequency and range ambiguities, system losses , related problems

UNIT - II **(12 Lectures)**

CW AND FREQUENCY – MODULATED RADAR: The Doppler Effect, CW radar, Frequency – Modulated CW Radar, Multiple – Frequency CW Radar.

MTI AND PULSE DOPPLER RADAR: Introduction, delay line cancelers, multiple or staggered pulse repetition frequencies, range – gated Doppler filters, limitations to MTI performance, non-coherent MTI, pulse Doppler radar, related problems.

UNIT - III **(14 Lectures)**

TRACKING RADAR: Tracking with radar, sequential lobing, conical scan, mono-pulse tracking radar, comparison of trackers, Acquisition search patterns.

RADAR ANTENNAS: Introduction, Antenna Parameters, Parabolic reflector antennas, radomes, related problems.

UNIT - IV **(10 lectures)**

RECEIVERS, DISPLAYS, AND DUPLEXERS : The Radar receiver, Noise Figure, Mixers, low – noise front ends, displays, duplexers and receiver protectors, related problems.

UNIT - V **(09 Lectures)**

DETECTION OF RADAR SIGNALS IN NOISE: Introduction, Matched – Filter Receiver, Correlation detection.

THE PHASED ARRAY ANTENNA: Introduction, Basic Concepts (elementary treatment only)

Text Books:

1. Merrill I. Skolnik (2007), *Introduction to Radar Systems*, 2nd edition, Tata McGraw Hill, New Delhi.

Reference Books:

1. Fred E. Nathanson (2007), *Radar Design Principles : Signal Processing and the Environment Systems*, 2nd edition, Scitech Publishing, New Jersy.

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)

B. Tech. ECE VII Semester **VCE-R15**

EMBEDDED SOFTWARE DESIGN
(Professional Elective - III)

Course Code: **A3459**

L	T	P	C
4	0	0	4

Course Overview:

Embedded Systems are very important in the present automation world and is increasingly pervading all aspects of engineering. Many of the latest products in consumer electronics, home security and industrial automation are because of the advancements in the embedded system design techniques. Embedded system is a combination of hardware and software designed for a dedicated application. Since embedded system is designed aiming a single application its size, cost and power consumption should be low. The selection of microcontroller, other hardware and software play a vital role in the overall system performance. This lab handles a range of experiments, from 8051 to all the way to projects using Advanced Risk Machines (ARM). Students make extensive use of ARM platforms, interfacing them with external hardware for course projects

Prerequisite(s):

- Microprocessors and Interfacing (A3419)
- Computer organization and architecture (A3508)
- Embedded systems (3424)

Course Outcomes:

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

CO1. Identify the functionality of development boards to implement embedded applications.

CO2. Compile bug free assembly or C language programs for microcontrollers to a required task.

CO3. Design an electronic circuit for diverse I/O devices used in real time embedded applications.

CO4. Develop a product with all sub systems of functional requirements in optimal hardware and software components.

VARDHAMAN COLLEGE OF ENGINEERING
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B. Tech. ECE VII Semester **VCE-R15**

EMBEDDED SOFTWARE DESIGN
(Professional Elective - III)

Course Code: **A3459**

L	T	P	C
4	0	0	4

SYLLABUS

UNIT - I **(10 Lectures)**

EMBEDDED DESIGN LIFE CYCLE: Introduction, Product Specification, Hardware/software partitioning, Iteration and Implementation, Detailed hardware and software design, Hardware/Software integration, Product Testing and Release, Maintaining and upgrading existing products.

UNIT - II **(11 Lectures)**

SELECTION PROCESS: Packaging the Silicon, Adequate Performance, RTOS Availability, Tool chain Availability, Other issues in the Selection process.

PARTITIONING DECISION: Hardware/Software Duality, Hardware Trends, ASICs and Revision Costs.

UNIT - III **(10 Lectures)**

DEVELOPMENT ENVIRONMENT: The Execution Environment, Memory Organization, System startup, Interrupt Response Cycle, Function Calls and Stack Frames, Object Placement.

UNIT - IV **(12 Lectures)**

SPECIAL SOFTWARE TECHNIQUES: Manipulating the Hardware, Interrupts and Interrupt service Routines (ISRs), Watchdog Times, Flash Memory, Design Methodology.

BASIC TOOL SET: Host - Based Debugging, Remote Debuggers and Debug Kernels, ROM Emulator, Logic Analyzer.

UNIT – V **(10 Lectures)**

BDM, JTAG, and Nexus: Background Debug Mode, Joint Test Action Group (JTAG) and Nexus.

The ICE — An Integrated Solution: Bullet Proof Run Control, Real time trace, Hardware Break points, Overlay memory, Timing Constrains, Usage Issue, Setting the Trigger.

List of Text Books / References / Websites / Journals / Others

Text Books:

1. Arnold S. Burger (2002), *Embedded Systems Design: Introduction to Processes, Tools, and Techniques*, CMP Books

Reference Books:

1. Steave Heath (2003), *Embedded Systems Design*, 2nd edition, Newnes Publications,Burlington.
2. Andrew N. Sloss, Dominic Symes, Cheris Wright(), ARM *Systems Developers Guide Designing and Optimizing System Software*, Elsevier Publication,San Fransisco.
3. Daniel P. Bovet, Marco Cesati (2005), *Understanding the Linux Kernel*, 3rd edition, O'Reilly Media,USA.

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)

B. Tech. ECE VII Semester **VCE-R15**

OPTICAL COMMUNICATIONS
(Professional Elective - III)

Course Code: A3460

L	T	P	C
4	0	0	4

Course Overview:

Because of the inherent advantage of immunity to RFI, EMI, round loop currents and to a large extent to nuclear radiations, optical transmission through dielectric wave guide or fibre optic transmission is gaining considerable importance in both civil and military communication. The additional unique advantage of large bandwidth transmission capabilities, low weight, cost and use of inexhaustible raw material (silica) makes the use of this new technology as a fore runner, which would ultimately replace coaxial transmission completely. To use this new technology for transmission of signals both in analog and digital formats, for short haul low bit rate signals or long high bit rate signals special attention has to be given in the selection of the four basic components namely the fiber, source, detector and the amplifier. This course discusses the progressive development of the above four components to meet the present day demand for high data rate long haul communication systems.

Prerequisite(s):

- Analog communications (A3412)
- Digital communications (A3415)
- Microwave engineering (A3429)

Course Outcomes:

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

CO1. Recognize and classify the structures of optical fiber and types.

CO2. Discuss the channel impairments like losses and dispersion

CO3. Analyze various coupling losses.

CO4. Classify the optical sources and detectors and to discuss their principle.

CO5. Build fiber Optical communication systems based on proper design considerations.

VARDHAMAN COLLEGE OF ENGINEERING
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B. Tech. ECE VII Semester **VCE-R15**

OPTICAL COMMUNICATIONS
(Professional Elective - III)

Course Code: A3460

L	T	P	C
4	0	0	4

SYLLABUS

UNIT – I **(11 Lectures)**

Overview of optical fiber communication - Historical development, The general system, advantages of optical fiber communications. Optical fiber wave guides- Introduction, Ray theory transmission, Total Internal Reflection, Acceptance angle, Numerical Aperture, Skew rays. Cylindrical fibers- Modes, Vnumber, Mode coupling, Step Index fibers, Graded Index fibers.

UNIT – II **(12 Lectures)**

Single mode fibers- Cut off wavelength, Mode Field Diameter, Effective Refractive Index. [2]. Fiber materials — Glass, Halide, Active glass, Chalgenide glass, Plastic optical fibers. Signal distortion in optical fibers- Attenuation, Absorption, Scattering and Bending losses, Core and Cladding losses(!4)

Information capacity determination, Group delay, Types of Dispersion - Material dispersion, Wave-guide dispersion, Polarization mode dispersion, Intermodal dispersion. Pulse broadening. Optical fiber Connectors- Connector types, Single mode fiber connectors, Connector return loss.

UNIT – III **(13 Lectures)**

Fiber Splicing- Splicing techniques, Splicing single mode fibers. Fiber alignment and joint loss- Multimode fiber joints, single mode fiber joints,. Optical sources- LEDs, Structures, Materials, Quantum efficiency, Power, Modulation, Power bandwidth product. Injection Laser Diodes- Modes, Threshold conditions, External quantum efficiency,Laser diode rate equations,Resonant frequencies. Reliability of LED&ILD. Source to fiber power launching - Output patterns, Power coupling, Power launching, Equilibrium Numerical Aperture, Laser diode to fiber coupling.

UNIT – IV **(11 Lectures)**

Optical detectors- Physical principles of PIN and APD, Detector response time, Temperature effect on Avalanche gain, Comparision of Photodetectors. Optical receiver operation- Fundamental receiver operation, Digital signal transmission, error sources, Receiver configuration, Digital receiver performance, Probability of error, Quantum limit, Analog receivers**.**

UNIT – V **(13 Lectures)**

Optical system design — Considerations, Component choice, Multiplexing. Point-to- point links, System considerations, Link power budget with examples. Overall fiber dispersion in Multi mode and Single mode fibers, Rise time budget with examples. Transmission distance, Line coding in Optical links, WDM, Necessity , Principles, Types of WDM, Measurement of Attenuation and Dispersion, Eye pattern.

Text Books:

1. *OpticalFiberCommunications*–GerdKeiser,McGraw-HillInternationaledition,3rdEdition,2000
2. *Optical Fiber Communications* – John M. Senior, PHI, 2nd Edition, 2002.

Reference Books:

1. *Fiber Optic Communications* – D.K. Mynbaev , S.C. Gupta and Lowell L.Scheiner, Pearson Education,2005.
2. Text Book on *Optical Fibre Communication and its Applications* – S.C.Gupta, PHI, 2005.
3. *Fiber Optic Communication Systems* – Govind P. Agarwal , John Wiley, 3rd Ediition, 2004.

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)

B. Tech. ECE VII Semester **VCE-R15**

DESIGN OF FAULT TOLERANT SYSTEMS
(PROFESSIONAL ELECTIVE – IV)

Course Code: **A3461**

L	T	P	C
4	0	0	4

Course Overview:

Fault tolerance is the ability of a system to continue performing its intended function despite of faults. In a broad sense, fault tolerance is associated with reliability, with successful operation, and with the absence of breakdowns. The ultimate goal of fault tolerance is the development of a dependable system. As computer systems become relied upon by society more and more, dependability of these systems becomes a critical issue. In airplanes, chemical plants, heart pace-makers or other safety critical applications, a system failure can cost people's lives or environmental disaster.

Prerequisite(s):

- Electronic Devices and Circuits (A3401)
- Digital Logic Design (A3404)
- VLSI Design (A3425)

Course Outcomes:

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

CO1. Convey relation between reliability and meantime between failures, maintainability and availability.

CO2. Categorize basic techniques for achieving fault-tolerance in electronic, communication and software systems and skills in modelling and evaluating fault-tolerant architectures in terms of reliability, availability and safety.

CO3. Deduct knowledge in sources of faults and means for their prevention and forecasting, transition count testing, and signature analysis.

CO4. Inference merits and limitations of fault-tolerant design, random access scan technique, built-in-test, design for autonomous self-test.

CO5. Convey the knowledge of savings in test-engineering time may be offset by added design-engineering effort to include Design of Fault Tolerance.

VARDHAMAN COLLEGE OF ENGINEERING
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B. Tech. ECE VII Semester **VCE-R15**

DESIGN OF FAULT TOLERANT SYSTEMS
(PROFESSIONAL ELECTIVE – IV)

Course Code: **A3461**

L	T	P	C
4	0	0	4

SYLLABUS

UNIT - I **(12 Lectures)**

BASIC CONCEPTS OF RELIABILITY: The definition of reliability, reliability and failure rate, relation between reliability and meantime between failures, maintainability and availability, series and parallel systems.

FAULTS IN DIGITAL CIRCUITS: Failures and Faults, modelling of faults, temporary faults.

UNIT - II **(10 Lectures)**

TEST GENERARTION: Fault diagnosis of digital systems, test generation of combinational logic circuits, detection of multiple faults in combinational logic circuits, test generation for sequential logic circuits, random testing, transition count testing, signature analysis.

UNIT - III **(14 Lectures)**

FAULT TOLERANT DESIGN: The importance of fault tolerance, basic concepts of fault tolerance, static redundancy, dynamic redundancy, hybrid redundancy, self-purging redundancy, sift-out modular redundancy (SMR), 5MR reconfiguration scheme, time redundancy, software redundancy, and fail-soft operation.

UNIT - IV **(12 Lectures)**

SELF-CHECKING AND FAIL-SAFE LOGIC: Introduction, design of totally self-checking checkers, self-checking sequential machines, partially self-checking circuits, strongly fault-secure circuits, fail-safe design, totally self-checking PLA design.

UNIT - V **(14 Lectures)**

DESIGN FOR TESTABILITY: Testability, controllability and observability, design of testable combinational logic circuits, testable design of sequential circuits, scan path technique, level sensitive scan design (LSSD), random access scan technique, built-in-test, design for autonomous self-test

TEXT BOOKS:

1. Parag K. Lala (1984), *Fault Tolerant & Fault Testable Hardware Design*, Prentice Hall of India, New Delhi, India.
2. Alfred L. Crouch (2008), *Design for Test for Digital IC's and Embedded Core Systems*, Pearson Education, New Delhi, India.

REFERENCE BOOKS:

1. MironAbramovici, Melvin A. Breuer, Arthur D. Friedman (1994), *Digital Sxxxxxxxystems Testing and Testable Design*, IEEE Press, New York, USA.
2. Michael L. Bushnell, Vishwani D. Agarwal(2000), *Essentials of Electronic Testing* For Digital, Memory, And Mixed-Signal Vlsi Circuits, Kluwer Academic Publishers, USA.

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)

B. Tech. ECE VII Semester **VCE-R15**

CELLULAR AND MOBILE COMMUNICATIONS
(Professional Elective - IV)

Course Code: **A3462**

L	T	P	C
4	0	0	4

Course Overview:

This course is intended to stress the fundamentals of mobile communications engineering that are important to any mobile communication system. It introduces cellular mobile radio systems, performance criteria, design, operations and various generations of cellular systems. It covers various types of interferences in mobile radio environment. This course describes cell coverage for signal and traffic, signal reflections in various terrains, various cell sites and mobile antennas and their analysis.

This course explains different frequency management and channel assignment techniques. This course also deals with handoff, dropped calls and cell splitting. It gives an overview of digital cellular networks like GSM, CDMA etc.

Course Outcomes:

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

CO1. Summarize the concepts pertained to cellular and mobile communications.

CO2. Identify different methods for reducing the interference.

CO3. Analyze various mobile radio propagation models and antennas for cell site and mobile.

CO4. Interpret different channel assignment strategies and handoffs.

CO5. Discuss the technical features of emerging cellular communication systems.

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)

B. Tech. ECE VII Semester **VCE-R15**

CELLULAR AND MOBILE COMMUNICATIONS
(Professional Elective - IV)

Course Code: **A3462**

L	T	P	C
4	0	0	4

SYLLABUS

UNIT - I **(10 Lectures)**

CELLULAR MOBILE RADIO SYSTEMS: Introduction to Cellular Mobile System, Why Cellular Mobile Telephone Systems, History Of 800mhz Spectrum Allocation, Trunking Efficiency, A Basic Cellular System, Performance Criteria, Uniqueness of Mobile Radio Environment, Operation of Cellular Systems, Marketing Image of Hexagonal Shaped Cells, Planning a Cellular system, Analog cellular Systems.

ELEMENTS OF CELLULAR RADIO SYSTEM DESIGN: General Description of The Problem, Concept of Frequency Channels, Co-Channel Interference Reduction Factor, Desired C/I From a Normal Case in a Omni-directional Antenna System, Handoff Mechanism, Cell Splitting, Consideration of The Components of Cellular System.

UNIT - II **(13 Lectures)**

INTERFERENCE: Co-Channel Interference, Exploring Co-Channel Interference areas in a system, Real Time Co-Channel Interference Measurement at mobile radio transceivers, Design of an Omni Directional Antenna System in the worst case, Design of a Directional Antenna System, Lowering the Antenna height, Reduction of Co-channel Interference by means of a notch in the tilted antenna pattern, Umbrella-pattern effect, use of parasitic elements, power control, Diversity Receiver.

NON CO-CHANNEL INTERFERENCE: Subjective test Vs objective test, Adjacent-channel interference, near-end-far-end interference, effect on near-end mobile units, cross talk-A unique characteristics of voice channels, effects on coverage and interference by applying power decrease, antenna height decrease, beam tilting, effects of cell-site components, interference between systems, UHF TV interference, long-distance interference.

UNIT - III **(10 Lectures)**

CELL COVERAGE FOR SIGNAL AND TRAFFIC: General Introduction, Obtaining the Mobile Point-to-Point Model (Lee Model), Propagation over Water or Flat Open Area, Foliage Loss, Propagation in Near-in Distance, Long –Distance Propagation, Obtain Path Loss from a Point-to-Point Prediction Model-A General Approach, Form of a Point-to-Point Model.

CELL SITE AND MOBILE ANTENNAS: Sum and Difference Patterns and their Synthesis, Antennas at Cell Site, Omni-directional Antennas, Directional Antennas for Interference Reduction, Unique Situations of Cell-Site Antennas, Mobile Antennas.

UNIT - IV **(13 Lectures)**

FREQUENCY MANAGEMENT AND CHANNEL ASSIGNMENT: Frequency Management, Frequency –Spectrum Utilization, Set-up Channels, Channel Assignments to Cell Sites and Mobile Units, Fixed Channel Assignment, Adjacent Channel Assignment, Channel Sharing and Borrowing, Sectorization, Underlay-Overlay arrangement, Non fixed Channel Assignment Algorithms.

HANDOFF: Value of Implementing Handoffs, Why handoffs, Types of Handoff, Initiation of a Handoff, Delaying a Handoff, Forced Handoffs, Queuing of Handoffs, Power-Difference Handoffs, Mobile Assisted Handoff(MAHO) and Soft Handoff, Cell-Site Handoff, Intersystem Handoff, Introduction to Dropped Call Rate, Formula of Dropped Call Rate.

UNIT - V **(06 Lectures)**

DIGITAL CELLULAR NETWORKS:GSM- Architecture, Channels, Multiple-access scheme, Radio resource management, Mobility management, Communication management, Network management, North American TDMA-History, Architecture, CDMA.

TEXT BOOKS:

1. William C. Y. Lee (2006), *Mobile Cellular Telecommunications*, 2nd edition, Tata McGraw Hill, India.
2. Theodore S. Rappaport (2002), *Wireless Communications*, 2nd edition, Pearson education, India.

REFERENCE BOOKS:

1. Gordon L. Stuber (2007), *Principles of Mobile Communication*, 2nd edition, Springer International, India.
2. William C. Y. Lee (2006), *Wireless and Cellular Telecommunications*, 3rd edition, McGraw Hill, New Delhi.

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)

B. Tech. ECE VII Semester **VCE-R15**

DIGITAL IMAGE PROCESSING
(Professional Elective - IV)

Course Code: **A3463**

L	T	P	C
4	0	0	4

Course Overview:
Visual information plays an important role in many aspects of our life. Much of this information is represented by digital images. Digital image processing is ubiquitous, with applications including television, tomography, photography, printing, robot perception, and remote sensing. It is an introductory course to the fundamentals of digital image processing. It emphasizes general principles of image processing, rather than specific applications. We expect to cover the following topics: image acquisition and display, color representations, image sampling and quantization, point operations, linear image filtering and correlation, image transforms and sub-band decompositions, contrast and color enhancement, image restoration, and image compression.

Prerequisite(s):
1. Signal and systems
2. Digital signal processing

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

CO1. Understand image formation model and low level process, mid level process and high level process

CO2. Apply the concepts of fundamental image enhancement algorithms and restoration techniques to improve the quality of image

CO3. Analyze the images by applying various transformation techniques.

CO4. Estimate the shape and the pattern of an image using segmentation techniques and color image processing.

CO5. Identify a practical solution to common image processing problems like storage space and channel bandwidth in communication by using compression.

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)

B. Tech. ECE VII Semester **VCE-R15**

DIGITAL IMAGE PROCESSING
(Professional Elective - IV)

Course Code: **A3463**

L	T	P	C
4	0	0	4

SYLLABUS

UNIT - I **(11 Lectures)**

DIGITAL IMAGE FUNDAMENTALS: Fundamental Steps in Digital Image Processing, Components of an ImageProcessing System, A Simple Image Formation Model, Image Sampling and Quantization, Relationships Between Pixels, Imaging Geometry.

UNIT - II **(11 Lectures)**

IMAGE TRANSFORMS: 2-D Fourier Transform, Properties, FFT, Walsh Transform, Hadamard Transform, Discrete Cosine Transform, Haar transform, Slant transform, Hotelling transform.

UNIT - III **(11 Lectures)**

IMAGE ENHANCEMENT IN THE SPATIAL DOMAIN: Introduction, Gray Level Transformations, Histogram Processing, Arithmetic and Logic Operations, Basics of Spatial Filtering, Smoothing Spatial Filters, Sharpening Spatial Filters.

IMAGE ENHANCEMENT IN FREQUENCY-DOMAIN: Smoothing Frequency-Domain Filters, Sharpening Frequency-Domain Filters, Homomorphic Filtering.

UNIT - IV **(12 Lectures)**

IMAGE RESTORATION: Image Degradation/Restoration Process, Noise Models, Restoration in the Presence of Noise Only-Spatial Filtering, Periodic Noise Reduction by Frequency Domain Filtering, Inverse Filtering, Minimum Mean Square Error (Wiener) Filtering, Constrained Least Squares Filters.

COLOR IMAGE PROCESSING: Pseudo-color Image Processing, Full-color Image Processing.

UNIT - V **(11 Lectures)**

IMAGE COMPRESSION: Fundamentals, Image Compression Models, Elements of information Theory, Error Free Compression, Lossy Compression.

IMAGE SEGMENTATION: Detection of Discontinuities, Edge Linking and Boundary Detection, Thresholding, Region-Based Segmentation, Segmentation by Morphological Watersheds

TEXT BOOKS:

1. R. C. Gonzalez, R. E. Woods (2002), *Digital Image processing*, 3rd edition, Addison Wesley/ Pearson education, New Delhi, India.

REFERENCE BOOKS:

1. K. Jain (1997), *Fundamentals of Digital Image processing*, Prentice Hall of India, New Delhi.
2. Rafael C. Gonzalez (2004), *Digital Image processing using MATLAB*, Richard E. Woods and Steven Low price Edition, Pearson Education Asia, India.
3. William K. Pratt, (2004), *Digital Image Processing*, 3rd edition, John Wiley & Sons, New Delhi, India.
4. Arthur R.Weeks, Jr. (1996), *Fundamentals of Electronic Image Processing,* SPIE Optical Engineering Press, New Delhi, India

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)

B. Tech. ECE VII Semester **VCE-R15**

CLOUD COMPUTING
(Professional Elective - IV)

Course Code: A3525

L	T	P	C
4	0	0	4

Course Overview:

Cloud computing is a computing paradigm, where is a large pool of systems are connected in private or public networks, to provide dynamically scalable infrastructure for application, data and file storage. With the advent of this technology, the cost of computation, application hosting, content storage and delivery is reduced significantly. This course covers all the above topics.

Course Outcomes:

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

CO1. Know and understand the basic ideas of Cloud Computing.
CO2. Understand the architecture, deployment models, and infrastructure models of cloud Computing.
CO3. Ability to understand distributed storage and performance.
CO4. Familiarity with the cloud computing security, federation, presence, identity, and privacy.
CO5. Be familiar with disaster recovery in cloud computing.
CO6. Be familiar with open source cloud computing software, and free/commercial cloud services.

VARDHAMAN COLLEGE OF ENGINEERING
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B. Tech. ECE VII Semester **VCE-R15**

CLOUD COMPUTING
(Professional Elective - IV)

Course Code: A3525

L	T	P	C
4	0	0	4

SYLLABUS

UNIT –I **(10Lectures)**

CLOUDCOMPUTINGBASICS: Cloudcomputingoverview,applications,intranetsandthecloud,firstmoversinthe cloud.

YOUR ORGANIZATION AND CLOUD COMPUTING: When you can use cloud computing, benefits, limitations,security concerns, regulatory issues.

CLOUD COMPUTING WITH THE TITANS: Google, EMC, netapp, Microsoft, Amazon, salesforce.com IBM, partnerships

UNIT–II **(10Lectures)**

THE BUSINESS CASE FOR GOING TO THE CLOUD: Cloud computing services, how those applications help yourbusiness, deleting your datacenter, salesforce.com and Thomson Reuters.

HARDWARE AND INFRASTRUCTURE: Clients, security, network, services.

ACCESSINGTHECLOUD: Platforms,webapplications,webAPIs,webbrowsers.

UNIT–III **(10Lectures)**

CLOUD STORAGE VENDORS: Overview of cloud storage, cloud storage providers

STANDARDS: Application, client, infrastructure, service.

UNIT–IV **(12Lectures)**

DEVELOPING CLOUD SERVICES: Types of cloud service development, software as a service: overview, driving forces, company offerings, industries, software plus services: overview, mobile device integration, providers, Microsoft online, platform as a service, web services, on-demand computing, discovering cloud services, development services and tools

UNIT–V **(14Lectures)**

DEVELOPING APPLICATIONS: Google, Microsoft, intuit quick base, cast iron cloud, bungee connect development, troubleshooting, application management.

LOCAL CLOUDS AND THIN CLIENTS: Virtualization in your organization, server solutions, thin client's case study: McNeil's steel

MIGRATING TO THE CLOUD: Cloud services for individuals, cloud services aimed at the mid-market, enterprise- class cloud offerings, migration.

BEST PRACTICES AND THE FUTURE OF CLOUD COMPUTING: Analyze your service, best practices, how cloudcomputing might evolve

Text Books:

1. AnthonyT.Velte,TobyJ.Velte,RobertElsenpeter(2010),*CloudComputing:APracticalApproach*,McGrawhill, NewDelhi,India.
2. Michael Miller (2008), *Cloud Computing: Web-Based Applications That Change the Way You Work and CollaborateOnline*,Que-Publishing

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)

B. Tech. ECE VII Semester **VCE-R15**

DIGITAL COMMUNICATIONS AND MICROWAVE ENGINEERING LAB

Course Code: **A3431**

L	T	P	C
0	0	3	2

Course Overview:

Microwave engineering pertains to the study and design of microwave circuits, components, and systems. A key part of the microwave laboratory experience is to learn how to use microwave test equipment to make measurements of power, frequency, S parameters, SWR, return loss and insertion loss. The essence of any communication system is the generation and reliable detection of signals which carry information over a noisy channel with bandwidth and power limitations. This Lab provides students with the opportunity to gain experience in understanding microwave components and –to familiarize various digital modulation schemes.

Course Outcomes:

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

CO1. Understand the concepts of digital modulation schemes and microwave measurement techniques

CO2. Apply the knowledge of basic mathematical background for communication signal analysis and scattering parameters to understand the operation of various microwave components

CO3. Analyze the signal flow in a digital communication system and wave propagation in the microwave transmission lines

CO4. Design and understand the generation of various digital modulations and microwave Transmission techniques using different sources

CO5. Evaluate the performance of various digital communication systems and characteristics of microwave components and devices.

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)

B. Tech. ECE VII Semester **VCE-R15**

DIGITAL COMMUNICATIONS AND MICROWAVE ENGINEERING LAB

Course Code: **A3431**

L	T	P	C
0	0	3	2

LIST OF EXPERIMENTS

PART - A: DIGITAL COMMUNICATIONS LAB (Any 6 Experiments)

1. Pulse code modulation Generation and Detection.
2. Differential pulse code modulation and demodulation.
3. Delta modulation and demodulation.
4. Amplitude shift keying Generation and Detection
5. Frequency shift keying Generation and Detection
6. phase shift keying Generation and Detection
7. study of spectral characteristics of PAM, QAM
8. Differential phase shift keying Generation and Detection
9. Quadrature Phase shift Keying Generation and Detection

PART - B: MICROWAVE ENGINEERING LAB (Any 6 Experiments)

1. Reflex Klystron Characteristics.
2. Gunn Diode Characteristics.
3. Directional Coupler Characteristics.
4. VSWR Measurement.
5. Measurement of Impedance of a given load.
6. Measurement of Scattering Parameters of a Magic Tee/ Circulator .
7. Attenuation Measurement.
8. Microwave Frequency Measurement.
9. Measurement of radiation pattern of Various Antennas.

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)

B. Tech. ECE VII Semester **VCE-R15**

DIGITAL SIGNAL PROCESSING LAB

Course Code: **A3432**

L	T	P	C
0	0	3	2

Course Overview:

The course will teach students to solve simple problems in the areas of communications and signal processing in a MATLAB environment. The course will reinforce material taught in the co-requisite courses and provide practical experience of signal and image processing implementation in preparation for the project. The course will be composed of programming sessions and course assignments covering discrete time signal analysis, communications and image processing. Experiments cover fundamental concepts of digital signal processing like sampling and aliasing, quantization in A/D conversion and in internal arithmetic operations, digital filter design and implementation, signal generation, spectrum estimation and fast transforms, sampling-rate conversion and multi-rate processing. Application experiments address a selection of multi-media and digital communications problems.

Prerequisite(s):

- Signals and system (A3405).
- Mathematics (A3006).

Course Outcomes:

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

CO1. Identity properties of discrete-time systems such as time-invariance and linearity and compute the linear convolution and correlations of discrete-time sequences.

CO2. Evaluate the discrete Fourier transform (DFT) of a sequence, relate it to the DTFT, and use the DFT to compute the linear convolution of two sequences.

CO3. Develop small projects based on signal processing concepts using MATLAB and CC Studio

CO4. Solve state of the art problems and answer questions using and applying algorithms and programs on a DSP and analyze the changes in the signal after interpolation, decimation and L/M rate conversion

CO5. Examine digital signal processing algorithms like convolution, design of digital filters using CC Studio on DSP processors.

VARDHAMAN COLLEGE OF ENGINEERING
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B. Tech. ECE VII Semester **VCE-R15**

DIGITAL SIGNAL PROCESSING LAB

Course Code: **A3432**

L	T	P	C
0	0	3	2

LIST OF EXPERIMENTS

The programs shall be implemented in software (using MATLAB/ LAB view/ C Programming/OCTAVE or Equivalent) and hardware (Using TI/Analog Devices/Motorola/ Equivalent DSP processors).

Part – A

1. Generation of various signals and sequences.
2. Operations on signals and sequences such as addition, multiplication, scaling, shifting, folding, computation of energy and average power.
3. To find frequency response of a given system given CT and DT domain system.
4. Impulse response of first order and second order systems.
5. Verification of linearity and time invariance properties of a given continuous/discrete time system.
6. Convolution between signals and sequences.
7. Auto Correlation and Cross Correlation between Signals and sequences.
8. Determination of power spectrum of a given signal(s).

Part – B

1. To find DFT/IDFT of given discrete time signal.
2. Implementation of FFT of given sequence.
3. Implementation of LPF, HPF, BPF, BSF FIR filters for a given sequence.
4. Implementation of LPF IIR filters for a given sequence.
5. Implementation of decimation and interpolation Process.
6. Implementation of sampling rate I/D converters.
7. Noise removal: Add noise above 3 KHz and then remove, interference suppression using 400 Hz tone.
8. Generation of sinusoidal signal based on recursive difference equations.

SYLLABI FOR
VIII SEMESTER

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)

B. Tech. ECE VIII Semester **VCE-R15**

MANAGEMENT SCIENCE

Course Code: A3014

L	T	P	C
3	1	0	3

Course Overview:

This course covers basic concepts of management, organizational structures and operations management and its application to business. The topics include right from revolutions of management such as Taylor's, Fayol's, Mayo, and Maslow's for balancing smooth functioning of operations. This course also focus on quality control, materials management and basic functions of human resources management for a wise decision making process. It provides a basis for students to estimate the optimum time and costfor completion of a project as per given specifications.

Prerequisite(s):NIL

Course Outcomes:

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

CO1. Explain and infer the concepts and aspects of management

CO2. Analyze the different organizational structures, plant layouts, work study tools for enhancement of productivity in an organization.

CO3. Apply the project management techniques to decide the optimum time and cost for completion of a project.

CO4. Apply statistical quality control techniques to know quality of product with in control limits

CO5. Use Human resource management techniques for better people management.

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)

B. Tech. ECE VIII Semester **VCE-R15**

MANAGEMENT SCIENCE

Course Code: A3014

L	T	P	C
3	1	0	3

SYLLABUS

UNIT I

Introduction: Management - Definition, Nature, Importance of management, Functions of Management - Taylor's scientific management theory, Fayol's principles of management, Contribution of Elton mayo, Maslow, Herzberg, Douglas MC Gregor. Basic concepts of Organisation- Authority, Responsibility, Delegation of Authority, Span of control, Departmentation and Decentralization - Organisation structures (Line organization, Line and staff organization, Functional organization, Committee organization, Matrix organization)

UNIT II

Operations Management: Plant location, Factors influencing location, Principles and types of plant layouts - Methods of production (job, batch and mass production), Work study - Basic procedure involved in method study and Work measurement.

UNIT III

Quality Control and Materials management: Statistical quality control – Meaning- Variables and attributes - X chart, R Chart, C Chart, P Chart, (simple Problems) Acceptance sampling, Sampling plans, Deming's contribution to quality. Materials management – objectives, Need for inventory control, Purchase procedure, Store records, EOQ, ABC analysis, Stock levels.

UNIT IV

Human Resource management (HRM): Concepts of HRM, Basic functions of HR manager: Man power planning, Recruitment, Selection, Training and development, Placement, Wage and salary administration, Promotion, Transfers, Separation, performance appraisal, Job evaluation and Merit rating.

UNIT V

Project management: Early techniques in project management - Network analysis: Programme evaluation and review technique (PERT), Critical path method (CPM), Identifying critical path, Probability of completing project within given time, Project cost analysis, project crashing (simple problems)

Text Books:

1. Dr. A.R.Aryasri, Management Science, TMH, 4th edition, 2009

References:

1. Koontz & weihrich – Essentials of management, TMH, 8th edition, 2010
2. Stoner, Freeman, Gilbert, Management, 6th edition Pearson education, New Delhi, 2004
3. O.P. Khana, Industrial engineering and Management L.S.Srinath, PERT & CPM.

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)

B. Tech. ECE VIII Semester **VCE-R15**

WIRELESS COMMUNICATIONS AND NETWORKS
(Professional Elective - V)

Course Code: A3464

L	T	P	C
4	0	0	4

Course Overview:

Wireless communications and networks have become ubiquitous technologies in the past couple of decades. The objective of this course is to give an introduction to the fundamentals of the wireless communications systems, the wireless network architectures, protocols, and applications. This course covers the basic principles of wireless communications and wireless network architectures. Topics of study include an overview of wireless communication systems, frequency reuse/cellular/microcellular concepts, spread-spectrum modulation for wireless systems, multiple access techniques, and wireless networking standards (e.g., 2.5G, 3G, IEEE 802.11, and IEEE 802.15).

Prerequisite(s):

- Cellular and Mobile Communications (A2432)

Course Outcomes:

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

CO1. Apply the knowledge of various systems, techniques and technologies for effective wireless communication.

CO2. Analyze the different types of protocols and standards for the enhancement (development) of wireless networking.

CO3. Make use of various design considerations to utilize the spectrum effectively.

CO4. Identify the ways for data transfer to achieve higher data rates in wireless networks.

VARDHAMAN COLLEGE OF ENGINEERING
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B. Tech. ECE VIII Semester **VCE-R15**

WIRELESS COMMUNICATIONS AND NETWORKS
(Professional Elective - V)

Course Code: A3464

L	T	P	C
4	0	0	4

SYLLABUS

UNIT – II **(10 Lectures)**

INTRODUCTION TO WIRELESS COMMUNICATION SYSTEMS: Evolution of mobile radio communications,examples of wireless communication systems-paging systems, cordless telephone systems, cellular telephone systems, comparison of common wireless communication systems, trends in cellular radio and personal communications.

MODERN WIRELESS COMMUNICATION SYSTEMS: Second generation (2G) cellular networks, thirdgeneration (3G) wireless networks, wireless local loop (WLL) and LMDS, wireless local area networks(WLANs), Bluetooth and personal area networks (PANs).

UNIT – II **(13Lectures)**

MULTIPLE ACCESS TECHNIQUES FOR WIRELESS COMMUNICATION: Introduction, FDMA, TDMA, spreadspectrum multiple access, SDMA, packet radio, packet radio protocols, CSMA protocols, reservation protocols, capacity of cellular systems.

INTRODUCTION TO WIRELESS NETWORKING: Introduction to wireless networks, difference betweenwireless and fixed telephone networks, development of wireless networks, traffic routing in wireless networks-circuit switching, packet switching, x.25 protocol, wireless data services - cellular digital packet data (CDPD), advanced radio data information systems(ARDIS), RAM mobile data(RMD), common channel signalling, ISDN, BISDN and ATM, signalling system no .7(SS7),network services part(NSP) of SS7,The SS7 user part, signalling traffic In SS7 ,SS7 services, performance of SS7.

UNIT – III **(10 Lectures)**

MOBILE IP AND WIRELESS APPLICATION PROTOCOL: Mobile IP, operation of mobile IP, discovery, co-located addresses, registration, tunneling, WAP architectural overview, wireless markup language, WML script, wireless application environment, wireless session protocol, wireless transaction protocol, wireless transport layer security, wireless datagram protocol.

WIRELESS LAN TECHNOLOGY: Overview, Infrared LANs, Spread Spectrum LANs, Narrowband Microwave LANs.

UNIT – IV **(10 Lectures)**

WI-FI AND THE IEEE 802.11 WIRELESS LAN STANDARD: IEEE 802 Architecture, IEEE 802.11 Architectureand Services, 802.11 Medium Access Control, 802.11 Physical Layer, Other IEEE 802.11 Standards, Wi-Fi Protected Access.

BLUETOOTH AND IEEE 802.15: Overview, Radio specification, Baseband specification, Link managerspecification, Logical link control and adaptation protocol, IEEE 802.15.

UNIT – V **(09 Lectures)**

MOBILE DATA NETWORKS: Introduction, data oriented CDPD network, GPRS and higher data rates,short messaging service in GSM, mobile application protocols.

WIRELESS ATM & HIPERLAN: Introduction, Wireless ATM, HIPERLAN, HIPERLAN-2.

TEXT BOOKS:

1. Theodore S. Rappaport (2002), *Wireless Communications - Principles Practice,* 2nd edition, Prentice Hall of India, New Delhi.
2. William Stallings (2009), *Wireless Communications and Networks,* 2nd edition, Pearson Education,India.
3. Kaveh PahLaven, Prashanth Krishna Murthy (2007), *Principles of Wireless Networks - A Unified Approach*, Pearson Education, India.

REFERENCE BOOKS:

1. Dr. Kamilo Feher (2003), *Wireless Digital Communications,* Prentice Hall of India, New Delhi.
2. Jochen Schiller (2009), *Mobile Communications*, 2nd edition, Pearson Education, India.
3. Andreas F. Molisch (2006), *Wireless Communications*, Wiley – India, New Delhi

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)

B. Tech. ECE VIII Semester **VCE-R15**

RF CIRCUIT DESIGN
(Professional Elective - V)

Course Code: A3465

L	T	P	C
4	0	0	4

Course Overview:

The objective of the course is to provide the students the knowledge in the field of RF circuits and systems. The course would explain various methodologies presently prevalent in the industry for the design of RF filters, various RF active and passive circuits. The course would start with a brief theoretical foundation of RF circuits. In addition, the students would be exposed to the Design and simulation schemes currently being used for various RF circuits and systems.

Prerequisite(s):

- Electromagnetic Theory and Transmission Lines (A3410)
- Microwave Engineering (A3429).

Course Outcomes:

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

CO1. Demonstrate capability of RF Design and development of various RF components.

CO2. Get hands on experience in RF Circuit design through the use of SMITH CHART and CAD tools.

CO3. Analyse RF circuits, networks and behaviour based on scattering parameters.

CO4. Design RF Amplifiers, Oscillators and Mixers.

CO5. Work in small teams and provide a written and oral report.

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)

B. Tech. ECE VIII Semester **VCE-R15**

RF CIRCUIT DESIGN
(Professional Elective - V)

Course Code: A3465

L	T	P	C
4	0	0	4

SYLLABUS

UNIT – I: RF passive components & TransmissionLine Analysis (15 Lectures)

Importance of RF Design- Frequency Spectrum- RF Behaviour of Passive Components: High frequency resistors, High frequency capacitors, High frequency inductors. Chip components and circuit board considerations: chip resistors, chip capacitors, and surface Mount Inductors.

Types of Transmission lines - Equivalent Circuit representation – R, L, C, G parameters of different line configurations. Terminated Lossless Transmission lines- special terminations: Short circuit, open circuit and quarter wave transmission lines. Sourced and loaded transmission lines: Power considerations, input impedance matching, return loss and insertion loss.

UNIT – II: Smith chart & Single- and Multiport Networks : (10 Lectures)

Reflection coefficient, Normalized impedance. Impedance transformation: Standing wave ratio, special transformation conditions – Admittance transformation- parallel and series RL&RC connections- basic definitions of single and multi port networks- interconnecting networks,

UNIT – IIIRF filter Design: (10 Lectures)

Scattering parameters: Definition, meaning, chain scattering matrix, conversion between S and Z parameters, Signal flow chart modelling and generalization. Basic Resonator and Filter configurations: Low pass, high pass, band pass and band stop type filters. Filter implementation using unit element and Kuroda's Identities Transformations- Coupled filters. Design and analysis of RF filters using HFSS

UNIT – IV: Active RF Component Modelling& Matching and Biasing networks (10 Lectures)

Diode Modelling: nonlinear and linear models. Transistor models: Large signal and small signal BJT Models, Large T and Pi matching networks. Amplifier classes of operation and biasing networks: Classes of operation andsignal small signal FET Models- Scattering parameter device characterization. Impedance Matching using discrete components: Two component matching networks, Forbidden regions, Frequency response and Quality factor, efficiency of Amplifiers, Biasing networks for BJT, biasing networks for FET.

UNIT – V

RF Transistor Amplifier, Oscillator and Mixer Design (15 Lectures)

Characteristics of Amplifiers- Amplifier power relations: RF source, Transducer power gain, Additional power relations. Stability considerations: Stability circles, unconditional stability, and stabilization methods. Unilateral and Bilateral design for constant gain, Noise figure circles, and constant VSWR circles. Basic oscillator Model: Negative resistance oscillator, Feedback oscillator Design, Design steps, Quartz Oscillators – Fixed frequency, High frequency Oscillator – Basic Characteristics of Mixers: Concepts, Frequency Domain Considerations, Single ended Mixer design, Single and Double balanced Mixers. Design using CAD tools (HFSS).

Text Books:

1. RF Circuit Design—Theory and applications by Reinhold Ludwig, pavel Bsetchko- Pearson Education India, 2000.
2. Radio Frequency and Microwave communication circuits – Analysis and Design by Devendra K.Misra – Wiely Student Edition – John Wiley & Sons, Inc.

Reference Books:

1. Radio Frequency and Microwave Electronics – illustrated by Matthew M. Radmanesh – PEI.
2. RF Circuit Design – Christopher Bowick, Cheryl Aljuni and john Biyler, Elsevier science,2008.
3. Secrets of RF Circuit Design by Joseph J.carr, TMH,2000.
4. Design of RF and Microwave amplifiers and oscillators, Peter L.D Abrif, Artech House,2000.
5. The design of CMOS Radio Frequency Integrated circuits by Thomas H.Lee, 2/e Cambridge University press, 2004.

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)

B. Tech. ECE VIII Semester **VCE-R15**

DSP PROCESSORS AND ARCHITECTURES
(PROFESSIONAL ELECTIVE – V)

Course Code:**A3466**

L	T	P	C
4	0	0	4

Course Overview:

It gives theknowledgeabout the processing of digital signal and their application in the present communication world. It also gives knowledge about different transforms used to represent the signal in frequency domain for analysis and Design tools for DSP systems using MATLAB. It helps us to learn the process to implement DSP systems with accuracy and understand Architectures for programmable devices. Allow the students to study the detailed architecture of TMS 320C54XX, Implementation of BASIC DSP algorithms, FFT algorithms and interfacing memory and I/O peripherals to programmable DSP devices.

Prerequisite(s):

- signals and systems (A3405)
- Digital signal processing (A3430)

Course Outcomes:

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

CO1. Develop basic DSP algorithms using DSP processors..

CO2. Analyze the effects of quantization and aliasing in a real-time DSP system.

CO3. Apply interfacing concepts to programmable DSP devices so as to connect the memory and I/O devices

CO4. Correlate execution control and pipelining as applicable to programmable DSP processors.

VARDHAMAN COLLEGE OF ENGINEERING
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B. Tech. ECE VIII Semester **VCE-R15**

DSP PROCESSORS AND ARCHITECTURES
(PROFESSIONAL ELECTIVE – V)

Course Code:**A3466**

L	T	P	C
4	0	0	4

SYLLABUS

UNIT - I **(10 Lectures)**

INTORODUCTION TO DIGITAL SIGNAL PROCESING: Introduction, A Digital signal-processing system, The sampling process, Discrete time sequences. Discrete Fourier Transform (DFT) and Fast Fourier Transform (FFT), linear time-invariant systems, Digital filters, Decimation and interpolation, Analysis and Design tool for DSP Systems MATLAB, DSP using MATLAB.

UNIT - II **(12 Lectures)**

COMPUTATIONAL ACCURACY IN DSP IMPLEMENTATIONS: Number formats for signals and coefficients in DSP systems, Dynamic Range and Precision, Sources of error in DSP implementations, A/D Conversion errors, DSP Computational errors, D/A Conversion Errors, Compensating filter.

ARCHITECTURES FOR PROGRAMMABLE DSP DEVICES: Basic Architectural features, DSP Computational Building Blocks, Bus Architecture and Memory, Data Addressing Capabilities, Address Generation Unit, Programmability and Program Execution, Speed Issues, Features for External interfacing.

UNIT - III **(12 Lectures)**

EXECUTION CONTROL AND PIPELINING: Hardware looping, Interrupts, Stacks, Relative Branch support, Pipelining and Performance, Pipeline Depth, Interlocking, Branching effects, Interrupt effects, Pipeline Programming models.

PROGRAMMABLE DIGITAL SIGNAL PROCESSORS : Commercial Digital signal-processing Devices, Data Addressing modes of TMS320C54XX DSPs, Data Addressing modes of TMS320C54XX Processors, Memory space of TMS320C54XX Processors, Program Control, TMS320C54XX instructions and Programming, On-Chip Peripherals, Interrupts of TMS320C54XX processors, Pipeline Operation of TMS320C54XX Processors.

UNIT - IV **(12 Lectures)**

IMPLEMENTATIONS OF BASIC DSP ALGORITHMS: The Q-notation, FIR Filters, IIR Filters, Interpolation Filters, Decimation Filters, PID Controller, Adaptive Filters, 2-D Signal Processing.

IMPLEMENTATION OF FFT ALGORITHMS: An FFT Algorithm for DFT Computation, A Butterfly Computation, Overflow and scaling, Bit-Reversed index generation, An 8-Point FFT implementation on the TMS320C54XX, Computation of the signal spectrum.

UNIT - V **(10 Lectures)**

INTERFACING MEMORY AND I/O PERIPHERALS TO PROGRAMMABLE DSP DEVICES: Memory space organization, External bus interfacing signals, Memory interface, Parallel I/O interface, Programmed I/O, Interrupts and I/O, Direct memory access (DMA). A Multichannel buffered serial port (McBSP), McBSP Programming, a CODEC interface circuit, CODEC programming, A CODEC-DSP interface example.

TEXT BOOKS:

1. Avtar Singh and S. Srinivasan(2006), *Digital Signal Processing*, Thomson Publication, India.
2. Phil Lapsley Jeff Bier, Amit Shoham, Edward A.Lee(2010),*DSP Processor Fundamentals, Architectures & Features,* John Wiley & Sons,India.

REFERENCE BOOKS:

1. B. Venkata Ramani and M. Bhaskar,(2004),*Digital Signal Processors, Architecture, Programming and Applications,* Tata McGraw-Hill, New Delhi.
2. Jonatham Stein(2005),Digital Signal Processing, John Wiley, India.
3. Emmaneul C Ifeachor, Barrie W Jrevis, *Digital Signal Processing,* Pearson Education.

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)

B. Tech. ECE VIII Semester **VCE-R15**

BIG DATA ANALYTICS
(Professional Elective-V)

Course Code: **A3564**

L	T	P	C
4	0	0	4

Course Overview:

This course covers statistical analysis methods, soft computing frame works, design of distributed files systems besides covering visualization techniques and stream data models

Course Outcomes:

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

CO1. Apply the statistical analysis methods.

CO2. Compare and contrast various soft computing frameworks.

CO3. Design distributed file systems

CO4. Apply Stream data model

CO5. Use Visualization techniques

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)

B. Tech. ECE VIII Semester **VCE-R15**

BIG DATA ANALYTICS
(Professional Elective-V)

Course Code: **A3564**

L	T	P	C
4	0	0	4

SYLLABUS

UNIT I

INTRODUCTION TO BIG DATA: Introduction to Big Data Platform – Challenges of conventional systems – Web data – Evolution of Analytic scalability, analytic processes and tools, Analysis vs reporting – Modern data analytic tools, Stastical concepts: Sampling distributions, resampling, statistical inference, prediction error.

UNIT II

DATA ANALYSIS: Regression modelling, Multivariate analysis, Bayesian modelling, inference and Bayesian networks, Support vector and kernel methods, Analysis of time series: linear systems analysis, nonlinear dynamics – Rule induction – Neural networks: learning and generalization, competitive learning, principal component analysis and neural networks; Fuzzy logic: extracting fuzzy models from data, fuzzy decision trees, Stochastic search methods.

UNIT III

MINING DATA STREAMS: Introduction to Streams Concepts – Stream data model and architecture – Stream Computing, Sampling data in a stream – Filtering streams – Counting distinct elements in a stream – Estimating moments – Counting oneness in a window – Decaying window – Realtime Analytics Platform(RTAP) applications – case studies – real time sentiment analysis, stock market predictions.

UNIT IV

FREQUENT ITEMSETS AND CLUSTERING: Mining Frequent itemsets – Market based model – Apriori Algorithm – Handling large data sets in Main memory – Limited Pass algorithm – Counting frequent itemsets in a stream – Clustering Techniques – Hierarchical – K- Means – Clustering high dimensional data – CLIQUE and PROCLUS – Frequent pattern based clustering methods – Clustering in non-euclidean space – Clustering for streams and Parallelism.

UNIT V

FRAMEWORKS AND VISUALIZATION: MapReduce – Hadoop, Hive, MapR – Sharding – NoSQL Databases – S3 – Hadoop Distributed file systems – Visualizations – Visual data analysis techniques, interaction techniques; Systems and applications:

TEXT BOOKS:

1. Michael Berthold, David J. Hand, *Intelligent Data Analysis*, Springer, 2007.
2. Anand Rajaraman and Jeffrey David Ullman, *Mining of Massive Datasets*, Cambridge University Press, 2012.

REFERENCES:

1. Bill Franks, Taming the Big Data Tidal Wave: Finding Opportunities in Huge Data Streams with advanced analystics, John Wiley & sons, 2012.
2. Glenn J. Myatt, Making Sense of Data, John Wiley & Sons, 2007 Pete Warden, Big Data Glossary, O'Reilly, 2011.
3. Jiawei Han, Micheline Kamber "Data Mining Concepts and Techniques", Second Edition, Elsevier, Reprinted 2008.

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)

B. Tech. ECE VI/VII/VIII Semester **VCE-R15**

FUNDAMENTALS OF DATABASE MANAGEMENT SYSTEMS
(Open Elective)

Course Code: A3576

L	T	P	C
3	0	0	3

Course Overview:

This course introduces to understand techniques to the design the database systems. This course consists of E-R modeling, data definition and manipulation languages, database security and administration. It also covers essential DBMS concepts such as: Transaction Processing, Concurrency Control and Recovery and various types of database and uses Indexing concepts for faster retrieval of data in database.

Prerequisite(s): Object oriented Programming
Discrete Mathematical Structures

Course Outcomes:

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

CO1. Design 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 database.

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

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

VARDHAMAN COLLEGE OF ENGINEERING
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B. Tech. ECE VI/VII/VIII Semester **VCE-R15**

FUNDAMENTALS OF DATABASE MANAGEMENT SYSTEMS
(Open Elective)

Course Code: A3576

L	T	P	C
3	0	0	3

SYLLABUS

UNIT – I **(13 Lectures)**

INTRODUCTION: History of database systems, introduction to database management systems, database system applications, database systems versus file systems, view of data, data models, database languages- DDL & DML commands and examples of basic SQL queries, database users and administrators, transaction management. (T2: Ch-1)

DATABASE DESIGN: Introduction to database design and E-R diagrams, entities, attributes and entity sets, relationships and relationship sets, conceptual design for large enterprises. (T1: Ch-2)

UNIT – II **(13 Lectures)**

THE RELATIONAL MODEL: Introduction to the relational model, integrity constraints over relations, enforcing integrity constraints, querying relational data. (T1: Ch-3)

RELATIONAL ALGEBRA AND CALCULUS: Preliminaries, relational algebra operators, relational calculus - tuple and domain relational calculus. (T1: Ch-4)

SQL: Overview, the form of a basic SQL query, union, intersect and except operators, nested queries, aggregate operators, null values, complex integrity constraints in SQL, cursors, triggers (T1: Ch-5)

UNIT – III **(9 Lectures)**

SCHEMA REFINEMENT AND NORMAL FORMS: Functional dependencies, reasoning about FDs. Normal forms: 1NF, 2NF, 3NF, BCNF, properties of decompositions, normalization, schema refinement in database design, other kinds of dependencies: 4NF, 5NF. (T1: Ch-19)

UNIT – IV **(10 Lectures)**

TRANSACTIONS MANAGEMENT: Transaction concept, transaction state, implementation of atomicity and durability, concurrent executions, Anomalies due to interleaved execution of transactions, serializability, recoverability. (T2: Ch-14)

CONCURRENCY CONTROL AND RECOVERY SYSTEM: Concurrency control - lock based protocols, time-stamp based protocols, validation based protocols, deadlock handling. (T2: Ch-16)

UNIT – V **(8 Lectures)**

OVERVIEW OF STORAGE AND INDEXING: RAID levels, Index data structures, Tree structured indexing - intuition for tree indexes, indexed sequential access method (ISAM), B+ Trees - a dynamic tree structure. (T1: Ch-9,10)

TEXT BOOK(S):

1. Raghurama Krishnan, Johannes Gehrke (2007), *Database Management Systems*, 3rd Edition, Tata McGraw-Hill, New Delhi, India.
2. Abraham Silberschatz, Henry F. Korth, S. Sudarshan (2010), *Database System Concepts,* 6th Edition, McGraw- Hill, New Delhi, India.

REFERENCE BOOK(S):

1. Elmasri Navate (2014), *Fundamentals of Database Systems*, Pearson Education, India.

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)

B. Tech. ECE VI/VII/VIII Semester **VCE-R15**

FUNDAMENTALS OF IMAGE PROCESSING
(Open Elective)

Course Code: A3577

L	T	P	C
3	0	0	3

Course Overview:

Visual information plays an important role in many aspects of our life. Much of this information is represented by digital images and videos. Extracting such information from the digital images and videos has numerous applications in computer vision, robotics, remote sensing, medical imaging, etc. This course gives the students the ability to understand and apply the principles of digital image processing and pattern recognition and develop some applications by following the team based learning principles.

Prerequisite(s): NIL

Course Outcomes:

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

CO1. Have an appreciation of the fundamentals of digital image processing and pattern recognition including the topics such as filtering, transforms, morphology, image analysis, compression, clustering, etc.

CO2. Be able to implement basic image processing algorithms in MATLAB and/or OpenCV (Python).

CO3. Have the skill base necessary to further explore advanced topics of digital image processing and pattern recognition.

CO4. Be in a position to make a positive professional contribution in the field of digital image processing and pattern recognition

VARDHAMAN COLLEGE OF ENGINEERING
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B. Tech. ECE VI/VII/VIII Semester **VCE-R15**

FUNDAMENTALS OF IMAGE PROCESSING
(Open Elective)

Course Code: A3577

L	T	P	C
3	0	0	3

SYLLABUS

UNIT - I **(Lectures 10)**

FUNDAMENTALS OF IMAGE PROCESSING:

Image acquisition, image model, sampling, quantization, relationship between pixels, distance measures, connectivity, and image geometry. (Chapter1: T1)

UNIT – II **(Lectures 8)**

IMAGE TRANSFORMS:

Fourier transform, DFT, DFT-properties , FFT, WALSH transform, HADAMARD transform, DCT. (chapter2: T1,R2)

UNIT – III **(Lectures 11)**

IMAGE ENHANCEMENT (SPATIAL Domain Methods):

Histogram Processing - definition, equalization, matching, local enhancement, use of histogram statics for image enhancement, Arithmetic and logical operations, pixel or point operations, size operations, Smoothing filters-mean, median, mode filters, sharpening spatial filtering. (chapter3: T1)

UNIT – IV **(Lectures 9)**

IMAGE ENHANCEMENT (FREQUENCY Domain Methods):

Design of low pass, high pass, edge enhancement, smoothening filters in frequency domain. Butter worth filter, sharpening frequency domain filters, homomorphic filters in frequency domain. (chapter4: T1,R1)

UNIT – V **(Lectures 13)**

IMAGE SEGMENTATION:

Detection of discontinuities, edge linking and boundary detection, thresholding, region based segmentation, use of motion in segmentation. (Chapter5: T1)

COLOR IMAGE PROCESSING:

Fundamentals, models, pseudo color image, color transformation, Fundamentals of image compression, image compression models, and color image compression. (Chapter5: T1,R1)

TEXT BOOK(S):

1. Rafael C. Gonzalez, Richard E. Woods (2008), Digital Image Processing, Low Price Edition, Pearson Education, New Delhi, India.

REFERENCE BOOK(S):

1. Rafael C. Gonzalez, Richard E. Woods, Digital Image Processing, Second Edition, Prentice Hall.
2. Fundamentals of digital image processing by Anil K. jain, Low Price Edition, Pearson Education.
3. Arthur R. Weeks (1996), Fundamentals of Electronic Image Processing, Prentice Hall of India, New Delhi.
4. Milan Sonka, Vaclav Hlavac, Roger Boyle (2008), Image processing, Analysis and Machine vision, Thomson Publications, India.

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)

B. Tech. ECE VI/VII/VIII Semester **VCE-R15**

OPERATING SYSTEM FUNDAMENTALS
(Open Elective)

Course Code: A3578

L	T	P	C
3	0	0	3

Course Overview:

Operating Systems Course is intended as a general introduction to the services provided by it. The course will give idea of various Operating system structures and types. The topics include process management and synchronization, handling of deadlocks, memory and storage management. The course also provides how Input-Output communicates with the system. The file, directory and disk management information can be understood. It compares different operating systems how they manage resources and services. Provides basic information related to protection and security.

Prerequisite(s): NIL

Course Outcomes:

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

CO1. Understand the difference between different types of modern operating systems, virtual machines and their structure of implementation and applications.

CO2. Identify the rationale behind various memory management techniques along with issues and challenges of main memory, virtual memory and file system.

CO3. Understand the concepts of deadlock in operating systems and how they can be managed / avoided and implement them in multiprogramming system.

CO4. Illustrate different protection and security mechanisms in operating system

VARDHAMAN COLLEGE OF ENGINEERING
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B. Tech. ECE VI/VII/VIII Semester **VCE-R15**

OPERATING SYSTEM FUNDAMENTALS
(Open Elective)

Course Code: A3578

L	T	P	C
3	0	0	3

SYLLABUS

UNIT – I **(11 Lectures)**

OPERATING SYSTEMS OVERVIEW: Introduction-operating system operations, process management, memory management, storage management, protection and security, System structures-Operating system services, systems calls, Types of system calls, system programs (T1: Ch-1, 2)

UNIT – II **(12 Lectures)**

PROCESS MANAGEMENT: Process concepts- Operations on processes, IPC, Process Scheduling (T1: Ch-3, 5).

PROCESS COORDINATION: Process synchronization- critical section problem, Peterson's solution, synchronization hardware, semaphores, classic problems of synchronization, readers and writers problem, dining philosopher's problem, monitors (T1: Ch-6).

UNIT – III **(11 Lectures)**

DEADLOCKS: System model, deadlock characterization, deadlock prevention, avoidance, detection and recovery from deadlock. (T1: Ch-7)

MEMORY MANAGEMENT: Memory management strategies-Swapping, contiguous memory allocation, paging, structure of the page table, segmentation, virtual-memory management- demand paging, page-replacement algorithms, allocation of frames, thrashing. (T1: Ch-8, 9)

UNIT – IV **(10 Lectures)**

STORAGE MANAGEMENT: File system-Concept of a file, access methods, directory structure, file system mounting, file sharing, protection. (T1: Ch-10)

SECONDARY-STORAGE STRUCTURE: Overview of mass storage structure, disk structure, disk attachment, disk scheduling algorithms, swap space management, stable storage implementation, and tertiary storage structure (T1: Ch-12).

UNIT – V **(11 Lectures)**

PROTECTION: System protection-Goals of protection, principles of protection, domain of protection access matrix, implementation of access matrix, access control, revocation of access rights. (T1: Ch-13)

SECURITY: System security-The security problem, program threats, system and network threats, implementing security defenses, firewalling to protect systems(T1: Ch -18).

TEXT BOOKS:

1. Abraham Silberschatz, Peter Baer Galvin, Greg Gagne (2009), Operating System Concepts, 8th Edition, Wiley India Private Limited, New Delhi.

REFERENCE BOOKS:

1. Stallings(2006), Operating Systems, Internals and Design Principles, 5th Edition, Pearson Education, India.
2. Andrew S. Tanenbaum (2007), Modern Operating Systems, 2nd Edition, Prentice Hall of India, India.
3. Deitel & Deitel (2008), Operating systems, 3rd Edition, Pearson Education, India.
4. Dhamdhere (2008), Operating Systems, 2nd Edition, Tata Mc graw Hill, New Delhi.
5. Paul Love, Joe Merlino, Craig Zimmerman, Jeremy C. Reed, and Paul Weinstein (2005), Beginning Unix, Wiley Publishing, Inc.

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)

B. Tech. ECE VI/VII/VIII Semester **VCE-R15**

JAVA PROGRAMMING
(Open Elective)

Course Code: A3579

L	T	P	C
3	0	0	3

Course Overview:

The Course provides a comprehensive coverage of conceptual and practical Java language, describing its syntax, keywords, and fundamental programming principles to become a proficient Java Programmer. The course is divided into five units, each focusing on a different aspect of core Java Environment suitable to write efficient, maintainable, and portable code. At the outset, the course ignites Object Oriented thinking and explores with the evolution of Java and its basics. It gives strong foundation on Inheritance, Packages and Interfaces and also discusses Exception Handling and Multithreaded mechanisms. The course examines java concepts such as Applets and Event handling. The course end up with nourishing AWT Controls and Swing concepts used for GUI applications. Overall, the knowledge of this course is essential to learn advanced Java and other OOP based languages and hence, stands as a pre-requisite for few fore coming courses like Struts and Spring Framework, Hibernate Framework. The course also plays a vital role in building front-end applications for Mini and Major Project Works in the final year.

Prerequisite(s): Data Structures (A3503)

Course Outcomes:

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

CO1. 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. ECE VI/VII/VIII Semester **VCE-R15**

JAVA PROGRAMMING
(Open Elective)

Course Code: A3579

L	T	P	C
3	0	0	3

SYLLABUS

UNIT – I **(15 Lectures)**

EVOLUTION OF JAVA: Object-Oriented Programming Introduction, Two Paradigms, The Three OOP Principles, Evolution of Java, Java Buzzwords, Java Program Structure, Implementing a Java Program, JVM Architecture, Data Types, Variables, Constants, Type Conversion and Casting, I/O Basics, Operators, and Control Statements.

CLASS, METHODS, OBJECTS AND CONSTRUCTORS: Introducing Classes, Objects, Methods, Constructors, Garbage Collection, finalize, Overloading Methods and Constructors, Argument Passing, Recursion, static and final Keywords.

ARRAYS: One dimensional and two dimensional arrays with sample examples.

STRINGS: Exploring String and String Buffer class and Methods.

UNIT – II **(10 Lectures)**

INHERITANCE: Inheritance Basics, Member Access and Inheritance, this and super Keywords, Creating Multilevel Hierarchy, Method Overriding, Dynamic Method Dispatch, Abstract Classes ,inheritance with final keyword.

PACKAGES AND INTERFACES: Defining a Package, Finding Packages and CLASSPATH, Access Protection, Importing Packages, Defining an Interface, and Implementing Interfaces.

UNIT – III **(10 Lectures)**

EXCEPTION HANDLING: Exception-Handling Fundamentals, Exception Types, Uncaught Exceptions, Using try, catch, throw, throws and finally Keywords, Built-in Exceptions, Creating Own Exception.

MULTITHREADED PROGRAMMING: Thread Life Cycle, Creating a Thread - Extending Thread Class and Implementing Runnable Interface, Creating Multiple Threads**,** Thread Priorities, Synchronization.

UNIT – IV **(10 Lectures)**

AWT CONTROLS: AWT Classes, Window Fundamentals, Working with Frame Windows, Working with Graphics, Color, Fonts, Control Fundamentals, Labels, Buttons, Check Boxes, Checkbox Group, Choice Controls, Lists, Scroll Bars, TextArea, and Layout Managers.

SWINGS: Swings Introduction, Features, Hierarchy of Swing, Top Level Containers - JFrame, JWindow, JApplet, Light Weight Containers - JPanel, Create a Swing Applet, Swing Components - JLabel and Image Icon, JTextField, JButton,JCheckBox, JRadioButton, and JComboBox.

EVENT HANDLING: Delegation Event Model, Event Classes, Sources of Events, Event Listener Interfaces, Handling Mouse and Keyboard Events, Adapter Classes.

UNIT – V **(10 Lectures)**

FILE I/O: Streams, Stream Classes- Byte and Character, File Operations – Reading, Writing and Closing,

EXPLORING JAVA.UTIL: Array List, Vector, Hash table, StringTokenizer, and Date.

APPLETS: Applet Basics, Applet Lifecycle, Applet Skeleton, Simple Applet Display Methods, the HTML APPLET Tag, Passing Parameters to Applets.

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TEXT BOOK:

1. Herbert Schildt (2011), *Java: The Complete Reference*, 8th Edition, Tata McGraw-Hill Education, New Delhi.

REFERENCE BOOKS:

1. Michael Ernest (2013), *Java SE 7 Programming Essentials*, John Wiley & Sons Inc.
2. Y. Daniel Liang (2014), *Introduction to Java Programming, Comprehensive Version*, 10th Edition, Pearson Education, India.
3. Kathy Sierra, Bert Bates (2014), *OCA/OCP Java SE 7 Programmer I & II Study Guide* (Exams 1Z0-803 & 1Z0-804), 1st Edition, McGraw-Hill Education Publisher, USA.

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)

B. Tech. ECE VI/VII/VIII Semester **VCE-R15**

CYBER LAWS
(Open Elective)

Course Code: A3676

L	T	P	C
3	0	0	3

Course Overview:

This course drawing upon a wealth of experience from academia, industry, and government service, Cyber Security details and dissects, in current organizational cyber security policy issues on a global scale—taking great care to educate students on the history and current approaches to the security of cyberspace. It includes thorough descriptions—as well as the pros and cons—of an excess of issues, and document policy alternatives for the sake of clarity with respect to policy alone. It also delves into organizational implementation issues, and equips students with descriptions of the positive and negative impact of specific policy choices.

Prerequisite(s):NIL

- Computer Networks (A3519)
- Information Security (A3608)
- E-Commerce (A3605)

Course Outcomes:

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

CO1.Analyze cyber-attack on different online web applications

CO2.Apply different techniques to classify different types of cybercrimes.

CO3.Understand different government cyber laws and cyber forensics techniques and how to protect themselves and society from cyber-attacks.

CO4.Describe and analyze the hardware, software, components of a network and the interrelations.

CO5.Illustrate the concepts of confidentiality, availability and integrity in Information Assurance, including physical, software, devices, policies and people.

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)

B. Tech. ECE VI/VII/VIII Semester **VCE-R15**

CYBER LAWS
(Open Elective)

Course Code: A3676

L	T	P	C
3	0	0	3

SYLLABUS

UNIT I **10 Lectures)**

INTRODUCTION: Cyber Security– Cyber Security policy – Domain of Cyber Security Policy – Laws and Regulations – Enterprise Policy – Technology Operations – Technology Configuration - Strategy Versus Policy – Cyber security Evolution – Productivity – Internet – E commerce – Counter Measures Challenges.

UNIT II **(11 Lectures)**

CYBER SECURITY OBJECTIVES AND GUIDANCE: Cyber Security Metrics – Security Management Goals – Counting Vulnerabilities – Security Frameworks – E Commerce Systems – Industrial Control Systems – Personal Mobile Devices – Security Policy Objectives – Guidance for Decision Makers – Tone at the Top – Policy as a Project – Cyber Security Management – Arriving at Goals – Cyber Security Documentation – The Catalog Approach – Catalog Format – Cyber Security Policy Taxonomy.

UNIT III **(10 Lectures)**

CYBER SECURITY POLICY CATALOG: Cyber Governance Issues – Net Neutrality – Internet Names and Numbers – Copyright and Trademarks – Email and Messaging - Cyber User Issues – Malvertising – Impersonation – Appropriate Use – Cyber Crime – Geo location – Privacy - Cyber Conflict Issues – Intellectual property Theft – Cyber Espionage – Cyber Sabotage – Cyber Welfare.

UNIT IV **(10 Lectures)**

CYBER MANGEMENT ISSUES: Fiduciary Responsibility – Risk Management – Professional Certification – Supply Chain – Security Principles – Research and Development – Cyber Infrastructure Issue – Banking and finance – Health care – Industrial Control systems.

UNIT V **(10 Lectures)**

CASE STUDY: A Government's Approach to Cyber Security Policy

TEXTBOOKS:

1. Jennifer L. Bayuk , J. Healey , P. Rohmeyer , Marcus Sachs , Jeffrey Schmidt , Joseph Weiss " Cyber Security Policy Guidebook" John Wiley & Sons 2012.
2. Rick Howard "Cyber Security Essentials" Auerbach Publications 2011

REFERENCE BOOKS:

1. Richard A. Clarke, Robert Knake " Cyberwar: The Next Threat to National Security & What to Do About It" Ecco 2010
2. Dan Shoemaker Cyber security The Essential Body Of Knowledge, 1st ed. Cengage Learning 2011
3. Anti-Hacker Tool Kit (Indian Edition) by Mike Shema, Publication Mc Graw Hill.
4. Cyber Security Understanding Cyber Crimes, Computer Forensics and Legal Perspectives by Nina Godbole and Sunit Belpure, Publication Wiley

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)

B. Tech. ECE VI/VII/VIII Semester **VCE-R15**

E-COMMERCE TRENDS
(Open Elective)

Course Code: A3677

L	T	P	C
3	0	0	3

Course Overview:

The tremendous growth of the Internet and World Wide Web is having great impact on businesses, governments and individuals throughout the world. In this course, we will attempt to understand the phenomena, technological, economic and social, behind these rapid changes, and how organizations successfully conduct Internet-based activities. We will also study some of the technology of the Internet. This course provides an overview of e-commerce from both technological and managerial perspectives. It introduces e-commerce frameworks, and technological foundations; and examines basic concepts such as strategic formulation for e-commerce enterprises, management of their capital structures and public policy. It is particularly important that the student place a great deal of emphasis in understanding the different E-Commerce system design principles.

Prerequisite(s):NIL

Course Outcomes:

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

CO1.Elaborate the components and roles of the E-Commerce environment.

CO2.Explain how to sell products and services on the web as well as to meet the needs of web site visitors.

CO3.Analyze e-commerce payment systems.

CO4.Identify and reach customers on the web.

CO5.Understand legal and ethical issues related to E-Commerce and web marketing approaches.

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)

B. Tech. ECE VI/VII/VIII Semester **VCE-R15**

E-COMMERCE TRENDS
(Open Elective)

Course Code: A3677

L	T	P	C
3	0	0	3

SYLLABUS

UNIT - I **(10 Lectures)**

INTRODUCTION TO E-BUSINESS AND E-COMMERCE: What is the difference between e-commerce and e-business, E-business risks and barriers to business adoption, Management responses to e-commerce and e-business.

E-COMMERCE FUNDAMENTALS - Location of trading in the marketplace, Business models for e-commerce, *Focus on* auction business models, *Focus on* Internet start-up companies.

UNIT - II **(10 Lectures)**

E-BUSINESS INFRASTRUCTURE- Introduction, Internet technology, Web technology, Internet-access software applications, Managing e-business infrastructure, *Focus on* web services, SaaS and service-oriented Architecture (SOA), *Focus on* mobile commerce.

UNIT - III **(10 Lectures)**

E-ENVIRONMENT- Social and legal factors, Environmental and green issues related to Internet Usage, Focus on e-commerce and globalization, Political factors.

E-BUSINESS STRATEGY- What is e-business strategy, Strategic analysis, Strategic objectives, Strategy definition, Strategy implementation, Focus on information systems strategy and e-business strategy.

UNIT - IV **(10 Lectures)**

SUPPLY CHAIN MANAGEMENT-What is supply chain management?, Focus on the value chain, Using e-business to restructure the supply chain, Supply chain management implementationE-procurement-What is e-procurement, Drivers of e-procurement, Focus on estimating e-procurement cost, Implementing e-procurement, Focus on electronic B2B marketplaces.

UNIT - V **(12 Lectures)**

E-MARKETING- What is e-marketing?, E-marketing planning, Situation analysis, Objective setting, Strategy, Tactics, Focus on online branding.

CUSTOMER RELATIONSHIP MANAGEMENT- What is e-CRM, The online buying process, Focus on marketing communications for customer Acquisition, Customer retention management, Technology solutions for CRM.

TEXT BOOK:

1. E-Business and E-Commerce Management , strategy, Implementation and practice, Dave Chaffey, Fourth Edition, Prentice Hall

REFERENCE BOOKS:

1. Frontiers of electronic commerce – Kalakata, Whinston, Pearson.
2. E-Commerce fundamentals and applications Hendry Chan, Raymond Lee, Tharam Dillon, Ellizabeth Chang, John Wiley.
3. E-Commerce, S.Jaiswal – Galgotia.
4. E-Commerce, Efrain Turbon, Jae Lee, David King, H.Michael Chang.

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)

B. Tech. ECE VI/VII/VIII Semester **VCE-R15**

PRINCIPLES OF SOFTWARE ENGINEERING
(Open Elective)

Course Code: A3678

L	T	P	C
3	0	0	3

Course Overview:

This course acts as a foundation in the field of software engineering and is aimed at helping students develop an understanding of how software systems are developed from scratch, by guiding them through the development process, adopting the fundamental principles of system development. The course will orient the students to the different software process models, software requirements engineering process, systems analysis and design as a problem-solving activity, with focus on quality.

Prerequisite(s):

Object Oriented Programming (A3509)

Course Outcomes:

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

CO1.Identify the right process model to develop the right software system.

CO2.Gather requirements and analyze them scientifically in order to develop the right product, besides authoring software requirements document.

CO3.Propose design as per functional and non-functional requirements using design principles.

CO4.Apply testing strategies for application being developed.

CO5.Find right set of umbrella activities for quality management and assurance.

CO6.Understand metrics in the process and project domains.

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)

B. Tech. ECE VI/VII/VIII Semester **VCE-R15**

PRINCIPLES OF SOFTWARE ENGINEERING
(Open Elective)

Course Code: A3678

L	T	P	C
3	0	0	3

SYLLABUS

UNIT I **(13 Lectures)**

INTRODUCTION TO SOFTWARE ENGINEEIRNG: The Evolving nature of software engineering, Changing nature of software engineering, Software engineering Layers, The Software Processes, Software Myths.

PROCESS MODELS: A Generic Process Model, Waterfall Model, Incremental Process Models, Evolutionary Process Models, Spiral Model, the Unified Process, the Capability Maturity Model Integration (CMMI).

AGILE DEVELOPMENT: What is Agility? Agility and the Cost of Change, What is an Agile Process? Extreme Programming (XP), Other Agile Process Models, A Tool set for the Agile Process.

UNIT II **(11 Lectures)**

REQUIREMENTS ENGINEERING: Functional and Non-Functional Requirements, The Software requirements Document, Requirements Specification, requirements Engineering, Requirements Elicitation and Analysis, Requirement Validation, Requirement Management, System Modeling: Context Models, Interaction Models, Structural Models, Behavioral Model, Model-Driven Engineering.

DESIGN CONCEPTS: The Design Process, Design Concepts, The Design Models and Architectural Design: Software Architecture, Architectural Genres and Architectural Styles.

UNIT III **(12 Lectures)**

DESIGN AND IMPLEMENTATION: The Object Oriented Design with UML, Design Patterns, Implementation Issues, Open Source development. User Interface Design: The Golden Rules, User Interface Analysis and Design, Interface Analysis, Interface Design Steps, Design Evaluation.

SOFTWARE TESTING STRATEGIES: A Strategic approach to Software Testing, Strategic Issues and Test Strategies for Conventional Software, Validation Testing, System Testing, The Art of Debugging, White-Box Testing, Black Box Testing.

UNIT IV **(12 Lectures)**

PRODUCT METRICS: A Frame Work for Product Metrics, Metrics for the Requirements Model, Metrics for Design Model, Metrics for Source Code, Metrics for Testing

PROCESS AND PROJECT METRICES: Metrics in the Process and Project Domains, Software Measurements, Metrics for Software Quality, Risk Management: Risk verses Proactive Risk Strategies, Software Risks, Risk Identification, Risk Projection, Risk Refinements, Risk Mitigation Monitoring and Management (RMMM), The RMMM Plan.

UNIT V **(12 Lectures)**

QUALITY MANAGEMENT: Quality Concepts, Software Quality, Software Quality Dilemma, Achieving Software Quality, Review Techniques, Reviews: A Formal spectrum, Informal Reviews, Formal Technical Reviews.

SOFTWARE QUALITY ASSURANCE: Background Issues, Elements of Software Quality Assurance, Tasks, Goals and Metrics, Software Reliability, the ISO 9000 Quality Standards.

TEXT BOOK:

1.Roger S. Pressman (2011), Software Engineering, A Practitioner's approach, 7th edition, McGraw Hill International Edition, New Delhi.

2.Sommerville (2001), Software Engineering, 9th edition, Pearson education, India.

REFERENCE BOOKS:

1.K. K. Agarval, Yogesh Singh (2007),Software Engineering,3rd edition, New Age International ublishers, India.

2.Lames F. Peters, WitoldPedrycz(2000), Software Engineering an Engineering approach, John Wiely& Sons, New Delhi, India.

3.Shely Cashman Rosenblatt (2006), Systems Analysis and Design, 6thedition, Thomson Publications, India.

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)

B. Tech. ECE VI/VII/VIII Semester **VCE-R15**

SCRIPTING LANGUAGES
(Open Elective)

Course Code: A3679

L	T	P	C
3	0	0	3

Course Overview:

This course will address the need for vertical open standards, domain knowledge and open source software skills for various industry verticals and drive to reduce the gap between industry requirement and availability of technical professionals for the same. This course provides the student with the insights into the world of open source software. Student will learn the Open source technologies like PHP, Perl, Python, MySQL technologies which helps him in developing applications (software) as part of project work and makes him industry ready.

Prerequisite(s):NIL

Course Outcomes:

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

CO1.Demonstrate knowledge about the advanced concepts of Linux OS like scheduling, cloning, signals.

CO2.Show skills to write PHP based GUI applications connecting to MYSQL.

CO3.Familiarize and define the programming syntax and constructs of LDAP connectivity in MySQL.

CO4.Analyze and implement Scripting applications using tuples, dictionaries and lists using Python.

CO5.Develop the ability to exhibit knowledge of writing packages and modules using Perl.

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)

B. Tech. ECE VI/VII/VIII Semester **VCE-R15**

SCRIPTING LANGUAGES
(Open Elective)

Course Code: A3679

L	T	P	C
3	0	0	3

SYLLABUS

UNIT 1 **(13 Lectures)**

INTRODUCTION: Introduction to Open sources – Need of open Sources – Advantages of Open Sources – Applications of Open sources. Open Source operating systems: Linux: Introduction – General Overview – Kernel Mode and user mode **LINUX:** Process – Advanced Concepts – Scheduling – Personalities – Cloning – Signals – Development with Linux

UNIT 2 **(14 Lectures)**

PHP: What is PHP? - Basic Syntax of PHP – programming in web environment - Common PHP Script Elements - Using Variables - Constants – Data types - Operators; Statements - Working with Arrays - Using Functions – OOP - String Manipulation and Regular Expression

FILE AND DIRECTORY HANDLING - Including Files - File Access

WORKING WITH FORMS -Processing Forms -Form Validation – Introduction to advanced PHP concepts

UNIT 3 **(12 Lectures)**

MySQL: Introduction - Setting up an account - Starting, Terminating and writing your own MySQL Programs Record Selection Technology - Working with Strings - Date and Time - Sorting Query Results module - Generating Summary - Working with Metadata - Using Sequences – MySQL-and-Web

PHP AND SQL DATABASE: PHP and LDAP ; PHP Connectivity ; Sending and receiving emails - Retrieving data from MySQL - Manipulating data in MySQL using PHP

UNIT 4 **(13 Lectures)**

PYTHON: Syntax and style – Python Objects – Numbers _ Sequences – Strings – Lists and Tuples – Dictionaries – Conditionals and loops - Functions - File Handling – Exception – Handling Exception-Execution Environment

UNIT 5 **(13 Lectures)**

PERL: Perl back grounder- Perl overview-Perl parsing rules- Variables and Data – Statements and control structures – Subroutines, Packages, and Modules- Working with Files – Data Manipulation

TEXT BOOKS:

1.Remy Card, Eric Dumas and Frank Mevel, " The Linux Kernel Book ", Wiley Publications, 2003
2.Steve Surching , "MySQL Bible" , John Wiley, 2002

REFERENCE BOOKS:

1.Rasmus Lerdorf and Levin Tatroe, " Programming PHP", O'Reilly, 2002
2.Wesley J. Chun , " Core Python Programming", Prentice Hall, 2001
3.Martin C.Brown, "Perl: The Complete Reference", 2nd Edition , Tata McGraw-Hill Publishing Company Limited, Indian Reprint 2009.
4.Steven Holzner, "PHP: The Complete Reference", 2nd Edition, Tata McGraw-Hill Publishing Company Limited, Indian Reprint 2009.
Vikram Vaswani, "MYSQL: The Complete Reference", 2nd Edition, Tata McGraw-Hill Publishing Company Limited, Indian Reprint 2009.

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)

B. Tech. ECE VI/VII/VIII Semester **VCE-R15**

DIGITAL ELECTRONICS
(Open Elective)

Course Code: A3476

L	T	P	C
3	0	0	3

Course Overview:

This course provides a modern introduction to logic design and the basic building blocks used in digital systems, in particular digital computers. It starts with a discussion of information representation and number systems, Boolean algebra, logic gates and minimization techniques. The second part of the course deals with combinational and sequential logic, where in the procedures to analyze and design the same will be discussed. Moreover, this course forms the basis for the study of advanced subjects like Computer Architecture and Organization, Microprocessors and Interfacing and Embedded systems.

Prerequisite(s):NIL

Course Outcomes:

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

CO1. Perform arithmetic operations on different number systems and to apply the principles of Boolean algebra to minimize logic expressions.

CO2. Use K-map and Tabulation method to minimize and optimize two-level logic functions up to five variables.

CO3. Analyze some basic components used in digital systems such as adder and subtractor, decoder, encoder, multiplexer, flip-flops.

CO4. Design various combinational PLDs such as ROMs, PALs, PALs and PROMs.

CO5. Develop digital systems using registers and counters such as shift registers, Ripple counters, synchronous counters.

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)

B. Tech. ECE VI/VII/VIII Semester **VCE-R15**

DIGITAL ELECTRONICS
(Open Elective)

Course Code: A3476

L	T	P	C
3	0	0	3

SYLLABUS

UNIT-I **(11 Lectures)**

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

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

UNIT-II **(9 Lectures)**

GATE LEVEL MINIMIZATION: The k-map method, four-variable map, five-Variable map, Sum of Products and Product of Sums simplification, don't-care conditions, NAND and NOR implementation, AND-OR-INVERT,OR-AND-INVERT implementations, exclusive – OR function, The tabulation (Quine Mccluskey) method, determination and selection of Prime implicants.

UNIT-III **(14 Lectures)**

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

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

UNIT-IV **(10 Lectures)**

SEQUENTIAL LOGIC: Classification of Sequential circuits (Synchronous, Asynchronous, Pulse mode, Level mode with examples), latches, Flip-Flops.

UNIT-V **(10 Lectures)**

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

TEXT BOOKS:

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

REFERENCE BOOKS:

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

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)

B. Tech. ECE VI/VII/VIII Semester **VCE-R15**

PRINCIPLES OF ANALOG AND DIGITAL COMMUNICATIONS
(Open Elective)

Course Code: A3477

L	T	P	C
3	0	0	3

Course Overview:

This course is useful to understand the basics of Signals, Systems, Random Variables and Communication. The course presents and integrates the basic concepts for both continuous-time and discrete signals and systems. This course provides a foundation in the theory and applications of random variables stochastic processes and an understanding of the mathematical techniques elating to random processes in the areas of signal processing, detection & estimation theory and communications. it gives the basics of Analog and Digital Communication and also gives the background required for advanced study on the course. This is accomplished by providing overviews of the necessary background in signal, system, probability, and random process theory required for the analog and digital communications. It gives more emphasis on stressing fundamental concepts. The topics in the course, more than enough to students needs.

Prerequisite(s):NIL

Course Outcomes:

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

CO1. **Analyze** linear and non - linear modulators and demodulators in time as well as frequency domain.

CO2. **Design** a linear and non linear modulators and demodulators for the analog signals.

CO3. **Outline** the basic concepts of digital communications with an insight into practical applications and Differentiate between PCM and DM and identify the applications of these modulation schemes in base band transmission.

CO4. **Estimate** a overall digital communication system for the improvement of the system performance.

CO5. **Analyze** the performance of a digital communication system by introducing various spread spectrum modulation techniques.

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)

B. Tech. ECE VI/VII/VIII Semester **VCE-R15**

PRINCIPLES OF ANALOG AND DIGITAL COMMUNICATIONS
(Open Elective)

Course Code: A3477

L	T	P	C
3	0	0	3

SYLLABUS

UNIT - I **(11 Lectures)**

Introduction to communication system, need for modulation, Types of modulation techniques: AM, FM, PM, Generation and detection. Comparison of AM, FM, PM. Radio transmitters and receivers (TRF& Super heterodyne).

UNIT - II **(12 Lectures)**

Sources of Noise, Resistor Noise, Shot Noise, Calculation of Noise in a Linear System, Noise in AM Systems, Noise in Angle Modulation Systems, Comparison between AM and FM with respect to Noise, Threshold Improvement in Discriminators, Comparisons between AM and FM.

UNIT - III **(11 Lectures)**

Analog-to-Digital Conversion: Pulse modulation techniques, Sampling, Time Division Multiplexing, Pulse Amplitude Modulation, Pulse Width Modulation, Pulse Position Modulation, Digital Modulation Techniques: Pulse Code Modulation, Differential Pulse Code Modulation, Delta Modulation, Adaptive Delta Modulation, Continuously Variable Slope Delta Modulation, Companding, Noise in Pulse-Code and Delta-Modulation Systems.

UNIT - IV **(11 Lectures)**

Binary Phase-Shift Keying, Differential Phase-Shift Keying, Differentially Encoded PSK (DEPSK), Quadrature Phase-Shift Keying (QPSK), M-ary PSK, Quadrature Amplitude Shift Keying (QASK), Binary Frequency Shift-Keying, Similarity of BFSK and BPSK, M-ary FSK, Minimum Shift Keying (MSK), Duo-binary Encoding.

UNIT - V **(11 Lectures)**

Spread Spectrum Modulation: Direct Sequence (DS) Spread Spectrum, Use of Spread Spectrum with Code Division Multiple Access (CDMA), Ranging using DS Spread Spectrum, Frequency Hopping (FH) Spread Spectrum, Generation and Characteristics of PN Sequences, Acquisition (Coarse Synchronization) of a FH Signal, Tracking (Fine Synchronization) of a FH Signal, Acquisition (Coarse Synchronization) of a DS Signal, Tracking of a DS Signal.

TEXT BOOKS:

1. *Communication Systems*, Simon Haykins (2nd Edition).
2. *Analog and Digital Communication Systems* by Martin S. Roden, 3rd edition, Prentice Hall, 1994.
3. *Principles of Communications* By Taub and Schilling

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)

B. Tech. ECE VI/VII/VIII Semester **VCE-R15**

TRANSDUCERS AND MEASUREMENTS
(Open Elective)

Course Code: A3478

L	T	P	C
3	0	0	3

Course Overview:

This course provides an overall understanding of the elements and processes, including sources of errors, and digitally acquiring these measurements. Along with an overview of instrumentation principles, the physical principles and electrical characteristics for several common instrument transducers are studied. The electronic signal conditioning circuits required converting the electrical changes in the transducers to signal which can be interpreted accurately by a microprocessor or an embedded controller are analyzed and designed effectively. This course also gives an integration of hardware and software in designing computer controlled processes and/or systems with the aid of sensors, transducers data acquisition board, and instrument control.

Prerequisite(s): NIL

Course Outcomes:

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

CO1. Aware the basic concepts of measurement parameters as well as instrument standards, characteristics and errors.

CO2. Construct and design various measuring devices like voltmeters, Ammeters, Ohmmeters, analog, digital multi-meters and analyze different types of cathode ray oscilloscopes.

CO3. Design different bridge networks and analyze balanced condition for finding out values of resistance, capacitance and inductance.

CO4. Analyze different physical parameters like pressure, force, velocity, acceleration, sound, torque, strain and stress etc. using non-electrical transducers.

CO5. Apply the principles and practice for instrument design and develop for real world problems.

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)

B. Tech. ECE VI/VII/VIII Semester **VCE-R15**

TRANSDUCERS AND MEASUREMENTS
(Open Elective)

Course Code: A3478

L	T	P	C
3	0	0	3

SYLLABUS

UNIT - I

CHARACTERSTICS OF INSTRUMENTS: Block schematic of measuring system, Performance characteristics of instruments-static and dynamic characteristics, Errors in measurement.

MEASURING INSTRUMENTS:DC voltmeters- multirange, range extension, DC Ammeter- multi range, range extension, Aryton shunt, ohmmeters-series type and shunt type, AC Voltmeter, thermocouple type RF ammeter.

DIGITAL VOLTMETERS: Dual slope and Successive Approximation type DVM

UNIT – II

CATHODE RAY OSCILLOSCOPE (CRO): Introduction to CRT, vertical amplifiers, horizontal deflection system, simple CRO.

SPECIAL PURPOSE OSCILLOSCOPES: Dual beam CRO, Dual trace oscilloscope, sampling oscilloscope, analog storage oscilloscope, digital storage oscilloscope, measurement of phase and frequency (lissajous patterns).

UNIT - III

DC and AC BRIDGES: Measurement of resistance Wheat's stone bridge, Kelvin's double bridge, measurement of Inductance using Maxwell's inductance bridge, Anderson's bridge, Hay's bridge, measurement of capacitance using Schering bridge, Wagner's ground connection, errors and precautions in using bridges.

UNIT - IV

TRANSDUCERS-I: Introduction, classification, strain gauges, LVDT, Piezo electric transducers, OPAMP applications in measurement and transducer circuits, instrumentation amplifier, thermometers, thermocouples, thermistors, sensistors.

UNIT - V

TRANSDUCERS-II: Measurement of non electrical quantities- displacement, pressure, torque, vibration, pH, sound, velocity, humidity, speed, analog and digital data acquisition systems, interfacing and bus standards, programmable logic controllers and their industrial applications.

TEXT BOOKS:

1. K Sawhney (2007), Electrical and Electronic Measurements and Instrumentation, 18th edition, Dhanpat Rai & Co, New Delhi.
2. H.S.Kalsi, Electronic Instrumentation, 3rd edition, Tata McGraw-Hill Education

REFERENCE BOOKS:

1.D. Helfrick, W.D. Cooper (2002), Modern Electronic Instrumentation and Measurement Techniques, 5th edition, Prentice Hall of India, New Delhi.
2.David A. Bell (2003), Electronic Instrumentation & Measurements, 2nd edition, Prentice Hall of India, New Delhi.

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)

B. Tech. ECE VI/VII/VIII Semester **VCE-R15**

INTERNET OF THINGS
(Open Elective)

Course Code: A3479

L	T	P	C
3	0	0	3

Course Overview:

The explosive growth of the "Internet of Things" is changing our world and the rapid drop in price for typical IoT components is allowing people to innovate new designs and products at home. In this course students will learn the importance of IoT in society, the current components of typical IoT devices and trends for the future. This course covers IoT design considerations, constraints and interfacing between the physical world to mobile device, how to make design trade-offs between hardware and software, and key components of networking to ensure that students understand how to connect their device to the Internet.

Prerequisite(s):

- Computer Architecture and Organization (A3508)
- Microprocessors and Microcontrollers (A3419)
- Embedded Systems (A3424)

Course Outcomes:

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

CO1. Explain the definition and usage of the term "The Internet of Things" in different contexts.

CO2. Understand where the IoT concept fits within the broader ICT industry and possible future trends.

CO3. Differentiate between the levels of the IoT stack and be familiar with the key technologies and protocols employed at each layer of the stack.

CO4. Design a simple IoT system comprising sensors, edge devices, wireless network connections and data analytics capabilities

CO5. Use the knowledge and skills acquired during the course to build and test a complete, working IoT system involving prototyping, programming and data analysis.

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)

B. Tech. ECE VI/VII/VIII Semester **VCE-R15**

INTERNET OF THINGS
(Open Elective)

Course Code: A3479

L	T	P	C
3	0	0	3

SYLLABUS

UNIT – I **10 Lectures)**

INTRODUCTION & CONCEPTS: Introduction to Internet of Things, Physical Design of IoT, Logical Design of IoT, IoT Enabling Technologies, IoT Levels.

UNIT - II **(12 Lectures)**

DESIGN PRINCIPLES FOR CONNECTED DEVICES: Calm And Ambient Technology, Magic As Metaphor, Privacy, Keeping Secrets, Whose Data Is It Anyway?, Web Thinking For Connected Devices, Small Pieces, Loosely Joined, First Class Citizens On The Internet, Graceful Degradation.

UNIT - III **(11 Lectures)**

INTERNET PRINCIPLES: An overview on IP, TCP & UDP, IP Addresses, MAC Addresses, TCP & UDP Ports, Application Layer Protocols

UNIT - IV **(11 Lectures)**

PROTOTYPING EMBEDDED DEVICES: Electronics, Embedded Computing Basics, Arduino, Raspberry PI, Beagle Bone Black, Electronic IMP, and Other notable Platforms

UNIT - V **(12 Lectures)**

TECHNIQUES FOR WRITING EMBEDDED CODE: Memory management, Types of memory, Making the most use of RAM, Performance & battery life, Libraries, Debugging.

PROTOTYPE TO REALITY: Who is the Business model for IoT?, Funding an IoT startup.

TEXT BOOKS:

1. Adrian McEwen & Hakim Cassimally (2014), *Designing the Internet of Things*, John Wiley and Sons, UK.
2. Vijay Madisetti and Arshdeep Bahga, "Internet of Things (A Hands – on - Approach)", 1 st Edition,VPT, 2014.

REFERENCE BOOKS:

1. Jan Holler, Vlasios Tsiatsis , Catherine Mulligan, Stefan Avesand, Stamatis Karnouskos, David Boyle, "*From Machine – to - Machine to the Internet of Things: Introduction to a New Age of Intelligence*", 1st Edition, Academic Press, 2014.
2. Francis daCosta, "*Rethinking the Internet of Things: A Scalable Approach to Connecting Everything*", 1st Edition, Apress Publications, 2013.
3. Daniel Kellmereit, "*The Silent Intelligence: The Internet of Things*", 2013.

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)

B. Tech. ECE VI/VII/VIII Semester **VCE-R15**

NANO TECHNOLOGY APPLICATIONS TO ELECTRICAL ENGINEERING
(Open Elective)

Course Code: A3276

L	T	P	C
3	0	0	3

Course Overview:

The course is designed to teach the elements of advanced science and technology used in nanotechnology materials and nano device fabrication. The topics taught include the fundamentals of: quantum mechanics, nano scale quantum structures, bulk semiconductor and epitaxial growth techniques, vacuum technology, semiconductor material characterization, defects in crystals, diffusion and implantation, wafer manufacturing, and processing.

Prerequisite(s):NIL

Course Outcomes:

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

CO1. Analyze the different forms of energy conversion methods conventional energy sources and sustainable renewable energy sources

CO2. Investigate different Nano materials and characteristics and applications in electrical energy storage and electrical energy applications

CO3. Evaluate micro fluid devices, Nano-engines, and energy conversion systems

CO4. Explore hydrogen storage systems .

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)

B. Tech. ECE VI/VII/VIII Semester **VCE-R15**

NANO TECHNOLOGY APPLICATIONS TO ELECTRICAL ENGINEERING
(Open Elective)

Course Code: A3276

L	T	P	C
3	0	0	3

SYLLABUS

UNIT – I

INTRODUCTION: Nanotechnology and its role in sustainable energy - Energy conversion process, Direct and in-direct energy conversion - Materials for: Light emitting diodes, Batteries, Advance turbines, Catalytic reactors, Capacitors and Fuel cells. Energy challenges - Development and implementation of renewable energy technologies.

UNIT – II

RENEWABLE ENERGY CONVERSION AND STORAGE: Energy conversion and storage - Nano, micro, poly crystalline Silicon and amorphous Silicon for solar cells, Silicon-composite structure, Techniques for Si deposition. Micro-fuel cell technologies, integration and performance of micro-fuel cell systems.

UNIT – III

MICROFLUIDIC SYSTEMS-I: Nano-electromechanical systems and novel micro fluidic devices - Nano engines – Driving mechanisms. Power generation - Micro channel battery - Micro heat engine (MHE) fabrication – Thermo capillary forces –Thermo capillary pumping (TCP) - Piezoelectric membrane.

UNIT – IV

HYDROGEN STORAGE METHODS-I: Hydrogen storage methods - Metal hydrides and size effects - Hydrogen storage capacity -Hydrogen reaction kinetics - Carbon-free cycle.

UNIT – V

HYDROGEN STORAGE METHODS-II: Gravimetric and volumetric storage capacities – Hydriding / Dehydriding kinetics - High enthalpy of formation and thermal management during the hydriding reaction.

TEXT BOOKS:

1. J. Twidell and T. Weir, *Renewable Energy Resources*, E & F N Spon Ltd, London, (1986).
2. Martin A Green, *Solar cells: Operating principles, technology and system applications*, Prentice Hall Inc, Englewood Cliffs, NJ, USA, (1981).
3. H J Moller, *Semiconductor for solar cells*, Artech House Inc, MA, USA, (1993).
4. Ben G Streetman, *Solis state electronic device*, Prentice Hall of India Pvt Ltd., New Delhi (1995).

REFERENCE BOOKS:

1. M.A. Kettani ,*Direct energy conversion,* Addision Wesley Reading, (1970).
2. Linden ,*Hand book of Batteries and fuel cells*, Mc Graw Hill, (1984).
3. Hoogers ,*Fuel cell technology handbook*. CRC Press, (2003).
4. Vielstich, *Handbook of fuel cells: Fuel cell technology and applications*, Wiley, CRC Press, (2003).

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)

B. Tech. ECE VI/VII/VIII Semester **VCE-R15**

INDUSTRIAL ELECTRONICS
(Open Elective)

Course Code: A3277

L	T	P	C
3	0	0	3

Course Overview:

The student is introduced to various electronic components and systems used in modern industry. Operational amplifier principles and applications including comparators (zero and nonzero crossing Detectors), voltage followers, inverting and non-inverting amplifiers. Subtraction, summing (mixer), difference and compound amplifiers and active filters. Operational amplifiers circuits are configured to make up complex analog circuits. Speed channels Filtering Noise using passive componentswill be explained. The design of Precession mechanical systems will be explained also the over view of micro controllers will be dealt.

Prerequisite(s):NIL

Course Outcomes:

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

CO1. Apply the knowledge of electronics in developing the controllers for industrial applications

CO2. Interpret system drawings, and design simple systems for sequential control systems involving valves and cylinders

CO3. Evaluate the operational characteristics the electrical and mechanical actuation systems

CO4. Construct a program and design a control system using microcontroller

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)

B. Tech. ECE VI/VII/VIII Semester **VCE-R15**

INDUSTRIAL ELECTRONICS
(Open Elective)

Course Code: A3277

L	T	P	C
3	0	0	3

SYLLABUS

UNIT - I

INTRODUCTION: Definition – Trends - Control Methods: Standalone , PC Based Real Time Operating Systems, Graphical User Interface , Simulation

SIGNAL CONDITIONING: Introduction – Hardware - Digital I/O , Analog input – ADC , resolution , sped channels Filtering Noise using passive components – Resistors, capacitors - Amplifying signals using OP amps.

UNIT – II

PRECISION MECHANICAL SYSTEMS: Pneumatic Actuation Systems - Electro-pneumatic Actuation Systems - Hydraulic Actuation Systems - Electro-hydraulic Actuation Systems - Timing Belts – Ball Screw and Nut - Linear Motion Guides - Linear Bearings - Harmonic Transmission - Bearings- Motor / Drive Selection.

UNIT – III

ELECTRONIC INTERFACE SUBSYSTEMS: TTL, CMOS interfacing - Sensor interfacing – Actuator interfacing – solenoids , motors Isolation schemes- opto coupling, buffer IC's - Protection schemes – circuit breakers, over current sensing , resettable fuses , thermal dissipation - Power Supply - Bipolar transistors / mosfets

UNIT – IV

ELECTROMECHANICAL DRIVES: Relays and Solenoids - Stepper Motors - DC brushed motors – DC brushless motors - DC servo motors - 4-quadrant servo drives , PWM's - Pulse Width Modulation – Variable Frequency Drives, Vector Drives - Drive System load calculation.

UNIT – V

MICROCONTROLLERS OVERVIEW: 8051 Microcontroller , micro processor structure – Digital Interfacing - Analog Interfacing - Digital to Analog Convertors - Analog to Digital Convertors - Applications.Programming –Assembly , (LED Blinking , Voltage measurement using ADC).

TEXT BOOKS:

1. Mechatronics Electronics Control Systems in Mechanical and Electrical Engineering by W Bolton,Pearson Education Press, 3rd edition, 2005.
2. Mechatronics/M.D.Singh/J.G.Joshi/PHI.

REFERENCES:

1. Mechatronics Source Book by Newton C Braga, Thomson Publications, Chennai.
2. Mechatronics – N. Shanmugam / Anuradha Agencies Publisers.
3. Mechatronics System Design / Devdasshetty/Richard/Thomson.

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)

B. Tech. ECE VI/VII/VIII Semester **VCE-R15**

SOLAR ENERGY AND APPLICATIONS
(Open Elective)

Course Code: A3278

L	T	P	C
3	0	0	3

Course Overview:

This is an engineering introduction to Solar energy technologies and potentials. The courseaims to introduce a general engineering/science audience to the basic concepts of solar energy. The concepts of Photo Voltaic cells and their properties will be explained. Applications of solar cells will be explained in detail also the environmental issues of solar systems will be explained.

Prerequisite(s): NIL

Course Outcomes:

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

CO1.Compare the present and future available electrical power from solar energy in the world based on the knowledge of global solar horizontal irradiation.

CO2.Assimilate and acquire the skills for design and engineering of solar thermal and solar photovoltaic technology and systems

CO3.Identify simple to complex problems involved in solar thermal energy conversion technique used in the liquid based solar heating and cooling systems for buildings/societal needs.

CO4.Examine a solar PV(Photo Voltaic) system components and their function by utilizing the previous literature knowledge on different Photovoltaic solar cells like crystalline, Multi-Crystalline, Amorphous and thin film

CO5.Analyze the techno economics interaction of developments in the solar energy systems

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)

B. Tech. ECE VI/VII/VIII Semester **VCE-R15**

SOLAR ENERGY AND APPLICATIONS
(Open Elective)

Course Code: A3278

L	T	P	C
3	0	0	3

SYLLABUS

UNIT - I

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

UNIT - II

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

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

UNIT - III

PHOTO VOLTAICS (PV): Fundamentals of solar cells, types of solar cells, semiconducting materials, band gap theory, absorption of photons, excitations and photo emission of electrons, band engineering.

PV CELL PROPERTIES: Solar cell properties and design, p-n junction photodiodes, depletion region, electrostatic field across the depletion layer, electron and holes transports, device physics, charge carrier generation, recombination and other losses, I-V characteristics, output power.

UNIT - IV

SOLAR CELL APPLICATIONS: PV cell interconnection, module structure and module fabrication, Equivalent circuits, load matching, efficiency, fill factor and optimization for maximum power, Design of stand-alone PV systems, system sizing, device structures, device construction, DC to AC conversion, inverters, on-site storage and grid connections.

UNIT - V

COST ANALYSIS AND ENVIRONMENTAL ISSUES: Cost analysis and pay back calculations for different types of solar panels and collectors, installation and operating costs, Environmental and safety issues, protection systems, performance monitoring.

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

TEXT BOOKS:

1. G. D. Rai (2009), *Non-Conventional Energy Sources*, 4th edition, Khanna Publishers, New Delhi.
2. Martin A. Green (2008), *Solar Cells: Operating Principles, Technology and system Applications*, 1st edition, Prentice Hall, New Delhi.

REFERENCES BOOKS:

1. Sukatme (2008), Solar Energy, 3rd Edition, McGraw Hill Companies, New Delhi.
2. D. Yogi gosuami, Frank Kreith, Jan F. Kreider (2000), Principles of Solar Engineering, 2nd edition, Taylor & Francis, USA.

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)

B. Tech. ECE VI/VII/VIII Semester **VCE-R15**

ENERGY MANAGEMENT AND AUDIT
(Open Elective)

Course Code: A3279

L	T	P	C
3	0	0	3

Course Overview:

Energy management can help industry control its operating costs. Energy management is also important for reducing local, regional and global emissions and can help mitigate the problem of global warming. This course will help industry professionals acquire the skills and techniques required to implement energy management. This course will also benefit researchers and students who are interested in working on energy management. In the context of the Energy Conservation Act 2001, the Bureau of Energy Efficiency has emphasised the importance of Energy Managers and Certified Energy Auditors. This course is designed to provide the background required for engineers to meet this role.

Prerequisite(s): Knowledge of Energy systems

Course Outcomes:

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

CO1. Analyze the influence of energy availability on the development of Industries and various other organizations.

CO2. Discuss the concepts and technologies used for energy conservation.

CO3. Develop methods for evaluating worth of project.

CO4. Investigate the schemes for demand side management.

CO5. Evaluate the VAR requirements for effective voltage control.

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)

B. Tech. ECE VI/VII/VIII Semester **VCE-R15**

ENERGY MANAGEMENT AND AUDIT
(Open Elective)

Course Code: A3279

L	T	P	C
3	0	0	3

SYLLABUS

UNIT - I

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

UNIT - II

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

UNIT - III

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

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

UNIT - IV

DEMAND SIDE MANAGEMENT: Concept and Scope of Demand Side Management, Evolution of Demand Side Management, DSM Strategy ,Planning, Implementation and its application. Customer Acceptance & its implementation issues. National and International Experiences with DSM.

UNIT - V

VOLTAGE AND REACTIVE POWER IN DISTRIBUTION SYSTEM: Voltage and reactive power calculations and control: Voltage classes and nomenclature, voltage drop calculations, Voltage control, VAR requirements and power factor, Capacitors unit and bank rating, Protection of capacitors and switching, Controls for switched capacitors and fields testing.

TEXT BOOKS:

1. W. R. Murphy, G. McKay (2008), *Energy Management,* 1st edition, B.S. Publications, New Delhi.
2. Tripathy S. C., "Electric Energy Utilization and conservation", Tata McGraw Hill.
3. Industrial Energy Conservation Manuals, MIT Press, Mass, 1982.

REFERENCE BOOKS:

1. B. Smith (2007), *Energy Management Principles*, 1st edition, Pergamon Press, Inc., England.
2. Energy Management Handbook, Edited by W.C.Turner, Wiley, New York, 1982.
3. IEEE Bronze Book, 'Recommended Practice for Energy Conservation and cost effective planning in Industrial facilities, IEEE Press

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)

B. Tech. ECE VI/VII/VIII Semester **VCE-R15**

ELEMENTS OF MECHANICAL ENGINEERING
(Open Elective)

Course Code: A3376

L	T	P	C
3	0	0	3

Course Overview:

The course description is multidisciplinary nature of Natural Resources: Renewable and nonrenewable resource. Hydraulic Machines deals describes about the hydraulic turbines. The course is also describing about the various machine tool operations and joining processes.

Prerequisite(s):

- Environmental studies
- Metallurgy and Material science
- Production Technology-I
- Hydraulic Machines
- Refrigeration and Air Conditioning

Course Outcomes:

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

CO1. Distinguish renewable and non-renewable energy sources and the associated environmental issues.

CO2. Classify hydraulic turbines and gas turbines based on working principles.

CO3. Apply metal removal and joining processes to get the designed shape and size of products in manufacturing.

CO4. Make use of engineering materials such as ferrous & non-ferrous metals, alloys, composite for different applications.

CO5. Explain the basic concepts of refrigerants, refrigeration, air-condition system.

B. Tech. ECE VI/VII/VIII Semester **VCE-R15**

ELEMENTS OF MECHANICAL ENGINEERING
(Open Elective)

Course Code: A3376

L	T	P	C
3	0	0	3

SYLLABUS

UNIT - I

ENERGY RESOURCES: Non-renewable and renewable energy resources, solid, liquid and gaseous fuels, Calorific values of fuels, Combustion and combustion products of fuels,

ENERGY: Introduction and application of Energy sources like fossil fuels, Nuclear Fuels, Solar, Hydal, wind and bio fuels, Environmental issues like global warming and ozonedepletion.

UNIT – II

TURBINES: Introduction Classification Efficiency, Principal and operation of pelton wheel Francis Turbine and Caplon Turbine

Gas Turbines: Classification, Working principles and Operations of Open cycle and closed cycle gas turbines.

UNIT - III:

MACHINE TOOL OPERATIONS: Turning, facing, knurling, Thread cutting, Taper Turning by swiveling the compound rest, Drilling, Boring, Reaming, Tapping, Counter Sinking, Counter Boring, -Plain milling, End milling, Slot milling.

UNIT –IV:

ENGINEERING MATERIALS AND JOINING PROCESSES:

ENGINEERING MATERIALS: Types and applications of Ferrous & Nonferrous metals and alloys.

Composites: Introduction: Definition, Classification and applications

Joining Process: welding: Definition, classification of welding, Description of Electric Arc Welding and Oxy-Acetylene Welding, soldering , brazing, Differences between soldering, Brazing and Welding.

UNIT - V

REFRIGERATION AND AIR-CONDITIONING: Properties of refrigerants, list of commonly used refrigerants. Refrigeration –Definitions – Refrigerating effect, Ton of Refrigeration, COP, Relative COP, unit of Refrigeration. Principle and working of anvapor compression refrigeration and vapour absorption refrigeration systems. Principle and applications of air conditioners, Room air conditioner.

TEXT BOOKS:

1. G. D. Rai (2010), Non-Conventional Energy Sources, 2nd edition, Pearson, India.
2. Domkundwar, S. C. Arora (2009), A Course in Refrigeration and Air conditioning, 6th edition, Dhanpatrai Publications, New Delhi, India.
3. Ganesan (2011), Gas Turbines, 3rd edition, Tata McGraw-Hill education (P) Ltd, New Delhi, India.
4. R K Jain(2004) Production Technology, Khanna Publications.

REFERENCE BOOKS:

1. S. Trymbaka Murthy, “A Text Book of Elements of Mechanical Engineering”, 4th Edition, Universities Press (India) Pvt. Ltd., 2006.
2. K.P. Roy, S.K. Hajra Choudhury, Nirjhar Roy, “Elements of Mechanical Engineering”, Media Promoters & Publishers Pvt. Ltd.,Mumbai,7th Edition, 2012
3. Pravin Kumar, (2013), “Basic Mechanical Engineering”, Edition, Pearson.
4. B K Singh (2012), Elements by Mechanical Engineering, Published by Ane Books Pvt. Ltd.

(AUTONOMOUS)

B. Tech. ECE VI/VII/VIII Semester **VCE-R15**

BASIC THERMODYNAMICS AND HEAT TRANSFER
(Open Elective)

Course Code: A3377

L	T	P	C
3	0	0	3

Course Overview:

This course focuses on basic areas of the relationship between heat and work in a substance during different types of thermodynamic processes. Specifically, thermodynamics focuses largely on how a heat transfer is related to various energy changes within a system undergoing a thermodynamic process. The course is extended to study the Air standard cycles and various modes of heat transfer in detail.

Prerequisite(s):NIL

- THERMODYNAMICS
- HEAT TRANSFER

Course Outcomes:

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

CO1. Define the laws of thermodynamics and heat transfer.

CO2. Explain the basic concepts of thermodynamics and heat transfer.

CO3. Solve the problems by applying the knowledge of thermodynamic and heat transfer laws.

CO4. Evaluate the performance of thermodynamic cycles, heat engines and heat pumps.

CO5. Analyze heat transfer due to conduction, convection and radiation.

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)

B. Tech. ECE VI/VII/VIII Semester **VCE-R15**

BASIC THERMODYNAMICS AND HEAT TRANSFER
(Open Elective)

Course Code: A3377

L	T	P	C
3	0	0	3

SYLLABUS

UNIT – I

BASIC CONCEPTS OF THERMODYNAMICS: Macroscopic and microscopic approaches, thermodynamic systems, boundary, surroundings, thermodynamic property, intensive and extensive properties, thermodynamic equilibrium, state, path, process and cycle, quasi static, reversible and irreversible processes, Energy and its forms, concepts of heat and work, Zeroth Law of thermodynamics.

UNIT – II

FIRST LAW OF THERMODYNAMICS: First law of thermodynamics, internal energy, enthalpy, PMM -I, Steady flow energy equation, Application of First law and Limitations of first law of thermodynamics.

SECOND LAW OF THERMODYNAMICS: Kelvin-Planck and Clausius statements, heat engine, heat pump, refrigerator, PMM-II, Carnot cycle, Carnot heat engine, Carnot theorem and its corollaries, Entropy.

UNIT – III

AIR STANDARD CYCLES: Otto, Diesel and Dual combustion cycles, description and representation on PV and TS diagrams, Thermal efficiency, mean effective pressures.

UNIT –IV

BASIC CONCEPTS OF HEAT TRASFER: Modes and mechanisms of heat transfer, Basic laws of heat transfer –Applications of heat transfer.

CONDUCTION HEAT TRANSFER: General heat conduction equation in Cartesian coordinates. Different forms of general equation – Steady state and Transient heat transfer – Initial and boundary conditions. One dimensional steady state heat conduction through Homogeneous slabs, Overall heat transfer coefficient.

UNIT –V

FORCED CONVECTION: Concepts of hydrodynamic and thermal boundary layer and use of empirical correlations for Flat plates.

FREE CONVECTION: Development of Hydrodynamic and thermal boundary layer along a vertical plate – Use of empirical relations for Vertical plates.

RADIATION HEAT TRANSFER: Introduction, properties and definitions, Laws of black-body radiation, Laws of Planck, Kirchoff, Lambert, Stefan and Boltzmann, Heat exchange between two black bodies, Emissivity, heat exchange between grey bodies.

TEXT BOOKS:

1. P. K. Nag (2012), *Engineering Thermodynamics*, 4th edition, Tata McGraw-Hill, New Delhi, India.
2. YUNUS A CENGEL, (2016*), Heat and mass transfer: fundamentals & applications*, 5th edition, TMH, New Delhi, India.

REFERENCE BOOKS:

1. J. B. Jones, R. E. Dugan (2009), *Engineering Thermodynamics*, 1st edition, Prentice Hall of India Learning, New Delhi, India.
2. M MRathod (2010), Thermal Engineering, Tata McGraw Hill, New Delhi, India.
3. M. Thirumaleshwar,(2014), Fundamentals of Heat & Mass Transfer, Second Edition, Pearson, India
4. R.C. Sachdeva, (2014), Fundamentals of Engineering, Heat & Mass Transfer, Third Edition, New Age, New Delhi.

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)

B. Tech. ECE VI/VII/VIII Semester **VCE-R15**

MECHANICAL MEASUREMENTS AND INSTRUMENTATION
(Open Elective)

Course Code: A3378

L	T	P	C
3	0	0	3

Course Overview:

This course covers the terminology, concepts, principles and computations used by engineers and technicians to specify, analysis and maintain instrumentation and control systems. It emphasizes practices in industry concepts, so that students learn what aspects of plant design and control are critical. Practical examples have been used for many common pressure, level, temperature and flow measuring systems. Approaches are presented for measurement selection, process/modification, and control system design.

Prerequisite(s): NIL

Course Outcomes:

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

CO1. Identify the functional elements of generalized measuring system and the errors occurring in Instrumentation and provide the remedial measures
CO2. List various pressure measuring instruments and applications in real life
CO3. Evaluate the measuring instruments and to trace the standards used to the ultimate standards.
CO4. Analyze the measuring system for the measurement of Displacement, Temperature, Flow, Liquid level, Stress, Strain and humidity.
CO5. Classify the various types of humidity, acceleration and vibration measurements.

B. Tech. ECE VI/VII/VIII Semester **VCE-R15**

MECHANICAL MEASUREMENTS AND INSTRUMENTATION
(Open Elective)

Course Code: A3378

L	T	P	C
3	0	0	3

SYLLABUS

UNIT - I

INTRODUCTION: Definition, Basic principles of measurement, Measurement systems, generalized configuration and functional descriptions of measuring instruments, examples. Dynamic performance characteristics, sources of error, Classification and elimination of error.

MEASUREMENT OF DISPLACEMENT: Theory and construction of various transducers to measure displacement ,Piezoelectric, Inductive, capacitance, resistance, ionization and Photo electric transducers, Calibration procedures.

UNIT - II

MEASUREMENT OF PRESSURE: Introduction, classification, basic principles used of Manometers, Piston, Bourdon pressure gauges, Bellows, Diaphragm gauges. Low pressure measurement, Thermal conductivity gauges, ionization pressure gauges, McLeod pressure gauge.

UNIT - III

MEASUREMENT OF LEVEL: Direct method, Indirect methods, capacitative, ultrasonic, magnetic, Bubler level indicators.

FLOW MEASUREMENT: Rotameter, magnetic, Ultrasonic, Turbine flow meter, hot wire anemometer, Laser Doppler Anemometer (LDA).

MEASUREMENT OF SPEED: Mechanical Tachometers, Electrical tachometers, Stroboscope, Non-Contact type oftachometer.

UNIT - IV

STRESS STRAIN MEASUREMENTS: Introduction to stream and strain, electrical strain gauge, gaugefactor, method of usage of resistance strain gauge for bending compressive and tensile strains, usage for measuring torque, Strain gauge Rosettes.

MEASUREMENT OF TEMPERATURE: Classification , Ranges , Various Principles of measurement , Expansion, Electrical Resistance, Thermistor , Thermocouple , Pyrometers, Temperature Indicators.

UNIT - V

MEASUREMENT OF HUMIDITY: Moisture content of gases, sling psychrometer, Absorption psychrometer and Dew pointmeter.

MEASUREMENT OF ACCELERATION AND VIBRATION: Different simple instruments, Principles of Seismic instruments, Vibrometer and accelerometer.

TEXT BOOKS:

1. D.S. Kumar(2011), *Mechanical Measurements and Controls*, 4th edition, Metropolitan Book Co. Pvt Ltd., New Delhi, India**.**
2. A. K. Tayal (2004), *Instrumentation and mechanical Measurements,* 2nd edition, Galgotia Publications, New Delhi, India.

REFERENCE BOOKS:

1. Er. R. K. Jain (2011), *Mechanical and Industrial Measurements*, 12th edition, Khanna Publishers, New Delhi, India.
2. Chennakesava R. Alavala(2010), *Principles of Industrial Instrumentation and Control Systems*, 1st edition, Cengage Learning, New Delhi, India.
3. B. C. Nakra, K. K. Choudhary (2010*), Instrumentation, measurement and analysis*, 4th, Tata McGraw-Hill, New Delhi, India.

(AUTONOMOUS)

B. Tech. ECE VI/VII/VIII Semester **VCE-R15**

ENGINEERING OPTIMIZATION
(Open Elective)

Course Code: A3379

L	T	P	C
3	0	0	3

Course Overview:

Optimization involves finding the “best” solution according to specified criteria. In the context of engineering design, the “best” solution may refer to a minimum cost or weight, maximum quality or efficiency, or some other performance index pertaining to a disciplinary objective. However, determining the optimal design involves more than just the minimization or maximization of an objective function. Designers must also identify the design variables that represent the physical form of the system and the constraints that represent limitations on the design space. Typically, the problems of interest in engineering are of a nonlinear nature, in that the objective functions and constraints considered are nonlinear.

Prerequisite(s):

Mathematics, Numerical Methods

Course Outcomes:

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

CO1. Explain various optimization techniques.

CO2. Solve problems involving single variable and multi variables under constrained or unconstrained environments.

CO3. Examine the impact of various factors affecting the Linear programming problem and solution using sensitivity (Post Optimality) analysis, with the aid of Simplex Method, Revised Simplex Method, Dual Simplex Method etc.

CO4. Apply dynamic programming technique to find optimum solution for inventory, capital budgeting, resource allocation, Production planning and control problems etc.

CO5. Solve quadratic, geometric and non-linear programming problems using different methods.

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)

B. Tech. ECE VI/VII/VIII Semester **VCE-R15**

ENGINEERING OPTIMIZATION
(Open Elective)

Course Code: A3379

L	T	P	C
3	0	0	3

SYLLABUS

UNIT I

OPTIMIZATION TECHNIQUE: Introduction, Single-Variable Optimization, Multivariable Optimization with No Constraints, Multivariable Optimization with Equality Constraints, Multivariable Optimization with Inequality Constraints, Convex Programming Problem.

UNIT II

LINEAR PROGRAMMING: Introduction, Revised Simplex Method, Duality in Linear Programming, Decomposition Principle, Sensitivity or Postoptimality Analysis, Transportation Problem, Karmarkar's Method, Quadratic Programming.

UNIT III

NON-LINEAR PROGRAMMING: Introduction, Unimodal Function, Unrestricted Search, Exhaustive Search, Dichotomous Search, Interval Halving Method, Fibonacci Method, Golden Section Method, Comparison of Elimination Methods, Quadratic Interpolation Method, Cubic Interpolation Method, Direct Root Methods, Rate of convergence, Design variables, Random search methods, Chrivariate methods, Powell's method, Newton's method, Marquard Method, Test function.

UNIT IV

GEOMETRIC PROGRAMMING: Introduction, Posynomial, Unconstrained Minimization Problem, Primal-Dual Relationship and Sufficiency Conditions in the Unconstrained Case,Constrained Minimization, Primal and Dual Programs in the Case of Less-Than Inequalities, Geometric Programming with Mixed Inequality Constraints, Complementary Geometric Programming, Applications of Geometric Programming.

UNIT V

DYNAMIC PROGRAMMING: Introduction, Multistage Decision Processes, Concept of Sub optimization and the Principle of Optimality, Computational Procedure in Dynamic Programming, The Calculus Method of Solution, The Tabular Method of Solution, Conversion of a Final Value Problem into an Initial Value Problem, Linear Programming as a Case of Dynamic Programming, Continuous Dynamic Programming, Applications.

TEXT BOOKS:

1. C B Gupta (2013), Optimization Techniques in Operations Research, 1st Edition, I K International Publications, New Delhi.
2. Singireshel S Rao (2011), Engineering Optimizations, 4th Edition, Elsevier Butterworth, Heineman, USA.

REFERENCES:

1. Jasibir Arora (2016), Introduction to Optimum Design, 4th Edition, Academic press in an Imprint of Elsevier, USA.
2. N V S Raju (2014), Optimization Methods for Engineering, 1st edition, PHI Publications, New Delhi.
3. K V Mittal (1996), Optimization Methods in Operations research and system analysis, 3rd Edition, New age Publications, New Delhi.
4. Edwin K, P Chang, Stanislaw H. Zak (2013), An Introduction to Optimization, 3rd Edition, Jhon Wiley, New York.

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)

B. Tech. ECE VI/VII/VIII Semester **VCE-R15**

ENVIRONMENTAL POLLUTION AND MANAGEMENT
(Open Elective)

Course Code: A3176

L	T	P	C
3	0	0	3

Course Overview:

The course has been designed to improve the understanding of the students about different pollution control strategies and the skills of application of remediation techniques to combat pollution in three environmental compartments i.e. air, water and soil. The course will also be dealing about the sources of pollution in air, soil, water, solid-waste and noise and the impacts these sources on the environment and health. In addition, the students will be given the training to develop the particular skills required in pollution related structured research.

Prerequisite(s): NIL

Course Outcomes:

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

CO1. **Distinguish** between various modes of air pollution and their characteristic.

CO2. **Examine** air pollution sampling and classify its level.

CO3. **Evaluate** water quality and propose necessary measures.

CO4. **List** different standards laid by governing authorities.

CO5. **Summarize** functions carried out by controlling bodies.

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)

B. Tech. ECE VI/VII/VIII Semester **VCE-R15**

ENVIRONMENTAL POLLUTION AND MANAGEMENT
(Open Elective)

Course Code: A3176

L	T	P	C
3	0	0	3

SYLLABUS

UNIT-I **(12 Lectures)**

Water pollution – sources & types of water pollution – physical, chemical & biological – effect of water pollution. Drinking water quality standards waste water treatment – primary, secondary, tertiary-water pollution prevention & control act – 1974.

UNIT-II **(12 Lectures)**

Air pollution –structure and composition of atmosphere – classification, sources & effects of air pollution – Acid rain –green house effect – global warming – Ozone depletion.

UNIT-III **(12 Lectures)**

Prevention and control of air pollution particulate control – settling chamber, scrubber, bag filter, cyclones electrostatic precipitators. Gaseous emission control methods. Air pollution prevention and control Act 1981.

UNIT-IV **(12 Lectures)**

Soil Pollution – soil pollutants – types – sources, effects & Control. Noise Pollution – sources effects & Control.

UNIT-V **(12 Lectures)**

Government Agencies & Programs – The Tiwari committee – creation of NCEPC, Department of Environment & Forest – Function of State Pollution Control Board.

TEXT BOOKS:

1. Rao, M. N and H.V.N. Rao (2005) Air Pollution, Tata McGraw – Hill Publishing Company Limited. New Delhi.
2. Kudesia, V.P and Ritu Kudesia (2005) Water Pollution, Pragati Prakashan Publication, Meerut.

REFERENCES

1. Sawyer, C. N., P.L McCarty and G.F. Perkin (1994) Chemistry for Environmental Engineers, II Edition. McGraw-Hill.
2. Sharma, B.K and H.Kaur (1994) Soil and Noise Pollution. Goel Publishing House, Meerut.
3. Kumarasawmy, K., A. Alagappa Moses and M. Vasanthy (2004) Environmental Studies (A Text Book for All Under Graduate Students) Bharathidasan University Publications.

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)

B. Tech. ECE VI/VII/VIII Semester **VCE-R15**

REMOTE SENSING AND GIS
(Open Elective)

Course Code: A3177

L	T	P	C
3	0	0	3

Course Overview:

This course covers the study of elements in remote sensing process and steps involved in electromagnetic remote sensing process. This course also covers the principals of photometry and various concepts of and terminology of GIS and also includes how the data is presented and data base management system. In this course the applications of remote sensing and GIS in civil engineering.

Prerequisite(s): NIL

Course Outcomes:

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

CO1. **Explain** basics of Aerial Photography, Remote sensing and GIS.

CO2. **Describe** the working principle of interpretation of Aerial photographs and satellite.

CO3. **Utilize** knowledge about the principles and physics of Remote sensing and data acquisition

CO4. **Summarize** the data types, data storage and carry out the analysis of spatial and attribute data.

CO5. **Apply** applications of remote sensing and GIS in various fields.

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)

B. Tech. ECE VI/VII/VIII Semester **VCE-R15**

REMOTE SENSING AND GIS
(Open Elective)

Course Code: A3177

L	T	P	C
3	0	0	3

SYLLABUS

UNIT – I **(12 Lectures)**

INTRODUCTION TO PHOTOGRAMMETRY: Principles & types of aerial photograph, geometry of vertical aerial photograph, Scale & Height measurement on single vertical aerial photograph, Height measurement based on relief displacement, Fundamentals of stereoscopy, fiducial points, parallax measurement using fiducial line.

UNIT – II **(12 Lectures)**

REMOTE SENSING: Basic concept of Remote sensing, Data and Information, Remote Sensing data collection, Remote sensing advantages & Limitations, Remote sensing process. Electro-magnetic Spectrum, Energy interactions with atmosphere and with earth surface features (Soil, Water, and Vegetation).

Indian Satellites and Sensors characteristics, Resolution, Map and Image and False color composite, introduction to digital data, elements of visual interpretation techniques.

UNIT – III **(12 Lectures)**

GEOGRAPHICAL INFORMATION SYSTEMS: Introduction to GIS; Components of a GIS; Geospatial Data: Spatial Data - Attribute data - joining Spatial and Attribute data; GIS operations: Spatial Data input-Attribute data Management - Data display - data exploration - Data Analysis.

COORDINATE SYSTEMS: Geographic Coordinate System: Approximation of Earth, Datum; Map Projections; Types of Map Projection parameters - Commonly used Map Projections - Projected coordinate Systems.

UNIT – IV **(10 Lectures)**

GIS SPATIAL ANALYSIS: Computational Analysis Methods (CAM), Visual Analysis Methods (VAM), Data storage-vector data storage, attribute data storage, overview of the data manipulation and analysis. Integrated analysis of the spatial and attribute data.

UNIT – V **(14 Lectures)**

APPLICATIONS: WATER RESOURCES APPLICATIONS - Surface water mapping - Flood and Drought impact assessment - Rainfall – Runoff relations - Watershed management for sustainable development and Watershed characteristics - TRANSPORTATION – shortest path- vehicle tracking – network travel cost – transportation master plan. DISASTER MANAGEMENT – ENVIRONMENTAL ENGINEERING – environmental impact assessment - site remediation – fire growth stimulation. AGRICULTURE.

TEXT BOOKS:

1. James B. Campbell, Randolph H. Wynne (2011), *Introduction to Remote Sensing, 5*th edition, Guilford Publications Inc., New York, USA.
2. L. R. A. Narayana (1999), *Remote Sensing and its applications,* Universities Press, India.
3. M. Anji Reddy (2001), *Remote Sensing and Geographical Information systems,* B. S. Publications, New Delhi, India.

REFERENCE BOOKS:

1. Thomas M. Lillesand, Ralph W. Kiefer (1994), *Remote Sensing and Image Interpretation*, Wiley & Sons, New Delhi, India.
2. Peter A. Burragh, Rachael (2011), *Principals of Geo physical Information Systems,* Oxford Press, India.
3. S. Kumar (2005), *Basics of remote sensing and GIS*, Laxmi Publications, New Delhi, India.

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)

B. Tech. ECE VI/VII/VIII Semester **VCE-R15**

DISASTER MANAGEMENT
(Open Elective)

Course Code: A3178

L	T	P	C
3	0	0	3

Course Overview:

This course will introduce students to the vocabulary and core components of Disaster Management. We will discuss the importance of this growing field that is changing rapidly as a result of an increase in frequency, complexity, and severity of man-made, natural, and technological disasters. We will examine historical events that have changed the nature of the field, and introduce students to the leadership and management roles that have emerged as a result of these events taking place.

Prerequisite(s):NIL

- Environmental sciences

Course Outcomes:

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

CO1. **List out** different causes of Environmental hazards.

CO2. **Classify** environmental hazards and disasters, Endogenous hazards, exogenous hazards, infrequent events - Cumulative atmospheric hazards / disasters.

CO3. **Explain** different characteristics of hazards.

CO4. **Develop** Emerging approaches in Disaster management.

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)

B. Tech. ECE VI/VII/VIII Semester **VCE-R15**

DISASTER MANAGEMENT
(Open Elective)

Course Code: A3178

L	T	P	C
3	0	0	3

SYLLABUS

UNIT–I **(12Lectures)**

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

UNIT – II **(12Lectures)**

TYPES OF ENVIRONMENTAL HAZARDS & DISASTERS: Natural hazards and Disasters – Man induced hazards & Disasters - Natural Hazards - Planetary Hazards / Disasters - Extra Planetary Hazards / disasters - Planetary Hazards - Endogenous Hazards - Exogenous Hazards

UNIT- III **(12Lectures)**

ENDOGENOUS HAZARDS: Volcanic eruption - Earthquakes - landslides - Volcanic Hazards / Disasters - Causes and distribution of Volcanoes - Hazardous effects of volcanic eruptions - Environmental impacts of volcanic eruptions - Earthquake Hazards / disasters - Causes of Earthquakes - Distribution of earthquakes - Hazardous effects of - earthquakes - Earthquake Hazards in India - Human adjustment, perception & mitigation of earthquake.

UNIT- IV **(13Lectures)**

Exogenous hazards / disasters - Infrequent events - Cumulative atmospheric hazards / disasters **Infrequent events:** Cyclones - Lightning – Hailstorms.

CYCLONES: Tropical cyclones & Local storms - Destruction by tropical cyclones & local stroms (causes, distribution human adjustment, perception & mitigation) Cumulative atmospheric hazards/ disasters :- Floods - Droughts - Cold waves - Heal waves Floods :- Causes of floods - Flood hazards India - Flood control measures (Human adjustment, perception & mitigation) Droughts :- Impacts of droughts - Drought hazards in India - Drought control measures - Extra Planetary Hazards / Disasters - man induced Hazards / Disasters - Physical hazards / Disasters - Soil erosion

SOIL EROSION: Mechanics & forms of Soil Erosion - Factors 7 causes of Soil Erosion - Conservation measures of Soil Erosion.

CHEMICAL HAZARDS / DISASTERS: Release of toxic chemicals, nuclear explosion - Sedimentation processes Sedimentation processes: - Global Sedimentation problems - Regional Sedimentation problems - Sedimentation & Environmental problems - Corrective measures of Erosion & Sedimentation

BIOLOGICAL HAZARDS / DISASTERS: Population Explosion

UNIT-V **(12Lectures)**

Emerging approaches in Disaster Management - Three stages
Pre-disaster Stage (preparedness)
Emergency Stage
Post Disaster stage – Rehabilitation

TEXT BOOKS:

1. Disaster Mitigation: Experiences And Reflections by Pradeep Sahni
2. Natural Hazards & Disasters by Donald Hyndman & David Hyndman - Cengage Learning

REFERENCE BOOKS:

1. R. B. Singh (Ed) Environmental Geography, Heritage Publishers New Delhi, 1990
2. Savinder Singh Environmental Geography, PrayagPustakBhawann 1997
3. Kates, B. I & White, G. F The Environment as Hazards, oxford, New York, 1978
4. R. B. Singh (Ed) Disaster Management, Rawat Publication, New Delhi, 2000
5. H. K. Gupta (Ed) Disaster Management, Universities Press, India, 2003
6. R. B. Singh, Space Technology for Disaster Mitigation in India (INCED), University of Tokyo, 1994
7. Dr.Satender, Disaster Management in Hills, Concept Publishing Co., New Delhi, 2003
8. S. Arya Action Plan For Earthquake, Disaster, Mitigation in V. K. Sharma (Ed) Disaster Management IIPA Publication New Delhi, 1994
9. R. K. Bhandani An overview on Natural & Manmade Disaster & their Reduction, CSIR, New Delhi
10. M. C. Gupta Manuals on Natural Disaster Management in india, National Centre for Disaster Management, IIPA, New Delhi, 2001.

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)

B. Tech. ECE VI/VII/VIII Semester **VCE-R15**

CONSTRUCTING PLANNING AND MANAGEMENT
(Open Elective)

Course Code: A3179

L	T	P	C
3	0	0	3

Course Overview:

The construction management degree prepares you for a wide range of professional roles in the building and construction industry. This course is management-oriented and focuses on a broad range of interrelated disciplines including domestic, commercial and civil construction. You will be taught by a dedicated team of professionals with qualifications and experience in construction-related disciplines. Core subjects include construction technology, measurement and estimating, project management, contracts administration, building law and economics, and communication and computer skills.

Prerequisite(s): NIL

Course Outcomes:

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

CO1. **Improve** business and management skills in positions within the construction industry.

CO2. **Adapt** technical skills and knowledge in mathematics, science, construction, and technology in support of planning, analyzing, and solving construction problems.

CO3. **Utilize** industry resources including associations and organizations, professional publications, and governmental data to analyze, evaluate, and apply current trends within the industry.

CO4. **Make use of** decision-making in personal and professional endeavors.

CO5. **Design** a quality construction project from start to completion while maintaining budget, schedule, and safety requirements.

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)

B. Tech. ECE VI/VII/VIII Semester **VCE-R15**

CONSTRUCTING PLANNING AND MANAGEMENT
(Open Elective)

Course Code: A3179

L	T	P	C
3	0	0	3

SYLLABUS

UNIT – I **(10Lectures)**

Contract management, project estimation, types of estimation, contract document, classification, bidding, and procurement process.

UNIT-II **(10 Lectures)**

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

UNIT – III **(12Lectures)**

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

UNIT – IV **(12Lectures)**

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

UNIT – V **(10Lectures)**

Construction claims, dispute and dispute resolution, and, source of claim, claim management, arbitration, project closure , construction closure and contract closure.

TEXT BOOKS:

1. Punmia, Khandelwal (2006), *Project planning and control with PERT and CPM*, 3rd edition, Laxmi Publications, New Delhi, India.
2. Construction project management-theory and practice, Nirajjha, Pearson education,2010.

REFERENCE BOOKS:

1. L. S. Srinath (1975), *PERT and CPM*, 2nd Edition, Afflicted East West Press Pvt. Ltd, New Delhi, India.
2. U. K. Shrivastava (1999), Construction Planning and Management, Galgotia Publications Pvt. Ltd., New Delhi**,** Construction technology by subir k. Sarkar, subhajit saraswathi/oxford university press,2009

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)

B. Tech. ECE VI/VII/VIII Semester **VCE-R15**

ENTREPRENEURSHIP
(Open Elective)

Course Code: A3076

L	T	P	C
3	0	0	3

Course Overview:

The course makes the students to learn the roles, characteristics, qualities, and functions of entrepreneur. It enables the students to know various Institutional support for setting up a business enterprise. Students would also understand the role, importance and functions of women entrepreneur and women entrepreneur development.

Prerequisite(s): NIL

Course Outcomes:

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

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

CO2. Understand various Institutional support for setting up a business enterprise and apply this knowledge while approaching these institutions for financial support.

CO3. Understand role, importance and functions of women entrepreneur and use this knowledge to become future women entrepreneurs.

CO4. Understand the concept of Project Management and steps in Project development and apply this knowledge while taking future project assignments.

CO5. Understand training programs and different training institutions to impart training and apply this knowledge to train existing and future entrepreneurs.

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)

B. Tech. ECE VI/VII/VIII Semester **VCE-R15**

ENTREPRENEURSHIP
(Open Elective)

Course Code: A3076

L	T	P	C
3	0	0	3

SYLLABUS

UNIT - I

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

UNIT - II

INSTITUTIONAL SUPPORT: Role of Government: Role of IDBI, SIDBI, SIDO, NIESBUD, DIC, Entrepreneurship Development Institute, T-Hub (Telangana Hub).

UNIT - III

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

UNIT - IV

PROJECT MANAGEMENT: Concept of project and classification of project, Project life cycle-identification, Project formulation, Project report , Project evaluation- profitability appraisal, social cost benefit analysis, feasibility analysis, financial analysis and project financing, Project implementation, Project completion.

UNIT - V

ENTREPRENEUR TRAINING: Designing appropriate training programmes to inculcate Entrepreneurial Spirit, significance of entrepreneurial training, Feedback and Performance of Trainees, NSIC, Pradhan Mantri Kaushal Vikas Yojana (PMKVY), Telangana Academy for Skill and Knowledge (TASK).

TEXT BOOKS:

3. 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. ECE VI/VII/VIII Semester **VCE-R15**

HUMAN RESOURCE MANAGEMENT
(Open Elective)

Course Code: A3077

L	T	P	C
3	0	0	3

Course Overview:

The course makes the students to equip with basic concepts, function of HRM and Human Resource Planning. Students will be able to understand HR specific functions, importance of Industrial relations, Trade Union and Grievance redressal machinery.

Prerequisite(s): NIL

Course Outcomes:

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

CO1. **Identify** functions of Human Resource Management.

CO2. **Illustrate** the process of Recruitment and selection.

CO3. **Analyze** the needs and methods for training.

CO4. **Outline** the functional relationship with performance and compensation.

CO5. **Illustrate** the importance of Industrial relations through collective bargaining, trade unions and industrial settlement machinery.

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)

B. Tech. ECE VI/VII/VIII Semester **VCE-R15**

HUMAN RESOURCE MANAGEMENT
(Open Elective)

Course Code: A3077

L	T	P	C
3	0	0	3

SYLLABUS

UNIT-I

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

UNIT-II

JOB ANALYSIS AND RECRUITMENT: Job analysis- Job description, Job specification, Sources of Recruitment; Selection, process of selection and techniques, 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

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

TEXT BOOKS:

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

REFERENCE BOOKS:

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

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)

B. Tech. ECE VI/VII/VIII Semester **VCE-R15**

ORGANIZATION BEHAVIOR
(Open Elective)

Course Code: A3078

L	T	P	C
3	0	0	3

Course Overview:

The course makes the students to learn the concept organizational behaviour in its broadest multi – disciplinary context of Individual, group and organization. Insight on group behaviour and role of leadership theories related to behavioural perspectives would also be instilled in the students.

Prerequisite(s): NIL

Course Outcomes:

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

CO1. Understand approaches, opportunities and challenges of OB and use this knowledge to understand behaviour people in organizations.

CO2. Understand the importance of diversity in organizations as well as personality and perception of individual and use this knowledge for better understanding of human beings in organizations.

CO3. Understand the group behaviour and leadership styles exhibit by the managers and apply this knowledge to get the things done through subordinates efficiently and effectively.

CO4. Understand motivation theories and different Organization structures and apply this knowledge to create suitable organization structure for business as well as to get better work from employees.

CO5. Understand role of Conflict management, Stress management, Organization change and Self management and apply this knowledge for solving different problems of organizations.

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)

B. Tech. ECE VI/VII/VIII Semester **VCE-R15**

ORGANIZATION BEHAVIOR
(Open Elective)

Course Code: A3078

L	T	P	C
3	0	0	3

SYLLABUS

UNIT-I

INTRODUCTION TO ORGANIZATIONAL BEHAVIOR: Foundation of O.B - Conceptual Model for O.B. – Organization System in Global Environment – Importance of Interpersonal Skills - Challenges & Opportunities for O.B- Developing O.B. Model – Approaches to O.B.

UNIT-II

INDIVIDUAL BEHAVIOR: Diversity – Biographical Characteristics - Ability – Implementing Diversity Management – Strategies – Attitudes & Job Satisfaction.

PERSONALITY: Theories of Personality –Perception – Process of Perception – Perception & Individual Decision Making – Motivation from concepts to Applications.

UNIT-III

GROUP BEHAVIOR: Foundations of Group Behaviour – Defining and Classifying Groups – Stages of Group Development – Group Properties – Roles – Norms – Status, Size and Cohesiveness – Group Decision Making – Understanding Work Teams – Types of Teams – Creating Effective Teams.

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

UNIT-IV

MOTIVATION THEORIES: Maslow's Hierarchy of Needs, Two- factor theory of Motivation, Alderfer's ERG theory, McClelland's need based Motivational Model, Douglas McGregor Theories of X and Y.

FOUNDATION OF ORGANIZATIONAL STRUCTURE: Nature of organizing, organizational levels, span of control and types of span of control, factors determining span, organizational structure, departmentation and types of departmentation, making organizing effective.

UNIT-V

ORGANIZATIONAL CULTURE AND CLIMATE: Conflicts management - Organization Change - Stress Management – Self Management – Managing Careers.

TEXT BOOKS:

1. Stephen P. Robbins, Timothy (2012), *Organization Behaviour*,Ed. 14, Pearson Publications.
2. Mirza S Saiyadain (2011), *Organisation Behaviour*, TMH, New Delhi
3. Aryasri & VSP Rao (2009), *Management and Organisational Behaviour*, Excel Publications.

REFERENCE BOOKS:

1. Kavitha Singh (2009), *Organisational Behaviour*, Pearson Publictions
2. Aswathappa (2009), *Organisational Behaviour*,Himalaya Publictions
3. John M. Ivancevich (2009), *Organisational Behaviour & Management*, TMH, New Delhi
4. Koontz, Weihrich & Aryasri (2009), *Principles of Management*, TMH, New Delhi
5. Luthans, Fred (2009), *Organisational Behaviour*, 11/e, McGraw Hill, 2009.
6. Pierce and Gardner (2009), *Management and Organisational Behaviour: An Integrated Perspective*, Cengage
7. Deepak Kumar Bhattacharyya (2012), *Principles of Management-text and cases*, Pearson

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)

B. Tech. ECE VI/VII/VIII Semester **VCE-R15**

LOGISTICS AND SUPPLY CHAIN MANAGEMENT
(Open Elective)

Course Code: A3079

L	T	P	C
3	0	0	3

Course Overview:

The course enables the students to identify the concepts of Supply chain management functions, drivers and different types of Logistics management. It would make the students to know the importance of Supply chain customer service and bench mark practices.

Prerequisite(s): NIL

Course Outcomes:

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

CO1.Understand Supply chain management functions, drivers and different types of Logistics and apply the knowledge in business environment.

CO2.Understand the importance of Supply chain customer service and bench mark practices and apply them in business environment.

CO3. Understand role of Sourcing and Distribution in supply chain and apply the knowledge in decision making process of organization.

CO4. Understand the importance of Co-ordination in supply chain and role of Information Technology in supply chain and use the knowledge to run the organization successfully.

CO5.Understand Global logistics & Global supply chain processes and strategies and use this knowledge to understand Global supply chain and logistics environment.

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)

B. Tech. ECE VI/VII/VIII Semester **VCE-R15**

LOGISTICS AND SUPPLY CHAIN MANAGEMENT
(Open Elective)

Course Code: A3079

L	T	P	C
3	0	0	3

SYLLABUS

UNIT-I

INTRODUCTION: Supply Chain Management- Concept, Objectives, Scope and Functions of Supply Chain; Process view of a Supply Chain. Supply Chain Drivers - Facilities, Inventory, Transportation, Information, Sourcing, Pricing; Obstacles to Achieve Strategic fit, Logistics Management: Introduction, Difference between Logistics and Supply Chain; Inbound, Inter and Outbound Logistics; Integrated Logistics Management; 3PL, 4PL, Intermodal and Reverse Logistics.

UNIT-II

SUPPLY CHAIN CUSTOMER SERVICE - The Marketing and Logistics interface, Customer Service and Customer Retention, Service-Driven Logistics System, Setting customer Service Priorities and Service Standards.

BENCH MARKING: Objectives, Bench marking Cycle, Process and types, Setting Bench marking Priorities.

UNIT-III

SOURCING IN SUPPLY CHAIN: Role of Sourcing in Supply Chain Management, Supplier Scoring and Assessment; Supplier Selection and Controlling; The Procurement process, Sourcing Planning and Analysis; Global Sourcing.

NETWORK DESIGN IN SUPPLY CHAIN: The role of distribution in the Supply Chain Management, factors influencing distribution network design; Transportation Fundamentals: The role of Transportation in Supply Chain, Factors influencing Transportation Decisions, Modes of transportation, Transportation documentation.

UNIT-IV

COORDINATION IN SUPPLY CHAIN: Introduction, Lack of Supply Chain Coordination and the Bullwhip effect, Impact of Lack of Coordination, Obstacles to Coordination in Supply Chain, Managerial levers to achieve Coordination.

IT IN SUPPLY CHAIN: The role of IT in the Supply Chain, The Supply Chain IT framework; CRM, Internal SCM, SRM; The future of IT in Supply Chain, Supply Chain IT in Practice.

UNIT-V

GLOBAL LOGISTICS AND GLOBAL SUPPLY CHAIN: Logistics in Global Economy, Change in Global Logistics, Global Supply Chain business process; Global Strategy; Global Purchasing, Global SCM.

TEXT BOOKS:

1. K.Sridhara butt, "*Logistics and Supply Chain management",* Himalaya Publishers, New Delhi, 2009.

REFERENCE BOOKS:

1. Sunil Chopra and Peter Meindl, " *Supply Chain Management: Strategy, Planning & Operations",* Pearson Education, New Delhi, 2004.
2. Donald J Bowerfox and David J Closs, " *Logistics Management: The integrated Supply Chain Process",* TMH, 2003.
3. D.K.Agarwal, "Logistics and Supply Chain management*",* Mc millan Publishers, 2011
4. B.Rajasekhar, Acharyulu, "*Logistics and Supply Chain management",* Excel Books, New Delhi, 2009.

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)

B. Tech. ECE VI/VII/VIII Semester **VCE-R15**

NATIONAL SERVICE SCHEME (NSS)
(Open Elective)

Course Code: A3080

L	T	P	C
3	0	0	3

Course Overview:

National Service Scheme, under the Ministry of Youth Affairs & Sports Govt. of India, popularly known as NSS was launched in Gandhiji's Birth Centenary Year 1969, in 37 Universities involving 40,000 students with primary focus on the development of personality of students through community service. Today, NSS has more than 3.2 million student volunteers on its roll spread over 298 Universities and 42 (+2) Senior Secondary Councils and Directorate of Vocational Education all over the country. From its inception, more than 3.75 crores students from Universities, Colleges and Institutions of higher learning have benefited from the NSS activities, as student volunteers.

Prerequisite(s):NIL

Course Outcomes:

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

CO1. Contrast the different types of NSS activities and financial pattern of expenditure in Community service.

CO2. Enhance the concept of youth, as an agent in social change.

CO3. Classify and explain the working of an organizational functionaries of NSS.

CO4. Design a system, component or process to meet the desired needs applicable to society , with realistic constraints such as economic, safety, manufacturability and sustainability etc., by youth – adult partnership.

CO5. Recognize the need for, and an ability to engage in society with lifelong learning capabilities with the concepts of volunteerism and its functions.

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)

B. Tech. ECE VI/VII/VIII Semester **VCE-R15**

NATIONAL SERVICE SCHEME (NSS)
(Open Elective)

Course Code: A3080

L	T	P	C
3	0	0	3

SYLLABUS

Unit-01: INTRODUCTION AND BASIC CONCEPTS OF NSS

a) History, philosophy, aims & objectives of NSS

b) Emblem, flag, motto, song, badge etc.

c) Organizational structure, roles and responsibilities of various NSS functionaries

Unit-02: NSS PROGRAMMES AND ACTIVITIES

a) Concept of regular activities, special camping, Day Camps

b) Basis of adoption of village/slums, Methodology of conducting Survey

c) Financial pattern of the scheme

d) Other youth prog./schemes of GOI

e) Coordination with different agencies

f) Maintenance of the Diary

Unit-03: UNDERSTANDING YOUTH

a) Definition, profile of youth, categories of youth

b) Issues, challenges and opportunities for youth

c) Youth as an agent of social change

Unit-04: COMMUNITY MOBILISATION

a) Mapping of community stakeholders

b) Designing the message in the context of the problem and the culture of the community

c) Identifying methods of mobilization

d) Youth-adult partnership

Unit-05: VOLUNTTERISM AND SHRAMDAN

a) Indian Tradition of volunteerism

b) Needs & importance of volunteerism

c) Motivation and Constraints of Volunteerism

d) Shramdan as a part of volunteerism

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)

Undertaking by Students/Parents

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Signature of Student

Signature of Parent
Name & Address with Phone Number

-- OFFICE COPY --