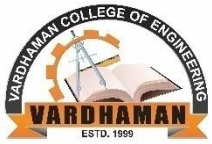

VARDHAMAN COLLEGE OF ENGINEERING

(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-R14)

CHOICE BASED CREDIT SYSTEM

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

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PRELIMINARY DEFINITIONS AND NOMENCLATURES

- "Autonomous Institution / College" means an institution / college designated as autonomous institute / college by University Grants Commission (UGC), as per the UGC Autonomous College Statutes.
- "Academic Autonomy" means freedom to a College in all aspects of conducting its academic programs, granted by the University for promoting excellence.
- "Commission" means University Grants Commission.
- "AICTE" means All India Council for Technical Education.
- "University" means Jawaharlal Nehru Technological University Hyderabad.
- "College" means Vardhaman College of Engineering, Hyderabad unless indicated otherwise by the context.
- "Program" means:
  - Bachelor of Technology (B. Tech.) Degree program
  - UG Degree Program: B. Tech.
- "Branch" means specialization in a program like B. Tech. Degree program in Civil Engineering, B. Tech. Degree program in 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, A2001: Linear Algebra and Ordinary Differential Equations, A2501: 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	**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

College Vision:

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

College Mission:

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

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

Department Vision:

The department of ECE will become a centre of world class excellence in Electronics and Communication Engineering. It will periodically refresh to reflect the cutting edge technologies of the industry in the global market. The vision of the department is to produce creative engineers those who can address the global challenges and excel at an International level.

Department Mission:

The mission of the department of ECE is to provide the students an environment of academic freedom that will insure the exchange of ideas and the dissemination of knowledge in this discipline through effective teaching. It infuses the scientific temper in the students towards the research in Electronics and Communication Engineering. It strives to establish incubation centres for research in Micro Electronics, Embedded Systems, Communications and Signal processing with an offer for consultancy services to industries.

Program Educational Objectives (PEOs)

PEO1. Students will be able to attain a solid foundation in Electronics and Communication Engineering fundamentals with an attitude to pursue continuing education

PEO2. Students will be able to function professionally in an increasingly international and rapidly changing world due to the advances in technologies and concepts and contribute to the needs of the society

PEO3. Students will be able to acquire and exercise excellent leadership qualities, at various levels appropriate to their experience which addresses issues in a responsive, ethical and innovative manner

PEO4. Students will be able to excel in their careers by being a part of success and growth of an organization with which they are associated

Program Outcomes:

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

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

1. APPLICABILITY

All the rules specified herein, approved by the Academic Council, will be in force and applicable to students admitted from the academic year 2014-2015 onwards. Any reference to "College" in these rules and regulations stands for Vardhaman College of Engineering.

2. EXTENT

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

3. ADMISSION

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

3.1.1. Eligibility:

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

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

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

3.1.2. Admission Procedure:

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

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

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

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

3.2.1. Eligibility:

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

3.2.2. Admission Procedure:

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

4. PROGRAMS OFFERED

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

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

5. MEDIUM OF INSTRUCTION

The medium of instruction and examinations for all courses is English.

6. DURATION OF THE PROGRAMS

6.1. Minimum Duration

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

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

6.2. Maximum Duration

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

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

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

7. SEMESTER STRUCTURE

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

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

Table 2: Academic Calendar

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

8. PROGRAM STRUCTURE

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

The Program of instruction consists of:

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

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

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

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

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

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

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

Table 3: Group of courses

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

9. CREDIT BASED SYSTEM

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

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

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

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

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

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

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

10. METHOD OF EVALUATION

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

10.1 THEORY COURSES

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

Table 4: Method of Evaluation

Mid Semester Test	20 Marks
Online Objective Test	05 Marks
End Semester Examination	75 Marks

10.1.1. MID SEMESTER TEST

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

10.1.2. ONLINE OBJECTIVE TEST

There will be one Online Objective Test in Theory Courses for a maximum of 05 marks to be answered in half an hour duration. The Online Objective Test will be held in the 18th week with the announced schedule in all the units of syllabus. In case a student does not appear in the Online Objective Test due to any reason whatsoever, will get zero marks(s).

10.1.3. END SEMESTER EXAMINATION

The end semester examination question paper in theory courses will be for a maximum of 75 marks to be answered in three hours duration. There shall be two questions of descriptive

type from each unit with internal choice. Each question carries 15 marks. Each theory course shall consist of five units of syllabus.

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

10.2 PRACTICAL

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

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

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

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

10.5 MINI PROJECT

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

10.6 TECHNICAL SEMINAR

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

10.7 COMPREHENSIVE VIVA

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

10.8 PROJECT WORK

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

expected to be completed by the end of VIII semester.

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

11. ATTENDANCE REQUIREMENTS TO APPEAR FOR THE END SEMESTER EXAMINATION

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

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

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

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

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

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

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

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

12. MISSING EXAMINATION

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

13. EVALUATION

Following procedure governs the evaluation.

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

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

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

14. PERSONAL VERIFICATION

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

15. SUPPLEMENTARY EXAMINATION

Supplementary examinations for the odd semester shall be conducted with the regular examinations of even semester and vice versa, for those who appeared and failed or absent in regular examinations. Such students

writing supplementary examinations may have to write more than one examination per day.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

17. TRANSITORYREGULATIONS

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

18. TRANSFER OF STUDENTS FROM OTHER COLLEGES/UNIVERSITIES

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

19. TRANSCRIPTS

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

20. AWARD OF DEGREE

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

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

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

- The candidate shall pursue a course of study for not less than four academic years and not more than eight academic years.
- The candidate shall register for 220 credits and secure at least 212 credits with compulsory subjects as listed in the Table below.

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

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

20.2. For lateral entry students (batches admitted from 2015–2016)

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

followingconditions:

- The candidate shall pursue a course of study for not less than three academic years and not more than six academic years.
- The candidate shall register for 168 credits and secure at least 160 credits with compulsory subjects as listed in the Table below.

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

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

20.3. Award of class

After a student has satisfied the requirement prescribed for the completion of the Program and is eligible for the award of B. Tech. Degree, he shall be placed in one of the following four classes shown in Table 5:

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

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

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

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

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

9.75	≥ 90 and < 95
10	≥ 95

21. ADDITIONAL ACADEMIC REGULATIONS

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

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

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

22. REGISTRATION

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

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

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

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

23. TERMINATION FROM THE PROGRAM

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

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

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

24. CURRICULUM

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

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

25. WITHHOLDING OF RESULTS

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

26. GRIEVANCES REDRESSAL COMMITTEE

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

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

The committee constituted shall submit a report to the principal of the college and the penalty to be imposed. The Principal upon receipt of the report from the committee shall, after giving an opportunity of being heard to the person complained against, submit the case with the committee's recommendation to the Governing

Body of the college. The Governing Body shall confirm with or without modification the penalty recommended after duly following the prescribed procedure.

27. MALPRACTICE PREVENTION COMMITTEE

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

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

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

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

28. AMENDMENTS TO REGULATIONS

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

29. STUDENTS' FEEDBACK

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

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

30. GRADUATION DAY

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

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

31. AWARD OF A RANK UNDER AUTONOMOUS SCHEME

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

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

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

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

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

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

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

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

32. CODE OF CONDUCT

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

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

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

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

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

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

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

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

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

33. OTHER ISSUES

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

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

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

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

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

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

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

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

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

34. GENERAL

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

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

MALPRACTICES RULES

DISCIPLINARY ACTION FOR / IMPROPER CONDUCT IN EXAMINATIONS

	Nature of Malpractices/Improper conduct	Punishment
	If the student:	
1. (a)	Possesses or keeps accessible in examination hall, any paper, note book, programmable calculators, Cell phones, pager, palm computers or any other form of material concerned with or related to the subject of the examination (theory or practical) in which he is appearing but has not made use of (material shall include any marks on the body of the student which can be used as an aid in the subject of the examination)	Expulsion from the examination hall and cancellation of the performance in that subject only.
(b)	Gives assistance or guidance or receives it from any other student orally or by any other body language methods or communicates through cell phones with any student or persons in or outside the exam hall in respect of any matter.	Expulsion from the examination hall and cancellation of the performance in that subject only of all the students involved. In case of an outsider, he will be handed over to the police and a case is registered against him.
2.	Has copied in the examination hall from any paper, book, programmable calculators, palm computers or any other form of material relevant to the subject of the examination (theory or practical) in which the student is appearing.	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the student has already appeared including practical examinations and project work and shall not be permitted to appear for the remaining examinations of the subjects of that Semester/year. The Hall Ticket of the student is to be cancelled and sent to the University.
3.	Impersonates any other student in connection with the examination.	The student who has impersonated shall be expelled from examination hall. The student is also debarred and forfeits the seat. The performance of the original student, who has been impersonated, shall be cancelled in all the subjects of the examination (including practicals and project work) already appeared and shall not be allowed to appear for examinations of the remaining subjects of that semester/year. The 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-R14)

B. TECH - ELECTRONICS AND COMMUNICATION ENGINEERING

REGULATIONS: VCE-R14

I SEMESTER									
Code	Subject	Category	Periods per Week			Credits	Scheme of Examination Maximum Marks		
			L	T	P		Internal	External	Total
A2001	Mathematics – I	BS	3	1	-	4	25	75	100
A2002	Engineering Physics	BS	4	-	-	4	25	75	100
A2003	Engineering Chemistry	BS	4	-	-	4	25	75	100
A2501	Computer Programming	BE	3	1	-	4	25	75	100
A2201	Basic Electrical Engineering	BE	3	1	-	4	25	75	100
A2008	Engineering Physics and Engineering Chemistry Lab	BS	-	-	3	2	25	50	75
A2502	Computer Programming Lab	BE	-	-	6	2	25	50	75
A2306	Computer Aided Engineering Drawing Lab	BE	-	-	3	2	25	50	75
TOTAL			17	03	12	26	200	525	725

II SEMESTER									
Code	Subject	Category	Periods per Week			Credits	Scheme of Examination Maximum Marks		
			L	T	P		Internal	External	Total
A2005	Technical English	HS	4	-	-	4	25	75	100
A2006	Mathematics – II	BS	3	1	-	4	25	75	100
A2007	Numerical Methods	BS	3	1	-	4	25	75	100
A2503	Data Structures through C	BE	4	-	-	4	25	75	100
A2401	Electronic Devices	BE	3	1	-	4	25	75	100
A2009	English Language Communication Skills Lab	HS	-	-	3	2	25	50	75
A2504	Data Structures through C Lab	BE	-	-	6	2	25	50	75
A2404	Electronic Devices Lab	BE	-	-	3	2	25	50	75
TOTAL			17	03	12	26	200	525	725

III SEMESTER									
Code	Subject	Category	Periods per Week			Credits	Scheme of Examination Maximum Marks		
			L	T	P		Internal	External	Total
A2010	Mathematics – III	BS	3	1	-	4	25	75	100
A2011	Environmental Science	HS	4	-	-	4	25	75	100
A2406	Digital Logic Design	CE	3	1	-	4	25	75	100
A2407	Signals and Systems	CE	3	1	-	4	25	75	100
A2408	Probability Theory and Stochastic Processes	CE	4	-	-	4	25	75	100
A2409	Electronic Circuit Analysis	CE	4	-	-	4	25	75	100
A2410	Simulation Lab	CE	-	-	3	2	25	50	75
A2411	Electronic Circuit Analysis Lab	CE	-	-	3	2	25	50	75
TOTAL			21	03	06	28	200	550	750

B. TECH - ELECTRONICS AND COMMUNICATION ENGINEERING

REGULATIONS: VCE-R14

IV SEMESTER

Code	Subject	Category	Periods per Week			Credits	Scheme of Examination Maximum Marks		
			L	T	P		Internal	External	Total
A2012	Managerial Economics and Financial Analysis	HS	4	-	-	4	25	75	100
A2510	Computer Organization and Architecture	CE	4	-	-	4	25	75	100
A2212	Principles of Electrical Engineering	CE	3	1	-	4	25	75	100
A2412	Pulse and Digital Circuits	CE	3	1	-	4	25	75	100
A2413	Electromagnetic Theory and Transmission Lines	CE	3	1	-	4	25	75	100
A2414	Analog Communications	CE	4	-	-	4	25	75	100
A2215	Electrical Engineering Lab	CE	-	-	3	2	25	50	75
A2416	Pulse and Digital Circuits Lab	CE	-	-	3	2	25	50	75
TOTAL			**21**	**03**	**06**	**28**	**200**	**550**	**750**

V SEMESTER

Code	Subject	Category	Periods per Week			Credits	Scheme of Examination Maximum Marks		
			L	T	P		Internal	External	Total
A2508	Object Oriented Programming through JAVA	CE	4	-	-	4	25	75	100
A2417	Digital Design through Verilog HDL	CE	4	-	-	4	25	75	100
A2418	Integrated Circuits Applications	CE	3	1	-	4	25	75	100
A2419	Microprocessors and Interfacing	CE	3	1	-	4	25	75	100
A2420	Digital Communications	CE	4	-	-	4	25	75	100
A2421	Antennas and Wave Propagation	CE	3	1	-	4	25	75	100
A2422	Integrated Circuits Applications Lab	CE	-	-	3	2	25	50	75
A2424	Microprocessors and Interfacing Lab	CE	-	-	3	2	25	50	75
TOTAL			**21**	**03**	**06**	**28**	**200**	**550**	**750**

VI SEMESTER

Code	Subject	Category	Periods per Week			Credits	Scheme of Examination Maximum Marks		
			L	T	P		Internal	External	Total
A2015	Professional Ethics and Intellectual Property Rights	HS	4	-	-	4	25	75	100
A2209	Control Systems	CE	3	1	-	4	25	75	100
A2425	Embedded Systems	CE	3	1	-	4	25	75	100
A2426	VLSI Design	CE	4	-	-	4	25	75	100
A2427	Digital Signal Processing	CE	3	1	-	4	25	75	100
INTERDEPARTMENTAL ELECTIVE - I		HS	4	-	-	4	25	75	100
A2428	Embedded Systems Lab	CE	-	-	3	2	25	50	75
A2429	Analog and Digital Communications Lab	CE	-	-	3	2	25	50	75
TOTAL			**21**	**03**	**06**	**28**	**200**	**550**	**750**

B. TECH - ELECTRONICS AND COMMUNICATION ENGINEERING

REGULATIONS: VCE-R14

VII SEMESTER

Code	Subject	Category	Periods per Week			Credits	Scheme of Examination Maximum Marks		
			L	T	P		Internal	External	Total
A2602	Computer Networks	CE	4	-	-	4	25	75	100
A2430	Electronic Measurements and Instrumentation	CE	3	1	-	4	25	75	100
A2431	Microwave Engineering	CE	3	1	-	4	25	75	100
A2432	Cellular and Mobile Communications	CE	4	-	-	4	25	75	100
INTERDEPARTMENTAL ELECTIVE - II		IE	4	-	-	4	25	75	100
PROFESSIONAL ELECTIVE - I		PE	3	1	-	4	25	75	100
A2439	VLSI Lab	CE	-	-	3	2	25	50	75
A2440	Digital Signal Processing Lab	CE	-	-	3	2	25	50	75
A2441	Mini Project	MP	-	-	-	2	-	50	50
TOTAL			**21**	**03**	**06**	**30**	**200**	**600**	**800**

VIII SEMESTER

Code	Subject	Category	Periods per Week			Credits	Scheme of Examination Maximum Marks		
			L	T	P		Internal	External	Total
A2442	Satellite and Radar Communications	CE	3	1	-	4	25	75	100
PROFESSIONAL ELECTIVE - II		PE	3	1	-	4	25	75	100
PROFESSIONAL ELECTIVE - III		PE	3	1	-	4	25	75	100
A2455	Advanced Communications and Virtual Instrumentation Lab	CE	-	-	6	2	25	50	75
A2456	Technical Seminar	TS	-	-	6	2	50	-	50
A2457	Comprehensive Viva	CV	-	-	-	2	-	75	75
A2458	Project Work	PW	-	-	12	8	50	150	200
TOTAL			**09**	**03**	**24**	**26**	**200**	**500**	**700**

B. TECH - ELECTRONICS AND COMMUNICATION ENGINEERING

REGULATIONS: VCE-R14

ELECTIVES	
INTERDEPARTMENTAL ELECTIVE - I	
Code	**Subject**
A2013	Management Science
A2016	Human Resource Management
A2017	Entrepreneurship
A2018	Business Communication
A2019	Project Planning and Management
A2020	Organizational Behaviour
INTERDEPARTMENTAL ELECTIVE – II	
A2506	Operating Systems
A2514	Data Base Management Systems
A2607	Network Security and Cryptography
A2333	Operations Research
A2351	Robotics
A2244	Energy Management
PROFESSIONAL ELECTIVE - I	
A2433	CPLD and FPGA Architectures and Applications
A2434	Telecommunication Switching Systems
A2435	Digital Image Processing
A2436	RF Circuit Design
A2437	Optical Communications
A2438	Real Time Operating Systems
PROFESSIONAL ELECTIVE - II	
A2443	Low Power VLSI Design
A2444	Wireless Communications and Networks
A2445	DSP Processors and Architectures
A2446	Software Defined Radio
A2341	Nanotechnology
A2447	Artificial Neural Networks and Fuzzy Logic
PROFESSIONAL ELECTIVE - III	
A2449	Design of Fault Tolerant Systems
A2450	High Speed Networks
A2451	Speech Signal Processing
A2452	Mobile Computing Technologies
A2453	Optical Networks
A2454	Biomedical Instrumentation

SYLLABI FOR
I SEMESTER

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)

B. Tech. ECE I Semester **VCE-R14**

MATHEMATICS – I

Course Code: **A2001**

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-R14**

MATHEMATICS – I

Course Code: **A2001**

L	T	P	C
4	0	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-R14**

ENGINEERING PHYSICS

Course Code: A2002

L	T	P	C
4	0	0	4

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
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B. Tech. ECE I Semester **VCE-R14**

ENGINEERING PHYSICS

Course Code: A2002

L	T	P	C
4	0	0	4

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., 'Engineering Physics', New Age International, 2007.
2. Arumugam, M, 'Engineering Physics', Anuradha Publishers, 2005.

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-R14**

ENGINEERING CHEMISTRY

Course Code: A2003

L	T	P	C
4	0	0	4

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 protectthem from corrosion.

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

CO3. Compare different methods of softening of hard water.

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

CO5. Compare and contrast the chemical behaviour, properties and applications ofengineeringsubstances.

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)

B. Tech. ECE I Semester **VCE-R14**

ENGINEERING CHEMISTRY

Course Code: A2003

L	T	P	C
4	0	0	4

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-R14**

COMPUTER PROGRAMMING

Course Code: A2501

L	T	P	C
3	1	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
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B. Tech. ECE I Semester **VCE-R14**

COMPUTER PROGRAMMING

Course Code: A2501

L	T	P	C
3	1	0	4

SYLLABUS

UNIT – I **(15 Lectures)**

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

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

OPERATORS AND EXPRESSIONS: Arithmetic, Relational and Logical Operators, Assignment Operators**,** 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-R14**

BASIC ELECTRICAL ENGINEERING

Course Code: A2201

L	T	P	C
3	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-R14**

BASIC ELECTRICAL ENGINEERING

Course Code: A2201

L	T	P	C
3	1	0	4

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-R14**

ENGINEERING PHYSICS AND ENGINEERING CHEMISTRY LAB

Course Code: A2008

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 different instrumental methods for the estimation of strengths of solutions and hardness of water.

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

VARDHAMAN COLLEGE OF ENGINEERING
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B. Tech. ECE I Semester **VCE-R14**

ENGINEERING PHYSICS AND ENGINEERING CHEMISTRY LAB

Course Code: A2008

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
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B. Tech. ECE I Semester **VCE-R14**

COMPUTER PROGRAMMING THROUGH C LAB

Course Code: A2502

L	T	P	C
0	0	3	2

Course Overview:

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

Prerequisite(s):NIL

Course Outcomes:

Upon successful completion of this course, 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-R14**

COMPUTER PROGRAMMING THROUGH C LAB

Course Code: A2502

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-R14**

COMPUTER AIDED ENGINEERING DRAWING LAB

Course Code: A2306

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-R14**

COMPUTER AIDED ENGINEERING DRAWING LAB

Course Code: A2306

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-R14**

TECHNICAL ENGLISH

Course Code: A2005

L	T	P	C
4	0	0	4

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-R14**

TECHNICAL ENGLISH

Course Code: A2005

L	T	P	C
4	0	0	4

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

Vocabulary **:** Word formation with Prefixes and Suffixes- Synonyms and Antonyms-Collocations- One word substitutes

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

UNIT - III **(8 Lectures)**

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

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

Grammar **:** Tenses, Question Tags

Vocabulary **:** Technical Vocabulary, Word formation with Prefixes and Suffixes- Synonyms and 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-R14**

MATHEMATICS - II

Course Code: A2006

L	T	P	C
3	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 (A2001)

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-R14**

MATHEMATICS - II

Course Code: A2006

L	T	P	C
3	1	0	4

SYLLABUS

UNIT – I **(11 Lectures)**

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

UNIT – II **(12 Lectures)**

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

UNIT – III **(10 Lectures)**

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

UNIT – IV **(10 Lectures)**

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

UNIT – V **(13 Lectures)**

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

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

TEXT BOOKS:

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

REFERENCE BOOKS:

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

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)

B. Tech. ECE II Semester **VCE-R14**

NUMERICAL METHODS

Course Code: A2007

L	T	P	C
3	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 Algebraic, Transcendental Equations and System of Linear Equations, Interpolation, Numerical Differentiation, Integration, Curve fitting, Numerical solutions of initial value problems in Ordinary differential equations of first order and Solutions of Partial differential equations.

Prerequisite(s):NIL

Course Outcomes:

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

CO1. Develop appropriate Numerical methods to approximate a function.

CO2. Compute interpolating polynomials, derivatives ,integrals for a given function from a given data

CO3. Make use of Numerical differentiation and integration in solving problems of engineering.

CO4. Apply appropriate method to find numerical solution of a differential equation.

CO5. Employ techniques to solve partial differential equations with appropriate boundary conditions

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)

B. Tech. ECE II Semester **VCE-R14**

NUMERICAL METHODS

Course Code: A2007

L	T	P	C
3	1	0	4

SYLLABUS

UNIT- I

ALGEBRAIC AND TRANSCENDENTAL EQUATIONS AND SOLUTIONS OF LINEAR EQUATIONS: Bisection method - Regula-falsi method - Iteration method - Newton-Raphson method. Iterative methods of solutionof system of equations: Jacobi's iteration method – Gauss-Seidel iteration method.

UNIT- II

FINITE DIFFERENCES AND INTERPOLATION: Finite differences: Forward, Backward and Central differences – Otherdifference operators and relations between them - Differences of a polynomial – Missing terms - Newton'sinterpolation formulae – Central difference interpolation formulae: Gauss's forward and backward interpolation formulae and Stirling's formula – Interpolation with unequal intervals: Lagrange's interpolation formula.

UNIT-III

NUMERICAL DIFFERENTIATION & INTEGRATION AND CURVE FITTING: Numerical differentiation: Derivatives usingNewton's interpolation formulae, Stirling's formula. 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 theform $y = ae^{bx}$, $y = ax^{b}$, $y = abx$ by the method of least squares.

UNIT-IV

NUMERICAL SOLUTION OF ORDINARY DIFFERENTIAL EQUATIONS OF FIRST ORDER: Taylor's series method – Picard'smethod - Euler's - modified Euler's Method - Runge-Kutta method of fourth order - Predictor and Corrector methods:Milne's method Adams-Bashforth method- Solution of two point boundary value problem (Shooting Method)

UNIT-V

NUMERICAL SOLUTION OF PARTIAL DIFFERENTIAL EQUATIONS: Classification of second order partial differentialequations – finite difference approximations to derivatives - Elliptic equations: Solution of Laplace equation byLiebmann's iteration process - Parabola equations: Solution of one dimensional heat equation by Schmidt explicit method and Crank-Nicolson implicit method.

TEXT BOOKS:

1. S S Sastry (2005), *Introductory Methods of Numerical Analysis*, Fourth Edition, New Delhi, PHI LearningPvt.Ltd.
2. M K Jain and S R K Iyengar (2007), *Numerical Methods for Scientific and Engineering Computation*, 5th Edition, New Age International Publishers, New Delhi.

REFERENCE BOOKS:

1. B S Grewal (2012), *Higher Engineering Mathematics*, 42nd Edition, Khanna Publishers, New Delhi.
2. T K V Iyengar, B Krishna Gandhi & Others (2013), *Numerical Methods*, Second Revised Edition, NewDelhi, S.Chand & Co. Ltd.

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)

B. Tech. ECE II Semester **VCE-R14**

DATA STRUCTURES THROUGH C

Course Code: A2503

L	T	P	C
4	0	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 (A2503)

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 non-linear data structures.

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)

B. Tech. ECE II Semester **VCE-R14**

DATA STRUCTURES THROUGH C

Course Code: A2503

L	T	P	C
4	0	0	4

SYLLABUS

UNIT - I

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

UNIT - II

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

UNIT - III

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

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

UNIT - IV

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

UNIT - V

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

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

TEXT BOOKS:

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

REFERENCE BOOKS:

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

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)

B. Tech. ECE II Semester **VCE-R14**

ELECTRONIC DEVICES

Course Code: A2401

L	T	P	C
3	1	0	4

Course Overview:

This course covers fundamental topics of electronic devices and their behaviour. 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, special devices, BJTs, JFETs and MOSFETs), and build-up to the construction of electronic circuits like rectifiers with and without filters, biasing circuits, and voltage regulator. 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 (A2003)
- Basic Electrical Engineering(A2201)

Course Outcomes:

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

CO1. Classify semiconductors and analyze the conduction behavior of semiconductors.

CO2. Analyze the physical behavior of diodes and transistors.

CO3. Compare various rectifiers, filters, transistors and biasing circuits.

CO4. Apply various stabilization and compensation techniques to obtain stable operating point of transistor.

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)

B. Tech. ECE II Semester **VCE-R14**

ELECTRONIC DEVICES

Course Code: A2401

L	T	P	C
3	1	0	4

SYLLABUS

UNIT – I

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

UNIT – II

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

UNIT – III

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

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

UNIT – IV

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

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

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

UNIT – V

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

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

TEXT BOOKS:

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

REFERENCE BOOKS:

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

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)

B. Tech. ECE II Semester **VCE-R14**

ENGLISH LANGUAGE COMMUNICATION SKILLS LAB

Course Code: A2009

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
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B. Tech. ECE II Semester **VCE-R14**

ENGLISH LANGUAGE COMMUNICATION SKILLS LAB

Course Code: A2009

L	T	P	C
0	0	3	2

LIST OF EXPERIMENTS

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

SYLLABUS:

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

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

SUGGESTED SOFTWARE:

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

REFERENCE BOOKS:

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

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)

B. Tech. ECE II Semester **VCE-R14**

DATA STRUCTURES THROUGH C LAB

Course Code: A2504

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-R14**

DATA STRUCTURES THROUGH C LAB

Course Code: A2504

L	T	P	C
0	0	3	2

LIST OF EXPERIMENTS

Week- 1: (Recursion function)

a) Write recursive program which computes the nth Fibonacci number, for appropriate values of n.
b) Write recursive program to find xy, where y can be either negative or positive.
c) Write recursive program to calculate the sum of the individual digits of N digit number.

Week-2: (Recursion function)

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

Week-3: (Searching Technique)

a) Write C programs that use both recursive and non-recursive functions to perform the searching operations for a key value in a given list of integers by using linear search technique.
b) Write C programs that use both recursive and non-recursive functions to perform the searching operations for a key value in a given list of integers by using binary search technique.
c) A person has registered for voter id, he received a voter number and he need to check whether it exist in the voter or not. Use a binary searching in a recursive way to find whether the voter number exist in the list or not.
d) Use linear search technique to search for a key value in a given list of characters and print the message found or not.

Week-4: (Sorting Technique)

a) Write C programs that implement Bubble sort, to sort a given list of integers in ascending order
b) Write C programs that implement Quick sort, to sort a given list of integers in ascending order.
c) A class contains 50 students who acquired marks in 10 subjects write a program to display top 10 students roll numbers and marks in sorted order by using bubble sorting technique

Week-5: (Sorting Technique)

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

Week- 6: (Stack)

a) Write C programs to implement Stack operations using linked list.
b) Write C programs to implement Stack operations using array.
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-7: (Stack)

a) Write a C program that uses Stack operations to convert infix expression into postfix expression.
b) Write a C program that uses Stack operations for evaluating the postfix expression.

Week-8: (Queue)

a) Write C programs to implement Queue operations using linked list.
b) Write C programs to implement Queue operations using array.

Week- 9: (Linked list)

a) Write a C program that uses functions to perform the following operations on single linked list.
(i) Creation (ii) insertion (iii) deletion (iv) traversal
b) Write a C program to reverse elements of a single linked list.

Week-10: (Linked list)

a) Write a C program to perform adding two large integers which are represented in linked list fashion.
b) Write a C program to store a polynomial expression in memory using linked list

Week-11: (Linked list)

a) Write a C program that uses functions to perform the following operations on double linked list.
(i) Creation (ii) insertion (iii) deletion (iv) traversal in both ways.
b) Write a C program to representation the given sparse matrix using linked list

Week-12: (Trees)

a) Write a C program to create a Binary Tree of integers
b) Write a recursive C program, for traversing a binary tree in preorder, in-order and post-order
c) Write a C program to search the given node is available or not in the binary tree by using in-order traversal

Week-13: (Additional Programs)

a) Use linear search technique to search for a key value in a given list of characters and print the message found or not
b) 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.
c) Write C programs that implement heap sort, to sort a given list of integers in ascending order
d) Write a C program that uses functions to perform the following operations on Circular linked list.
(i) Creation (ii) insertion (iii) deletion (iv) traversal in both ways
e) Write a non recursive C program, for traversing a binary tree in preorder, in-order and post-order.

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 (2005), Data Structures: A Pseudo code approach with C, 2nd Edition, Thomson, India.

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)

B. Tech. ECE II Semester **VCE-R14**

ELECTRONIC DEVICES LAB

Course Code: A2404

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 multi-meter. 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.

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.

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B. Tech. ECE II Semester **VCE-R14**

ELECTRONIC DEVICES LAB

Course Code: A2404

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
4. Soldering Practice.

PART - B:

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

SYLLABI FOR
III SEMESTER

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)

B. Tech. ECE III Semester **VCE-R14**

MATHEMATICS – III

Course Code: A2010

L	T	P	C
3	1	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-R14**

MATHEMATICS – III

Course Code: A2010

L	T	P	C
3	1	0	4

SYLLABUS

UNIT - I

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

UNIT - II

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

UNIT - III

ELEMENTARY FUNCTIONS: Exponential, circular, hyperbolic and logarithmic functions of a complex variable -General and principal value of a logarithmic function CONFORMAL MAPPING: Geometrical interpretation of w = f (z). Some standard transformations: Translation, rotation, inversion and Bilinear transformation. Fixed points, properties and invariance of cross ratio under bilinear transformation. Determination of bilinear transformation mapping three given points. Conformal transformation, special conformal transformations: z^2, $z+\frac{1}{z}$, e^z, $\sin z$, $\cos z$, $\sinh z$, $\cosh z$

UNIT - IV

COMPLEX INTEGRATION: Line integral, evaluation of Line Integral along a path and by indefinite integration, Cauchy'sintegral 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, singularpoints and poles of an analytic function.

UNIT - V

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

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 HillPublishing 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
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B. Tech. ECE III Semester **VCE-R14**

ENVIRONMENTAL SCIENCE

Course Code: A2011

L	T	P	C
4	0	0	4

Course Overview:

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

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 theknowledge ofEnvironmental ethicsto 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-R14**

ENVIRONMENTAL SCIENCE

Course Code: A2011

L	T	P	C
4	0	0	4

SYLLABUS

UNIT – I

ENVIRONMENTAL SCIENCE INTRODUCTION AND NATURAL RESOURCES

INTRODUCTION: Multidisciplinary nature of Environmental Studies: Definition, Scope and Importance.Need forPublic 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 effectson 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 modernagriculture, fertilizer-pesticide problems, water logging, salinity.

ENERGY RESOURCES: Growing energy needs, renewable and non-renewable energy sources, use of alternate energysources, Case studies.

LAND RESOURCES: Land as a resource, land degradation, man induced landslides, soil erosion and desertification.Role of an individual in conservation of natural resources.

UNIT- II

ECOSYSTEM AND BIODIVERSITY

ECOSYSTEMS: Concept of an ecosystem. Structure and function of an ecosystem. Producers, consumers anddecomposers. 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-sports of biodiversity. Threats to biodiversity- habitat loss, poaching of wildlife, man-wildlife conflicts. Endangered and endemic species of India. Conservation of biodiversity- In-situ and Ex-situ conservation of biodiversity.

UNIT - III

ENVIRONMENTAL POLLUTION, GLOBAL ENVIRONMENTAL ISSUES AND CONTROL MEASURES

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

SOLID WASTE MANAGEMENT: Causes, effects and control measures of urban and industrial wastes. Role of an individual in prevention of pollution. Pollution case studies.

DISASTER MANAGEMENT: Floods, earthquake, cyclone and landslides. E-waste and plastic waste-recycling and reuse.

WATER CONSERVATION: Rain water harvesting, watershed management. Resettlement and rehabilitation of people;its problems and concerns. Case Studies. Climate change, global warming, acid rain, ozone layer depletion, nuclearaccidents and holocaust. Case Studies.

UNIT- IV
GREEN ENVIRONMENTAL ISSUES

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

UNIT – V
ENVIRONMENTAL ETHICS, ENVIRONMENTAL IMPACT ASSESMENT & ROLE OF NGOs

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

ENVIRONMENTAL IMPACT ASSESSMENT: Conceptual facts of EIA, Baseline date acquisition, planning andmanagement 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 ageinternational.
2. Anji Reddy .M (2007), *Textbook of Environmental Sciences and Technology*, Hyderabad, BS Publications.

VARDHAMAN COLLEGE OF ENGINEERING
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B. Tech. ECE III Semester **VCE-R14**

DIGITAL LOGIC DESIGN

Course Code: A2406

L	T	P	C
3	1	0	4

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 such as 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
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B. Tech. ECE III Semester **VCE-R14**

DIGITAL LOGIC DESIGN

Course Code: A2406

L	T	P	C
3	1	0	4

SYLLABUS

UNIT - I

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

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

UNIT - II

GATE LEVELMINIMIZATION: The k-map method, four-variable map, five-variable map, sum of products and productof sums simplification, don't-care conditions, NAND and NOR implementation, AND-OR-INVERT, OR-AND-INVERTimplementations, exclusive - OR function, the tabulation (Quine - Mccluskey) technique, determination and selection of Prime Implicants.

UNIT - III

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

SEQUENTIAL LOGIC: Classification of sequential circuits (Synchronous, Asynchronous, Pulse mode, Level mode with examples) latches, flip-flops, analysis of clocked sequential circuits, State reduction and assignment, design procedure.

UNIT - IV

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

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

UNIT - V

FINITE STATE MACHINE (FSM): Finite state machine-capabilities and limitations, Mealy and Moore modelsminimization of completely specified sequential machines, Partition techniques, incompletely specified sequentialmachines using merger table.

ALGORITHMIC STATE MACHINE (ASM): Salient features of the ASM chart-Simple examples-System design using data path and control subsystems-control implementations-examples of Weighing machine and Binary multiplier.

TEXT BOOKS:

1. M. Morris Mano, Michael D. Ciletti (2008), *Digital Design*, 4th Edition, Pearson Education Inc, India.
2. Charles H. Roth (2004), *Fundamentals of Logic Design*, 5th Edition, Thomson, India.

REFERENCE BOOKS:

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

VARDHAMAN COLLEGE OF ENGINEERING
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B. Tech. ECE III Semester **VCE-R14**

SIGNALS AND SYSTEMS

Course Code: A2407

L	T	P	C
3	1	0	4

Course Overview:

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

Prerequisite(s):

- Mathematics – I (A2001)
- Mathematics – II (A2006)

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
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B. Tech. ECE III Semester **VCE-R14**

SIGNALS AND SYSTEMS

Course Code: A2407

L	T	P	C
3	1	0	4

SYLLABUS

UNIT - I

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

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

UNIT - II

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

UNIT - III

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

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

UNIT - IV

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

UNIT - V

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

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

TEXT BOOKS:

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

REFERENCE BOOKS:

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

VARDHAMAN COLLEGE OF ENGINEERING
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B. Tech. ECE III Semester **VCE-R14**

PROBABILITY THEORY AND STOCHASTIC PROCESSES

Course Code: A2408

L	T	P	C
4	0	0	4

Course Overview:

This course provides a foundation in the theory and applications of probability and stochastic processes and an understanding of 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 and 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 randomvariable 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-R14**

PROBABILITY THEORY AND STOCHASTIC PROCESSES

Course Code: A2408

L	T	P	C
4	0	0	4

SYLLABUS

UNIT – I

PROBABILITY THEORY: Probability introduced through sets and relative frequency, axioms of probability, jointprobability, conditional probability and total probability, Baye's theorem, Bernoulli's trials.

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

UNIT – II

OPERATIONS ON SINGLE RANDOM VARIABLE: Expectation, moments, variance and skew, Chebyshev's inequality,Markov's inequality, characteristic function, moment generating function.

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

UNIT – III

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

TRANSFORMATION OF RANDOM VARIABLES: Transformations of single random variable (monotonic and non-monotonic)and multiple random variables, linear transformations of Gaussian randomvariables.

UNIT – IV

RANDOM PROCESS - TEMPORAL CHARACTERISTICS: Random process concept, classification of random processes,distribution and density functions, concept of stationary and statistical independence. first-order stationaryprocesses, second- order and wide-sense stationary, Nth-Order and strict-sense stationarity, time averages andergodicity, mean-ergodic processes, correlation-ergodic processes, autocorrelation function and its properties, crosscorrelationfunction and its properties, covariance functions.

UNIT – V

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

NOISE: Types of noise, Resistive noise, Shot noise, extra terrestrial noise, arbitrary noise sources, white noise, narrowband noise: In-phase and quadrature phase components and its properties, Modelling of noise sources, average noisebandwidth, 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-R14**

ELECTRONIC CIRCUIT ANALYSIS

Course Code: A2409

L	T	P	C
4	0	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):

- Electronic Devices (A2401)

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 theperformance 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
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B. Tech. ECE III Semester **VCE-R14**

ELECTRONIC CIRCUIT ANALYSIS

Course Code: A2409

L	T	P	C
4	0	0	4

SYLLABUS

UNIT - I

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 Emitterhybrid model, Millers theorem and its dual, analysis of CE amplifier with un-bypassed RE, frequency response ofamplifier.

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

UNIT - II

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

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

UNIT - III

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

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

UNIT - IV

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 pulland complementary symmetry configurations, thermal stability, heat sink.

UNIT - V

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

TEXT BOOKS:

1. Jacob Milliman, Christos C. Halkias, Chetan D. Parikh (2011), *Integrated Electronics-Analog and DigitalCircuits and Systems,* 2nd edition, Tata McGraw Hill Education Private Limited, New Delhi.

a. G. K. Mithall (1998), *Electronic Devices and Circuits*, Khanna Publishers, New Delhi.

REFERENCE BOOKS:

2. Robert L. Boylestad, Louis Nashelsky (2006), *Electronic Devices and Circuits Theory*, 9th edition, Pearson/Prentice Hall, India.
3. Jacob Millman, Arvin Grabel (2003), *Microelectronics*, 2nd edition, Tata McGraw Hill, New Delhi.

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)

B. Tech. ECE III Semester **VCE-R14**

SIMULATION LAB

Course Code: A2410

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. Understand 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 digital logic circuits and verilog conversions between different number systems using LabVIEW software.
CO5. Analyze the functionality of Combinational circuits and Sequential Circuits using LabVIEW.

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)

B. Tech. ECE III Semester **VCE-R14**

SIMULATION LAB

Course Code: A2410

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. b. Relational
    c. c. Logical
    d. 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-R14**

ELECTRONIC CIRCUIT ANALYSIS LAB

Course Code: A2411

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-R14**

ELECTRONIC CIRCUIT ANALYSIS LAB

Course Code: A2411

L	T	P	C
0	0	3	2

LIST OF EXPERIMENTS

PART - A

DESIGN AND SIMULATION USING MULTISIM

1. Common Emitter Amplifier.
2. Voltage Series Feedback Amplifier.
3. Current Shunt Feedback Amplifier.
4. Two Stage RC Coupled Amplifier.
5. Cascade Amplifier.
6. Darlington Pair Configuration.
7. Class A Power Amplifier (Transformer less).
8. Class B Complementary Symmetry Push Pull Amplifier.

PART - B

TESTING IN THE HARDWARE LABORATORY:

a) Any Three circuits simulated in Simulation laboratory

b) Any Three of the following

1. Common Source Amplifier.
2. Hartley Oscillator.
3. Colpitt's Oscillator.
4. Class A Power Amplifier (with Transformer Load)
5. Class B Power Amplifier.
6. Single Tuned Voltage Amplifier..
7. RC Phase Shift Oscillator.
8. Wien Bridge Oscillator.

SYLLABI FOR

IV SEMESTER

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)

B. Tech. ECE IV Semester **VCE-R14**

MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS

Course Code: A2012

L	T	P	C
4	0	0	4

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-R14**

MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS

Course Code: A2012

L	T	P	C
4	0	0	4

SYLLABUS

UNIT - I

INTRODUCTION TO MANAGERIAL ECONOMICS: Definition, nature and scope managerial economics. Demandanalysis - demand determinants, law of demand and its exceptions.

ELASTICITY OF DEMAND: Definition, types, measurement and significance of elasticity of demand. Demandforecasting, factors governing demand forecasting, methods of demand forecasting (survey methods, statisticalmethods, expert opinion method, test marketing, controlled experiments, judgmental approach to demandforecasting).

UNIT - II

THEORY OF PRODUCTION AND COST ANALYSIS: Production function - isoquants and isocosts, MRTS, least costcombination of inputs, production function, laws of returns, internal and external economies of scale.

COST ANALYSIS: Cost concepts, opportunity cost, fixed vs. variable costs, explicit costs vs. implicit costs, out of pocketcosts vs. imputed costs. Break Even Analysis (BEA), termination of breakeven point (simple problems), managerialsignificance and limitations of BEA.

UNIT - III

INTRODUCTION TO MARKETS AND PRICING STRATEGIES: Market structures - types of competition, features ofperfect competition, monopoly and monopolistic competition. Price-output determination in case of perfectcompetition and monopoly. Pricing strategies.

UNIT - IV

BUSINESS AND NEW ECONOMIC ENVIRONMENT: Characteristic features of business, features and evaluation of soleproprietorship, partnership, joint stock company, public enterprises and their types, changing business environmentin post-liberalization scenario.

CAPITAL AND CAPITAL BUDGETING: Capital and its significance, types of capital, estimation of fixed and workingcapital requirements, methods and sources of raising finance. Nature and scope of capital budgeting, features ofcapital budgeting proposals, methods of capital budgeting: payback method, Accounting Rate of Return (ARR) and netpresent value method (simple problems).

UNIT - V

INTRODUCTION TO FINANCIAL ACCOUNTING: Double entry book keeping, journal, ledger, trial balance-finalaccounts (trading account, profit and loss account and balance sheet with simple adjustments).

FINANCIAL ANALYSIS THROUGH RATIOS: Computation, analysis and interpretation of liquidity ratios (current ratioand quick ratio), activity ratios (inventory turnover ratio and debtor turnover ratio), capital structure ratios (debtequityratio, interest coverage ratio), and profitability ratios (gross profit ratio, net profit ratio, operating ratio, P/ERatio and EPS).

TEXT BOOKS:

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

REFERENCE BOOKS:

1. Ambrish Gupta (2004), *Financial Accounting for Management,* Pearson Education, New Delhi.
2. Domnick Salvatore (2003), *Managerial Economics in a Global Economy,* 4th edition, Thomson Publications, India.
3. Narayanaswamy (2005), *Financial Accounting - A Managerial Perspective,* Prentice Hall of India, India.

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)

B. Tech. ECE IV Semester **VCE-R14**

COMPUTER ARCHITECTURE AND ORGANIZATION

Course Code: A2510

L	T	P	C
4	0	0	4

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
(AUTONOMOUS)

B. Tech. ECE IV Semester **VCE-R14**

COMPUTER ARCHITECTURE AND ORGANIZATION

Course Code: A2510

L	T	P	C
4	0	0	4

SYLLABUS

Unit – I

STRUCTURE OF COMPUTERS: Computer Functional units, Von-Neumann architecture, Bus structures, BasicOperational Concepts, Software, Performance, Data representation (Fixed and Floating point), Error detecting codes.

REGISTER TRANSFER AND MICRO-OPERATIONS: Register transfer language, Register transfer, Bus and memorytransfers, Arithmetic micro-operations, Logic micro-operations, Shift micro-operations, and Arithmetic logic shiftunit.

UNIT - II

BASIC COMPUTER ORGANIZATION AND DESIGN: Instruction codes, Computer registers, Computer instructions,Instruction cycle, Timing and Control, Memory-reference instructions, Register-reference instructions, Input-Outputand interrupt. Central Processing Unit: Stack organization, Instruction formats, Addressing modes, Data transfer andmanipulation, Program Control, Reduced Instruction Set Computer (RISC).

UNIT - III

MICRO-PROGRAMMED CONTROL: Control memory, Address sequencing, Micro-Program Example, design of controlunit.

COMPUTER ARITHMETIC: Addition and Subtraction, Multiplication and Division algorithms, Floating-point arithmeticoperation, Decimal arithmetic unit, Decimal arithmetic operations.

UNIT - IV

THE MEMORY SYSTEM: Basic concepts, Semiconductor RAM types of Read Only Memory (ROM), Cache memory,Performance considerations, Direct Memory Access (DMA).Parallel Processing, Pipelining, Arithmetic Pipeline, Instruction Pipeline, RISC Pipeline Vector Processing, ArrayProcessors

UNIT - V

MULTIPROCESSORS: Characteristics of multiprocessors, Interconnection structures, Inter processor arbitration, Interprocessor communication and Synchronization, Cache coherence, Shared memory multiprocessors.

TEXT BOOKS:

1. M. Moris Mano (2006), *Computer Organization and Architecture,* 3rd edition, Pearson/PHI, Indai.
2. Caarl Hamacher, Zvonks Vrnesic, SafeaZaky (2002), *Computer Organization*, 5th edition, McGraw Hill, NewDelhi, India.

REFERENCE BOOKS:

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

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)

B. Tech. ECE IV Semester **VCE-R14**

PRINCIPLES OF ELECTRICAL ENGINEERING

Course Code: A2212

L	T	P	C
3	1	0	4

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 (A2201)

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-R14**

PRINCIPLES OF ELECTRICAL ENGINEERING

Course Code: A2212

L	T	P	C
3	1	0	4

SYLLABUS

UNIT - I

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

UNIT - II

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 and Laplace transform method.

UNIT - III

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, speedcontrol of DC shunt motor, flux and armature voltage control methods.

UNIT - IV

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

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.

SINGLE PHASE MOTORS: Principle of operation, Shaded pole motors, Capacitor motors, stepper motors characteristics.

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-R14**

PULSE AND DIGITAL CIRCUITS

Course Code: A2412

L	T	P	C
3	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 (A2401)
- Mathematics – II (A2006)

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 multivibrator, 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-R14**

PULSE AND DIGITAL CIRCUITS

Course Code: A2412

L	T	P	C
3	1	0	4

SYLLABUS

UNIT - I

LINEAR WAVE SHAPING: High pass, low pass RC circuits, their response for sinusoidal, step, pulse, square, ramp andexponential inputs, high pass RC circuit as differentiator and low pass RC circuit as integrator, attenuators, RL and RLCcircuits and their response for step input, ringing circuit.

UNIT - II

STEADY STATE SWITCHING CHARACTERISTICS OF DEVICES: Diode as a switch, diode switching times, temperaturevariation of saturation parameters, design of transistor as a switch, transistor-switching times, transistor in saturation.

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

UNIT - III

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

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

UNIT - IV

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

UNIT - V

SAMPLING GATES: Basic operating principles of sampling gates, Unidirectional diode gate, Bi-directional samplinggates using transistors, Reduction of pedestal in gate circuit, four diode sampling gate, an alternate form of four diodegate, 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 BOOK:

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-R14**

ELECTROMAGNETIC THEORY AND TRANSMISSION LINES

Course Code: A2413

L	T	P	C
3	1	0	4

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 (2010)

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-R14**

ELECTROMAGNETIC THEORY AND TRANSMISSION LINES

Course Code: A2413

L	T	P	C
4	1	0	4

SYLLABUS

UNIT - I

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 densityand illustrative problems. Convection and conduction currents, Continuity equation, relaxation time, poisons andLaplace equations, Capacitance – Parallel plate, coaxial, spherical capacitors, Illustrative problems.

UNIT - II

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

UNIT - III

TIME VARYING FIELDS & MAXWELLS EQUATIONS: Faradays law, Inconsistency of Amperes law and displacementcurrent 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

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

UNIT - V

TRANSMISSION LINES: Transmission line types, parameters, equations, Infinite line concepts, distortion, condition fordistortion less, lossless and minimum attenuation, loadings, Input impedance relations of open and short circuitedtransmission lines, reflection coefficient and VSWR, Smith chart configuration and applications, Single stub anddouble 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 ofIndia, 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-R14**

ANALOG COMMUNICATIONS

Course Code: A2414

L	T	P	C
4	1	0	4

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(A2407)
- Probability Theory and Stochastic Processes (A2408)

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.

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)

B. Tech. ECE IV Semester **VCE-R14**

ANALOG COMMUNICATIONS

Course Code: A3001

L	T	P	C
4	1	0	4

SYLLABUS

UNIT - I

AM MODULATION: Introduction to communication system, need for modulation, Amplitude modulation- timedomain 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.

DSBSC MODULATION: Time domain and frequency domain description, balanced modulator, Ring modulator,Coherent detection of DSBSC modulated waves, Coastas loop.

UNIT - II

SSB MODULATION: SSB modulation frequency domain description, frequency discrimination method for generationof AM SSB modulated wave, time domain description, phase discrimination method for generating SSB, Demodulationof SSB waves.

VESTIGIAL SIDEBAND MODULATION: Frequency description, Generation of VSB modulated wave, Time domaindescription, Envelope detection of VSB wave plus carrier, Comparison of AM techniques, Applications of different AMsystems, Frequency division multiplexing**.**

UNIT - III

BASIC CONCEPTS OF FREQUENCY MODULATION: Single tone frequency modulation, Spectrum analysis of sinusoidalFM wave, Narrow band FM, Wideband FM, Constant Average Power, Transmission Bandwidth of FM Wave-Comparison of FM&AM.

GENERATION AND DETECTION OF FM WAVES: Generation of FM :direct method- Parametric variation method,Varactor Diode, Indirect Method- Armstrong Method, detection of FM waves: Balanced Frequency Discriminator, Zerocrossing Detector, Phase locked loop, Foster Seeley Discriminator, Ratio detector.

UNIT - IV

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

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

UNIT - V

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, Imagefrequency, Choice of IF, AGC, FM Receiver, Amplitude limiting, Comparison with AM Receiver.

TEXT BOOKS:

1. Simon Haykin (1994), *Communication Systems*, 2nd edition, Wiley Eastern, India.
2. Taub and schilling (2011), *Principles of Communication Systems*, Tata McGraw Hill, India.

REFERENCE BOOKS:

1. Kennedy (2005), Davis, *Electronic Communication Systems*, 4th Edition, Tata McGraw Hill, New Delhi.
2. B. P. Lathi (1998), *Modern Digital and Analog Communication Systems*, 3rd edition, BPB Publication, NewDelhi.
3. R. P. Singh, S. D. Sapre (2009), *Communication Systems*, 2nd edition, Tata McGraw Hill, New Delhi.

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)

B. Tech. ECE IV Semester **VCE-R14**

ELECTRICAL ENGINEERING LAB

Course Code: A2215

L	T	P	C
0	0	3	2

Course Overview:

This lab deals with experiments related to electrical circuits and electrical machines. Different network theorems are vertified practically and different two port network parameters are calculated. Different tests are performed on different electrical machines to analyze their performance.

Prerequisite(s):NIL

Course Outcomes:

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

CO1. Verify network theorems practically by conducting suitable experiment.

CO2. Verify basics of electrical circuits like KCL, KVL and series and parallel resonant circuits.

CO3. Calculate different two port network parameters for circuits.

CO4. Analyze the performance of different electrical machines by conducting suitable tests.

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)

B. Tech. ECE IV Semester **VCE-R14**

ELECTRICAL ENGINEERING LAB

Course Code: A2215

L	T	P	C
0	0	3	2

LIST OF EXPERIMENTS

PART - A: ELECTRICAL CIRCUITS

1. Verifications of KVL and KCL for series and parallel networks
2. Draw the frequency response of R-L-C Series and Parallel Resonance and estimate the Band-width and Resonant frequency
3. Determination of Z and Y Parameters for T and Π networks.
4. Determination of ABCD and h-Parameters for T and Π networks.
5. Verification of Thevenins and Norton's theorems.
6. Verification of Maximum Power Transfer theorem.
7. Verification of Super Position and Reciprocity theorems.

PART - B: ELECTRICAL MACHINES

1. Open circuit characteristics of D.C Shunt Generator and determine the Critical Field Resistance (Rc).
2. Brake test on D.C Shunt motor and draw the characteristics.
3. Predetermination of efficiency of given D.C Shunt machine working as Generator and Motor (Swinburne's Test).
4. Speed control of DC shunt Motor.
5. Open circuit and Short Circuit tests on Single Phase Transformer and determination of efficiency and regulation at given power factors and draw the equivalent circuit.
6. Load test on single phase Transformer.
7. Break test on three phase induction motors.

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)

B. Tech. ECE IV Semester **VCE-R14**

PULSE AND DIGITAL CIRCUITS LAB

Course Code: A2416

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

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 multivibrators 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
(AUTONOMOUS)

B. Tech. ECE IV Semester **VCE-R14**

PULSE AND DIGITAL CIRCUITS LAB

Course Code: A2416

L	T	P	C
0	0	3	2

LIST OF EXPERIMENTS

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. Study of Flip-Flops & some applications.

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. Study of Logic Gates & Some applications.

SYLLABI FOR
V SEMESTER

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)

B. Tech. ECE V Semester **VCE-R14**

OBJECT ORIENTED PROGRAMMING THROUGH JAVA

Course Code: A2508

L	T	P	C
4	0	0	4

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 suitableto 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 GUIapplications. 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):

- Computer Programming (A2501)

Course Outcomes:

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

CO1. Analyze the necessity for Object Oriented Programming paradigm over structured programming and become familiar with the fundamental concepts in OOP like encapsulation, Inheritance and Polymorphism.

CO2. Demonstrate an ability to design high speed, fault tolerant applications using multi threading and exception handling concepts.

CO3. Excel in contemporary Java based integrated development environments to develop rich GUI applications

CO4. Develop confidence for self-education and ability for life-long learning needed for advanced java technologies.

CO5. Prepare for competitive examinations like GATE, Engineering services, recruitment interviews etc.

VARDHAMAN COLLEGE OF ENGINEERING
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B. Tech. ECE V Semester **VCE-R14**

OBJECT ORIENTED PROGRAMMING THROUGH JAVA

Course Code: A2508

L	T	P	C
4	0	0	4

SYLLABUS

UNIT – I **(14 Lectures)**

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

JAVA BASICS: History of Java, Java buzzwords, JVM architecture, data types, variables, scope and life time of variables, operators, control statements, type conversion and casting, arrays, classes and objects, nested and inner class, simple java program, constructors, methods, the abstract method, finalize method, method overloading, garbage collection, String and String Buffer handling functions, format function, Math, Wrapper, Random Classes.

UNIT – II **(12 Lectures)**

INHERITANCE AND POLYMORPHISM: Relationship between objects, forms of inheritance- specialization, specification, construction, extension, limitation, combination, benefits of inheritance, costs of inheritance, member access rules, usage of this and super key word, method overriding, abstract classes, dynamic method dispatch, usage of final keyword, static import.

PACKAGES AND INTERFACES: Defining, Creating and Accessing a Package, Understanding CLASSPATH, importing packages, defining an interface, implementing interface, variables in interface and extending interfaces.

I / O STREAMS: Concepts of streams, stream classes- byte and character stream, reading console input and writing console output, File: introduction to file, File operations, Random Access File.Exploring packages – java.io, java.util.

UNIT – III **(13 Lectures)**

EXCEPTION HANDLING: Exception handling fundamentals, exception types, uncaught exceptions, usage of try, catch, throw, throws and finally keywords, built-in exceptions, creating own exception sub classes.**MULTI THREADING:**Concepts of thread, thread life cycle, creating threads using thread class and runnable interface, synchronization, thread priorities, inter thread communication.

UNIT – IV **(10 Lectures)**

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

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

UNIT – V **(10 Lectures)**

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

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

TEXT BOOK:

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

REFERENCE BOOKS:

1. T. Budd (2009), An Introduction to Object Oriented Programming, 3rd edition, Pearson Education,India.
2. J. Nino, F. A. Hosch (2002), An Introduction to programming and OO design using Java, John Wiley & sons, New Jersey.
3. Y. Daniel Liang (2010), Introduction to Java programming, 7th edition, Pearson education, India.

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)

B. Tech. ECE V Semester **VCE-R14**

DIGITAL DESIGN THROUGH VERILOG HDL

Course Code: A2417

L	T	P	C
4	0	0	4

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.

Pre-requisites:

- Computer Programming (A2501)
- Digital Logic Design (A2406)

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-R14**

DIGITAL DESIGN THROUGH VERILOG HDL

Course Code: A2417

L	T	P	C
4	0	0	4

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 and Contention Resolution, Verilog Design Examples Using Gate Level Modelling.

UNIT – III **(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 BehaviouralModelling.

UNIT – IV **(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 – 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. Samir Palnitkar (2013), Verilog HDL – A Guide to Digital Design and Synthesis, 2nd Edition, Pearson Education, New Delhi, India
2. T. R. Padmanabhan, B. Bala Tripura Sundari (2004), *Design through Verilog HDL*, Wiley & Sons Education, IEEE Press, USA.
3. J. Bhaskar (2003)*, A Verilog Primier,* 2nd edition*,* BS Publications, India.

REFERENCE BOOKS:

1. Stephen. Brown, Zvonko Vranesic (2005), *Fundamentals of Logic Design with Verilog,* Tata McGraw Hill, India.
2. Michael D. Ciletti (2005), *Advanced Digital Design with Verilog HDL*, Prentice Hall of India, New Delhi.

VARDHAMAN COLLEGE OF ENGINEERING
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B. Tech. ECE V Semester **VCE-R14**

INTEGRATED CIRCUITS APPLICATIONS

Course Code: A2418

L	T	P	C
3	1	0	4

Course Overview:

Integrated Circuit design can be divided into broad categories of digital and analog IC design. The physical world is inherently analog indicating that there is always need for analog circuitry. Today the growth of any industry is dependent upon electronics to a great extent. Integrated circuit is electronics and this course acquaints the students with general analog principles and design methodologies using practical devices and applications. It focuses on process of learning about signal condition, signal generation, instrumentation, timing and control using various IC circuitry. With modern digitization advantages we need to work with digital data and hence digital to analog and analog to digital converters are needed in connecting physical world to the more sophisticated digital world. This course focuses on analysis and design ADC and DAC circuits.

Prerequisite(s):

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

Course Outcomes:

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
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B. Tech. ECE V Semester **VCE-R14**

INTEGRATED CIRCUITS APPLICATIONS

Course Code: A2418

L	T	P	C
3	1	0	4

SYLLABUS

UNIT - I **(10 Lectures)**

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

UNIT - II **(14 Lectures)**

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

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

UNIT - III **(10 Lectures)**

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

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

UNIT - IV **(12 Lectures)**

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

UNIT - V **(10 Lectures)**

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

TEXT BOOKS:

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

REFERENCE BOOKS:

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

VARDHAMAN COLLEGE OF ENGINEERING
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B. Tech. ECE V Semester **VCE-R14**

MICROPROCESSORS AND INTERFACING

Course Code: A2419

L	T	P	C
3	1	0	4

Course Overview:

This course provides a comprehensive introduction to microprocessors, microcontrollers (8051) and their architectures with an emphasis on its interfacing with external devices. Focus is on 8086 microprocessor family which includes internal architecture, pin diagram, instruction set, register organization, addressing modes, operating modes, interrupt structure, assembly language programming 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 (A2406)
- Computer Organization and Architecture (A2510)

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-R14**

MICROPROCESSORS AND INTERFACING

Course Code: A2419

L	T	P	C
3	1	0	4

SYLLABUS

UNIT - I **(10 Lectures)**

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

UNIT - II **(12 Lectures)**

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

UNIT - III **(12 Lectures)**

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

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

UNIT - IV **(12 Lectures)**

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

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

UNIT – V **(10 Lectures)**

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

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

Text Books:

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

Reference Books:

1. Walter A. Triebel, Avtar Singh (2003), *The 8088 and 8086 Microprocessors* 4th Edition, Prentice Hall of India, New Delhi.
2. K. Ray, K M Bhurchandi (2006), Advanced Microprocessors and Peripherals, 2nd Edition, Tata McGraw Hill, New Delhi.
3. Deshmukh (2004), *Microcontrollers*, Tata McGraw Hill Edition, New Delhi.

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)

B. Tech. ECE V Semester **VCE-R14**

DIGITAL COMMUNICATIONS

Course Code: A2420

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 (A2407)
- Probability Theory and Stochastic Processes (A2408)
- Analog Communications (A2414)

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-R14**

DIGITAL COMMUNICATIONS

Course Code: A2420

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, band-width-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.
3. R.P.Singh and S.D.Sapre, Communication Systems, second edition, Tata McGraw Hill Publishing Company Limited, New Delhi

REFERENCE BOOKS:

1. Hwei P. HSU (2006), Schaums outlines of Analog and Digital Communications, 2nd 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. Herbert Taub, Donald L. Schilling (1986), *Principles of Communication Systems*, 2nd edition, Tata McGraw Hill Publishing Company Limited, New Delhi.
4. Amitabha Bhattacharya (2006), *Digital Communication*, Tata McGraw Hill Publishing Company Limited, New Delhi.

VARDHAMAN COLLEGE OF ENGINEERING
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B. Tech. ECE V Semester **VCE-R14**

ANTENNAS AND WAVE PROPAGATION

Course Code: A2421

L	T	P	C
3	1	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 (A2413).

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
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B. Tech. ECE V Semester **VCE-R14**

ANTENNAS AND WAVE PROPAGATION

Course Code: A2421

L	T	P	C
3	1	0	4

SYLLABUS

UNIT - I **(20 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 **(15 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 **(7 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 **(8 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.

UNIT - V **(7 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 (2003), Antennas for All Applications, 3rd edition, Tata McGraw Hill,New Delhi, India.
2. K. D. Prasad, SatyaPrakashan (2001), Antennas and Wave Propagation, Tech India Publications, New Delhi.

REFERENCE BOOKS:

1. C. A. Balanis (2001), Antenna Theory, 2nd Edition, John Wiley & Sons, India.
2. E. C. Jordan, K. G. Balmain (2000), Electromagnetic Waves and Radiating Systems, 2nd edition, PHI.
3. F. E. Terman (1955), Electronic and Radio Engineering, 4thedition, Tata McGraw Hill, New Delhi.

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)

B. Tech. ECE V Semester **VCE-R14**

INTEGRATED CIRCUITS APPLICATIONS LAB

Course Code: A2422

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 (A2406)
- Electronic Circuit Analysis Lab (A2411)
- Pulse and Digital Circuits Lab (A2416)

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
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B. Tech. ECE V Semester **VCE-R14**

INTEGRATED CIRCUITS APPLICATIONS LAB

Course Code: A2422

L	T	P	C
0	0	3	2

LIST OF EXPERIMENTS

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

Prepare Verilog Design Modules demonstrating the use of following Verilog HDL Constructs 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-R14**

MICROPROCESSORS AND INTERFACING LAB

Course Code: A2424

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):NIL

- Digital Logic Design (A2406)
- Computer Organization and Architecture (A2510)
- Microprocessors and Interfacing (A2419)

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

CO5. software components for few input and output devices.

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B. Tech. ECE V Semester **VCE-R14**

MICROPROCESSORS AND INTERFACING LAB

Course Code: A2424

L	T	P	C
0	0	3	2

LIST OF EXPERIMENTS

PART - A
MICROPROCESSOR 8086 PROGRAMMING USING MASM:

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

PART – B
INTERFACING 8086 TO OTHER PERIPHERAL USING TRAINER KITS:

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

REFERENCE BOOKS / MATERIALS:

1. Douglas V.Hall, Microprocessors Interface, 2nd Edition, 2007, TMH.
2. Liu and GA Gibson (1988), Micro Computer System 8066/8088 Family Architecture, programming and Design, 2nd Edition, PHI, India.
3. Walter A.Triebel, Avtar Singh (2003), the 8088 and 8086 Microprocessors 4th Edition, PHI, India.

SYLLABI FOR
VI SEMESTER

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)

B. Tech. ECE VI Semester **VCE-R14**

PROFESSIONAL ETHICS AND INTELLECTUAL PROPERTY RIGHTS

Course Code: A2015

L	T	P	C
4	0	0	4

Course Overview:

The study of ethical decisions confronting individuals and organizations in engineering and science related questions about moral conduct, character, ideals, and relationships of people and organizations involved in technical development are discussed. Ethics codes for engineers, computer scientists, and natural scientists are covered. Course also includes topics antitrust, misappropriation, espionage, electronic communication privacy, computer fraud and abuse, reverse engineering, ownership and enforcement of patents and trademarks.

Course Outcomes:

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

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

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

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

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

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

VARDHAMAN COLLEGE OF ENGINEERING
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B. Tech. ECE VI Semester **VCE-R14**

PROFESSIONAL ETHICS AND INTELLECTUAL PROPERTY RIGHTS

Course Code: A2015

L	T	P	C
4	0	0	4

SYLLABUS

UNIT-I **(10 Lectures)**

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

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

UNIT–II **(10 Lectures)**

ENGINEERINGASSOCIALEXPERIMENTATION: Engineeringasexperimentation,engineersasresponsibleexperimenters,codesofethics, abalanced outlook onlaw,thechallengercase study.

UNIT-III **(14 Lectures)**

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

UNIT-IV **(10 Lectures)**

INTRODUCTIONTOINTELLECTUALPROPERTY:Introduction,types of intellectualproperty, internationalorganizations,agenciesandtreaties,importanceofintellectualpropertyrights.

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

UNIT - V **(10 Lectures)**

LAWOFCOPYRIGHTS:Fundamentalsofcopyrightlaw,originalityofmaterial,rightsofreproduction,rightstoperform the work publicly, copy rightownership issues,copy rightregistration, notice of copy right.

LAWOFPATENTS:Foundationofpatentlaw,patentsearchingprocess,ownershiprightsandtransfer.

NEWDEVELOPMENTSIN INTELLECTUAL PROPERTY: Trademarklaw;Copyrightlaw and Patentlaw, Tradesecretslaw, Intellectualproperty audits.

TEXTBOOKS:

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

REFERENCEBOOKS:

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

VARDHAMAN COLLEGE OF ENGINEERING
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B. Tech. ECE VI Semester **VCE-R14**

CONTROL SYSTEMS

Course Code: A2209

L	T	P	C
3	1	0	4

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 (A2001)
- Basic Electrical Engineering (A2201)

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 VI Semester **VCE-R14**

CONTROL SYSTEMS

Course Code: A2209

L	T	P	C
3	1	0	4

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 VI Semester **VCE-R14**

EMBEDDED SYSTEMS

Course Code: A2425

L	T	P	C
3	1	0	4

Course Overview:

An embedded system is a computer system designed for specific control functions within a larger system, often with real-time computing constraints. It is embedded as part of a complete device often including hardware and mechanical parts. By contrast, a general-purpose computer, such as a personal computer (PC), it 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):

- Computer Programming (A2501)
- Digital Logic Design (A2406)
- Computer Organization and Architecture (A2510)

Course Outcomes:

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

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

CO2. Apply and implement software systems to provide an interface between hardware peripheral sensors and systems.

CO3. Summarize the applications, benefits, and limitations of networked embedded systems for environmental science, health, and safety, industrial, and consumer usage objectives.

CO4. Determine the both promote systematic methods as well as reinforcing core knowledge. This also includes Midterm and Final project presentations.

CO5. Decide a subsystem and integrate this with a complete system to perform a complex task involving networked, mobile, embedded systems.

VARDHAMAN COLLEGE OF ENGINEERING
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B. Tech. ECE VI Semester **VCE-R14**

EMBEDDED SYSTEMS

Course Code: A2425

L	T	P	C
3	1	0	4

SYLLABUS

UNIT - I **(11 Lectures)**

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

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 **(11 Lectures)**

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

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

UNIT - IV **(11 Lectures)**

INTRODUCTION TO ADVANCED ARCHITECTURES:ARM and SHARC, processor and memory organization and instruction level parallelism; networked embedded systems: bus protocols, I2C bus and CAN bus; internet-enabled systems, design example elevator controller.

UNIT - V **(11 Lectures)**

MULTIPROCESSORS: Introduction, Why Multiprocessors? , CPUs and Accelerators, Multiprocessor Performance Analysis, Consumer Electronics Architecture, Cell Phones, Audio Players, Digital Still Cameras, Video Accelerator.

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.

REFERENCE BOOKS:

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

OTHER RELATED REFERENCE BOOKS / MATERIALS:

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

VARDHAMAN COLLEGE OF ENGINEERING
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B. Tech. ECE VI Semester **VCE-R14**

VLSI DESIGN

Course Code: A2426

L	T	P	C
4	0	0	4

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 (A2401)
- Digital Logic Design (A2406)
- Digital Design Through Verilog HDL (A2417)

Course Outcomes:

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

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

CO2. Identify the various IC fabrication methods.

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

CO4. Design different types if CMOS logic structures.

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

VARDHAMAN COLLEGE OF ENGINEERING
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B. Tech. ECE VI Semester **VCE-R14**

VLSI DESIGN

Course Code: A2426

L	T	P	C
4	0	0	4

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, the differential inverter, the Tristate inverter, Bipolar devices.

UNIT - II **(10 Lectures)**

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

UNIT - III **(14 Lectures)**

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

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

UNIT - IV **(12 Lectures)**

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

UNIT - V **(14 Lectures)**

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

TEXT BOOKS:

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

Reference Books:

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

VARDHAMAN COLLEGE OF ENGINEERING
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B. Tech. ECE VI Semester **VCE-R14**

DIGITAL SIGNAL PROCESSING

Course Code: A2427

L	T	P	C
3	1	0	4

Course Overview:

his 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 & Systems (A2407)
- Mathematics.

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 anti symmetric 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
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B. Tech. ECE VI Semester **VCE-R14**

DIGITAL SIGNAL PROCESSING

Course Code: A2427

L	T	P	C
3	1	0	4

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 anti symmetric 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 VI Semester **VCE-R14**

MANAGEMENT SCIENCE
(INTERDEPARTMENTAL ELECTIVE – I)

Course Code: A2013

L	T	P	C
4	0	0	4

Course Overview:

In this course, students will learn the fundamental concepts and contributions of Management. This course also explains Inventory control techniques, Human Resource Practices, Quality control techniques and Project Management which plays a vital role in the organization.

Course Outcomes:

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

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

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

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

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

CO5. Plan and control projects through network analysis techniques.

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)

B. Tech. ECE VI Semester **VCE-R14**

MANAGEMENT SCIENCE
(INTERDEPARTMENTAL ELECTIVE – I)

Course Code: A2013

L	T	P	C
4	0	0	4

SYLLABUS

UNIT I **(12 Lectures)**

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, Depart mentation and Decentralization - Organisation structures (Line organization, Line and staff organization, Functional organization, Committee organization, Matrix organization)

UNIT II **(12 Lectures)**

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 **(12 Lectures)**

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 **(12 Lectures)**

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 **(15 Lectures)**

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 Stoner, Freeman, Gilbert, Management, 6th edition Pearson education, New Delhi, 2004
2. O.P. Khana, Industrial engineering and Management L.S.Srinath, PERT & CPM .

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)

B. Tech. ECE VI Semester **VCE-R14**

HUMAN RESOURCE MANAGEMENT
(INTERDEPARTMENTAL ELECTIVE – I)

Course Code: A2016

L	T	P	C
4	0	0	4

Course Overview:

This course provides a modern introduction to logic design and the basic building blocks used in digital systems, in particular digital computers. It starts with a discussion of information representation and number systems, Boolean algebra, logic gates and minimization techniques. The second part of the course deals with combinational and sequential logic, where in the procedures to analyze and design the same will be discussed. State machines will then be discussed and illustrated through case studies of complex systems. The course has an accompanying lab that integrates hands-on experience with 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

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. Analysis the needs and methods for training

CO4. Outline the functional relationship with performance and compensation.

CO5. Illustrates the importance of Industrial relations through collective bargaining, trade unions and industrial settlement machinery.

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)

B. Tech. ECE VI Semester **VCE-R14**

HUMAN RESOURCE MANAGEMENT
(INTERDEPARTMENTAL ELECTIVE – I)

Course Code: A2016

L	T	P	C
4	0	0	4

SYLLABUS

UNIT - I **(15 Lectures)**

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

UNIT – II **(12 Lectures)**

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

UNIT - III **(13 Lectures)**

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

UNIT - IV **(12 Lectures)**

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

UNIT - V **(13 Lectures)**

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

TEXT BOOKS:

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

REFERENCE BOOKS:

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

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)

B. Tech. ECE VI Semester **VCE-R14**

ENTREPRENEURSHIP
(INTERDEPARTMENTAL ELECTIVE – I)

Course Code: A2017

L	T	P	C
4	0	0	4

Course Overview:

Entrepreneurship is generally believed to refer to the development of new ideas and opportunities within large or established businesses, directly leading to the improvement of organizational profitability and an enhancement of competitive position or the strategic renewal of an existing business. In addition to its focus on innovation, there also exists an equal drive toward venturing. These two work in union as the company undertakes innovations across the entire organizational spectrum, from product and process to technology and administration.

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. Interpret various Institutional support for setting up a business enterprise and apply this knowledge while approaching these institutions for financial support.

CO3. Illustrate role, importance and functions of women entrepreneur and use this knowledge to become future women entrepreneurs

CO4. Infer the concept of Project Management and steps in Project development and analyse while taking future project assignments.

CO5. Indicate 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 Semester **VCE-R14**

ENTREPRENEURSHIP
(INTERDEPARTMENTAL ELECTIVE – I)

Course Code: A2017

L	T	P	C
4	0	0	4

SYLLABUS

UNIT - I **(15 Lectures)**

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

UNIT - II **(12 Lectures)**

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

UNIT - III **(10 Lectures)**

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 **(13 Lectures)**

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

UNIT - V **(10 Lectures)**

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

TEXT BOOKS:

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

REFERENCE BOOKS:

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

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)

B. Tech. ECE VI Semester **VCE-R14**

BUSINESS COMMUNICATION
(INTERDEPARTMENTAL ELECTIVE – I

Course Code: A2018

L	T	P	C
4	0	0	4

Course Overview:

The basic idea behind offering Business Communication as an Elective for the third year at the undergraduate is to equip students with a language held by advance consent to be the most popular language and predictably the most used in countries across the globe. Business English will help students to activate and extend their knowledge of English and gain the necessary confidence and skills to use it for their personal and professional purposes. It encourages learners to think about language creativity. Further, there are opportunities for individual, pair and group work and encourage learning lifelong. This course includes a wide range of activities and approaches designed to appeal to different personal learning styles. Besides, the course has in mind the task of preparing students to fulfil advance functions with language that come their way during the course of study, such as being able to compose email effectively, prepare technical papers, abstracts, write effective business, formal and job application letters, publish articles, write memos and technical reports, etc.

Course Outcomes:

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

CO1. Apply business communication strategies and principles to prepare effective communication for domestic and international business situations

CO2. Participate in team activities that lead to the development of collaborative work skills

CO3. Select appropriate organizational formats and channels used in developing and presenting business messages

CO4. Communicate via electronic mail, Internet, and other technologies

CO5. Deliver an effective oral business presentation

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)

B. Tech. ECE VI Semester **VCE-R14**

BUSINESS COMMUNICATION
(INTERDEPARTMENTAL ELECTIVE – I

Course Code: A2018

L	T	P	C
4	0	0	4

SYLLABUS

UNIT –I

Introduction to Business English- Scope and Objectives
Grammar: Tenses, Active and Passive Voice
Vocabulary: Vocabulary through Mnemonics
Writing: Paragraph Writing- SPELT Method

UNIT –II

Business Correspondence –Writing
Grammar: Concord (Subject verb Agreement)
Vocabulary: Synonyms and Antonyms
Writing: Letter Writing: Types of letters, Styles of letters, Parts of letters, Letter of Sales and reply, Letter of Complaint, Order and Reply.

UNIT –III

Business Correspondence –Making Presentations
Verbal and Non-verbal Communication
Business Role-plays, Advertising, Negotiation Skills, Dialogue and Speech Writing
Grammar: Prepositions
Vocabulary: One word Substitutes
Writing: Emails Writing – structure and elements
Memo Writing –structure and elements

UNIT-IV

Business Correspondence- Resume and Interview
Grammar: Correction of Sentences and Sentence Patterns
Vocabulary: Words often confused/misspelled and Idioms and Phrasal verbs
Writing: Writing Technical Articles

UNIT-V

Reading Comprehension and Essay Writing
Grammar: Simple, Compound and Complex
Vocabulary: Business Vocabulary
Writing: Report Writing –Types of reports, importance of Reports, Styles of Reports, Structure of Reports
Project Writing – Research Proposal, Structure and Elements

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)

B. Tech. ECE VI Semester **VCE-R14**

PROJECT PLANNING AND MANAGEMENT
(INTERDEPARTMENTAL ELECTIVE – I)

Course Code: A2019

L	T	P	C
4	0	0	4

Course Overview:

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

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

Course Outcomes:

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

CO1. DEVELOP an evidenced based project management plan which addresses all elements of the project development life cycle.

CO2. ANALYZE and synthesize project management theory and apply this knowledge in project management.

CO3. Critically EVALUATE decision making and its impact on project success.

CO4. APPLY effective team work and communication skills to develop and communicate a feasible and strategic project plan.

CO5. DEMONSTRATE effective project execution and control techniques that result in successful projects.

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)

B. Tech. ECE VI Semester **VCE-R14**

PROJECT PLANNING AND MANAGEMENT
(INTERDEPARTMENTAL ELECTIVE – I)

Course Code: A2019

L	T	P	C
4	0	0	4

SYLLABUS

UNIT –I **(10 Lectures)**

PERTANDCPM: Introduction,originofPERTandCPM,planning,schedulingandcontrolling,barcharts,milestonecharts,weaknessesinbar charts,PERTandCPMnetworkscomparison,event,activity,rulesfordrawingnetworks,numberingtheevents (Fulkerson'slaw),dummyactivities.

UNIT –II **(13 Lectures)**

CPM - PERT NETWORK ANALYSIS: Time estimate, expected time, earliest allowable occurrence time, latest allowableoccurrencetime,slack,projectduration, Probability ofcompletion,startandfinishtimeestimates,floats,projectscheduling,criticalandsub-criticalpath.Updating-processofupdating,whentoupdate.

UNIT –III **(12 Lectures)**

CPMCOSTMODEL&RESOURCESALLOCATIONS,RESOURCESCHEDULING: Costanalysis,directandindirectcosts,operationtime,normalandcrashtimesandcosts,optimizing project cost,crash limit,freefloatlimit,optimization.Resource smoothening, resourcelevelling.

UNIT –IV **(12 Lectures)**

MANAGEMENT: Scope of construction management, significance of construction management, concept ofscientificmanagement, psychology in management, a historical account of management philosophy, qualities of manager,theroles/functions performed by effective and competent managers, the manager - as a decision maker, as amotivator,asacommunication-link,asaconflictresolver,asawell-wisherofco-employeesandtheemployeretc.

UNIT –V **(14 Lectures)**

ORGANIZATION: Typesoforganization,meritsanddemeritsofdifferenttypesof organization,authority,policy,recruitmentprocessandtraining;developmentofpersonneldepartment;laborproblems;laborlegislationinIndia;'workmen'scompensationactof1923andminimumwagesactof1948',andsubsequentamendments.Safetyinconstruction.

Textbooks:

1. Punmia,Khandelwal(2006),*ProjectplanningandcontrolwithPERTandCPM*,3rd edition,LaxmiPublications,New Delhi,India.

Referencebooks:

1. L. S. Srinath (1975), *PERT and CPM*, 2nd Edition, Afflicted East West Press Pvt. Ltd, New Delhi,India.
2. U.K.Shrivastava(1999),ConstructionPlanningandManagement,GalgotiaPublicationsPvt.Ltd.,NewDelhi.

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)

B. Tech. ECE VI Semester **VCE-R14**

ORGANIZATIONAL BEHAVIOR
(INTERDEPARTMENTAL ELECTIVE – I)

Course Code: A2020

L	T	P	C
4	0	0	4

Course Overview:

Course Outcomes:

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

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

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

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

CO4. Able to understand organizations and its structures.

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

VARDHAMAN COLLEGE OF ENGINEERING
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B. Tech. ECE VI Semester **VCE-R14**

ORGANIZATIONAL BEHAVIOR
(INTERDEPARTMENTAL ELECTIVE – I)

Course Code: A2020

L	T	P	C
4	0	0	4

SYLLABUS

UNIT - I **(13 Lectures)**

NATURE AND IMPORTANCE OF ORGANIZATIONAL BEHAVIOR: Foundation of O.B.; Conceptual Model for O.B. –Organization System in Global Environment – Importance of Interpersonal Skills, Challenges & Opportunities for O.B., Developing O.B. Model – Approaches to O.B.

UNIT - II **(12 Lectures)**

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 **(12 Lectures)**

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 **(14 Lectures)**

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 and span of control and types of span of control, factors determining span, organizational structure, depart mentation and types of depart mentation, making organizing effective.

UNIT - V **(11 Lectures)**

ORGANIZATIONAL CULTURE AND CLIMATE: Conflicts management, Organization Change & Stress Management – Self Management – Managing Careers.

TEXTBOOKS:

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 Semester **VCE-R14**

EMBEDDED SYSTEMS LAB

Course Code: A2428

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):

- Computer Programming (A2501)
- Microprocessors and Interfacing (A2419)

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-R14**

EMBEDDED SYSTEMS LAB

Course Code: A2428

L	T	P	C
0	0	3	2

LIST OF EXPERIMENTS

PART – A

8051 RTOS using Eclipse

1. Interfacing a switch, LED (blinking one after the other with some delay).
2. Displaying the numbers 00 to 99 & all prime numbers from 00 to 99 on two seven segment displays.
3. Check a password is correct or not using encryption and decryption.
4. Scroll the string on LCD display by checking busy flag.
5. Interface ADC to convert a DC voltage 0-5V to digital and convert a sine wave to digital.
6. Generate a triangular wave of 1KHz using DAC and a stair case of 5 steps with 1KHz frequency using DAC.
7. Implement the operation of an elevator using 8051uc
8. Interface IR sensor to detect obstacle

PART – B

8051 Keil Compiler

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. Stepper motor interfacing.
7. Temperature sensor and Relay control.
8. GPS and GSM module interfacing.

REFERENCE BOOKS / MATERIALS:

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

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)

B. Tech. ECE VI Semester **VCE-R14**

ANALOG AND DIGITAL COMMUNICATIONS LAB

Course Code: A2429

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 signals at different types of demodulators. In this course first, a theory is given to represent signal in time and frequency domain. All the analog modulation techniques like AM, DSBSC, SSBSC, FM, PAM, PWM, PPM are observed practically. In the Digital communications lab, various concepts of digitization of information (PCM, DPCM and DM), the related digital data transmission (ASK, FSK, PSK) and channel coding techniques are analyzed. On completion of this lab, students will be able to use their knowledge, gained through this lab, for the designing and development of various digital communication systems.

Prerequisite(s):

- Analog Communications (A2414)
- Digital Communications (A2420)

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. Apply the knowledge of basic mathematical background for communication signal analysis.

CO4. Design and understand the generation of various digital modulations and demodulation techniques.

CO5. Evaluate the performance of various digital communication systems.

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)

B. Tech. ECE VI Semester **VCE-R14**

ANALOG AND DIGITAL COMMUNICATIONS LAB

Course Code: A2429

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.

PART - A: ANALOG COMMUNICATIONS LAB (Any 6 Experiments)

1. Amplitude Modulation and Demodulation
2. DSB-SC Modulation and Demodulation
3. SSB-SC Modulation (Phase Shift Method) and Demodulation
4. Frequency Modulation and Demodulation
5. Pre-emphasis and De-emphasis
6. Pulse Amplitude Modulation & Demodulation
7. Pulse Width Modulation & Demodulation
8. Pulse Position Modulation & Demodulation
9. Frequency synthesizer
10. AGC Characteristics.

PART - B: 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. Differential phase shift keying Generation and Detection.
8. Time Division Multiplexing & De-multiplexing.
9. Generation of Linear block codes.
10. Generation of cyclic codes.
11. Generation of Convolutional codes.

SYLLABI FOR
VII SEMESTER

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)

B. Tech. ECE VII Semester **VCE-R14**

COMPUTER NETWORKS

Course Code: A2602

L	T	P	C
4	0	0	4

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):

- Digital Logic Design (A2406)
- Discrete Mathematical Structures
- Computer Architecture and Organization (A2510)

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 VII Semester **VCE-R14**

COMPUTER NETWORKS

Course Code: A2602

L	T	P	C
4	0	0	4

SYLLABUS

UNIT I **(10 Lectures)**

INTRODUCTION: Network applications, Network hardware, Network software, Reference models: OSI, TCP/IP, ARPANET.

THE PHYSICAL LAYER: Theoretical basis for communication, Guided transmission media, Wireless transmission, Modems.

UNIT - II **(14 Lectures)**

THE DATA LINK LAYER: Design issues, Error detection and correction, elementary data link protocols, sliding window protocols, example data link protocols - HDLC, PPP.

THE MEDIUM ACCESS SUBLAYER: Channel allocation problem, Multiple access protocols, Ethernet, Wireless LAN, Bluetooth.

UNIT – III **(16 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.

UNIT – IV **(10 Lectures)**

THE TRANSPORT LAYER: Transport service, Elements of transport protocol, Internet transport layer protocols: UDP, TCP and STCP, QOS in TCP and UDP.

UNIT – V **(10 Lectures)**

THE APPLICATION LAYER:

Domain name system, Electronic mail, World Wide Web: architectural overview, dynamic web document and http. Simple Network Management Protocol, File Transfer Protocol, Simple Mail Transfer Protocol, Telnet.

Text books:

1. A.S. Tanenbaum, Computer Networks (2011), 5th Edition, Pearson Education/ PHI. New Delhi, India.
2. Behrouz A. Forouzan (2012), 5th Edition, Data communication and Networking, Tata McGraw-Hill, India.

Reference books:

1. Micheal A Gallo, Bill Hancock , (2001), Computer Communications and Networking Technologies,
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.
4. Jim kurose and Keiser Ross (2012), Computer Networking Top Down Approach, 6th Edition, Pearson Education.

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)

B. Tech. ECE VII Semester **VCE-R14**

ELECTRONIC MEASUREMENTS AND INSTRUMENTATION

Course Code: A2430

L	T	P	C
3	1	0	4

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):

- Electronic devices (A2401)
- Pulse & Digital Circuits (A2412)
- IC Applications (A2418)

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
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B. Tech. ECE VII Semester **VCE-R14**

ELECTRONIC MEASUREMENTS AND INSTRUMENTATION

Course Code: A2430

L	T	P	C
3	1	0	4

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. A. 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 VII Semester **VCE-R14**

MICROWAVE ENGINEERING

Course Code: A2431

L	T	P	C
3	1	0	4

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(A2413)
- Antennas and Wave Propagation (A2421)

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-R14**

MICROWAVE ENGINEERING

Course Code: A2431

L	T	P	C
3	1	0	4

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. Micro strip 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 Travelling Wave 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 **(5 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.

TEXT BOOKS:

1. Samuel Y. Liao (1994), *Microwave Devices and Circuits*, 3rd edition, Prentice Hall of India, New Delhi.
2. Herbert J. Reich, J. G. Skalnik, P. F. Ordung, H. L. Krauss (2004), *Microwave Principles,* CBS Publishers, New Delhi, India.
3. M. Kulkarni (1998), *Micro Wave and Radar Engineering,* Umesh Publications, New Delhi.

REFERENCE BOOKS:

1. R. E. Collin (2002), *Foundations for Microwave Engineering,* 2nd edition, IEEE Press, John Wiley, India.
2. M. L. Sisodia, G. S. Raghuvanshi (1995), *Microwave Circuits and Passive Devices,* Wiley Eastern Ltd., New Age International Publishers Ltd.
3. Peter A. Rizzi (1999), *Microwave Engineering Passive Circuits*, Prentice Hall of India, New Delhi.
4. F. E. Terman (1955), *Electronic and Radio Engineering*, 4th edition, McGraw Hill, New Delhi.

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)

B. Tech. ECE VII Semester **VCE-R14**

CELLULAR AND MOBILE COMMUNICATIONS

Course Code: A2432

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.

Prerequisite(s):

- Analog Communications (A2414)
- Digital Communications (A2420)
- Antennas and Wave Propagation (A2421)

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
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B. Tech. ECE VII Semester **VCE-R14**

CELLULAR AND MOBILE COMMUNICATIONS

Course Code: A2432

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-R14**

OPERATING SYSTEMS
INTERDEPARTMENTAL ELECTIVE - II

Course Code: A2506

L	T	P	C
4	0	0	4

Course Overview:

Operating Systems Course is intended as a general introduction to the techniques used to implement operating systems. The topics covered will be functions of operating systems, process management processor scheduling; deadlock prevention, avoidance, and recovery; main-memory management; virtual memory management; control of disks and other input/output devices; file-system structure and implementation; and protection and security. The course also covers the related UNIX commands and system calls.

Prerequisite(s):

- Computer Organization and Architecture (A2510)
- Object Oriented Programming through JAVA (A2508)

Course Outcomes:

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

CO1. Demonstrate knowledge about the role and purpose of Operating system.

CO2. Identify fundamental operating system abstractions such a processes, threads, files, semaphores, IPC abstraction, shared memory regions.

CO3. Analyse how the Operating system abstractions can be implemented and how these Operating system abstractions can be used in the development of application program, or to build higher level abstractions.

CO4. Analyse the principle of concurrency and synchronization, and apply them to write concurrent program/software.

CO5. Identify basic principles and resource management techniques (scheduling, time management and space management)

VARDHAMAN COLLEGE OF ENGINEERING
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B. Tech. ECE VII Semester **VCE-R14**

OPERATING SYSTEMS
INTERDEPARTMENTAL ELECTIVE - II

Course Code: A2506

L	T	P	C
4	0	0	4

SYLLABUS

UNIT–I

OPERATING SYSTEMS OVERVIEW: Introduction, operating system operations, process management, memory management,storagemanagement,protectionandsecurity,distributedsystems,specialpurposesystems.

OPERATINGSYSTEMSSTRUCTURES: Operatingsystemservicesandsystemscalls, systemprograms,operatingsystem structure,operatingsystemsgenerations.

UNIT–II

PROCESS MANAGEMENT: Process concepts, process state, process control block, scheduling queues, process scheduling,multithreadedprogramming.

CONCURRENCYAND SYNCHRONIZATION: Process synchronization,critical section problem, Peterson'ssolution, synchronization hardware,semaphores,classicproblemsofsynchronization, readersandwriter's problem,dining philosopher'sproblem,monitors.

UNIT–III

DEADLOCKS: Systemmodel,deadlockcharacterization,deadlockprevention,detectionandavoidance,recovery from deadlockbanker'salgorithm.

MEMORY MANAGEMENT: Swapping, contiguous memory allocation, paging, structure of the page table, segmentation,virtualmemory,demandpaging,page-replacementalgorithms,allocationofframes,thrashing.

UNIT–IV

FILESYSTEM: Conceptofafile,accessmethods,directorystructure,file systemmounting,file sharing,protection.File system implementation:file system structure, filesystem implementation,directory implementation,allocation methods,free-spacemanagement,efficiencyandperformance.

I/OSYSTEM: Massstoragestructure-overviewofmassstoragestructure,diskstructure,diskattachment,disk schedulingalgorithms,swapspacemanagement,RAID, stablestorageimplementation,tertiarystoragestructure.

UNIT–V

PROTECTION: Goalsofprotection,principlesofprotection,domainofprotectionaccessmatrix,implementation of accessmatrix,accesscontrol,revocationofaccessrights.

SECURITY: Thesecurityproblem,programthreats,systemandnetworkthreatscryptographyasasecurity tool,user authentication,implementingsecuritydefense,firewallingtoprotectsystems.

TEXTBOOK:

1. AbrahamSilberschatz,PeterBaerGalvin, GregGagne (2006), OperatingSystemPrinciples, 7thedition, Wiley IndiaPrivateLimited,NewDelhi.

REFERENCEBOOKS:

1. Stallings (2006), OperatingSystems,InternalsandDesignPrinciples,5thedition, PearsonEducation,India.
2. AndrewS.Tanenbaum(2007), Modern Operating Systems,2ndedition, PrenticeHallofIndia,India.
3. Deitel&Deitel (2008), Operating systems,3rdedition, Pearson Education, India.
4. Dhamdhere (2008),OperatingSystems,SecondEdition,Tata McGraw-Hill,NewDelhi.

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)

B. Tech. ECE VII Semester **VCE-R14**

DATABASE MANAGEMENT SYSTEMS
INTERDEPARTMENTAL ELECTIVE - II

Course Code: A2514

L	T	P	C
4	0	0	4

Course Overview:

This course introduces the core principles and techniques required in the design and implementation of database systems. This course focus on relational database management systems, including database design theory: E-R modelling, data definition and manipulation languages, database security and administration. It also covers essential DBMS concepts such as: Transaction Processing, Concurrency Control and Recovery and various types of databases like distributed database, and intelligent database, Client/Server. Students undertake a semester project to design and build a simple database system and demonstrate competence with the fundamental tasks involved with modelling, designing, and implementing a DBMS. It also provides students with theoretical knowledge and practical skills in the use of databases and database management systems in information technology applications

Prerequisite(s):

- Object Oriented Programming through JAVA (A2508)
- 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 data base.

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

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

VARDHAMAN COLLEGE OF ENGINEERING
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B. Tech. ECE VII Semester **VCE-R14**

DATABASE MANAGEMENT SYSTEMS
INTERDEPARTMENTAL ELECTIVE - II

Course Code: A2514

L	T	P	C
4	0	0	4

SYLLABUS

UNIT-I

INTRODUCTION: Historyof databasesystems,introductionto databasemanagementsystems,databasesystem applications, databasesystemsversusfilesystems,viewofdata,datamodels,databaselanguages- DDL&DML commands and examples of basic SQL queries, database users and administrators, transaction management, databasesystemstructure,applicationarchitectures.

DATABASEDESIGN: IntroductiontodatabasedesignandE-Rdiagrams,entities,attributesandentitysets,relationships and relationship sets,additionalfeaturesoftheE-Rmodel,conceptualdesignwiththeE-Rmodel,conceptual designforlargeenterprises

UNIT-II

THERELATIONALMODEL: Introductiontotherelationalmodel,integrityconstraintsoverrelations,enforcingintegrity constraints, queryingrelational data,logicaldatabasedesign:E-Rtorelational,introduction toviews, destroying/alteringtablesandviews.

RELATIONALALGEBRAANDCALCULUS: Preliminaries, relationalalgebraoperators,relationalcalculus-tupleand domainrelationalcalculus,expressivepowerofalgebraandcalculus.

SQL: Overview, theform ofabasicSQLquery,union,intersect andexceptoperators, nestedqueries,aggregate operators,null values,complexintegrityconstraintsinSQL, cursors,triggersIntroductiontoPL/SQL,moreonPL/SQL. Storedproceduresandfunctions,advantagesofusinga procedureor function,procedureversus functions.

UNIT-III

SCHEMAREFINEMENT ANDNORMALFORMS: Introductiontoschemarefinement,functionaldependencies, reasoningaboutFDs.Normalforms:1NF,2NF,3NF,BCNF,propertiesofdecompositions, normalization,schema refinementindatabasedesign,otherkindsofdependencies:4NF,5NF,DKNF,casestudies

UNIT-IV

TRANSACTIONSMANAGEMENT: Transactionconcept,transactionstate,implementation ofatomicityanddurability, concurrentexecutions,serializability,recoverability,implementationof isolation,transactiondefinitioninSQL, testing for serializability.

CONCURRENCY CONTROLANDRECOVERYSYSTEM: Concurrencycontrol-lockbasedprotocols,time-stampbased protocols,validationbasedprotocols,multiplegranularity, anddeadlockhandling. Recoverysystem–failure classification,storagestructure,recoveryandatomicity,log-basedrecovery,shadowpaging,recoverywithconcurrent transactions, buffermanagement, failurewithlossofnon-volatile storage,advancedrecoverytechniques,remote backupsystems.

UNIT–V

OVERVIEWOF STORAGEANDINDEXING: Data on externalstorage,fileorganizationsand indexing,indexdatastructures,comparison offileorganizations, indexesandperformancetuning.Treestructuredindexing-intuitionfor treeindexes,indexedsequentialaccessmethod(ISAM), B+Trees-a dynamictreestructure.

TEXTBOOKS:

1. RaghuramaKrishnan,JohannesGehrke (2007),*DatabaseeManagementSystems*,3rdedition, TataMcGraw-Hill,NewDelhi,India.
2. AbrahamSilberschatz,HenryF.Korth,S. Sudarshan (2005), *DatabaseSystemConcepts,*5thedition, McGraw-Hill,NewDelhi,India.

REFERENCEBOOKS:

1. ElmasriNavate (1994), *FundamentalsofDatabaseSystems*,PearsonEducation,India.
2. CJdate(2010),anIntroductiontodatabaseSystems,8th editionMcGraw-Hill,NewDelhi,India.

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)

B. Tech. ECE VII Semester **VCE-R14**

NETWORK SECURITY AND CRYPTOGRAPHY

INTERDEPARTMENTAL ELECTIVE - II

Course Code: A2607

L	T	P	C
4	0	0	4

Course Overview:

The growing importance of information systems, and their use to support safety-critical applications, has made information security a central issue for modern systems. The 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.

Course Outcomes:

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

CO1. Able to demonstrate and apply concept and principle of security Attacks, Services and Mechanisms.
CO2. Able to demonstrate existing Conventional encryption algorithms.
CO3. Expertise in Message authentication, Hash function and Public key encryption.
CO4. Able to applying Cryptographic algorithms in various real time applications.
CO5. Able to Investigate and perform various security vulnerability tests.
CO6. Able to understand impact of the security attacks in real time applications
CO7. Understand the security vulnerabilities in existing Cryptograph algorithms and network security protocols.

VARDHAMAN COLLEGE OF ENGINEERING
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B. Tech. ECE VII Semester **VCE-R14**

NETWORK SECURITY AND CRYPTOGRAPHY

INTERDEPARTMENTAL ELECTIVE - II

Course Code: A2607

L	T	P	C
4	0	0	4

SYLLABUS

UNIT - I

INTRODUCTION: Security trends, The OSI Security Architecture, Security Attacks, Security Services and Security Mechanisms, A model for Network security.

CLASSICAL ENCRYPTION TECHNIQUES: Symmetric Cipher Modes, Substitute Techniques, Transposition Techniques, Rotor Machines, Stenography.

UNIT - II

BLOCK CIPHER AND DATA ENCRYPTION STANDARDS: Block Cipher Principles, Data Encryption Standards, the Strength of DES, Differential and Linear Crypt Analysis, Block Cipher Design Principles.

ADVANCED ENCRYPTION STANDARDS: Evaluation Criteria for AES, the AES Cipher.

MORE ON SYMMETRIC CIPHERS: Multiple Encryption, Triple DES, Block Cipher Modes of Operation, Stream Cipher and RC4.

INTRODUCTION TO NUMBER THEORY: Prime Numbers, Fermat's and Euler's Theorem, Testing for Primality, The Chinese Remainder Theorem, Discrete logarithms.

UNIT - III

PUBLIC KEY CRYPTOGRAPHY AND RSA: Principles Public key crypto Systems the RSA algorithm, Key Management, Diffie Hellman Key Exchange, Elliptic Curve Arithmetic, Elliptic Curve Cryptography.

MESSAGE AUTHENTICATION AND HASH FUNCTIONS: Authentication Requirement, Authentication Function, Message Authentication Code, Hash Function, Security of Hash Function and MACs.

HASH AND MAC ALGORITHM: Secure Hash Algorithm, Whirlpool, HMAC, CMAC.

DIGITAL SIGNATURE: Digital Signature, Authentication Protocol, Digital Signature Standard.

UNIT - IV

AUTHENTICATION APPLICATION: Kerberos, X.509 Authentication Service, Public Key Infrastructure.

EMAIL SECURITY: Pretty Good Privacy (PGP) and S/MIME.

IP SECURITY: Overview, IP Security Architecture, Authentication Header, Encapsulating Security Payload, Combining Security Associations and Key Management.

UNIT - V

WEB SECURITY: Requirements, Secure Socket Layer (SSL) and Transport Layer Security (TLS), Secure Electronic Transaction (SET), Intruders, Viruses and related threats.

FIREWALL: Firewall Design principles, Trusted Systems.

TEXT BOOKS:

1. William Stallings (2006), Cryptography and Network Security: Principles and Practice, 4thedition, PearsonEducation, India.
2. William Stallings (2000),Network Security Essentials (Applications and Standards), Pearson Education, India.

REFERENCE BOOKS:

1. Charlie Kaufman (2002), Network Security: Private Communication in a Public World, 2ndedition, Prentice Hallof India, New Delhi.
2. Atul Kahate (2008), Cryptography and Network Security, 2ndedition, 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 VII Semester **VCE-R14**

OPERATIONS RESEARCH
INTERDEPARTMENTAL ELECTIVE - II

Course Code: A2333

L	T	P	C
4	0	0	4

Course Overview:

Operations Research is a science of Modelling and optimization. It allows you to model real- world problems by using mathematical techniques. It provides the tools and theories to solve these real-world problems by finding the optimal solutions to the models subject to constraints of time, labor, resource, material, and business rules. With Operations Research, people make intelligent decisions to develop and manage their processes and businesses in various applications.

Course Outcomes:

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

CO1. **Explain** the Operations Research features, models, applications and methods such as linear programming, transportation, sequencing, assignment, replacement, games theory and dynamic programming.

CO2. **Build** mathematical models for finding optimum solutions for various real world problems and case studies.

CO3. **Evaluate** various alternatives available to aid in effective decision making.

CO4. **Choose** the best strategies to maximize the profit in the presence of a competitor.

CO5. **Devise** operating policies for the efficient and effective management of men, materials and machines in inventory, production, distribution and service systems.

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)

B. Tech. ECE VII Semester **VCE-R14**

OPERATIONS RESEARCH
INTERDEPARTMENTAL ELECTIVE - II

Course Code: A2333

L	T	P	C
4	0	0	4

SYLLABUS

UNIT - I

INTRODUCTION TO OPERATIONS RESEARCH: Basics definition, scope, objectives, phases, models and limitations of Operations Research. Linear Programming Problem, Formulation and Graphical solution of Linear Programming Problem. Simplex Method, Artificial variables Techniques, big -M method, two - phase simplex method, degeneracy and unbound solutions.

UNIT - II

TRANSPORTATION PROBLEM: Formulation, solution, unbalanced Transportation problem. Finding basic feasible solutions, North-West corner rule, least cost method and Vogel's approximation method. Optimality test – MODI method.

ASSIGNMENT MODEL: Formulation, Hungarian method for optimal solution, solving unbalanced problem, Traveling salesman problem as assignment problem.

UNIT - III

SEQUENCING MODELS: Solution of Sequencing Problem, Processing n Jobs through two machines, Processing n Jobs through three machines, Processing two Jobs through m machines, Processing n Jobs through m Machines.

QUEUING THEORY: Introduction, Single Channel, Poisson arrivals, exponential service times with infinite population and finite population models.

UNIT - IV

REPLACEMENT MODELS: Replacement of Items that Deteriorate whose maintenance costs increase with time without change in the money value, Replacement of items that fail suddenly, individual replacement policy, group replacement policy.

INVENTORY MODELS: Inventory costs, Models with deterministic demand model: (a) Demand rate uniform and production rate infinite, (b) Demand rate non-uniform and production rate infinite, (c) Demand rate uniform and production rate finite.

UNIT - V

GAME THEORY: Competitive game, rectangular game, saddle point, minimax (maximin) method of optimal strategies, value of the game. Solution of games with saddle points, dominance principle, Rectangular games without saddle point, mixed strategy for 2 X 2 games.

DYNAMIC PROGRAMMING: Characteristics of dynamic programming, Dynamic programming approach for priority management employment smoothening, Capital budgeting, Stage Coach/Shortest Path, cargo loading and Reliability problems.

TEXT BOOKS:

1. A. M. Natarajan, P. Balasubramani, A. Tamilarasi (2006), *Operations Research*, Pearson Education, India.
2. S. D. Shama (2009), *Operation Research,* Tata McGraw Hill, New Delhi.

REFERENCE BOOKS:

1. J. K. Sharma (2007), *Operations Research – Theory and Applications,* 3rd edition, Macmillan India Ltd, India.
2. R. Panneerselvam (2008), *Operations Research*, 2nd edition, Prentice Hall of India, India.
3. F. S. Hillier, G. J. Lieberman (2007), *Introduction to Operations Research,* 8th edition, Tata McGraw Hill, New Delhi, India.

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)

B. Tech. ECE VII Semester **VCE-R14**

ROBOTICS
INTERDEPARTMENTAL ELECTIVE - II

Course Code: A2351

L	T	P	C
4	0	0	4

Course Overview:

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

Course Outcomes:

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

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

VARDHAMAN COLLEGE OF ENGINEERING
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B. Tech. ECE VII Semester **VCE-R14**

ROBOTICS
INTERDEPARTMENTAL ELECTIVE - II

Course Code: A2351

L	T	P	C
4	0	0	4

SYLLABUS

UNIT - I

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

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

UNIT - II

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

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

UNIT - III

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

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

UNIT - IV

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

UNIT - V

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

TEXT BOOKS:

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

REFERENCE BOOKS:

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

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)

B. Tech. ECE VII Semester **VCE-R14**

ENERGY MANAGEMENT
(INTERDEPARTMENTAL ELECTIVE - II)

Course Code: A2244

L	T	P	C
4	0	0	4

Course Overview:

Energy management can help industry control its operating costs. Energy management is also important for reducing local, regional and global emissions and can help mitigate the problem of global warming. This course will help industry professionals acquire the skills and techniques required to implement energy management. This course will also benefit researchers and students who are interested in working on energy management. This course is designed to provide the background required for engineers to meet this role.

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. Analyze the concepts and technologies used for energy conservation.

CO3. Develop methods for evaluating worth of project.

CO4. Analyze schemes for demand side management.

CO5. Evaluate the VAR requirements for effective voltage control.

VARDHAMAN COLLEGE OF ENGINEERING
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B. Tech. ECE VII Semester **VCE-R14**

ENERGY MANAGEMENT
(INTERDEPARTMENTAL ELECTIVE - II)

Course Code: A2244

L	T	P	C
4	0	0	4

SYLLABUS

UNIT - I

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

UNIT - II

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

UNIT - III

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

UNIT - IV

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

UNIT - V

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

TEXT BOOKS:

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

REFERENCE BOOKS:

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

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)

B. Tech. ECE VII Semester **VCE-R14**

CPLD AND FPGA ARCHITECTURES AND APPLICATIONS
(Professional Elective - I)

Course Code: A2433

L	T	P	C
3	1	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.

Prerequisite(s):

- Electronic Devices (A2401)
- Digital Logic Design (A2406)
- VLSI Design (A2426)

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-R14**

CPLD AND FPGA ARCHITECTURES AND APPLICATIONS
(Professional Elective - I)

Course Code: A2433

L	T	P	C
3	1	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 – SpeedPerformance 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, India.

REFERENCE BOOKS:

1. S. Trimberger, Edr. (1994), *Field Programmable Gate Array Technology*, Kluwer Academic Publications, New Dehi, India.
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-R14**

TELECOMMUNICATION SWITCHING SYSTEMS
(Professional Elective - I)

Course Code: A2434

L	T	P	C
3	1	0	4

Course Overview:

Today's Telecommunication Network is a complex interconnection of a variety of heterogeneous switching systems. Electromechanical and Electronic systems, direct and common control systems, and hard-wired and stored program control systems coexist. In a sense, it is a marvel that these systems work in close cooperation to offer a plethora of complex telecommunication services, often involving instantaneous information transfer across the globe. Presently, two important classes of telecommunication networks, viz. Public switched telephone network (PSTN) and public data network (PDN) are the wide use.The newly emerging integrated services digital network (ISDN) is expected to be in place in next 20 Years or so as a result of the process of total digitalization of telecommunication networks currently under way.

Prerequisite(s):

- Probability Theory and Stochastic Processes (A2408)
- Analog Communications (A2414)
- Digital Communications (A2420)

Course Outcomes:

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

CO1. Explain the working principle of switching systems involved in telecommunication switching.

CO2. Understand telecommunications traffic, congestion, loss systems and queuing systems.

CO3. Design multi stage switching networks.

CO4. Compare signaling techniques and examine its performance.

CO5. Analyze the Integrated Services Digital Networks (ISDN).

VARDHAMAN COLLEGE OF ENGINEERING
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B. Tech. ECE VII Semester **VCE-R14**

TELECOMMUNICATION SWITCHING SYSTEMS
(Professional Elective - I)

Course Code: A2434

L	T	P	C
3	1	0	4

SYLLABUS

UNIT - I **(09 Lectures)**

SWITCHING SYSTEMS: Evolution of Telecommunications, simple telephone communication, Basics of a Switching System, Manual Switching System, major Telecommunication Networks.

STROWGER SWITCHING SYSTEMS: Rotary Dial Telephone, Signalling Tones, Stronger Switching Components, Step by Step Switching, Design Parameters, 100 Line Switching systems, 1000 Line Blocking Exchange, 10000 Line Exchange.

CROSSBAR SWITCHING: Principles of Common Control, Touch Tone Dial Telephone, Principles of Crossbar Switching, Crossbar Switch Configurations, Cross point Technology, Crossbar Exchange Organization.

UNIT - II **(14 Lectures)**

ELECTRONIC SPACE DIVISION SWITCHING: Stored Program Control, Centralized SPC, Distributed SPC, Software Architecture, Application Software, Enhanced Services, Two-Stage Networks, Three-Stage Networks, *n*-Stage Networks.

TIME DIVISION SWITCHING- Basic Time Division Space Switching, Basic Time Division Time Switching, Time Multiplexed Space Switching, Time Multiplexed Time Switching, Combination Switching-Three Stage Combination Switching, n-stage Combination Switching.

UNIT - III **(13 Lectures)**

TELECOMMUNICATIONS TRAFFIC: Introduction, The Unit of Traffic, Congestion, Traffic Measurement, A Mathematical Model, Lost-call Systems –Theory, Traffic Performance, Loss Systems in Tandem, Use of traffic Tables; Queuing Systems -The Second Erlang Distribution, Probability of Delay, Finite Queue Capacity, Some Other Useful Results, Systems with a Single Server, Queues in tandem, Delay Tables, Applications of Delay Formulae.

SWITCHING NETWORKS: Introduction, Single Stage networks, Gradings –Principle, Design of Progressive Gradings, Other forms of grading, Traffic Capacity of Gradings, Applications of Gradings; Link Systems - General, Two Stage Networks, Three Stage Networks, Four Stage Networks, Discussion; Grades of Service of Link Systems.

UNIT - IV **(08 Lectures)**

TELEPHONE NETWORKS: Subscriber Loop Systems, Switching Hierarchy and Routing, Transmission Plan, Numbering Plan, Charging Plan.

SIGNALLING: Introduction, Customer Line Signalling, Audio-frequency Junctions and Trunk Circuits, FDM Carrier Systems-Outbound signalling, Inland (VF) Signalling; PCM Signalling, Inter Register Signalling, Common Channel Signalling Principles-General, Signalling Networks, CCITT Signalling System no. 6, CCITT Signalling System no. 7- The High Level data link Control Protocol, Signal Units, The Signalling Information field, Digital Customer Line Signalling.

UNIT - V **(10 Lectures)**

PACKET SWITCHING: Introduction, Statistical multiplexing, Local-area and Wide-area Networks– Bus Networks, Ring Networks, Comparison of Bus and Ring Networks, Optical Fibre Networks; Large-scale Networks – General, Datagram's and Virtual Circuits, Routing, Flow Control, Standards, Frame Relay; Broadband Networks-General, The Asynchronous Transfer Mode, ATM Switches.

INTEGRATED SERVICES DIGITAL NETWORK (ISDN): Introduction, Motivation for ISDN, Network and Protocol Architecture, Transmission Channels, User- Network Interfaces, Signalling, Numbering and Addressing, service characterisation, Interworking, ISDN Standards, Broadband ISDN.

TEXT BOOKS:

1. Thiagarajan Viswanathan (2007), *Telecommunication Switching Systems and Networks,* Prentice Hall of India, New Delhi, India.
2. J. E. Flood (2008), *Telecommunications Switching, Traffic and Networks,* Pearson Education, New Delhi.

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)

B. Tech. ECE VII Semester **VCE-R14**

DIGITAL IMAGE PROCESSING
(Professional Elective - I)

Course Code: A2435

L	T	P	C
3	1	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):

- Signal and systems (A2407)
- Digital signal processing (A2427)

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 colour 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
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B. Tech. ECE VII Semester **VCE-R14**

DIGITAL IMAGE PROCESSING
(Professional Elective - I)

Course Code: A2435

L	T	P	C
3	1	0	4

SYLLABUS

UNIT - I **(11 Lectures)**

DIGITAL IMAGE FUNDAMENTALS: Fundamental Steps in Digital Image Processing, Components of an Image Processing 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, Hoteling 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. 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-R14**

RF CIRCUIT DESIGN
(Professional Elective - I)

Course Code: A2436

L	T	P	C
3	1	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(A2413)
- Microwave Engineering (A2431).

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.

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B. Tech. ECE VII Semester **VCE-R14**

RF CIRCUIT DESIGN
(Professional Elective - I)

Course Code: A2436

L	T	P	C
3	1	0	4

SYLLABUS

UNIT – I **(16 Lectures)**

Importance of RF Design- Dimensions and units – 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 **(10 Lectures)**

The Smith chart: 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 – III **(10 Lectures)**

Scattering parameters: Definition, meaning,chain scattering matrix, conversion between S and Z parameters, Signal floe 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.

UNIT – IV **(10 Lectures)**

RF Diode models: nonlinear and linear models.Transistor models: Large signal and small signal BJT Models, Large signal small signal FET Models- Scattering parameter device characterization. Impedance Matching using discrete components: Two component matching networks, Forbidden regions, Frequency response and Quality factor, T and Pi matching networks.Amplifier classes of operation and biasing networks: Classes of operation and efficiency of Amplifiers, Biasing networks for BJT, biasing networks for FET.

UNIT – V **(10 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 balance Mixers.

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 VII Semester **VCE-R14**

OPTICAL COMMUNICATIONS
(Professional Elective - I)

Course Code: A2437

L	T	P	C
3	1	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 as it is popularly known is gaining considerable importance of 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 fibre,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 (A2414)
- Digital communications (A2420)
- Microwave engineering (A2431)

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-R14**

OPTICAL COMMUNICATIONS
(Professional Elective - I)

Course Code: A2437

L	T	P	C
3	1	0	4

SYLLABUS

UNIT – I **(10 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 **(10 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 **(10 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 **(10 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 **(10 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.
4. *Fiber Optic Communications* – Joseph C. Palais, 4th Edition, Pearson Education, 2004.

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)

B. Tech. ECE VII Semester **VCE-R14**

REAL TIME OPERATING SYSTEMS
(Professional Elective - I)

Course Code: A2438

L	T	P	C
3	1	0	4

Course Overview:

An introduction to real-time operating systems, with an emphasis on embedded system software development, tasks, inter-task communications and synchronization as well as network software.This course prepares students to write real-time event-driven applications running under an RTOS. The µCOS RTOS is used as an example which will be examined at the C source code level. Practical applications running under an RTOS for embedded computers in event-driven systems are also described. It introduces the principles shared by many real-time operating systems, and their use in the development of embedded multitasking application software, begins with the fundamental elements of real-time multitasking embedded application software design and development. Processor and operating system concepts relevant to multitasking systems are examined, with focus on pre-emptive task scheduling, intertask communicationand synchronization and continues with a detailed survey of popular operating system kernel services, giving many application examples. Practical experience is gained during student work exercises.

Prerequisite(s):

- operating system (A2506)
- Data Structures through C (A2503)

Course Outcomes:

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

CO1. Organize the operating system architecture and develop applications that use the standard Real Time Operating System (RTOS) using system calls in µC/OS-II environment.

CO2. Interpret of System design for measurement of embedded system operating characteristics (for example, latency and reliability) and to determine system performance relative to functional requirements.

CO3. Summarize the applications, benefits, and limitations of networked embedded systems for environmental science, health, and safety, industrial, and consumer usage objectives.

CO4. Use tools to build an embedded real-time system with key Real-Time Operating System terms and concepts (RTX51 Tiny OS introduction).

CO5. Validate basic multi - task scheduling algorithms for periodic, aperiodic, and sporadic tasks.

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B. Tech. ECE VII Semester **VCE-R14**

REAL TIME OPERATING SYSTEMS
(Professional Elective - I)

Course Code: A2438

L	T	P	C
3	1	0	4

SYLLABUS

UNIT - I **(11 Lectures)**

BASIC REAL-TIME CONCEPTS: Terminology, Real-Time System Design Issues, Example Real-Time Systems, CommonMisconceptions, 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, Pre-emptive-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 DrivenScheduling; 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, HardwareInterfacing, 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,POSIXMessages ,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. 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.

OTHER RELATED REFERENCE BOOKS / MATERIALS:

1.Jean J. Labrosse (2002), *MicroC/OS-II The Real-Time Kernel*, 2nd edition, CMP Books (ISBN No: 1-57820-103-9).

VARDHAMAN COLLEGE OF ENGINEERING
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B. Tech. ECE VII Semester **VCE-R14**

VLSI LAB

Course Code: A2439

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 (A2401)
- Digital Logic Design (A2406)
- VLSI Design (A2426)

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 VII Semester **VCE-R14**

VLSI LAB

Course Code: A2439

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 VII Semester **VCE-R14**

DIGITAL SIGNAL PROCESSING LAB

Course Code: A2440

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):

- algorithms and system
- Mathematics.

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.

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B. Tech. ECE VII Semester **VCE-R14**

DIGITAL SIGNAL PROCESSING LAB

Course Code: A2440

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-R14**

SATELLITE AND RADAR COMMUNICATIONS

Course Code: A2442

L	T	P	C
3	1	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 access, and earth station design. This class 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. 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):

- Probability Theory & Stochastic Processes (A2408)
- Analog communications (A2414)
- Digital communications (A2420)
- Antennas and Wave Propagation (A2421).

Course Outcomes:

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

CO1. Identify the architectures of space and earth segments as related to satellite communications and analyze the various applications of satellites.

CO2. Evaluate satellite link budgets and utilize various multiple access schemes for communication satellites.

CO3. Analyze the performance of radar systems and plan the subsystem performance requirements in a typical radar system design.

CO4. Examine the various tracking mechanisms as applicable to radar systems.

VARDHAMAN COLLEGE OF ENGINEERING
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B. Tech. ECE VIII Semester **VCE-R14**

SATELLITE AND RADAR COMMUNICATIONS

Course Code: A2442

L	T	P	C
3	1	0	4

SYLLABUS

UNIT - I **(12 Lectures)**

ORIGIN OF SATELLITE COMMUNICATIONS: Historical Back-ground, Basic Concepts of Satellite Communications, Frequency allocations for Satellite Services, Applications, Future Trends of Satellite Communications.

SATELLITE SUBSYSTEMS: Attitude and orbit control system, telemetry, tracking, Command and monitoring, power systems, communication subsystems, Satellite antenna Equipment reliability and Space qualification.

UNIT - II **(10 Lectures)**

SATELLITE LINK DESIGN: Basic transmission theory, system noise temperature and G/T ratio, Design of down links, up link design, Design of satellite links for specified C/N, System design example.

MULTIPLE ACCESS: Frequency division multiple access (FDMA) Inter modulation, Calculation of C/N. Time division Multiple Access (TDMA) Frame structure, Examples. Code Division Multiple access (CDMA).

UNIT - III **(12 Lectures)**

EARTH STATION TECHNOLOGY: Introduction, Transmitters, Receivers, Antennas, Tracking systems, Terrestrial interface, and Primary power test methods.

INTRODUCTION TO RADAR: Introduction Nature of Radar, Maximum unambiguous range, Radar waveforms, Simple form of Radar equation, Radar block diagram & Operation, Radar frequencies and applications, Related Problems.

UNIT - IV **(12 Lectures)**

RADAR EQUATION: Prediction of Range performance, Minimum detectable signal, Receiver Noise & SNR, Integration of Radar pulses, PRF & Range Ambiguities, System losses, Related Problems.

CW AND FREQUENCY MODULATED RADAR: Doppler Effect, CW Radar – Block Diagram, Isolation between Transmitter and Receiver, Non-zero IF Receiver, Receiver Bandwidth Requirements, Applications of CW radar, FM-CW Radar-Range and Doppler Measurement, Block Diagram and Characteristics, FM-CW altimeter.

UNIT - V **(10 Lectures)**

MTI AND PULSE DOPPLER RADAR: Introduction, Principle, MTI Radar with - Power Amplifier Transmitter and Power Oscillator Transmitter, Delay Line Cancellers – Filter Characteristics, Blind Speeds, Double Cancellation. MTI Radar Parameters, Limitations to MTI Performance. Non-coherent MTI, MTI versus Pulse Doppler Radar.

TRACKING RADAR: Tracking with Radar, Sequential Lobing, Conical Scan, Monopulse Tracking Radar – Amplitude Comparison Monopulse (one- and two- coordinates), Phase Comparison Monopulse

TEXT BOOKS:

1. Timothy Pratt, *"Satellite Communications",* 2nd edition Wiley Publications, 2003
2. Wilbur L.Pritchard, Robert A Nelson, *"Satellite Communication Engineering",* 2nd edition, Pearson Publications, 2003
3. Merill I. Skolnik , "*Introduction to Radar Systems*", 2nd Edition.,2007, TMH

REFERENCE BOOKS:

1. M.Richharia, *"Satellite Communications: Design Principles"*, BS publications 2nd edition 2003.
2. Dennis Roddy, *"Satellite Communications*", 2nd edition 1996
3. Merill I Skolnik, "*Introduction to Radar Systems*", 3rd Edition, 2001, TMH.

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)

B. Tech. ECE VIII Semester **VCE-R14**

LOW POWER VLSI DESIGN
(PROFESSIONAL ELECTIVE – II)

Course Code: A2443

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 (A2401)
- VLSI design (A2426)

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
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B. Tech. ECE VIII Semester **VCE-R14**

LOW POWER VLSI DESIGN
(PROFESSIONAL ELECTIVE – II)

Course Code: A2443

L	T	P	C
4	0	0	4

SYLLABUS

UNIT - I **(12 Lectures)**

PHYSICS OF POWER DISSIPATION: 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-Shot 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 and probability calculations-signal probability using binary decision diagrams, probabilistic techniques for signal activity estimation-switching activity in combinational circuits, derivation of activity for static CMOS circuits switching activity in sequential circuits and approximation method.

STATISTICAL TECHNIQUES: Combinational and sequential circuits, estimation of glitching,power- delay models and monte-carlo techniques, sensitivity analysis, power estimation using input vector compaction and domino CMOS circuits.

UNIT - III **(10 Lectures)**

SYNTHESIS FOR LOW POWER: Behavioral, logic and circuit level approaches, Algorithm level transforms, power- constrained least squares optimization for adaptive and non-adaptive filters, circuit activity driven architectural transformations, voltage scaling, operation reduction and substitution, pre-computation, 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 ,Steep sub threshold swing and multiple threshold voltages, Testing with elevated intrinsic leakage , multiple supply voltages.

UNIT - V **(10 Lectures)**

LOW ENERGY COMPUTING: Energy dissipation in transistor channel, energy recovery circuit design, designs with reversible and partially reversible logic, energy recovery in adiabatic logic and SRAM core, design of Peripheral circuits-address decoder, level shifter and I/O Buffer, supply clock generation.

SOFTWARE DESIGN FOR LOW POWER: Introduction, sources of power dissipation, 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 VIII Semester **VCE-R14**

WIRELESS COMMUNICATIONS AND NETWORKS
(PROFESSIONAL ELECTIVE – II)

Course Code: A2444

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):NIL

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-R14**

WIRELESS COMMUNICATIONS AND NETWORKS
(PROFESSIONAL ELECTIVE – II)

Course Code: A2444

L	T	P	C
4	0	0	4

SYLLABUS

UNIT - I **(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, third generation (3G) wireless networks, wireless local loop (WLL) and LMDS, wireless local area networks (WLANs), Bluetooth and personal area networks(PANs).

UNIT - II **(13 Lectures)**

MULTIPLE ACCESS TECHNIQUES FOR WIRELESS COMMUNICATION: Introduction, FDMA, TDMA, spread spectrum 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 between wireless 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, tunnelling, 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 Architecture and 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 manager specification, 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-R14**

DSP PROCESSORS AND ARCHITECTURES
(PROFESSIONAL ELECTIVE – II)

Course Code: A2445

L	T	P	C
4	0	0	4

Course Overview:

It gives the knowledge about 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 (A2407)
- Digital signal processing (A2427)

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-R14**

DSP PROCESSORS AND ARCHITECTURES
(PROFESSIONAL ELECTIVE – II)

Course Code: A3001

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-R14**

SOFTWARE DEFINED RADIO
(Professional Elective - II)

Course Code: A3001

L	T	P	C
4	0	0	4

Course Overview:

Software defined radio, also known as software radio is an emerging technology, thought to build flexible radio systems, multiservice, multi-standard, multiband, reconfigurable and reprogrammable by software. It is an adaptive, future-proof solution to making wireless networks highly flexible. It replaces conventional radio hardware. This course covers software radio architectures and methods to implement the functional modules in a radio system such as modulation/demodulation, signal generation, coding and link-layer protocols in software. This helps in building reconfigurable software radio systems where dynamic selection of parameters for each of the above-mentioned functional modules is possible.SDR technology can be used to implement military, commercial and civilian radio applications.A wide range of radio applications like Bluetooth, WLAN, GPS, Radar, WCDMA, GPRS, etc. can be implemented using SDR technology.

Prerequisite(s):

- Analog Communications (A2414)
- Digital Communications (A2420)
- Digital Signal Processing (A2427)

Course Outcomes:

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

CO1. Justify system-level decisions for software defined radio technology and products.

CO2. Identify Various analog RF components as front end block in implementation of SDR.

CO3. Develop digital hardware architectures and build flexible radio systems which are reconfigurable and reprogrammable by software.

CO4. Interpret the basics of designing antenna systems to accommodate the needs of a software defined radio (i.e. smart antenna algorithms).

CO5. Be aware of current industry trends.

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)

B. Tech. ECE VIII Semester **VCE-R14**

SOFTWARE DEFINED RADIO
(Professional Elective - II)

Course Code: A3001

L	T	P	C
4	0	0	4

SYLLABUS

UNIT - I **(12 Lectures)**

Introduction: Software Defined Radio, A Traditional Hardware Radio Architecture, Signal Processing Hardware History, Software Defined Radio Project Complexity.

A Basic Software Defined Radio Architecture: Introduction, 2G Radio Architectures, Hybrid Radio Architecture, Basic Software Defined Radio Block Diagram, System Level Functioning Partitioning, Digital Frequency Conversion Partitioning.

UNIT - II **(10 Lectures)**

RF System Design: Introduction, Noise and Channel Capacity, Link Budget, Receiver Requirements, Multicarrier Power Amplifiers, Signal Processing Capacity Tradeoff.

Analog-to-Digital and Digital-to-Analog Conversion: Introduction, Digital Conversion Fundamentals, Sample Rate, Bandpass Sampling, Oversampling, Antialias Filtering, Quantization, ADC Techniques, Successive Approximation, Figure of Merit, DACs, DAC Noise Budget, ADC Noise Budget.

UNIT - III **(08 Lectures)**

Digital Frequency Up- and Down Converters: Introduction, Frequency Converter Fundamentals, Digital NCO, Digital Mixers, Digital Filters, Half-band Filters, CIC Filters, Decimation, Interpolation, and Multirate Processing, DUCs , Cascading Digital Converters and Digital Frequency Converters.

UNIT - IV **(12 Lectures)**

Signal Processing Hardware Components: Introduction, SDR Requirements for Processing Power, DSPs, DSP Devices, DSP Compilers, Reconfigurable Processors, Adaptive Computing Machine, FPGAs.

Software Architecture and Components : Introduction, Major Software Architecture Choices, Hardware – Specific Software Architecture, Software Standards for SoftwareRadio, Software Design Patterns, Component Choices, Real Time Operating Systems- High Level Software Languages- Hardware Languages.

UNIT - V **(10 Lectures)**

Smart Antennas Using Software Radio: Introduction, 3G smart Antenna Requirements, Phased Antenna Array Theory, Applying Software Radio Principles to Antenna Systems, Smart Antenna Architectures, Optimum Combining/ Adaptive Arrays, DOA Arrays, Beam Forming for CDMA, Downlink Beam Forming.

TEXT BOOKS:

1. Paul Burns (2002), Software Defined Radio for 3G, Artech House.
2. Tony J Rouphael (2008), RF and DSP for SDR, Elsevier Newnes Press.
3. Jouko Vanakka (2005), Digital Synthesizers and Transmitter for Software Radio, Springer.
4. P Kenington (2005), RF and Baseband Techniques for Software Defined Radio, Artech House.

REFERENCE BOOKS:

1. Walter Tuttle Bee (2002), Software Define Radio Fabrication Technologies, Wiley publications, New Delhi.
2. Markus Dilinger, kambiz Madani, Nancy Alonistioti (2002), Software Defined Radio: Architectures, Systems and Functions, Wiley - India, New Delhi.

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)

B. Tech. ECE VIII Semester **VCE-R14**

NANOTECHNOLOGY
(PROFESSIONAL ELECTIVE – II)

Course Code: A2341

L	T	P	C
4	0	0	4

Course Overview:

Nanotechnology is an existing research area that spans disciplines from electrical engineering to biology. Over the last two decades the basic science of this area has launched new technologies, the first examples of which are finding way into commercial products. This course will provide students with a bird's eye view into this fast moving area and leave students with an appreciation of the importance and foundation of super – small materials and devices.

Prerequisite(s):NIL

- Engineering Chemistry (A2003)
- Engineering Physics (A2002)
- Computer Programming (A2501)

Course Outcomes:

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

CO1. Describe and explain nanotechnology.

CO2. Elaborate the importance of reduction in materials dimensionality, and its relationship with materials properties.

CO3. Explain top down and bottom up approaches for nano materials fabrication.

CO4. Give examples on the use of nanotechnology in biomedical, optical, microelectronics and various other applications.

CO5. Present results of a research in the form of an oral presentation.

VARDHAMAN COLLEGE OF ENGINEERING
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B. Tech. ECE VIII Semester **VCE-R14**

NANOTECHNOLOGY
(PROFESSIONAL ELECTIVE – II)

Course Code: A2341

L	T	P	C
4	0	0	4

SYLLABUS

UNIT - I **(12 Lectures)**

INTRODUCTION TO NANOTECHNOLOGY: Importance of nanoscale, Nanostructure types, electronic, magnetic, optical Properties of Nano materials, top-down and bottom- up approach to nanostructures.

QUANTUM MECHANICAL PHENOMENON IN NANOSTRUCTURES: Quantum confinement of electrons in semiconductor Nano structures, one dimensional confinement (Quantum wires), two dimensional confinements (Quantum Wells), three dimensional confinements (Quantum dots).

UNIT - II **(10 Lectures)**

CARBON NANO STRUCTURES: Carbon nano tubes (CNTs), Fullerenes, C60, C80 and C240 Nanostructures, Properties (mechanical, optical and electrical) and applications.

UNIT - III **(13 Lectures)**

FABRICATION OF NANO MATERIALS: Physical Methods: Inert gas condensation, Arc discharge, RF plasma, Plasma arc technique, Ion sputtering, Laser ablation, Laser pyrolysis, Molecular beam epitaxy, Chemical vapour deposition method.

NANO SCALE CHARACTERIZATION TECHNIQUES: Scanning probe techniques (AFM, MFM, STM, SEM, TEM), XRD

UNIT - IV **(10 Lectures)**

NANO DEVICES AND NANO MEDICINE: Lab on chip for bio-analysis, Core/shell Nano particles in drug delivery systems (site specific and targeted drug delivery), cancer treatment, and bone tissue treatment.

UNIT - V **(11 Lectures)**

NANO AND MOLECULAR ELECTRONICS: Resonant-Tunnelling structures, single electron tunnelling, Single Electron transistors, coulomb blockade, giant magneto resistance, tunnelling magneto resistance.

NANOLITHOGRAPHY AND NANO MANIPULATION: E-beam lithography and SEM based nanolithography and nano manipulation, Ion beam lithography, oxidation and metallization, Mask and its application. Deep UV lithography, X-ray based lithography.

TEXT BOOKS:

1. Charles P. Pode (2010), Introduction to nanotechnology, Reprint Edition, Springer, USA.
2. Bharat Bhusan (2010), *Springer Handbook of Nanotechnology,* 3rd edition, Springer, USA.

REFERENCE BOOKS:

1. Phani kumar (2012), *Principles of nanotechnology*, 3rd edition, Scitech publications, Chennai.
2. Challa S. S. Kumar (2007), Nanofabrication towards biomedical application: Techniques, tools, Application and impact, 1st Edition, Wiley- India, New Delhi.
3. Hari Singh Nalwa (2011), Encyclopedia of Nanotechnology, American Scientific Publishers, USA
4. Michael J. O'Connell (2006), Carbon Nano tubes: Properties and Applications, Taylor & Francis, USA.
5. S. Dutta (2009), Electron Transport in Mesoscopic systems, 8th Print, Cambridge University press,
6. New Delhi.

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)

B. Tech. ECE VIII Semester **VCE-R14**

ARTIFICIAL NEURAL NETWORKS AND FUZZY LOGIC
(PROFESSIONAL ELECTIVE – II)

Course Code: A2447

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.

Prerequisite(s):NIL

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
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B. Tech. ECE VIII Semester **VCE-R14**

ARTIFICIAL NEURAL NETWORKS AND FUZZY LOGIC
(PROFESSIONAL ELECTIVE – II)

Course Code: A2447

L	T	P	C
4	0	0	4

SYLLABUS

UNIT – I

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

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

UNIT – II

FEEDFORWARD NEURAL NETWORKS: SUPERVISED LEARNING - I: Perceptron's - Learning and memory, Learning algorithms, Error correction and gradient decent rules, Perceptron learning algorithms.

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

UNIT – III

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

UNIT – IV

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

UNIT – V

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

GENETIC ALGORITHMS: Introduction 0074o Genetic Algorithms, Evolutionary Algorithms.

TEXT BOOKS:

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

REFERENCE BOOKS:

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

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)

B. Tech. ECE VIII Semester **VCE-R14**

DESIGN OF FAULT TOLERANT SYSTEMS
(PROFESSIONAL ELECTIVE – III)

Course Code: A2449

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 (A2401)
- Digital Logic Design (A2406)
- VLSI Design (A2426)

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 VIII Semester **VCE-R14**

DESIGN OF FAULT TOLERANT SYSTEMS
(PROFESSIONAL ELECTIVE – III)

Course Code: A2449

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 Systems 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
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B. Tech. ECE VIII Semester **VCE-R14**

HIGH SPEED NETWORKS
(PROFESSIONAL ELECTIVE – III)

Course Code: A2450

L	T	P	C
4	0	0	4

Course Overview:

The exponential growth in the Internet and the telecommunications industry has accelerated the emergence and deployment of high-speed network architectures and protocols that integrate multiple traffic types and provide quality-of-service differentiation. This course covers the current state-of-the-art in emerging high-speed network architectures, protocols and control algorithms. It provides a foundation for research on current issues related to the modelling, analysis, and design of high speed networks. It provides an in-depth understanding of the Internet architecture and underlying technologies and applications and provide services to users at high-availability, reliability, and flexibility in a cost effective manner and also cover unique challenges to management and security of the high-speed Internets and how they are addressed, emerging technologies, and future trends.

Prerequisite(s):

- Computer Networks (A2602)
- Data Communication Systems

Course Outcomes:

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

CO1. Understand the basics of high speed networking technologies; demonstrate the knowledge of network planning and optimization.

CO2. Solve numerical or analytical problems pertaining to the high-speed networking technologies.

CO3. Perform network design and configure networks using the technologies to meet a given set of requirements.

CO4. Evaluate various technologies and identify the most suitable one to meet a given set of requirements for a hypothetical corporate network.

CO5. Expose to cutting-edge research on high-speed networks.

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B. Tech. ECE VIII Semester **VCE-R14**

HIGH SPEED NETWORKS
(PROFESSIONAL ELECTIVE – III)

Course Code: A2450

L	T	P	C
4	0	0	4

SYLLABUS

UNIT - I **(10 Lectures)**

HIGH SPEED NETWORKS:

Frame Relay Networks - Asynchronous transfer mode - ATM Protocol Architecture, ATM logical Connection, ATM Cell - ATM Service Categories - AAL. High Speed LANs: Fast Ethernet, Gigabit Ethernet, Fiber Channel - Wireless LANs: applications, requirements - Architecture of 802.11

UNIT - II **(10 Lectures)**

CONGESTION AND TRAFFIC MANAGEMENT:

Queuing Analysis- Queuing Models - Single Server Queues - Effects of Congestion - Congestion Control - Traffic Management - Congestion Control in Packet Switching Networks - Frame Relay Congestion Control.

UNIT - III **(11 Lectures)**

TCP AND ATM CONGESTION CONTROL:

TCP Flow control - TCP Congestion Control - Retransmission - Timer Management - Exponential RTO back off KARN's Algorithm - Window management - Performance of TCP over ATM. Traffic and Congestion control in ATM - Requirements - Attributes - Traffic Management Frame work, Traffic Control - ABR traffic Management - ABR rate control, RM cell formats, ABR Capacity allocations - GFR traffic management.

UNIT - IV **(09 Lectures)**

INTEGRATED AND DIFFERENTIAL SERVICES:

Integrated Services Architecture - Approach, Components, Services- Queuing Discipline, FQ, PS, BRFQ, GPS, WFQ - Random Early Detection, Differentiated Services

UNIT - V **(11 Lectures)**

PROTOCOLS FOR QOS SUPPORT:

RSVP - Goals & Characteristics, Data Flow, RSVP operations, Protocol Mechanisms - Multiprotocol Label Switching - Operations, Label Stacking, Protocol details - RTP - Protocol Architecture, Data Transfer Protocol, RTCP.

TEXT BOOKS:

1. William Stallings," HIGH SPEED NETWORKS AND INTERNET", Pearson Education, Second Edition, 2002.

REFERENCE BOOKS:

1. Warland & Pravin Varaiya,"HIGH PERFORMANCE COMMUNICATION NETWORKS",Jean Hardcourt Asia Pvt. Ltd.,II Edition,2001.
2. Irvan Pepelnjk,Jin Guichard and Jeff Apcar ,"MPLS and VPN architecture ", Cisco Press, Volume 1 and 2 ,2003.

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)

B. Tech. ECE VIII Semester **VCE-R14**

SPEECH SIGNAL PROCESSING
(PROFESSIONAL ELECTIVE – III)

Course Code: A2451

L	T	P	C
4	0	0	4

Course Overview:

This course is an introduction to speech signal processing. Topics include production & classification of speech sounds, pole-zero models, homomorphic signal processing, short-time Fourier Transform analysis and synthesis, filter-bank analysis and synthesis, sinusoidal analysis and synthesis, pitch estimation, and speech coding. The objective of the course is to develop an understanding of how speech signals are processed in three general areas: Analysis, Synthesis, and Recognition. Speech must also be understood in the context of its creation (anatomy, classification of sounds, etc.) as well as in its perception (psychology & neuroscience). Analytical tools are needed for analysis and synthesis, which draw on the areas of digital signal processing and time-frequency analysis. Pattern recognition concepts are needed for speech recognition.

Prerequisite(s):

- Signals and Systems (A2407)
- Digital Signal Processing (A2427)

Course Outcomes:

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

CO1. Examine Levinson recursion algorithm and its properties

CO2. Determine minimum mean square error and pole-zero model in the context of speech signals.

CO3. Apply various filtering techniques on speech signals.

CO4. Analyze and synthesize the cepstrum of voiced and unvoiced speech signals.

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B. Tech. ECE VIII Semester **VCE-R14**

SPEECH SIGNAL PROCESSING
(PROFESSIONAL ELECTIVE – III)

Course Code: A2451

L	T	P	C
4	0	0	4

SYLLABUS

UNIT – I **(12 Lectures)**

CLASSIFICATION OF SPEECH SOUNDS: Review of signal processing, anatomy and physiology of speech production,spectrographic analysis of speech, categorization of speech sounds, prosody-the melody of speech, speech perception.

ACOUSTICS OF SPEECH PRODUCTION: Introduction, physics of sound basics, the wave equation, uniform tube model-losslesscase, effect of energy loss, boundary effects, a complete model, a discrete-time model based on tube concatenation.

UNIT – II **(12 Lectures)**

ANALYSIS AND SYNTHESIS OF POLE-ZERO SPEECH MODELS-I: Introduction, time-dependent processing, all-pole Modelling ofdeterministic signals-formulation, error minimization, autocorrelation method, the levinson recursion and its associatedproperties, lattice filter formulation of the inverse filter, frequency-domain interpretation,linear prediction analysis ofstochastic speech sounds formulation, errorminimization, autocorrelation method.

UNIT - III **(12 Lectures)**

ANALYSIS AND SYNTHESIS OF POLE-ZERO SPEECH MODELS-II: Criterion of goodness time domain frequency domain,synthesis based on all-pole Modelling, pole-zero estimation linearization, application to speech, high-pitched speakers- usingtwo analysis windows, decomposition of the glottal flow derivative model, estimation.

UNIT - IV **(12 Lectures)**

HOMOMORPHIC SIGNAL PROCESSING: Introduction, homomorphic systems for convolution, complex cepstrum of speechlikesequences, sequences with rational z-transforms, impulse trains convolved with rational z-transform sequences,homomorphic filtering, discrete complex cepstrum, spectral root homomorphic filtering, short-time homomorphicanalysis of periodic sequences, frequency-domain perspective, frequency-domain perspective.

UNIT - V **(10 Lectures)**

SHORT TIME SPEECH ANALYSIS: Short time speech analysis-complex cepstrum of voiced speech, complex cepstrum ofunvoiced speech, analysis/synthesis structures- zero and minimum-phase synthesis, mixed-phase synthesis, spectral rootdeconvolution contrasting linear prediction and homomorphic filtering-properties, homomorphic prediction.

TEXT BOOKS:

1. Thomas F. Quatieri (2001), *Discrete-Time Speech Signal Processing: Principles and Practice*, 2nd edition, Dev Publishers & Distributors, New Delhi.
2. Ben Gold, Nelson Morgan (2006), *Speech and Audio Signal Processing: Processing and Perception of Speech and Music*, Wiley Publishers, New Delhi, India.

REFERENCE BOOKS:

1. Lawrence R. Rabiner, Ronald W. Schafer (1979), *Introduction to Digital Speech Processing*, Pearson Education, New Delhi, India.
2. Sadaoki Furui (2001), *Digital Speech Processing, Synthesis and Recognition*, 2nd edition, Prentice Hal.

VARDHAMAN COLLEGE OF ENGINEERING
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B. Tech. ECE VIII Semester **VCE-R14**

MOBILE COMPUTING TECHNOLOGIES
(PROFESSIONAL ELECTIVE – III)

Course Code: A2452

L	T	P	C
4	0	0	4

Course Overview:

This course will introduce students to mobile computing and mobile application development. Mobile computing will be discussed from three perspectives: mobile technology, application development, and user interaction. The course wills first, overview various mobile computing applications, technologies and wireless communication. Next, students will learn about common paradigms in mobile computing such as low power computing, computing in an environment with limited resources, fault tolerance, and persistence. Students will be introduced to and use mobile application frameworks and development environments to reinforce concepts cover in lectures. Lastly, the course will look at some current research in mobile computing. Students will be expected to learn at least one mobile application development framework and use it to implement their assignments and course project.

Prerequisite(s):

- Operating Systems (A2506)
- Computer Programming (A2501)

Course Outcomes:

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

CO1. Develop applications that are mobile – device specific and demonstrate current practice in mobile computing contexts.

CO2. Analyze the performance of different handoff roaming and location update algorithms for cellular networks.

CO3. Create Android specific applications.

CO4. Illustrate traffic routing with mobile IP and will be able to differentiate from IP

CO5. Describe current and emerging interests in wireless and mobile computing and current capabilities, limitations and potential of each.

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(AUTONOMOUS)

B. Tech. ECE VIII Semester **VCE-R14**

MOBILE COMPUTING TECHNOLOGIES
(PROFESSIONAL ELECTIVE – III)

Course Code: A2452

L	T	P	C
4	0	0	4

SYLLABUS

UNIT - I

INTRODUCTION TO MOBILE COMPUTING ARCHITECTURE: Mobile computing, dialog control, Networks, Middleware andGateways, Application and Services, developing Mobile computing Applications, Security in Mobile Computing, Architecture for Mobile Computing, Three Tier Architecture, Design considerations for Mobile computing, Mobile Computing through Internet, Making existing Applications Mobile Enabled.

UNIT - II

CELLULAR TECHNOLOGIES (GSM): Bluetooth, Radio frequency Identification, Wireless Broadband, Mobile IP Internet ProtocolVersion 6(IPv6), Java Card, GSM Architecture, GSM Entities, Call routing in GSM, PLNM Interfaces, GSM addresses and Identifiers, Network aspects in GSM, Authentication and Security.

GPS, GPRS, CDMA And 3G: Mobile computing over SMS, GPRS and packet data Network, GPRS Network Architecture, GPRSNetwork Operations, Data Services in GPRS, Applications for GPRS, Limitations of GPRS, Spread Spectrum Technology, Is-95, CDMA Versus GSM, Wireless Data, Third Generation Networks, Applications on 3G.

UNIT - III

WIRELESS APPLICATION PROTOCOL (WAP) AND WIRELESS LAN:WAP, MMS Wireless LAN Advantages, IEEE 802.11 Standards,Wireless LAN Architecture, Mobility in wireless LAN.

INTELLIGENT AND INTERNETWORKING: Introduction, Fundamentals of call processing, intelligence in the Networks, SS#7Signalling, IN Conceptual Model (INCM), soft switch, Programmable Networks, Technologies and Interfaces for IN.

UNIT - IV

CLIENT PROGRAMMING, PLAM OS, SYMBIAN OS, WIN CE ARCHITECTURE: Introduction, Moving beyond the desktop, A PeekUnder the Hood: Hardware overview, Mobile phones, PDA, Design Constraints in Applications for Handheld Devices, Palm OS Architecture, Application Development, Multimedia Symbian OS Architecture, Applications for Symbian , Different flavours of Windows CE, Windows CE Architecture.

J2ME: Java in the Handset, The Three-prong approach to JAVA Everywhere, JAVA 2 Micro Edition (J2ME) technology, Programmingfor CLDC, GUI in MIDP, UI Design Issues, Multimedia Record Management System, Communication in MIDP, Security Considerations in MIDP, Optional Packages.

UNIT - V

VOICE OVER INTERNET PROTOCOL AND CONVERGENCE: Voice over IP- 11.323 Frame work for Voice over IP, Session InitiationProtocol, Comparison between H.323 and SIP, Real time Protocols, Convergence Technologies, Call Routing, Voice over IP Applications, IP multimedia subsystem (IMS), Mobile VoIP.

SECURITY ISSUES IN MOBILE COMPUTING: Introduction, Information Security, Security Techniques and Algorithms, SecurityProtocols, Public Key Infrastructure, Trust – Security Models, Security frameworks for Mobile Environment.

TEXT BOOKS:

1. Asoke K. Talukder, Roopa R. Yavagal (2009), *Mobile computing: Technology, Applications and Service Creation,* Tata McGraw-Hill, New Delhi.
2. Jochen Schiller (2004), *Mobile Communications*, 2nd edition, Low price edition, Pearson Education, New Delhi.

REFERENCE BOOKS:

1. Vieri Vaughi, Alexander Damn Jaonvic(2004), *The cdma2000 System for Mobile Communications:* 3G Wireless Evolution, Pearson Education India, New Delhi.
2. Adalestein (2008), *Fundamentals of Mobile and Parvasive Computing*, Tata McGraw-Hill, New Delhi.

VARDHAMAN COLLEGE OF ENGINEERING
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B. Tech. CSEVI/VII/VIII Semester **VCE-R14**

OPTICAL NETWORKS
(PROFESSIONAL ELECTIVE – III)

Course Code: A2453

L	T	P	C
4	0	0	4

Course Overview:

The objective of this course is to gain an understanding of various issues in designing an optical network. Topics include SONET/SDH, wavelength division multiplexing, framing techniques, traffic grooming, multiple access protocols, virtual topology design, routing and wavelength assignment, protection and restoration, and optical packet switching. Upon completion of this course, the student will be able to understand the most important aspects of optical networks, including the techniques used to transport and switching information within the network but also the management and network recovery aspects.

Prerequisite(s):

- Digital communications (A2420)
- Optical communications (A2437)

Course Outcomes:

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

CO1. Identify the three generations of optical networking evolution.

CO2. List all the important technological issues that affect the implementation of optical networks.

CO3. Comprehend the potentialities and limitations of optical networks.

CO4. Analyze and design virtual topology.

CO5. Discuss and apply the various wave length routing networks.

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)

B. Tech. ECE VIII Semester **VCE-R14**

OPTICAL NETWORKS
(PROFESSIONAL ELECTIVE – III)

Course Code: A2453

L	T	P	C
4	0	0	4

SYLLABUS

UNIT – I

OPTICAL SYSTEM COMPONENTS : **(12 Lectures)**

Light propagation in optical fibers –Loss & bandwidth, System limitations, Non-Linear effects;Solitons; Optical Network Components –Couplers, Isolators & Circulators, Multiplexers & Filters,Optical Amplifiers, Switches, Wavelength Converters.

UNIT – II

OPTICAL NETWORK ARCHITECTURES: **(10 Lectures)**

Introduction to Optical Networks; SONET / SDH standards, Metropoliton Area Networks,Layered Architecture; Broadcast and Select Networks–Topologies for BroadcastNetworks, Media AccessControl Protocols, Testbeds for Broadcast & Select WDM; Wavelength Routing Architecture.

UNIT – III

WAVELENGTH ROUTING NETWORKS: **(08 Lectures)**

The optical layer,Node Designs, Optical layer cost tradeoff, Routing and wavelength Assignment[RWA], Virtual topology design, Wavelength Routing Testbeds, Architectural variations.

UNIT – IV

PACKET SWITCHING AND ACCESS NETWORKS: **(10 Lectures)**

Photonic Packet Switching –OTDM, Multiplexing and Demultiplexing, Synchronisation, Broadcast OTDM networks, Switch-based networks; Access Networks –Network Architecture over view, OTDM networks; Optical Access Network Architectures; Future Access Networks.

UNIT – V

NETWORK DESIGN AND MANAGEMENT: **(12 Lectures)**

Transmission System Engineering –System model, Power penalty- transmitter, receiver, Optical amplifiers, crosstalk, dispersion; Wavelength stabilization; Overall design considerations;Control and Management–Network management functions, Configuration management ,Performance management, Fault management, Optical safety, Service interface.

Text Books:

1. Rajiv Ramaswami and Kumar N. Sivarajan, “Optical Networks : A Practical Perspective”, Harcourt Asia Pvt Ltd., Second Edition 2004.
2. C. Siva Ram Moorthy and Mohan Gurusamy, “WDM Optical Networks : Concept,Design and Algorithms”, Prentice Hall of India, Ist Edition, 2002.

Reference Books:

1. Biswanath Mukherjee, “Optical Communication Networks”, Mc-Graw Hill c1997, First Edition ISBN 0-07-044435-8.
2. P.E. Green, Jr., “Fiber Optic Networks”, Prentice Hall, NJ, 1993.
3. Rajiv Ramaswami and Kumar N. Sivarajan, “Optical Networks : A Practical Perspective”, Harcourt Asia Pvt Ltd., First Edition 2004.

VARDHAMAN COLLEGE OF ENGINEERING
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B. Tech. ECE VIII Semester **VCE-R14**

BIOMEDICAL INSTRUMENTATION
(PROFESSIONAL ELECTIVE – III)

Course Code: A2454

L	T	P	C
4	0	0	4

Course Overview:

This course introduces fundamental concepts of instrumentation, transducers and applications of Bio Medical Instrumentation. The course investigates the physiology and electrical hazards during Bio electric monitoring. The familiarity with the Transducer concepts for Electro cardiography and neuro muscular instrumentation is applied. This idea is extended to the field of Bio telemetry and medical imaging. While this course deals largely with the theory of Bio medical equipment's used in Bio medical engineering.

Prerequisite(s):

- Electronic measurements and instrumentation (A2430).

Course Outcomes:

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

CO1. Have a clear knowledge about human physiology system.

CO2. Have knowledge of the principle operation and design and the background knowledge of biomedical instruments and specific applications of biomedical engineering.

CO3. Analyze and evaluate the effect of different diagnostic and therapeutic methods, their risk potential, physical principles, opportunities and possibilities for different medical procedures.

CO4. Study the designs of several instruments used to acquire signals from living systems.

CO5. Have a basic understanding of medical terminology, relevant for biomedical.

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B. Tech. ECE VIII Semester **VCE-R14**

BIOMEDICAL INSTRUMENTATION
(PROFESSIONAL ELECTIVE – III)

Course Code: A2454

L	T	P	C
4	0	0	4

SYLLABUS

UNIT - I **(12 Lectures)**

PHYSIOLOGY: Basic Charge on cell, transmission of action potentials, sources and theories of action potentials, physiology of Cardiac, Nervous and Respiratory Systems, Generalized Medical Instrumentation System, Problems Encountered with measurements from Human beings.

TRANSDUCERS: Different Types of transducers and their selection for biomedical applications, Electrode Theory, Various types of Electrodes, Errors caused by electrodes in measurement of body potential.

UNIT - II **(12 Lectures)**

ELECTRO CARDIOGRAPHY: Block Diagram of ECG Machine, Origin of ECG, different types of Lead Systems electrode positions, Noise problems and their elimination.

ELECTRO-ENCEPHALOGRAPHY: Block Diagram of EEG Recording System, Electrode Locations, 10-20 electrode system, Characteristics of Abnormal EEG, Resting Rhythms and sleep stages.

ELECTROMYOGRAPHY: Block Diagram of EMG Machine, simulation, strength duration curves, Electromyography with voluntary muscle action and electrical simulation.

UNIT - III **(12 Lectures)**

NEURO-MUSCULAR INSTRUMENTATION: Interpretation of EEG and EMG, Respiratory Instrumentation, Mechanism of respiration, Spirometry, Pnemuotachograph Ventilators.

CARDIAC INSTRUMENTATION: Direct and Indirect measuring techniques of Blood pressure, Blood flow measurement by Electromagnetic, Doppler and Plethysmographic and dilution methods, Einthoven triangle, Pacemaker, Defibrillator and Phonocardiography, Diathermy, Hemodialysis machine.

UNIT - IV **(12 Lectures)**

MEDICAL IMAGING: Ultra Sound Imaging, Radiography, MRI, electrical Tomography and applications.

BIO-ELECTRODES: Bio potential Electrodes-External electrodes, Internal Electrodes, Biochemical Electrodes, Mechanical function, Electrical Conduction system of the heart, Cardiac cycle. Relation between electrical and mechanical activities of the heart.

UNIT - V **(10 Lectures)**

BIOTELEMETRY: Transmission and Reception aspect of Biomedical Signals via long distances.

ELECTRICAL HAZARDS DURING BIO-ELECTRIC MONITORING: Safety, codes, standards Micro and Macro and their physiological effects, leakage currents and protection by use of isolation transformer, Equipotential grounding and earth free monitoring.

TEXT BOOKS:

1. Leslie Cromwell, F. J. Weibell, E. A. Pfeiffer (2006), Biomedical Instrumentation and Measurements, 2nd edition, Prentice Hall of India, New Delhi, India.
2. John G. Webster (2005), Medical Instrumentation - Application and Design, 3rd edition, John Wiley & Sons, New Delhi, India.

REFERENCE BOOKS:

1. L. A. Geoddes, L. E. Baker (2002), Principles of Applied Biomedical Instrumentation, John Wiley & Sons, New Delhi, India.
2. R. S. Khandpur (2003),Hand-book of Biomedical Instrumentation, 2nd edition, Tata McGraw-Hill, New Delhi.
3. Mackay, Stuart R. (2001), Biomedical Telemetry, John Wiley & Sons, New Delhi, India.
4. Willis J. Tompkins, Editor (2001), Biomedical Digital Signal Processing, Prentice Hall of India, New Delhi, India.
5. Dr. M. Arumugam (1994), Biomedical Instrumentation, 2nd edition, Anuradha Publications, India.

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)

B. Tech. ECE VIII Semester **VCE-R14**

ADVANCED COMMUNICATIONS AND VIRTUAL INSTRUMENTATION LAB

Course Code: A2455

L	T	P	C
0	0	6	2

Course Overview:

The Advanced Communications and Virtual Instrumentation lab supports teaching and research in Antennas and Micro Wave devices and re-configurable hardware technology. We are engaged in research on architecture, design, and embedded computing communication systems. This laboratory studies a wide range of issues in all aspects of real-time computing in Antennas and embedded systems. This lab handles a range of experiments, from basic dipole Antenna design to Microwave devices design using ANSYS HFSS and also handles designing of different hardware circuits using LabVIEW. These labs are equipped withPC workstations having LabVIEW tool and HFSS software to perform the research work in Antennas, Microwave devices, Sensors and Robotics.

Prerequisite(s):

- Computer Programming Lab(A2502)
- Simulation Lab(A2410)

Course Outcomes:

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

CO1. Apply the concepts of computational electromagnetic techniques necessary to characterize and solve antenna and microwave related design problems.

CO2. Simulate various types of antennas and microwave components using commercial CAD tool Ansys HFSS and extend this experience into frontiers of mm-wave technologies.

CO3. Apply knowledge gained in software and hardware integration in LabVIEW environment.

CO4. Design and implement software systems to provide an interface between hardware peripheral sensors and systems.

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B. Tech. ECE VIII Semester **VCE-R14**

ADVANCED COMMUNICATIONS AND VIRTUAL INSTRUMENTATION LAB

Course Code: A2455

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LIST OF EXPERIMENTS

PART – A

ADVANCED COMMUNICATION:

1. Introduction to ANSYS HFSS.
2. Design and Analysis of Half Wave Dipole.
3. Design and Analysis of Loop Antenna.
4. Design and Analysis of Broadside Array.
5. Design and Analysis of Horn Antenna.
6. Design and Analysis of Microstrip Patch Antenna.
7. Design and Analysis of Array of Microstrip Patches.
8. Design and Analysis of RF Microwave Amplifier.
9. Design and Analysis of 1-2 Power dividers.
10. Design and Analysis of Band Pass Filter.

PART – B

Virtual Instrumentation:

1. Simulate the Traffic Light controller using LabVIEW Environment.
2. Simulate the ATM Machine using LabVIEW Environment.
3. Automatic Temperature controller system using Arduino, LabVIEW and LM35.
4. Direction control of simple Robot using Arduino-LabVIEW.
5. Door unlocker using myDAQ, RFID tags and stepper motor with LabVIEW.
6. Driving 16x2 LCD Display using myDAQ with LabVIEW.
7. Driving Hall Effect Sensor using myRIO with LabVIEW.
8. Controlling 7 segment LED using myRIO with LabVIEW.
9. Analog Input Digital Alarming using NI USB-6211.
10. Barcode based attendances system using myRIO with LabVIEW.

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 --

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Signature of Student

Signature of Parent
Name & Address with Phone Number

-- OFFICE COPY --