MARRI LAXMAN REDDY
INSTITUTE OF TECHNOLOGY AND MANAGEMENT
(AN AUTONOMOUS INSTITUTION)
(Approved by AICTE, New Delhi & Affiliated to JNTUH, Hyderabad)
Accredited by NBA and NAAC with 'A' Grade & Recognized Under Section2(f) & 12(B)of the UGC act,1956

B.Tech - Electronics and Communication Engineering
Course Structure (R20)
Applicable From 2020-21 Admitted Batch
Structure Breakup

S. No	Category	Breakup of credits (Total 160 credits)
1	Humanities and Social Sciences including Management courses (HSMC)	10
2	Basic Sciences Courses (BS)	23
3	Engineering Sciences courses including Workshop, Drawing basics of electrical/mechanical/computer etc.(ES)	24
4	Professional Core courses (PC)	63
5	Professional Electives (PE)	18
6	Open Electives (OE)	9
7	Project work, Seminar and Internship in industry or elsewhere (PS)	13
8	Mandatory Courses	-
	TOTAL	**160**

I YEAR I SEMESTER

S. No.	Course Code	Course Name	Course Area	Periods per week			Credits	Scheme of Examination Maximum Marks		
				L	T	P		Internal (CIE)	External (SEE)	Total
1	2010001	Engineering Mathematics-I	BS	3	1	0	4	30	70	100
2	2010006	Applied Physics	BS	3	1	0	4	30	70	100
3	2010501	Programming for Problem Solving	ES	3	1	0	4	30	70	100
4	2010071	Applied Physics Laboratory	BS	0	0	3	1.5	30	70	100
5	2010571	Programming for Problem Solving Laboratory	ES	0	0	3	1.5	30	70	100
6	2010371	Engineering Drawing Practice	ES	1	0	4	3	30	70	100
		Induction Programme	-	-	-	-	-	-	-	-
TOTAL				**10**	**3**	**10**	**18**	**180**	**420**	**600**

I YEAR II SEMESTER

S. No.	Course Code	Course Name	Course Area	Periods per week			Credits	Scheme of Examination Maximum Marks		
				L	T	P		Internal (CIE)	External (SEE)	Total
1	2020002	Engineering Mathematics-II	BS	3	1	0	4	30	70	100
2	2020008	Engineering Chemistry	BS	3	1	0	4	30	70	100
3	2020009	Communicative English	HS	2	0	0	2	30	70	100
4	2020502	Data Structures	ES	3	0	0	3	30	70	100
5	2020073	Engineering Chemistry Laboratory	BS	0	0	3	1.5	30	70	100
6	2020074	Communicative English Language Laboratory	HS	0	0	2	1	30	70	100
7	2020572	Data Structures Laboratory	ES	0	0	2	1	30	70	100
8	2020372	Engineering Workshop	ES	1	0	3	2.5	30	70	100
9	2020321	Environmental Science	*MC	3	0	0	0	-	-	-
TOTAL				**15**	**2**	**10**	**19**	**240**	**560**	**800**

***MC- Satisfactory/Unsatisfactory**

II YEAR I SEMESTER

S. No.	Course Code	Course Name	Course Area	Periods per week			Credits	Scheme of Examination Maximum Marks		
				L	T	P		Internal (CIE)	External (SEE)	Total
1	2030003	Laplace Transforms, Series Solutions and Complex Variables	BS	3	1	0	4	30	70	100
2	2030411	Electronic Devices and Circuits	PC	3	1	0	4	30	70	100
3	2030201	Basic Electrical Engineering	PC	3	0	0	3	30	70	100
4	2030509	Java Programming	ES	2	0	0	2	30	70	100
5	2030412	Signals and Systems	PC	3	1	0	4	30	70	100
6	2030473	Electronic Devices and Circuits Laboratory	PC	0	0	3	1.5	30	70	100
7	2030271	Basic Electrical Engineering Laboratory	PC	0	0	2	1	30	70	100
8	2030570	Java Programming Laboratory	ES	0	0	2	1	30	70	100
9	2030023	Constitution of India	*MC	2	0	0	0	-	-	-
TOTAL				**16**	**3**	**7**	**20.5**	**240**	**560**	**800**

II YEAR II SEMESTER

S. No.	Course Code	Course Name	Course Area	Periods per week			Credits	Scheme of Examination Maximum Marks		
				L	T	P		Internal (CIE)	External (SEE)	Total
1	2040401	Analog and Pulse Circuits	PC	3	0	0	3	30	70	100
2	2040413	Analog and Digital Communication	PC	3	1	0	4	30	70	100
3	2040414	Digital System Design	PC	3	1	0	4	30	70	100
4	2040505	Python Programming	ES	2	0	0	2	30	70	100
5	2040415	Electromagnetic Theory and Transmission Lines	PC	3	0	0	3	30	70	100
6	2040471	Analog and Pulse Circuits Laboratory	PC	0	0	3	1.5	30	70	100
7	2040575	Python Programming Laboratory	ES	0	0	2	1	30	70	100
8	2040474	Basic Simulation & Digital System Design Laboratory	PC	0	0	3	1.5	30	70	100
9	2040022	Gender Sensitization	*MC	2	0	0	0	-	-	-
TOTAL				**16**	**2**	**8**	**20**	**240**	**560**	**800**

***MC- Satisfactory/Unsatisfactory**

III YEAR I SEMESTER

S. No.	Course Code	Course Name	Course Area	Periods per week			Credits	Scheme of Examination Maximum Marks		
				L	T	P		Internal (CIE)	External (SEE)	Total
1	2050237	Control Systems	PC	2	1	0	3	30	70	100
2	2050416	Linear and Digital IC Applications	PC	3	1	0	4	30	70	100
3	2050010	Business Economics and Financial Analysis	HS	3	0	0	3	30	70	100
4	2050417	Probability Theory and Stochastic Processes	PC	3	0	0	3	30	70	100
5		Professional Elective – I	PE	3	0	0	3	30	70	100
6	2050503	Data Base Management Systems	ES	2	0	0	2	30	70	100
7	2050475	Analog and Digital Communications Lab	PC	0	0	3	1.5	30	70	100
8	2050573	Data Base Management Systems Laboratory	ES	0	0	2	1	30	70	100
9	2050075	Advanced English Language Communication Skills Laboratory	HS	0	0	2	1	30	70	100
10	2050024	Intellectual Property Rights	*MC	2	0	0	0	-	-	-
TOTAL				**18**	**2**	**7**	**21.5**	**270**	**630**	**900**

III YEAR II SEMESTER

S. No.	Course Code	Course Name	Course Area	Periods per week			Credits	Scheme of Examination Maximum Marks		
				L	T	P		Internal (CIE)	External (SEE)	Total
1	2060418	Digital Signal Processing	PC	3	1	0	4	30	70	100
2	2060403	Micro Processors and Micro Controllers	PC	3	1	0	4	30	70	100
3		Open Elective – I	OE	3	0	0	3	30	70	100
4		Professional Elective - II	PE	3	0	0	3	30	70	100
5	2060419	VLSI Design	PC	3	0	0	3	30	70	100
6	2060472	Micro Processors and Micro Controllers Lab	PC	0	0	2	1	30	70	100
7	2060476	Digital Signal Processing Laboratory	PC	0	0	3	1.5	30	70	100
8	2060477	Linear and Digital IC Applications Laboratory	PC	0	0	2	1	30	70	100
9	2060025	Professional Ethics	*MC	2	0	0	0	-	-	-
TOTAL				**17**	**2**	**7**	**20.5**	**240**	**560**	**800**

***MC- Satisfactory/Unsatisfactory**

IV YEAR I SEMESTER

S. No.	Course Code	Course Name	Course Area	Periods per week			Credits	Scheme of Examination Maximum Marks		
				L	T	P		Internal (CIE)	External (SEE)	Total
1	2070011	Fundamentals of Management	HS	3	0	0	3	30	70	100
2	2070420	Antennas and Microwave Engineering	PC	3	1	0	4	30	70	100
3		Professional Elective – III	PE	3	0	0	3	30	70	100
4		Professional Elective – IV	PE	3	0	0	3	30	70	100
5		Open Elective - II	OE	3	0	0	3	30	70	100
6	2070478	ECAD & VLSI Design Laboratory	PC	0	0	3	1.5	30	70	100
7	2070479	Microwave Engineering Laboratory	PC	0	0	2	1	30	70	100
8	2070480	Industry Oriented Mini Project / Summer Internship**	PS	0	0	4	2	30	70	100
9	2070481	Project Stage - I	PS	0	0	6	3	30	70	100
TOTAL				**15**	**1**	**15**	**23.5**	**270**	**630**	**900**

IV YEAR II SEMESTER

S. No.	Course Code	Course Name	Course Area	Periods per week			Credits	Scheme of Examination Maximum Marks		
				L	T	P		Internal (CIE)	External (SEE)	Total
1		Open Elective - III	OE	3	0	0	3	30	70	100
2		Professional Elective - V	PE	3	0	0	3	30	70	100
3		Professional Elective - VI	PE	3	0	0	3	30	70	100
4	2080482	Technical Seminar	PS	0	0	2	1	100	-	100
5	2080483	Project Stage - II	PS	0	0	14	7	30	70	100
TOTAL				**9**	**0**	**16**	**17**	**220**	**280**	**500**

****Students have to complete Industry Oriented Mini Project / Summer Internship in III Year- II Semester Summer break, Evaluation is carried in IV-I semester.**

Professional Elective (PE) Courses

PE I - Professional Elective I

S. No.	Course Code	Course Title
1	2050441	Digital Design using Verilog
2	2050442	Electronic Measurements and Instrumentation
3	2050443	Spread Spectrum Communications
4	2050444	FPGA Programming

PE II - Professional Elective II

S. No.	Course Code	Course Title
1	2060445	Digital Image Processing
2	2060446	Cellular Mobile Communications
3	2060571	Artificial Neural Networks
4	2066703	R - Programming

PE III - Professional Elective III

S. No.	Course Code	Course Title
1	2070447	Wireless Communications and Networks
2	2070517	Internet of Things
3	2070448	Radar Systems
4	2070449	Satellite Communications

PE IV - Professional Elective IV

S. No.	Course Code	Course Title
1	2070450	Embedded System Design
2	2070547	Cryptography & Network Security
3	2070543	Artificial Intelligence
4	2070510	Operating System

PE V - Professional Elective V

S. No.	Course Code	Course Title
1	2080451	System Design using FPGAs
2	2080452	Optical Communications
3	2080518	Machine Learning
4	2080453	Introduction to Nano Technology

PE VI - Professional Elective VI

S. No.	Course Code	Course Title
1	2080565	Cyber Security
2	2080454	Analog CMOS IC Design
3	2080455	Global Navigation Satellite System
4	2080456	Computer Vision

Open Elective (OE) Courses

S. No	Open Elective	Course Code	Course Title
1	Open Elective - I	2060404	Electronic Communications & Applications
2	Open Elective – II	2070405	Introduction to VLSI & Embedded Systems
3	Open Elective - III	2080406	Global Navigation Satellite System & Applications

Note: *Open Elective subject's syllabus is provided in a separate document. Student should take open electives from the list of offered by other departments/branches only.*

I-I

MARRI LAXMAN REDDY INSTITUTE OF TECHNOLOGY AND MANAGEMENT
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2010001: ENGINEERING MATHEMATICS- I

I Year B.Tech. ECE I – Sem. **L T P C**

3 1 0 4

Pre-requisites: Knowledge on Basic Electrical Engineering and Semiconductor Device Physics

Course Objectives:

- Types of matrices and their properties, Concept of a rank of the matrix and applying this concept to know the consistency and solving the system of linear equations.
- Concept of Eigen values and eigenvectors and to reduce the quadratic form to canonical form.
- Geometrical approach to the mean value theorems and their application to the mathematical problems.
- Partial differentiation, concept of total derivative, finding maxima and minima of function of two and three variables.
- The evaluation of Multiple integration and its applications

Course Outcomes: At the end of this course, students will be able to

- Recall the concepts of rank, Echelon form, Normal form, and the properties of non-singular matrices.
- Explain the process of finding eigenvalues and eigenvectors of a matrix and its role in diagonalization.
- Relate Beta and Gamma functions for solving standard integral related problems
- Apply Euler's theorem and compute total derivatives for multivariable functions.
- Understand the methods for changing variables in double and triple integrals, including transformations of polar, spherical, and cylindrical coordinates.

UNIT-I

Matrices: Types of Matrices, Symmetric; Skew-symmetric; orthogonal matrices; rank of a matrix by Echelon form, Normal form, Inverse of Non-singular matrices by Gauss-Jordan method; System of linear equations; solving system of Homogeneous and Non-Homogeneous equations. Gauss elimination method, Gauss seidel iteration method.

Learning Outcomes:

- Understand the matrix representation of a set of linear equations
- Explain the Normal form and Echelon form.
- Apply elementary operations to find the rank
- Analyse the solution of the system of Linear equations
- Evaluate the rank of the matrix.

UNIT-II

Eigen Values and Eigen Vectors:

Eigen values and Eigenvectors and their properties: Diagonalization of a matrix; Cayley-Hamilton Theorem (without proof); finding inverse and power of a matrix by Cayley-Hamilton Theorem; Quadratic forms up to three variables. Nature of the Quadratic Forms; Reduction of Quadratic form to canonical forms by Orthogonal Transformation.

Learning Outcomes:

- Understand how to find the eigen values and eigen vectors of a matrix.
- Explain the quadratic form to canonical form using orthogonal transformations.
- Apply Cayley Hamilton theorem to find inverse and powers of the matrix
- Analyse the nature of the quadratic form.
- Evaluate the powers of matrix.

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UNIT-III

Calculus of Single Variable:

Mean value theorems: Rolle's Theorem, Lagrange's Mean value theorem with their Geometrical Interpretation and applications, Cauchy's Mean value Theorem. Taylor's and Maclaurin theorems with remainders (without proof). Beta and Gamma functions and their applications.

Learning Outcomes:

- Understand the concept of mean value theorem.
- Explain the nature of functions by using mean value theorems.
- Apply Taylor's or Maclaurin's series to find the series expansion for the functions.
- Analyse the geometrical interpretation of mean value theorem.
- Evaluation of the slopes at any point on the curve

UNIT-IV

Multivariable Calculus:

Partial Differentiation; Euler's Theorem; Total derivative; Jacobian; Functional dependence, independence, Maxima and minima of functions of two variables and three variables using method of Lagrange multipliers.

Learning Outcomes:

- Understand the concept of partial differentiation.
- Explain the functional dependence using Jacobian.
- Apply Lagrange's method to find Maxima and minima.
- Analyse concept of Lagrange multipliers.
- Evaluate the maximum and minimum value of functions of two variables.

UNIT-V

Multiple Integrals& Applications:

Evaluation of Double integrals (Cartesian and polar coordinates); Change of order of integration (Cartesian form); Evaluation of Triple integrals; Change of variables (Cartesian to polar) for double and (cartesian to spherical and cylindrical polar coordinates) for triple integrals.

Applications: finding the area of a region using double integration and volume of a region using double and triple integration.

Learning Outcomes:

- Understand the concept of double integrals.
- Explain the polar form of double integral and triple integral.
- Apply double integration techniques in evaluating areas bounded by region.
- Analyse the centre of mass of a Lamina
- Evaluation of double integrals interns of volumes

TEXTBOOKS:

1. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 36th Edition, 2010
2. Erwin kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons,2006

REFERENCES:

1. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2008.
2. Ramana B.V., Higher Engineering Mathematics, Tata McGraw Hill New Delhi, 11thReprint, 2010.

MARRI LAXMAN REDDY INSTITUTE OF TECHNOLOGY AND MANAGEMENT
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2010006: APPLIED PHYSICS

I Year B.Tech. ECE I – Sem. **L T P C**

3 1 0 4

Course Objectives:

- Students will demonstrate skills in scientific inquiry, problem solving and laboratory techniques.
- Students will be able to demonstrate competency and understanding of the concepts found in Quantum Mechanics, Fiber optics and lasers, Semiconductor physics, optoelectronics and dielectric and magnetic properties and a broad base of knowledge in physics.
- The graduates will be able to solve non-traditional problems that potentially draw on knowledge in multiple areas of physics.
- To study applications in engineering like memory devices, transformer core and electromagnetic machinery.

Course Outcomes: At the end of this course, students will be able to

- Illustrate the principles of matter's dual nature and the Schrödinger wave equation for a particle confined in a simple system.
- Explain the classification of semiconductors and its uses in diodes
- Examine the I-V characteristics of various optoelectronics devices of LED, Solar cell and photodiodes.
- Relate the concepts of lasers and optical fibers, when used with normal light, in terms of their mechanisms and applications across various fields and scientific practices.
- Gain knowledge on properties of dielectric and magnetic materials, suitable for engineering applications.

UNIT-I

Quantum Mechanics:

Introduction to quantum physics, Black body radiation, Photoelectric effect, de-Broglie's hypothesis, Wave-particle duality, Davisson and Germer experiment, Heisenberg's Uncertainty principle, Born's interpretation of the wave function, Schrodinger's time independent wave equation, Particle in one dimensional box.

Learning Outcomes:

- Understand the fundamental concepts of quantum mechanics.
- Explain the physical significance of wave function.
- Apply Schrödinger's wave equation for a free particle.
- Analyze the particle behavior in different potential regions.
- Evaluate the significance of energy values in one dimensional box.

UNIT-II

Semiconductor Physics:

Intrinsic and Extrinsic semiconductors, Dependence of Fermi level on carrier-concentration and temperature, Carrier transport: diffusion and drift, p-n junction diode, Zener diode and their V-I Characteristics, Bipolar Junction Transistor (BJT): Construction, Principle of operation, Hall effect.

Learning Outcomes:

- Understand the energy band formation of semiconductors.
- Explain the properties of n-type and p-type semiconductors.
- Apply the Hall effect for various types of semiconductors.
- Analyze the various types of diodes.
- Evaluate the hall coefficient of semiconductors.

UNIT-III

Optoelectronics:

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Radiative and non-radiative recombination mechanisms in semiconductors, LED : Device structure, Materials, Characteristics and figures of merit, Semiconductor photodetectors: Solar cell, PIN and Avalanche photodiode and their structure, working principle and Characteristics.

Learning Outcomes:

- Understand the basic principle involved in LED.
- Explain about various types of photodiodes.
- Apply the knowledge on various diodes.
- Analyze the working of PIN and Avalanche diodes.
- Evaluate the characteristics of diodes.

UNIT-IV

Lasers and Fibre Optics:

Lasers: Introduction to Lasers, Coherence, Population inversion, Pumping, Lasing action, Types of Lasers: Ruby laser, Carbon dioxide (CO_2) laser, He-Ne laser, Semiconductor laser; Applications of laser. Fibre Optics: Introduction, Block diagram of fiber optic communication system, Total internal reflection, Acceptance angle and Numerical aperture, Step and Graded index fibres, Losses associated with optical fibres, Applications of optical fibres.

Learning Outcomes:

- Understand about Laser and fiber optics.
- Explain the working principle of laser and optical fibers.
- Apply optical fibers in communication system.
- Analyze the applications of optical fibers in medical, communication and other fields.
- Evaluate the laser and fiber optic concepts in various fields.

UNIT-V

Dielctric and Magnetic Properties:

Dielectric Properties: Introduction to dielectrics, Polarisation, Permittivity and Dielectric constant, Types of polarisation (Qualitative), Internal fields in a solid, Clausius-Mossotti equation, Ferroelectrics and Piezoelectrics.

Magnetic Properties: Introduction to magnetism, Magnetisation, permeability and susceptibility, Classification of magnetic materials, Domain theory of ferro magnetism, Hysteresis, Applications of magnetic materials.

Learning Outcomes:

- Understand the concept of polarization in dielectric materials.
- Explain various types of polarization of dielectrics and classification of magnetic materials.
- Apply Lorentz field and Claussius- Mosotti relation in dielectrics.
- Analyze the ferromagenetism on the basis of domain theory.
- Evaluate the applications of dielectric and magnetic materials.

TEXT BOOKS:

1. Engineering Physics, B.K. Pandey, S. Chaturvedi - Cengage Learing.
2. Halliday and Resnick, Physics - Wiley.
3. A textbook of Engineering Physics, Dr. M. N. Avadhanulu, Dr. P.G. Kshirsagar - S. Chand

REFERENCES:

1. Richard Robinett, Quantum Mechanics
2. J. Singh, Semiconductor Optoelectronics: Physics and Technology, Mc Graw-Hill inc. (1995).
3. Online Course: “Optoelectronic Materials and Devices” by Monica Katiyar and Deepak Guptha on NPTEL.

2010501: PROGRAMMING FOR PROBLEM SOLVING

MARRI LAXMAN REDDY INSTITUTE OF TECHNOLOGY AND MANAGEMENT

(AUTONOMOUS)

I Year B.Tech. ECE I – Sem. **L T P C**

3 1 0 4

Course Objectives:

- To learn the fundamentals of computers.
- To understand the various steps in program development.
- To learn the syntax and semantics of C programming language.
- To learn the usage of structured programming approach in solving problems.

Course Outcomes:

At the end of this course, students will be able to

- Develop the algorithms and draw flowcharts for solving Mathematical and Understand Engineering problems.
- Identify, compile, and debug C programs fro analyzing the results of applied experiments- give a better statement with same meaning
- Construct programs using decision structures and loops by enabling iteration, ensuring code is executed repeatedly as required.
- List the differences between call by value and call by reference while ensuring appropriate communication between functions.
- Utilize arrays for implementing mathematical vectors, matrices, and other types of rectangular tables.

Unit – I

Introduction to Programming:

Introduction to Computers: disks, primary and secondary memory, processor, operating system, compilers, creating and running of program, Number systems, Pseudo code, algorithm, flowchart.

Introduction to C Programming Language: Basic structure of C program, Syntax and Logical Errors in compilation, 'C' tokens: Identifiers, variables, Data types, Operators(Arithmetic, Relational, Logical, Bit-wise, Increment and Decrement, size of, Conditional operator, Assignment, Special operator), expressions and precedence, Expression evaluation, Precedence and Associativity, type conversion, Command line arguments.

Unit – II

Control Statements, Arrays:

Conditional statements: Writing and evaluation of conditionals and consequent branching with if, if-else, nested if-else and switch statements.

Iterative Statements: while, do-while, for, Nested loops

Jumping Statements: break, continue and goto

I/O: Simple input and output with scanf and printf, formatted I/O, stdin, stdout,stderr.

Arrays: Types of arrays, creating, accessing and manipulating elements of arrays.

Unit – III

Strings, Structures and Unions, Pointers:

Strings: Introduction to strings, handling strings as array of characters, string I/O functions, string handling functions, arrays of strings.

Structures and unions: Defining structures, Initializing structures, Array of structures, nested structures, Bit Fields, unions.

Pointers: Defining pointers, Address and Indirection operators, pointers to arrays and structures, use of pointers in self-referential structures, Enumeration Data types

Unit – IV

Functions and Dynamic Memory Allocation:

Functions: Designing structured programs, Declaring a function, Signature of a function, Parameters and return type of a function, passing parameters to functions, call by value, Passing arrays to functions, call

by reference, void function, Structure to functions, Some C standard functions and libraries, Storage classes (auto, extern, static and register).

Recursion: Simple programs, such as Finding Factorial, Fibonacci series etc., Limitations of Recursive functions.

Dynamic Memory Allocation: Allocating and freeing memory, Allocating memory for arrays of different data types.

Unit – V

Preprocessor and File Handling in C:

Preprocessor: Commonly used Preprocessor commands like include, define, undef, if, ifdef, ifndef.

Files: Text and Binary files, File structure, Creating, Reading and Writing text and binary files, Appending data to existing files, Writing and Reading structures using binary files,File Status functions, File Positioning functions.

TEXT BOOKS:

1. B.A. Forouzan and R.F. Gilberg C Programming and Data Structures, Cengage Learning, (3rdEdition)
2. Let us C by YashavantKanetkar BPB publications (16th Edition)

REFERENCE BOOKS:

1. programming in ANSI C by Balaguruswamy,(7th Edition)
2. Brian W. Kernighan and Dennis M. Ritchie, The C Programming Language, Prentice Hall of India
3. R.G. Dromey, How to solve it by Computer, Pearson (16thImpression)
4. Programming in C, Stephen G. Kochan, Fourth Edition, Pearson Education HerbertSchildt, C: The Complete Reference, McGrawHill, 4th Edition

MARRI LAXMAN REDDY INSTITUTE OF TECHNOLOGY AND MANAGEMENT
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2010071: APPLIED PHYSICS LAB

I Year B.Tech. ECE I – Sem. **L T P C**

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Course Objectives:

- To gain practical knowledge by applying the experimental methods to correlate with the theoretical knowledge of physics concepts.
- To learn the usage of electrical and optical systems for measurements.
- Apply the analytical techniques and graphical analysis to the experimental data.
- To develop intellectual communication skills through discussion on basic principles of scientific concepts in a group.

Course Outcomes:

At the end of this course, students will be able to

- Understand the concepts of the error and its analysis
- Explain the different measuring devices and meters while recording the data with precision.
- Apply the experimental skills for designing new experiments in engineering.
- Analyze the theoretical knowledge and correlate with the experiment.
- Evaluate the various parameters accurately.

List of Experiments:

1. Energy gap of P-N junction diode: To determine the energy gap of a semiconductor diode.
2. Solar Cell: To study the V-I Characteristics of solar cell.
3. Photoelectric effect: To determine work function of a given material.
4. Light emitting diode: Plot V-I and P-I characteristics of light emitting diode.
5. LASER: To study the V-I characteristics of LASER sources.
6. Optical fibre: To determine the Numerical aperture and bending losses of Optical Fibres
7. Stewart – Gee's experiment:
   Determination of magnetic field induction along the axis of a current carrying coil.
8. Hall effect: To determine Hall co-efficient of a given semiconductor.
9. LCR Circuit: To determine the resonance frequency and Quality factor of LCR Circuit.
10. R-C Circuit: To determine the time constant of R-C circuit.

Note: Any 8 experiments are to be performed

MARRI LAXMAN REDDY INSTITUTE OF TECHNOLOGY AND MANAGEMENT
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2010571: PROGRAMMING FOR PROBLEM SOLVING LAB

I Year B.Tech. ECE I – Sem. **L T P C**

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[Note: The programs may be executed using any available Open Source/ Freely available IDE Some of the Tools available are:
Code Lite: https://codelite.org/ Code::Blocks: http://www.codeblocks.org/
DevCpp :http://www.bloodshed.net/devcpp.html Eclipse: http://www.eclipse.org
This list is not exhaustive and is NOT in any order of preference]

Course Objectives: The students will learn the following:

- To work with an IDE to create, edit, compile, run and debug programs
- To analyze the various steps in program development.
- To develop programs to solve basic problems by understanding basic concepts in C like operators, control statements etc.
- To develop modular, reusable and readable C Programs using the concepts like functions, arrays etc.
- To create, read from and write to text and binary files

Course Outcomes:

At the end of this course, students will be able to

- Solve computational problems by integrating variables, operators, conditional statements, and loops for writing functional and efficient programs.
- Debug and optimize programs involving arrays, strings, and pointers for ensuring correctness, efficiency, and minimal memory usage.
- Demonstrate knowledge of file handling in C, including the use of file streams, modes, and operations like reading, writing, and appending.
- Write and execute programs using user-defined functions and improve code reusability.
- Implement sorting algorithms, including both iterative and recursive approaches, for organizing data.

Simple Numeric Problems:

a. Write a program for the simple, compound interest.
b. Write a program for calculating area, perimeter of a rectangle, triangle and square.
c. Write a program for calculating area and perimeter of a circle.
d. Write a program to implement bit-wise operators.
e. Write a program for converting Fahrenheit to Celsius.
f. Write a simple program that converts one given data type to another using auto conversion and casting. Take the values from standard input.
g. Write a simple program to find largest of two and three numbers using conditional operator.
h. Write a program for swapping two numbers with and without using third variable and using bitwise operators.

Condition branching and statements:

a. Write a program for finding largest of three numbers.
b. Write a program that declares Class awarded for a given percentage of marks, where marks<40%= Failed, 40% to <60% = Second class, 60% to <70%=First class, >= 70% = Distinction. Read percentage from standard input.
c. Write a C program to find the roots of a Quadratic equation.
d. Write a C program, 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)

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Condition branching and loops:

a. Write a program to find whether the given number is a prime or not.
b. Write a C program to find the sum of individual digits of a positive integer and test given number is palindrome.
c. Write a program that prints a multiplication table for a given number and the number of rows in the table. For example, number=5 and no. of rows = 3, the output should be:

5 x 1 = 5
5 x 2 =10
5 x 3 =15

d. Write a program that shows the binary equivalent of a given positive number between 0 to255.
e. A Fibonacci sequence is defined as follows: the first and second terms in the sequence are 0 and 1. Subsequent terms are found by adding the preceding two terms in the sequence. Write a C program to generate the first n terms of the sequence.
f. Write a C program to generate all the prime numbers between 1 and n, where n is a value supplied by the user.
g. Write a C program to calculate the following, where x is a fractional value.
$1-x/2+x^2/4-x^3/6$
h. Write a C program to read in two numbers, x and n, and then compute the sum of this geometric progression:$1+x+x^2+x^3+….+x^n$. For example: if n=3 and x=5, then the program compute 1+5+25+125.
i. Write a C program to construct a pyramid of numbers as follows:

```
1          *          1          1          *
1 2        * *        2 3        2 2        * *
1 2 3      * * *      4 5 6      3 3 3      * * *
                                 4 4 4 4    * *
                                            *
```

j. Write a C program to find given number is Armstrong number or not.
k. Write a C program to find given number is Perfect number or not.

Arrays, Strings, Pointers and Structures:

a. Write a C program to find the minimum, maximum and average in an array of integers.
b. Write a program to compute Mean, Variance, Standard Deviation, Sorting of n elements in single dimension array.
c. Write a C program that perform the following:
   i. Addition of Two Matrices
   ii. Multiplication of Two Matrices
   iii. Transpose of a matrix with memory dynamically allocated for the new matrix as row and column counts may not be same.
d. Write a C program that sorts a given array of names.
e. Write a C program that perform the following operations:
   i. To insert a sub-string in to a given main string from a given position.
   ii. To delete n Characters from a given position in a given string.
f. Write a program for reading elements using pointer into array and display the values using array.
g. Write a program for display values reverse order from array using pointer.
h. Write a program through pointer variable to sum of n elements from array.
i. Write a program to implement student information by using structure to function.
j. Write a program to sort student id or name using structures.

Functions:

a. Write a C program to find factorial of a given number using functions.
b. Write a C program to perform swapping using functions.

c. Write a C program to find LCM, GCD of two numbers using functions.
d. Write a C program to implement sorting using functions.
e. Write a C program to create and print two dimensional array using functions.
f. Write a C program to find factorial of a given number using recursion.
g. Write a C program to find Fibonacci series using recursion
h. Write a C program to implement Towers of Hanoi problem using recursion.

Files:

a. Write a C program to display the contents of a file to standard output device.
b. Write a C program which copies one file to another, replacing all lowercase characters with their upper case equivalents.
c. Write a C program to count the occurrence of a character in a text file. The file name and the character are supplied as command line arguments.
d. Write a C program to merge two files into a third file (i.e., the contents of the first file followed by those of the second are put in the third file).

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2010371: Engineering Drawing Practice

I Year B.Tech. ECE I – Sem. **L T P C**

1 0 4 3

Pre-requisites: Knowledge in dimensions and units, Usage of geometrical instruments and analytical ability.

Course Objectives:

- The course is aimed at developing basic graphic skills so as to enable them to use these skills in preparation of engineering drawings, their reading and interpretation.
- To prepare the student to use the technique s, skills, and modern engineering tools necessary for engineering practice.
- To get exposure to a CAD package.

Course Outcomes:

At the end of this course, students will be able to

- Illustrate bureau of Indian standards conventions of engineering drawing with basic concepts, ideas and methodology for different geometries and their execution.
- Apply for the development of multi-view sketches, including additional and sectional views
- Construct parabolic, hyperbolic, and elliptical curves for profiles such as buildings and bridges, and create cycloidal and involute profiles for developing new products like gears and other engineering applications.
- Explain various types of scales for engineering applications like maps, buildings, bridges.
- Explain the concept of projecting solids inclined to both planes for interpreting different views and understanding orthographic projection in solid modeling.

UNIT – I

Introduction To Engineering Drawing: Principles of Engineering Graphics and their Significance-Drawing Instruments and their Uses-Conventions in Drawing-BIS -Lettering and Dimensioning.

Geometrical Constructions: Bisecting a Line, Arc. Dividing A Line into 'N' Equal Parts, Construction of Polygons, Division of Circle into Equal Parts (8 And 12)

Construction of Scales: Plain, Diagonal and Vernier Scale.

Conic Sections: Ellipse, Parabola, Hyperbola and Rectangular Hyperbola- General Methods only.

Engineering Curves: Cycloid, Epicycloid, Hypocycloid

Involutes: For Circle, Triangle, Square, Pentagon and Hexagon.

Learning Outcomes:

- To understand the basic standards, conventions of engineering drawing and how to use the instruments in drawing.
- Learn and draw the various types of curves used in engineering application.

UNIT – II

Orthographic Projections: Principles- Assumptions- Different Angles of Projection.

Projections of Points- orientation in all the quadrants

Projections of Lines- Parallel, Perpendicular, Inclined to one plane and Inclined to both planes.

Projections of Planes: Surface Parallel, Perpendicular, Inclined to one plane and Inclined to both planes.

Learning Outcomes:

- knowledge in various planes of projections
- To draw the front view, top view and side views of the given geometrical elements

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UNIT – III
Projections Of Solids:
Classification of solids- Axis- Parallel, Perpendicular, Inclined to one plane and Inclined to both planes- Prisms, Pyramids, Cylinder and Cone.

Learning Outcomes:
- To understand the various solid types
- To draw all the views of the given solid in all possible orientations.

UNIT – IV
Section Of Solids and Development Of Surfaces
Types of Section Planes, Sectioning Prisms, Pyramids, Cylinders and Cones using various planes. Development of surfaces of right Regular Solids- Parallel Line Method, Radial Line Method.
Learning Outcomes:
- To identify the cut surfaces and represent the sectional views graphically when the solid is sectioned.
- To develop the surfaces of solid using various methods.

UNIT – V
Isometric Projections and Perspective Projections
Principles, Isometric Views of Planes, Solids- Box Method, Offset Method, Compound solids, Sectioned Solids.
Conversion of Isometric to Multi view projection. And vice versa.

Learning Outcomes:
- Knowledge in principles of isometric projection
- Conversion of isometric to orthographic and vice-versa.
- To use the computer as tool in drafting.
- Using CAD in drawing the isometric and orthographic views of the given object.

TEXT BOOKS:
1. N.D.Bhatt, Elementary Engineering Drawing, Charotar Publishers,2012.
2. Basanth Agrawal and C M Agrawal –Engineering Drawing 2nd Edition -McGraw-Hill Education(India) Pvt.Ltd.

REFERENCE BOOKS:
1. Engineering graphics with Auto CAD- R.B. Choudary/Anuradha Publishers
2. Engineering Drawing- Johle/Tata Macgraw Hill.
3. K.Veenugopal, –Engineering Drawing and Graphics + Autocad New Age International Pvt.Ltd, 2011.

I-II

MARRI LAXMAN REDDY INSTITUTE OF TECHNOLOGY AND MANAGEMENT
(AUTONOMOUS)

2020002: ENGINEERING MATHEMATICS - II

I Year B.Tech. ECE II – Sem. **L T P C**

3 1 0 4

Pre-requisites: Nil

Course Objectives:

- Methods of solving the differential equations of 1st and higher order.
- The applications of the differential equations to Newton's law of cooling, Natural growth and decay, etc.
- Concept of Sequence and nature of the series.
- The physical quantities involved in engineering field related to vector valued functions
- The basic properties of vector valued functions and their applications to line, surface and volume integrals.

Course Outcomes:

At the end of this course, students will be able to

- Utilize the methods of differential equations for solving Newton's law of cooling, Law of Natural growth and decay.
- Understand the solutions of linear differential equations with constant coefficients.
- Classify the sequences and series based on their convergence properties.
- Interpret the vector differential operators and their relationships for solving engineering problems.
- Apply the integral transformations to surface, volume and line of different geometrical models.

UNIT– I

First Order and First-Degree ODE and its Applications:

Exact, linear and Bernoulli's equations; Applications: Newton's law of cooling, Law of natural growth and decay. Equations not of first degree: equations solvable for p, equations solvable for y, equations solvable for x and Clairaut's type.

Learning Outcomes: At the end of this unit, the student will be able to

- Identify whether the given differential equation of first order is exact or not.
- Apply the concept of differential equation to real world problems.
- Understand the concepts of linear and Nonlinear differential equations.
- Analyze Exact and Non-Exact differential equations.
- Explain formation of differential equations, Homogeneous equations.

UNIT – II

Higher Order Linear Differential equations: Linear differential equations of second and higher order with constant coefficients, RHS term of the type e^{ax}, Sin ax, Cos ax, and x^n , e^{ax} V(x), x^n V(x), method of variation of parameters; Equations reducible to linear ODE with constant coefficients: Legendre's equation, Cauchy-Euler equation.

Learning Outcomes: At the end of this unit, the student will be able to

- Identify essential characteristics of linear differential equations with constant coefficients.
- Apply higher order DE's for solving some real-world problems.
- Understand the differential equations with constant coefficients by appropriate method.
- Analyze Legendre's equation and Cauchy-Euler equation.
- Explain Method of variation of parameters.

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UNIT – III

Sequences & Series: Sequence: Definition of a Sequence, limit; Convergent, Divergent and Oscillatory sequences. Series: Convergent, Divergent and Oscillatory Series; Series of positive terms; Comparison test, p-test, D-Alembert's ratio test; Raabe's test, logarithmic test; Cauchy's Integral test; Cauchy's root test; Alternating series: Leibnitz test; Alternating Convergent series: Absolute and Conditionally Convergence.

Learning Outcomes: At the end of this unit, the student will be able to

- Identify the Sequence, types of sequences.
- Apply the concept of sequence and series to real world problems.
- Understand the logical knowledge of forming the series.
- Analyze the nature of sequence and series.
- Explain Alternating series.

UNIT – IV

Vector Differential Calculus: Vector point functions and scalar point functions. Gradient, Divergence and Curl. Directional derivatives. Solenoidal and Irrotational vectors, Scalar potential functions. Vector Identities.

Learning Outcomes: At the end of this unit, the student will be able to

- Identify scalar and vector point functions.
- Apply Del to scalar and vector point functions.
- Understand the concepts of Solenoidal and irrotational vectors.
- Analyze the physical interpretation of Gradient, Divergence and curl.
- Explain vector identities

UNIT – V

Vector Integral Calculus: Line Integral-Work done, Surface Integrals-Flux of a vector valued function and Volume Integrals. Theorems of Green, Gauss and Stokes (without proofs) and their applications.

Learning Outcomes: At the end of this unit, the student will be able to

- Identify the work done in moving a particle along the path over a force field.
- Apply Greens, Stokes and Divergence theorems in evaluation of double and triple integrals.
- Understand the concepts of Line Integral.
- Analyze the Flux of a vector valued function.
- Explain Vector valued theorems to real world problems.

TEXT BOOKS:

1. B.S. Grewal, "Higher Engineering Mathematics," Khanna Publishers, 36th Edition, 2010
2. Erwin kreyszig, "Advanced Engineering Mathematics," 9th Edition, John Wiley & Sons,2006
3. G.B. Thomas and R.L. Finney, "Calculus and Analytic geometry," 9thEdition, Pearson, Reprint, 2002.

REFERENCES:

1. Paras Ram, "Engineering Mathematics," 2nd Edition, CBS Publishes
2. S. L. Ross, "Differential Equations," 3rd Ed., Wiley India, 1984.

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2020008: ENGINEERING CHEMISTRY

I Year B.Tech. ECE II – Sem. **L T P C**

3 1 0 4

Pre-requisites: Nil

Course Objectives:

- To bring adaptability to the concepts of chemistry and to acquire the required skills to become a perfect engineer.
- To impart the basic knowledge of atomic, molecular and electronic modifications which makes the student to understand the technology based on them.
- To acquire the knowledge of electrochemistry, corrosion and water treatment which are essential for the Engineers and in industry
- To acquire the skills pertaining to spectroscopy and to apply them for medical and other fields.
- To impart the knowledge of stereochemistry and synthetic aspects useful for understanding reaction pathways

Course Outcomes:

At the end of this course, students will be able to

- Relate microscopic chemistry in terms of atomic, molecular orbitals and intermolecular forces.
- Interpret how the ion exchange process is used to soften water.
- Explain the various factors that affect corrosion.
- Compare the processes involved in synthesising aspirin and paracetamol.
- Make use of the concepts of nuclear magnetic resonance spectroscopy for solving real-world Problems.

UNIT– I

Molecular Structure and Theories of Bonding: Atomic and Molecular orbitals / Introduction of VBT. Linear Combination of Atomic Orbitals (LCAO), molecular orbitals of diatomic molecules, molecular orbital energy level diagrams of N2, O2 and CO molecules. π molecular orbitals of 1,3-butadiene. Crystal Field Theory (CFT): Salient Features of CFT – Crystal Field Splitting of transition metal ion d- orbitals in tetrahedral, octahedral and square planar geometries. Applications of CFT. Band structure of solids and effect of doping on conductance.

Learning Outcomes: At the end of this unit, the student will be able to

- Understand the Schrodinger wave equation to hydrogen and particle in a box.
- Explain the molecular orbital energy level diagram of different molecular species.
- Apply the band theory of solids for conductors, semiconductors and insulators.
- Analyze discuss the magnetic behavior and colour of complexes.
- Evaluate the Crystal Field theory and Splitting of d- orbital's

UNIT – II

Water and its Treatment: Introduction – hardness of water – Causes of hardness - Types of hardness: temporary and permanent – expression and units of hardness – Estimation of hardness of water by complexometric method, Numerical Problems on hardness of water. Potable water and its specifications. Steps involved in treatment of water – Disinfection of water by chlorination and ozonization. Boiler troubles-scale and sludge, caustic embrittlement, priming and foaming. Boiler feed water and its treatment – Calgon conditioning, Phosphate conditioning and colloidal conditioning. External treatment of water – Ion exchange process. Desalination of water – Reverse osmosis.

Learning Outcomes: At the end of this unit, the student will be able to

- Understand the differences between temporary and permanent hardness of water.

- Explain the principles of reverse osmosis and Ion-Exchange processes.
- Apply the drinking water with BIS and WHO standards.
- Analyze problems associated with hard water - scale and sludge.
- Evaluate the Internal and external treatment of water.

UNIT – III

Electrochemistry and corrosion: Electro chemical cells – electrode potential, standard electrode potential, types of electrodes – calomel, Quinhydrone and glass electrode. Nernst equation Determination of pH of a solution by using glass electrode. Electrochemical series and its applications. Numerical problems. Potentiometric titrations. Batteries – primary (Lithium cell) and secondary batteries (Lead – acid storage battery and Lithium-ion battery).

Causes and effects of corrosion – theories of chemical and electrochemical corrosion – mechanism of electrochemical corrosion, Types of corrosion: Galvanic, water-line and pitting corrosion. Factors affecting rate of corrosion, Corrosion control methods- Proper Design, Cathodic protection – Sacrificial anode and impressed current cathodic methods. Surface coatings – metallic coatings – methods of application. Electroplating and electroless plating of Nickel.

Learning Outcomes: At the end of this unit, the student will be able to

- Understand the Nernst equation for calculating electrode and cell potentials.
- Explain the corrosion prevention methods and factors affecting corrosion.
- Apply the Pilling Bed worth rule for corrosion and corrosion prevention.
- Analyze the Dry and Wet corrosion and its Mechanism.
- Evaluate the Corrosion control methods

UNIT – IV

Stereochemistry, Reaction Mechanism and synthesis of drug molecules: Introduction to representation of 3-dimensional structures, Structural and stereoisomers, symmetry and chirality. Enantiomers, diastereomers, optical activity and configurational nomenclatures (D,L and R,S configurations) Conformational analysis of n- butane.

Substitution reactions: Nucleophilic substitution reactions: Mechanism of SN1, SN2 reactions. Electrophilic and nucleophilic addition reactions: Addition of HBr to propene. Markownikoff and anti Markownikoff's additions. Grignard additions on carbonyl compounds. Elimination reactions: Dehydro halogenation of alkylhalides. Saytzeff rule. Oxidation reactions: Oxidation of alcohols using KMnO4.Reduction reactions: reduction of carbonyl compounds using LiAlH4.Structure, synthesis and pharmaceutical applications of Paracetamol and Aspirin.

Learning Outcomes: At the end of this unit, the student will be able to

- Understand the 3-dimension structures of organic chemistry
- Explain the symmetry, chirality of the organic molecule
- Apply the Markownikoff and anti Markownikoff's additions; Grignard additions conformations of n-butane
- Analyze the reaction mechanism of different compounds.
- Evaluate the synthesis of aspirin, paracetamol

UNIT – V

Spectroscopic techniques and applications: Principles of spectroscopy, selection rules and applications of electronic spectroscopy and IR Spectroscopy. Basic concepts of Nuclear magnetic resonance Spectroscopy, chemical shift, spin-spin splitting Introduction to Magnetic resonance imaging.

Learning Outcomes: At the end of this unit, the student will be able to

- Understand the. Principles of. spectroscopy and its selection rules
- Explain the concepts of nuclear magnetic resonance spectroscopy
- Apply the chemical shift values for the different compounds
- Analyze the different structures of organic compound

- Evaluate the vibrational and rotational spectroscopy

TEXT BOOKS:

1. P.C.Jain & M.Jain, “Engineering Chemistry,” Dhanpat Rai Publishing Company (P) Ltd., New Delhi.
2. Jaya Shree Anireddy “Engineering chemistry” Wiley Publications.
3. Prasanth Rath,B.Rama Devi and Ch.Venkata Ramana Reddy, “Engineering Chemistry,” Cengage Publication 2019.

REFERENCES:

1. Morrison and Boyd, “Organic reaction Mechanism”.
2. C.N.Banwell, “Fundamentals of Molecular Spectroscopy”
3. J.D.Lee, “Inorganic Chemistry”

MARRI LAXMAN REDDY INSTITUTE OF TECHNOLOGY AND MANAGEMENT
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2020009: COMMUNICATIVE ENGLISH

I Year B.Tech. ECE II – Sem. **L T P C**

2 0 0 2

Pre-requisites: Nil

Course Objectives:

- Improve language proficiency with emphasis on Vocabulary, Grammar, Reading and Writing skills.
- Apply the theoretical and practical components of English syllabus to study academic subjects more effectively and critically.
- Analyze a variety of texts and interpret them to demonstrate in writing or speech.
- Write clearly and creatively, and adjust writing style appropriately to the content, the context, and nature of the subject.
- Develop language components to communicate effectively in formal and informal situations.

Course Outcomes:

At the end of this course, students will be able to

- Use English Language effectively in spoken and written forms.
- Comprehend the given texts and respond appropriately.
- Communicate confidently in various contexts in their profession.
- Acquire basic proficiency in English including LSRW skills.
- Recognize and apply basic grammar rules and incorporate sentence variety for improving
- Writing skills.

UNIT– I

'The Raman Effect' from the prescribed textbook 'English for Engineers' published by Cambridge University Press

Vocabulary Building: The Concept of Word Formation --The Use of Prefixes and Suffixes.
Grammar: Common Errors: Articles and Prepositions.
Reading: Reading and Its Importance- Techniques for Effective Reading.
Basic Writing Skills: Sentence Structures -Use of Phrases and Clauses in Sentences- Importance of Proper Punctuation- Techniques for writing precisely – **Paragraph writing** – Types, Structures and Features of a Paragraph - Creating Coherence-Organizing Principles of Paragraphs in Documents.

Learning Outcomes: At the end of this unit, the student will be able to

- Understand the concept of word formation, root words and their usage in English.
- Know the types of sentences and analyze the sentence structure
- Use articles and prepositions appropriately
- Use punctuation marks correctly in writing
- Understand the techniques of effective reading
- Write paragraphs effectively

UNIT – II

Writing Skills.
Vocabulary: Synonyms and Antonyms.
Grammar: Identifying Common Errors in Writing with Reference to Noun-pronoun Agreement and Subject-verb Agreement.
Reading: Improving Comprehension Skills – Techniques for Good Comprehension
Writing: Format of a Formal Letter-**Writing Formal Letters** E.g.., Letter of Complaint, Letter of Requisition, and Job Application with Resume.

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Learning Outcomes: At the end of this unit, the student will be able to

Enrich their vocabulary using synonyms and antonyms

- Noun, pronoun and subject verb agreement accurately
- Understand the techniques of reading comprehension
- Write formal letters in various context

UNIT – III

'Blue Jeans' from the prescribed textbook 'English for Engineers' published by Cambridge University Press

Vocabulary: Acquaintance with Prefixes and Suffixes from Foreign Languages in English to form Derivatives-Words from Foreign Languages and their Use in English.
Grammar: Identifying Common Errors in Writing with Reference to Misplaced Modifiers and Tenses.
Reading: Sub-skills of Reading- Skimming and Scanning.
Writing: Nature and Style of Sensible Writing- **Defining- Describing** Objects, Places and Events – **Classifying**- Providing Examples or Evidence.

Learning Outcomes: At the end of this unit, the student will be able to

- Use Prefixes and Suffixes from Foreign Languages in English
- Understand the use misplaced modifiers and uses of tenses
- Skim and scan the given text appropriately
- Write definitions, descriptions and classifications

UNIT – IV

'What Should You Be Eating' from the prescribed textbook 'English for Engineers' published by Cambridge University Press.

Vocabulary: Standard Abbreviations in English
Grammar: Redundancies and Clichés in Oral and Written Communication.
Reading: Comprehension**-** Intensive Reading and Extensive Reading
Writing: Writing Practices--Writing Introduction and Conclusion - Essay Writing-Précis Writing.

Learning Outcomes: At the end of this unit, the student will be able to

- understand the importance of food pyramid in your daily life.
- explain the Active and passive Voice Subject Verb Agreement (Concord)
- apply the One word Substitutes in your every day vocabulary.
- analyze the Intensive and Extensive reading skills.
- evaluate the importance of Technical Report Writing, and E-mail writing.

UNIT – V

'How a Chinese Billionaire Built Her Fortune' from the prescribed textbook 'English for Engineers' published by Cambridge University Press.

Vocabulary: Technical Vocabulary and their usage
Grammar: Common Errors in English
Reading: Reading Comprehension-Exercises for Practice
Writing: Technical Reports- Introduction – Characteristics of a Report – Categories of Reports Formats- Structure of Reports (Manuscript Format) -Types of Reports - Writing a Report.

Learning Outcomes: At the end of this unit, the student will be able to

- Understand the Technical Vocabulary and their Usage.
- Avoid common errors in English
- Read any text using the sub skills of reading
- Write technical reports using manual script format.

TEXT BOOKS:

1. Sudarshan, N. P. and Savitha, C. "English for Engineers", Cambridge University Press, 2018.
2. Wren & Martin. "High School English Grammar and Composition" Book, S Chand Publishing, 2017.

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REFERENCES:

1. Murphy, R. (2015). “Essential Grammar in Use.” Cambridge University Press.
2. R. P Sinha, “Current English Grammar and Usage with Composition”
3. Wood, F.T. “Remedial English Grammar.” Macmillan. 2007
4. Swan, M. “Practical English Usage.” Oxford University Press, 2016
5. Exercises in Spoken English. Parts I –III. CIEFL, Hyderabad. Oxford University Press.

MARRI LAXMAN REDDY INSTITUTE OF TECHNOLOGY AND MANAGEMENT
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2020502: DATA STRUCTURES

I Year B.Tech. ECE II – Sem. **L T P C**

3 0 0 3

Course Objectives:

- Exploring basic data structures such as linked list, stacks and queues.
- Describes searching and sorting techniques.
- Introduces trees and graphs.

Course Outcomes:

At the end of this unit, the student will be able to

- Identify appropriate searching technique for efficient retrieval of data stored location
- Select a sorting technique for organizing data in a specified format, optimizing data search efficiency.
- Make use of stacks and queues representation, operations and their applications in data organization
- Construct a tree for performing various traversal techniques.
- Select appropriate graph traversal techniques for visiting the vertices of a graph.

UNIT - I

Introduction to Data Structures, Linear list – singly linked list, Doubly linked list, Circular linked list - operations and its applications

UNIT-II

Stacks- Introduction, Operations, array and linked representations of stacks, stack applications (Infix to postfix conversion and postfix evaluation), Queues-Introduction, operations, array and linked representations of queues and its applications.

UNIT - III

Searching: Linear Search and Binary Search and its applications.
Sorting: Bubble sort, Selection sort, Insertion sort, Merge sort, Quick sort and its applications.

UNIT-IV

Trees - Introduction, Types of trees, Binary tree, recursive and non- recursive Traversals of Binary Tree, Binary search tree- Operations and its applications.

UNIT - V

Graphs: Introduction, Types of graphs, Representation of graphs, Graph Traversal Methods, comparison between trees and graphs and its applications.

TEXT BOOKS:

1. Fundamentals of data structures in C, E.Horowitz, S.Sahni and Susan Anderson Freed, 2nd Edition, Universities Press.
2. Data structures using C, A.S.Tanenbaum, Y. Langsam, and M.J. Augenstein, PHI/pearson education.

REFERENCES:

1. Data structures: A Pseudocode Approach with C, R.F.Gilberg And B.A.Forouzan, 2nd Edition, Cengage Learning.
2. Introduction to data structures in C, Ashok Kamthane, 1st Edition, Pearson.

MARRI LAXMAN REDDY INSTITUTE OF TECHNOLOGY AND MANAGEMENT
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2020073: ENGINEERING CHEMISTRY LABORATORY

I Year B.Tech. ECE II – Sem. **L T P C**

0 0 2 1

Course Objectives:

- Estimation of hardness and chloride content in water to check its suitability for drinking purpose.
- To determine the rate constant of reactions from concentrations as an function of time.
- The measurement of physical properties like adsorption and viscosity.
    - To synthesize the drug molecules and check the purity of organic molecules by thin layer chromatographic (TLC) technique.

Course Outcomes:

At the end of the laboratory work, students will be able to

- Determination of parameters like hardness of water by complexometric method and estimate the given Fe amount by volumetric analysis.
- Understand the methods such as conductometry, potentiometry for finding the concentrations or equivalence points of acids and bases.
- Determination of rate constant of acid-catalysed hydrolysis of methyl acetate, Synthesis of aspirin and paracetamol
- Estimate the viscosity of lubricant oils, understand its properties for the proper lubrication of machinery in industries.
- Calculate the Rf values for ortho and para-nitrophenols

List of Experiments/Demonstrations:

1. Determination of total hardness of water by complexometric method using EDTA
2. Determination of chloride content of water by Argentometry

Conductometric titrations

3. Strong acid vs strong base
4. Weak acid vs strong base

Potentiometric titrations

5. Strong acid vs strong base
6. Redox titration: -Fe2+ using KMnO4
7. Determination of rate constant of acid catalyzed hydrolysis of methyl acetate
8. Synthesis of Aspirin and Paracetamol
9. Thin layer chromatography- calculation of Rf values. eg: ortho and para nitro phenols
10. Determination of acid value of coconut oil
11. Determination of viscosity of castor oil and ground nut oil by using Ostwald's viscometer.
12. Determination of surface tension of a give liquid using stalagmometer

REFERENCES:

1. Senior practical physical chemistry, B.D. Khosla, A. Gulati and V. Garg (R. Chand & Co., Delhi)
2. An introduction to practical chemistry, K.K. Sharma and D. S. Sharma (Vikas publishing, N. Delhi)
3. Vogel's text book of practical organic chemistry 5th edition
4. Text book on Experiments and calculations in Engineering chemistry – S.S. Dara

MARRI LAXMAN REDDY INSTITUTE OF TECHNOLOGY AND MANAGEMENT
(AUTONOMOUS)

2020074: COMMUNICATIVE ENGLISH LANGUAGE LABORATORY

I Year B.Tech. ECE II – Sem. **L T P C**

0 0 2 1

The Communicative English Language Lab focuses on the production and practice of sounds of language and familiarizes the students with the use of English in everyday situations both in formal and informal contexts.

Course Objectives:

- Facilitate computer-assisted multi-media instruction enabling individualized and independent language learning.
- Enhance English language skills, communication skills and to practice soft skills.
- Improve fluency and pronunciation intelligibility by providing an opportunity for practice in speaking.
- Train students in different interview and public speaking skills such as JAM, debate, role
- play, group discussion etc.
- Instill confidence and make them competent enough to express fluently and neutralize their mother tongue influence.

Course Outcomes:

At the end of this unit, the student will be able to

- Understand the nuances of the English language through audio-visual experiences.
- Apply strategies for neutralizing accents, ensuring clarity in communication.
- Interpret and contribute in group discussions, enhancing speaking skills with clarity and confidence, thereby improving employability prospects.
- Demonstrate effective communication skills in diverse public and interpersonal settings.
- Build confidence and apply techniques for fluent expression while minimizing the influence of the mother tongue.

Communicative English Language Lab (CELL) shall have two parts:

a. Computer Assisted Language Learning (CALL) Lab
b. Interactive Communication Skills (ICS) Lab

Listening Skills
Objectives

a. Enable students develop their listening skills to appreciate its role in the LSRW skills approach to language and improve their pronunciation.
b. Equip students with necessary training in listening so that they can comprehend the speech of people of different backgrounds and regions.

Students should be given practice in listening to the sounds of the language, to be able to recognize them and find the distinction between different sounds, to be able to mark stress and recognize and use the right intonation in sentences.

- Listening for general content
- Listening to fill up information
- Intensive listening
- Listening for specific information

Speaking Skills
Objectives

a. Involve students in speaking activities in various contexts.
b. Enable students express themselves fluently and appropriately in social and professional contexts.

- Oral practice: Just A Minute (JAM) Sessions
- Describing objects/situations/people

- Role play – Individual/Group activities
- Group Discussions
- Debate

Exercise – I
CALL Lab: *Understand:* Listening Skill- Its importance – Purpose- Process- Types- Barriers of Listening. *Practice*: Introduction to Phonetics – Speech Sounds – Vowels and Consonants.
ICS Lab: *Understand:* Communication at Work Place- Spoken vs. Written language. *Practice:* Ice-Breaking Activity and JAM Session- Situational Dialogues – Greetings – Taking Leave – Introducing Oneself and Others.

Exercise – II
CALL Lab: *Understand:* Structure of Syllables – Word Stress and Rhythm– Weak Forms and Strong Forms in Context. *Practice:* Basic Rules of Word Accent - Stress Shift - Weak Forms and Strong Forms in Context.
ICS Lab: *Understand:* Features of Good Conversation – Non-verbal Communication. *Practice:* Situational Dialogues – Role-Play- Expressions in Various Situations –Making Requests and Seeking Permissions - Telephone Etiquette.

Exercise - III
CALL Lab: *Understand:* Intonation-Errors in Pronunciation-the Influence of Mother Tongue (MTI). *Practice:* Common Indian Variants in Pronunciation – Differences in British and American Pronunciation.
ICS Lab: *Understand:* How to make Formal Presentations. *Practice:* Formal Presentations.

Exercise – IV
CALL Lab: *Understand:* Listening for General Details. *Practice:* Listening Comprehension Tests.
ICS Lab: *Understand:* Public Speaking – Exposure to Structured Talks. *Practice:* Making a Short Speech – Extempore.

Exercise – V
CALL Lab: *Understand:* Listening for Specific Details. *Practice:* Listening Comprehension Tests.
ICS Lab: *Understand:* Interview Skills. *Practice:* Mock Interviews.

REFERENCES:
1. Kumar, S. & Lata, P. (2011). Communication Skills. Oxford University Press.
2. Balasubramanian, T. (2008). A Text book of English Phonetics for Indian Students, Macmillan.
3. Thorpe, E. (2006). Winning at Interviews, Pearson Education.
4. Sethi, J. et al. (2005). A Practical Course in English Pronunciation (with CD), PHI.

MARRI LAXMAN REDDY INSTITUTE OF TECHNOLOGY AND MANAGEMENT
(AUTONOMOUS)

2020572: DATA STRUCTURES LABORATORY

I Year B.Tech. ECE II – Sem. **L T P C**

0 0 2 1

Prerequisites: A Course on “Programming for problem solving”

Course Objectives

- It covers various concepts of C programming language
- It introduces searching and sorting algorithms
- It provides an understanding of data structures such as stacks and queues.

Course Outcomes

- Identify appropriate searching technique for efficient retrieval of data stored location
- Choose a sorting technique that represents data in a specified format, optimizing data search efficiency.
- Utilize stacks and queues for data representation, performing operations, and organizing specified data.
- Construct a tree for performing various traversal techniques.
- Select appropriate graph traversal techniques for visiting the vertices of a graph.

List of Experiments

1. Write a program that uses functions to perform the following operations on singly linked list.: i) Creation ii) Insertion iii) Deletion iv) Traversal
2. Write a program that uses functions to perform the following operations on doubly linked list.: i) Creation ii) Insertion iii) Deletion
3. Write a program that uses functions to perform the following operations on circular linked list: i) Creation ii) Insertion iii) Deletion
4. Write a program that implement stack operations using i) Arrays ii) Pointers
5. Write a c program to implement infix to postfix conversion using stack.
6. Write a c program to implement postfix evaluation.
7. Write a program that implement Queue operations using i) Arrays ii) Pointers
8. Write a program that implements the following sorting methods to sort a given list of integers in ascending order i) Bubble sort ii) Selection sort iii) Insertion sort
9. Write a program that implements the following sorting methods to sort a given list of integers in ascending order i) Merge sort ii) Quick sort
10. Write a program that use both recursive and non-recursive functions to perform the following searching operations for a Key value in a given list of integers: i) Linear search ii) Binary search
11. Write a program to implement the tree traversal methods using both recursive and non-recursive.
12. Write a program to implement the graph traversal methods.

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2020372: ENGINEERING WORK SHOP

I Year B.Tech. ECE II – Sem. **L T P C**

1 0 3 2.5

Course Objectives:

- To Study of different hand operated power tools, uses and their demonstration.
- To gain a good basic working knowledge required for the production of various engineering products.
- To provide hands on experience about use of different engineering materials, tools, equipment's and processes those are common in the engineering field.
- To develop a right attitude, team working, precision and safety at work place.
- It explains the construction, function, use and application of different working tools, Equipment and machines

Course Outcomes:

At the end of the laboratory work, students will be able to

- Demonstrate proficiency in using hand tools commonly used in carpentry while working from drawings and blueprints
- Evaluate the ability in producing fitting jobs as per specified dimensions with hand tools commonly used in fitting.
- Create metal art using fire and furnace, transforming raw materials into usable elements through basic blacksmith techniques.
- Organisze the moulding techniques for producing casting of different and complex shapes using various patterns.
- Develop various engineering and household articles such as tin boxes, cans, funnels, ducts etc., from a flat sheet of metal.

UNIT– I

Carpentry-Introduction, Carpentry tools, sequence of operations, Trade importance, advantages, disadvantages and applications.

Fitting-Introduction, fitting tools, sequence of operations, Trade importance, advantages, disadvantages and applications.

Learning Outcomes: At the end of this unit, the student will be able to

- Understand the trade of carpentry and fitting.
- Explain the tools involved in manufacturing operations.
- Evaluate the applications of carpentry and fitting.

UNIT – II

Tin-Smithy-Introduction, Tin smithy tools, sequence of operations, Trade importance, advantages, disadvantages and applications

Black smithy-Introduction, Black smithy tools, sequence of operations, Trade importance, advantages, disadvantages and applications

Learning Outcomes: At the end of this unit, the student will be able to

- Understand the oldest manufacturing methods
- Describe the sequence of operations involved.
- Explain the safety precautions and tools usage.

UNIT – III

House-wiring-Introduction, Electrical wiring tools, sequence of operations and applications (Parallel & Series, Two-way Switch and Tube Light).

Welding Practice - Introduction, electrode, welding tools, and sequence of operations,

advantages and applications (Arc Welding & Gas Welding).

Learning Outcomes: At the end of this unit, the student will be able to

- Discuss the topic of Heat engines.
- Identify types of Heat engines cycles.
- Evaluate the Factors affecting routing procedure, Route Sheet.

List of Experiments/Demonstrations:

1. Carpentry
2. Fitting
3. House Wiring
4. Tin smithy
5. Black smithy
6. Welding
7. Foundry

TRADES FOR DEMONSTRATION & EXPOSURE:

1. Plumbing
2. Metal Cutting (Water Plasma), Power
3. Tools In Construction And Wood Working

TEXT BOOKS:

1. Workshop Practice /B. L. Juneja / Cengage
2. Workshop Manual / K. Venugopal / Anuradha

REFERENCES:

1. Work shop Manual – P. Kannaiah/ K. L. Narayana/ SciTech
2. Workshop Manual / Venkat Reddy/ BSP

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2020321: ENVIRONMENTAL SCIENCE
(MANDATORY COURSE)

I Year B.Tech. ECE II – Sem. **L T P C**

3 0 0 0

Course Objectives:
- Understanding the importance of ecological balance for sustainable development.
- Understanding the impacts of developmental activities and mitigation measures.
- Understanding the environmental policies and regulations

Course Outcomes:
At the end of this course, students will be able to
- Illustrate the role of ecosystems in sustaining life on Earth and their contribution toward environmental stability.
- Summarize the role of environmental regulations in achieving sustainable development goals (SDGs).
- Organize the key characteristics of renewable and non-renewable resources and their contribution in functioning of ecosystems.
- Interpret how environmental regulations help decision-makers consider environmental factors in developing activities.
- Identify the role of aesthetic, social and ethical values in environmental design.

UNIT– I

Ecosystems: Definition, Scope, and Importance of ecosystem. Classification, structure, and function of an ecosystem, Food chains, food webs, and ecological pyramids. Flow of energy, Biogeochemical cycles, Bioaccumulation, Biomagnification, ecosystem value, services and carrying capacity, Field visits.

UNIT-II

Natural Resources: Classification of Resources: Living and Non-Living resources, **water resources:** use and over utilization of surface and ground water, floods and droughts, Dams: benefits and problems. **Mineral resources:** use and exploitation, environmental effects of extracting and using mineral resources, **Land resources:** Forest resources, **Energy resources:** growing energy needs, renewable and non renewable energy sources, use of alternate energy source, case studies.

UNIT-III

Biodiversity And Biotic Resources: Introduction, Definition, genetic, species and ecosystem diversity. Value of biodiversity; consumptive use, productive use, social, ethical, aesthetic and optional values. India as a mega diversity nation, Hot spots of biodiversity. Field visit. Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts; conservation of biodiversity: In-Situ and Ex-situ conservation. National Biodiversity act.

UNIT-IV

Environmental Pollution and Control Technologies: Environmental Pollution: Classification of pollution, **Air Pollution:** Primary and secondary pollutants, Automobile and Industrial pollution, Ambient air quality standards. **Water pollution:** Sources and types of pollution, drinking water quality standards. **Soil Pollution:** Sources and types, Impacts of modern agriculture, degradation of soil. **Noise Pollution:** Sources and Health hazards, standards, **Solid waste:** Municipal Solid Waste management, composition and characteristics of e-Waste and its management. **Pollution control technologies:** Wastewater Treatment methods: Primary, secondary and Tertiary.

Overview of air pollution control technologies, Concepts of bioremediation. **Global Environmental Issues and Global Efforts: C**limate change and impacts on human environment. Ozone depletion and Ozone depleting substances (ODS). Deforestation and desertification. International conventions / Protocols: Earth summit, Kyoto protocol, and Montréal Protocol. NAPCC-GoI Initiatives.

UNIT-V

Environmental Policy, Legislation & EIA: Environmental Protection act, Legal aspects Air Act- 1981, Water Act, Forest Act, Wild life Act, Municipal solid waste management and handling rules, biomedical waste management and handling rules, hazardous waste management and handling rules. EIA: EIA structure, methods of baseline data acquisition. Overview on Impacts of air, water, biological and Socio-economical aspects. Strategies for risk assessment, Concepts of Environmental Management Plan (EMP). **Towards Sustainable Future:** Concept of Sustainable Development Goals, Population and its explosion, Crazy Consumerism, Environmental Education, Urban Sprawl, Human health, Environmental Ethics, Concept of Green Building, Ecological Foot Print, Life Cycle assessment (LCA), Low carbon lifestyle.

TEXT BOOKS:

1. Textbook of Environmental Studies for Undergraduate Courses by Erach Bharucha for University Grants Commission.
2. Environmental Studies by R. Rajagopalan, Oxford University Press.

REFERENCES:

1. Environmental Science: towards a sustainable future by Richard T. Wright. 2008 PHL Learning Private Ltd. New Delhi.
2. Environmental Engineering and science by Gilbert M. Masters and Wendell P. Ela. 2008 PHI Learning Pvt.Ltd.
3. Environmental Science by Daniel B. Botkin & Edward A. Keller, Wiley INDIA edition.
4. Environmental Studies by Anubha Kaushik, 4th Edition, New age international publishers.
5. Text book of Environmental Science and Technology - Dr. M. Anji Reddy 2007, BS Publications.
6. Introduction to Environmental Science by Y. Anjaneyulu, BS.Publications.

II-I

MARRI LAXMAN REDDY INSTITUTE OF TECHNOLOGY AND MANAGEMENT

(AUTONOMOUS)

2030003: LAPLACE TRANSFORMS, SERIES SOLUTIONS AND COMPLEX VARIABLES

II Year B.Tech. ECE I – Sem. **L T P C**

3 1 0 4

Course Objectives:

- To understand the basic theory of complex functions to express the power series
- To evaluate the contour integration using Cauchy residue theorem
- Solving ordinary differential equations using Laplace transforms techniques

Course Outcomes:

At the end of this course, students will be able to

- Apply the Laplace Transform and its Inverse in solving Differential Equations and Evaluate Integrals.
- Analyze and Represent Periodic Functions Using Fourier Series.
- Solve Ordinary Differential Equations Using Series Solutions and Apply Bessel Functions.
- Analyze and Solve Complex Functions Using Differentiation and Analyticity Conditions.
- Apply complex integration techniques for analyzing analytic functions and solving contour integrals.

UNIT– I

Laplace Transforms: Laplace Transform of standard functions; first shifting theorem; Laplace transforms of functions when they are multiplied and divided by‘t’. Laplace transforms of derivatives and integrals of function; Evaluation of integrals by Laplace transforms; Laplace transforms of Special functions; Laplace transform of periodic functions. Inverse Laplace transform by different methods, convolution theorem (without Proof), solving ODEs by Laplace Transform method.

Learning Outcomes: At the end of this unit, the student will be able to

- Understand the concept of transformations.
- Analyze the Laplace transforms of various functions
- Explain the Laplace Transform of periodic functions.
- Evaluate the integrals by Laplace Transforms.
- Apply Laplace Transforms to solve the ordinary differential Equations.

UNIT – II

FOURIER SERIES: Introduction, Periodic functions, Fourier series of Periodic functions, Dirichlet’s conditions, Even and Odd Functions, Change of interval, Half range Fourier sine and cosine series.

Learning Outcomes: At the end of this unit, the student will be able to

- Understand the concept of algebraic function into trigonometric series.
- Explain the concepts of Periodic functions.
- Apply Fourier series for change of interval.
- Analyse an Even and Odd functions.
- Evaluate the Discontinuity functions in a given period.

UNIT – III

SERIES SOLUTIONS OF ODE: Introduction, Ordinary and singular point of an Equation.Bessel’s Differential equation: Bessel function, properties of Bessel function, Recurrence relations of Bessel function, Generating function and Orthogonality of Bessel function, Trigonometric expansions involving Bessel function.

Learning Outcomes: At the end of this unit, the student will be able to

- Understand Bessel’s function
- Explain Properties of Bessel’s function

- Apply Bessel's function in circuit analysis.
- Analyse the Orthogonality of Bessel function
- Evaluation Recurrence relations of Bessel function.

UNIT – IV

Complex Variables (Differentiation): Limit, Continuity and Differentiation of Complex functions, Analyticity, Cauchy-Riemann equations (without proof), finding harmonic conjugate; Milne-Thomson method for constructing analytic functions.

Learning Outcomes: At the end of this unit, the student will be able to

- Understand the basic theory of complex functions
- Explain the concepts of limit, continuity, differentiability, analyticity.
- Apply C-R equations to different complex functions
- Analyse the harmonic functions
- Evaluate the Bilinear Transformation.

UNIT – V

Complex Variables (Integration): Line integral, Cauchy's theorem, Cauchy's Integral formula, Zeros of analytic functions, Singularities, Taylor's series, Laurent's series; Residues, Cauchy Residue theorem, Conformal mappings, Mobius transformations and their properties.(All theorems are without proof)

Learning Outcomes: At the end of this unit, the student will be able to

- Understand the concept of complex integration.
- Explain the Cauchy's integral theorem
- Apply Complex integration over the stream flow functions
- Analyse the contour Integration.
- Evaluation of a line integral along a path.

TEXT BOOKS:

1. Erwin Kreyszig, "Advanced Engineering Mathematics", John Wiley & Sons Publishers, 10th Edition, 2014.
2. B. S. Grewal, "Higher Engineering Mathematics", Khanna Publishers, 42nd Edition, 2012.

REFERENCE BOOKS:

1. Churchill, R.V. and Brown, J.W, "Complex Variables and Applications", Tata Mc Graw-Hill, 8th Edition, 2012.
2. A. K. Kapoor, "Complex Variables Principles and Problem Sessions", World Scientific Publishers, 1st Edition, 2011.
3. Murray Spiegel, John Schiller, "Probability and Statistics", Schaum"s Outline Series, 3rd Edition,2010.

MARRI LAXMAN REDDY INSTITUTE OF TECHNOLOGY AND MANAGEMENT
(AUTONOMOUS)

2030411: ELECTRONIC DEVICES AND CIRCUITS

II Year B.Tech. ECE I – Sem. **L T P C**

3 1 0 4

Pre-requisites: Knowledge on Basic Electrical Engineering and Semiconductor Device Physics

Course Objectives:

- To introduce components such as Diodes, BJTs and FETs
- To know the applications of semiconductor devices
- To study special purpose semiconductor devices
- To give understanding of various types of amplifier circuits
- To design and analyze the different small-signal amplifier circuits

Course Outcomes:

At the end of this course, students will be able to

- Understand the fundamental principles of semiconductor diodes, including their construction, operation and applications for evaluating the device parameters.
- Analyze the performance characteristics of BJT configurations based on parameters like gain and impedance.
- Analyze transistor circuits with appropriate biasing and stabilization techniques for operating BJTs and MOSFETs in different regions.
- Apply the low-frequency small signal equivalent circuit models of BJTs for measuring amplifier parameters, including gain and impedance
- Demonstrate the working principle of special purpose semiconductor diodes and transistors for triggering and voltage regulation applications.

UNIT– I

Semiconductor Diode and Applications: Basic Structure of the pn Junction with Zero and Reverse Applied Bias, PN Junction Current, Static and Dynamic resistances, Equivalent circuit, Load line analysis, Diffusion and Transition Capacitances, Parallel and Series diode Configurations, Rectifiers, Rectifiers with Capacitive and Inductive Filters, Clippers, Clampers.

Learning Outcomes: At the end of this unit, the student will be able to

- Understand the physics of semiconductor materials
- Learn the basic semiconductor device operation
- Analyze the diode applications

UNIT – II

Bipolar Junction Transistor (BJT): Principle of Operation, Common Emitter, Common Base and Common Collector Configurations, Transistor as a switch, Transistor Biasing and Stabilization - Operating point, DC & AC load lines, Biasing – Fixed-Bias, Self-Bias, Voltage-Divider bias, Bias Stability, Bias Compensation using Diodes.

Learning Outcomes: At the end of this unit, the student will be able to

- Understand the operation of BJT
- Understand and analyze the transistor biasing
- Calculate operating point and load line

UNIT – III

Field Effect Transistor (FET): Construction, Principle of Operation, Pinch-Off Voltage, Volt-Ampere Characteristic, Comparison of BJT and FET, Biasing of FET, FET as Voltage Variable resistor.

MOSFET operation, MOSFET Characteristics in Enhancement and Depletion mode, MOS as a Capacitor.

Learning Outcomes: At the end of this unit, the student will be able to
- Understand the operation and volt-amperes characteristics of a JFET
- Analyze various FET biasing methods
- Understand the V -I characteristics of a various diodes

UNIT – IV

Analysis and Design of Small Signal Low Frequency BJT Amplifiers: Transistor Hybrid model, Determination of h-parameters from transistor characteristics, Typical values of h- parameters in CE, CB and CC configurations, Transistor amplifying action, Analysis of CE, CC, CB Amplifiers and CE Amplifier with emitter resistance, Low frequency response of BJT Amplifiers, Effect of coupling and bypass capacitors on CE Amplifier.

Learning Outcomes: At the end of this unit, the student will be able to
- Analyze hybrid parameters for CE, CB and CC configurations
- Understand and analyze CE, CB and CC amplifiers using hybrid parameters
- Analyze the effect of coupling and bypass capacitors on CE amplifier

UNIT – V

FET Amplifiers: FET Small Signal Model**,** Analysis of JFET Amplifiers, Analysis of CS, CD, CG JFET Amplifiers; Basic Concepts of MOS Amplifiers,

Special Purpose Devices: Zener diode, Voltage Regulator, SCR, Tunnel diode, UJT, Varactor diode, Photo diode and Solar Cell – Characteristics, Operations and Applications.

Learning Outcomes: At the end of this unit, the student will be able to
- Analyze small signal model of various JFET amplifiers
- Understand the MOSFET characteristics
- Understand the basic concepts of special purpose devices

TEXT BOOKS:

1. Jacob Millman, Christos C. Halkias, and Satyabrata Jit, “Electronic Devices and Circuits”, 3rd Edition., Mc-Graw Hill Education, 2010.
2. Robert L. Boylestad, Louis Nashelsky, “Electronic Devices and Circuits theory” 11th Edition, Pearson**,** 2013.

REFERENCES:

3. Donald Neamen, Dhrubes Biswas, “Semiconductor Physics and Devices” 4th Edition, McGraw Hill Education, 2017.
4. Steven T. Karris, “Electronic Devices and Amplifier Circuits with MATLAB Applications” Orchard Publications, 3rd Edition 2005.
5. Paul Horowitz, Winfield Hill, “The Art of Electronics” 3rd Edition Cambridge University Press, 1994.

MARRI LAXMAN REDDY INSTITUTE OF TECHNOLOGY AND MANAGEMENT
(AUTONOMOUS)

2030201: BASIC ELECTRICAL ENGINEERING
(COMMON to ECE, CSE, CSC, CSD, CSM, CSIT & IT)

II Year B.Tech. ECE I - Sem. **L T P C**

3 0 0 3

Pre-requisites: Nil

Course Objectives:

- To analyze and solve electric circuits.
- To provide an understanding of basics in Electrical circuits.
- To identify the types of electrical machines for a given application.
- To explain the working principles of Electrical Machines and single phase transformers.

Course Outcomes

After completion of this course the student is able to

- Use Fundamental Theorems and Laws for analyzing DC Circuits
- Understand Three-Phase Balanced AC Circuits and their Voltage/Current Relationships
- Evaluate the Performance of Transformers, Auto-Transformers, and Three-Phase Transformer Connections
- Analyze the Operation, Control, and Efficiency of Electrical Machines
- Apply electrical installation components and perform design calculations.

UNIT-I

DC Circuits: Electrical circuit elements (R, L and C), voltage and current sources, Kirchhoff current and voltage laws, analysis of simple circuits with dc excitation. Superposition, Thevenin's and Norton's Theorems.

Learning Outcomes: At the end of this unit, the student will be able to

- Explain the need of circuit elements.
- Analyse the resistive circuits with independent sources.
- Solve D.C. circuits by using KVL and KCL.
- Apply network theorems for solving D.C. circuit problems.

Unit-II

AC Circuits: Representation of sinusoidal waveforms, peak and rms values, phasor representation, real power, reactive power, apparent power and power factor. Analysis of single-phase ac circuits consisting of R, L, C, and RL, RC, RLC combinations (series only). Three phase balanced circuits, voltage and current relations in star and delta connections.

Learning Outcomes: At the end of this unit, the student will be able to

- Develop an understanding of the fundamental laws and elements of A.C circuits.
- Learn the energy properties of electric elements and the techniques to measure voltage and current.
- Explain the concept of steady state.

UNIT-III

Transformers: Ideal and practical transformer, equivalent circuit, losses in transformers, regulation and efficiency. Auto-transformer and three-phase transformer connections.

Learning Outcomes:

At the end of this unit, the student will be able to

- Demonstrate knowledge of construction and operating principles of single-phase transformers.
- Determine losses, efficiency, and voltage regulation of a transformer under specific operating conditions.
- Identify the connections of a three phase transformer.
- Illustrate the performance characteristics of different induction motors.

UNIT-IV

Electrical Machines: Generation of rotating magnetic fields, Construction and working of a three-phase induction motor, Significance of torque-slip characteristic. Loss components and efficiency, starting and speed control of induction motor. Single-phase induction motor. Construction, working, torque-speed characteristic and speed control of separately excited dc motor. Construction and working of synchronous generators.

Learning Outcomes: At the end of this unit, the student will be able to

- Explain construction & working of induction motor - DC motor.
- Perform speed control of DC Motor.
- Explain principle and operation of DC Generator & Motor.

UNIT-V

Electrical Installations: Components of LT Switchgear: Switch Fuse Unit (SFU), MCB, ELCB, MCCB, Types of Wires and Cables, Earthing. Types of Batteries, Important Characteristics for Batteries. Elementary calculations for energy consumption, power factor improvement and battery backup.

Learning Outcomes: At the end of this unit, the student will be able to

- Understand working principles of LT Switchgear components.
- Perform elementary calculations for energy consumption, power factor improvement and battery backup.

TEXT BOOKS:

1. Basic Electrical Engineering - By M.S.Naidu and S. Kamakshaiah – TMH.

2. Basic Electrical Engineering –By T.K.Nagasarkar and M.S. Sukhija Oxford University Press.

REFERENCE BOOKS:

1. Theory and Problems of Basic Electrical Engineering by D.P.Kothari & I.J. Nagrath PHI.
2. Principles of Electrical Engineering by V.K Mehta, S.Chand Publications.
3. Essentials of Electrical and Computer Engineering by David V. Kerns, JR. J. David Irwin Pearson.

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2030509: JAVA PROGRAMMING

II Year B.Tech. ECE I - Sem. **L T P C**

2 0 0 2

Prerequisites: A course on programming for problem solving

Course Objectives:

- To introduce the object-oriented programming concepts.
- To understand object-oriented programming concepts, and apply them in solving problems.
- To introduce the principles of inheritance and polymorphism; and demonstrate how they relate to the design of abstract classes.
- To introduce the implementation of packages and interfaces.
- To introduce the concepts of exception handling and multithreading.
- To introduce the design of Graphical User Interface using applets and swing controls.

Course Outcomes:

- Analyze Object-Oriented Solutions and Write Java Programs Using Core OOP Concepts.
- Apply Inheritance, Polymorphism, and Interfaces for designing Modular and Reusable Java Applications.
- Develop Concurrent Applications Using Multithreading Concepts and Synchronization.
- Design Interactive Java Applications Using Event Handling and AWT Components.
- Understand Applets and Java Swing Applications for Web and Desktop Interfaces.

UNIT-I:

Object oriented thinking and Java Basics- Need for oop paradigm, summary of oop concepts, coping with complexity, abstraction mechanisms. A way of viewing world – Agents, responsibility, messages, methods, History of Java, Java buzzwords, data types, variables, scope and life time of variables, arrays, operators, expressions, control statements, type conversion and casting, simple java program,

Functions, Recursion, Enumeration. concepts of classes, objects, constructors, methods, access control, this keyword, garbage collection, overloading methods and constructors, method binding, inheritance, overriding and exceptions, parameter passing, recursion, nested and inner classes, exploring string class.

UNIT II:

Inheritance, Packages and Interfaces – Hierarchical abstractions, Base class object, subclass, subtype, substitutability, forms of inheritance- specialization, specification, construction, extension, limitation, combination, benefits of inheritance, costs of inheritance. Member access rules, super uses, using final with inheritance, polymorphism- method overriding, abstract classes, the Object class. Defining, Creating and Accessing a Package, Understanding CLASSPATH, importing packages, differences between classes and interfaces, defining an interface, implementing interface, applying interfaces, variables in interface and extending interfaces. Exploring java.io.

UNIT III:

Exception handling and Multithreading—Concepts of exception handling, benefits of exception handling, Termination or resumptive models, exception hierarchy, usage of try, catch, throw, throws and finally, built in exceptions, creating own exception sub classes. String handling, Exploringjava.util. Differences between multi threading and multitasking, thread life cycle,creating threads, thread priorities, synchronizing threads, interthread communication, thread groups,daemon threads.

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(AUTONOMOUS)

UNIT IV:

Event Handling : Events, Event sources, Event classes, Event Listeners, Delegation event model, handling mouse and keyboard events, Adapter classes. The AWT class hierarchy, user interface components- labels, button, canvas, scrollbars, text components, check box, check box groups, choices, lists panels – scrollpane, dialogs, menubar, graphics, layout manager – layout manager types – border, grid, flow, card and grid bag.

UNIT V :

Applets – Concepts of Applets, differences between applets and applications, life cycle of an applet, types of applets, creating applets, passing parameters to applets. Swing – Introduction, limitations of AWT, MVC architecture, components, containers, exploring swing- Japplet, Jframe and Jcomponent, Icons and Labels, text fields, buttons – The Jbutton class, Check boxes, Radio buttons, Combo boxes, Tabbed Panes, Scroll Panes, Trees, and Tables

TEXT BOOKS:

1. Java The complete reference, 9th edition, Herbert Schildt, McGraw Hill Education (India) Pvt. Ltd.
2. Understanding Object-Oriented Programming with Java, updated edition, T. Budd, Pearson Education.

REFERENCE BOOKS:

1. An Introduction to programming and OO design using Java, J. Nino and F.A. Hosch, John Wiley & sons
2. Introduction to Java programming, Y. Daniel Liang, Pearson Education.
3. Object Oriented Programming through Java, P. Radha Krishna, University Press.
4. Programming in Java, S. Malhotra, S. Chudhary, 2nd edition, Oxford Univ. Press.
5. Java Programming and Object-oriented Application Development, R. A. Johnson, Cengage Learning.

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(AUTONOMOUS)

2030412: SIGNALS AND SYSTEMS

II Year B.Tech. ECE I - Sem. **L T P C**

3 1 0 4

Pre-requisites: Basics of Mathematics

Course Objectives:

- Acquire the knowledge of signals and systems
- Understand the behavior of signals in time and frequency domain
- Analyze the characteristics of LTI systems
- Study the concepts of Signals and Systems and its analysis using different Transform techniques
- Obtain the relation between two same signals and two different signals

Course Outcomes:

At the end of this course, students will be able to

- Classify and Perform Operations on Signals for Practical Applications
- Analyze and Represent Signals Using Fourier Series and Fourier Transforms
- Analyze Signal Transmission Through Linear Systems and their Characteristics
- Utilize Laplace and Z-Transforms for assessing continuous and discrete signals in time and frequency domains.
- Understand the necessity of Sampling Theorem and Correlation Techniques in Signal Processing

UNIT – I

Signal Analysis: Analogy between vectors and signals, Orthogonal signal space, Signal approximation using orthogonal functions, mean square error, Closed or complete set of orthogonal functions, Orthogonality in complex functions, Classification of signals and systems, operations on signals, Exponential and sinusoidal signals, Concepts of impulse function, Unit step function, Signum function.

Learning Outcomes: At the end of this unit, the students will be able to

- Discuss the similarity between vectors and signals
- Describe different types of signals
- Perform different operations on signals

UNIT – II

Fourier Series: Representation of Fourier series, Continuous time periodic signals, Properties of Fourier Series, Dirichlet's conditions, Trigonometric Fourier series and exponential Fourier series, Complex Fourier spectrum.

Fourier Transforms: Deriving Fourier Transform from Fourier series, Fourier Transform of arbitrary signals, Fourier Transform of standard signals, Fourier Transform of periodic signals, Properties of Fourier Transform, Fourier Transforms involving impulse function and signum function, Introduction to Hilbert Transform.

Learning Outcomes: At the end of this unit, the students will be able to

- Illustrate Fourier series and properties of Fourier series
- Demonstrate dirichlet's conditions of Fourier series and Fourier Transform
- Compute Fourier Transform from Fourier series and Transform of different signals.

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UNIT – III

Signal Transmission through Linear Systems: Linear system, Impulse response, Response of a linear system, Linear time invariant(LTI) system, Transfer function of a LTI system, Filter characteristics of linear system, Distortion less transmission through a system, Signal bandwidth, System bandwidth, Ideal LPF, HPF, and BPF characteristics, Causality and paley-wiener criterion for physical realization, Relationship between bandwidth and rise time, Convolution and correlation of signals, Concept of convolution in time domain and frequency domain, Graphical representation of convolution

Learning Outcomes: At the end of this unit, the students will be able to

- Analyze the response of a linear system
- Compute transfer function of a LTI system
- Discuss filter characteristics of linear systems

UNIT – IV

Laplace Transforms: Laplace Transforms (L.T), Inverse Laplace Transform, Concept of region of convergence (ROC) for Laplace Transforms, Properties of L.T, Relation between L.T and F.T of a signal, Laplace Transform of certain signals using waveform synthesis, and it's Applications.

Z–Transforms: Concept of Z-Transform of a discrete sequence, Distinction between Laplace, Fourier and Z Transforms, Region of convergence in Z-Transform, Constraints on ROC for various classes of signals, Inverse Z-Transform, Properties of Z-Transforms, and it's Applications.

Learning Outcomes: At the end of this unit, the students will be able to

- Describe Laplace Transform and inverse Laplace Transform with the concept of region of convergence (ROC)
- Examine the constraints on ROC for various classes of signals
- Describe the properties of L.T's, Z.T's and relation between F.T, L.T, and Z.T of a signal

UNIT – V

Sampling Theorem: Graphical and analytical proof for band limited signals, Impulse sampling, Natural and flat top sampling, Reconstruction of signal from its samples, Effect of under sampling – Aliasing, Introduction to band pass sampling.

Correlation: Cross correlation and auto correlation of functions, Properties of correlation functions, Energy density spectrum, Parsevals theorem, Power density spectrum, Relation between autocorrelation function and energy/power spectral density function, Relation between convolution and correlation, Detection of periodic signals in the presence of noise by correlation, Extraction of signal from noise by filtering.

Learning Outcomes: At the end of this unit, the students will be able to

- Illustrate sampling theorem and types of sampling
- Reconstruct the signal from its samples and effect of under sampling
- Demonstrate auto correlation and cross correlation of functions and its properties

TEXT BOOKS:

1. B.P. Lathi, "Signals, Systems & Communications," BSP, 2nd Edition 2001.
2. A.V. Oppenheim, A.S. Willsky and S.H. Nawabi, "Signals and Systems," Pearson India 2nd Edition, 1996.

REFERENCES:

1. Simon Haykin and Van Veen, "Signals and Systems," John Wiley 2nd Edition, 2007.
2. A. Anand Kumar, "Signals and Systems," PHI, 3rd Edition, 2013.
3. Michel J. Robert, "Fundamentals of Signals and Systems," MGH International, 2nd Edition, 2008.

MARRI LAXMAN REDDY INSTITUTE OF TECHNOLOGY AND MANAGEMENT
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2030473: ELECTRONIC DEVICES AND CIRCUITS LABORATORY

II Year B.Tech. ECE I – Sem.

L	T	P	C
0	0	3	1.5

Course Objectives:

- To know the characteristics of PN junction diode
- To measure the efficiency of half wave and full wave rectifiers
- To study the BJT operation
- To know the switching characteristics of SCR
- To design the clipper and clamper circuits

Course Outcomes:

At the end of the laboratory work, students will be able to

- Analyze the characteristics and applications of semiconductor devices, including PN junction diodes, Zener diodes, and SCRs.
- Design rectifiers with and without filters, and evaluate clippers and clampers for voltage shaping.
- Examine the input and output characteristics of BJTs and FETs in different configurations and Analyze their applications.
- Employ transistors as switches for on-off control of devices and design circuits like voltage level indicators using BJTs.
- Implement Zener diodes as voltage regulators and test diode-powered backup systems.

List of Experiments:

1. PN Junction and Zener diode characteristics
2. Half and Full Wave Rectifier with & without filters
3. Clippers at different reference voltages
4. Clampers at different reference voltages
5. Input and output characteristics of BJT in CE, CB, CC Configuration
6. Verify the SCR Characteristics
7. CE and CC amplifier characteristics
8. Calculate the resistance and capacitance values for different biases in CE
9. Verify the Common Source amplifier characteristics
10. Input and output characteristics of FET in CS Configuration
11. Test the powered backup system using diode
12. Logic gates using BJT
13. Voltage level indicator
14. Transistor as a switch to control the on–off states of a bulb

NOTE: Minimum of 12 experiments to be conducted.

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2030271: BASIC ELECTRICAL ENGINEERING LABORATORY

II Year B.Tech. ECE I – Sem.

L	T	P	C
0	0	2	1

Course Objectives:

- To analyze a given network by applying various electrical laws and network theorems
- To know the response of electrical circuits for different excitations
- To calculate, measure and know the relation between basic electrical parameters.
- To analyze the performance characteristics of DC and AC electrical machines

Course Outcomes:

- Understand Fundamental Electrical Laws for Solving Electrical Circuits.
- Analyze the Response of Electrical Circuits to Various Excitations.
- Calculate and Relate Electrical Parameters for System Optimization
- Analyze the Operating Principles and Characteristics of Transformers.
- Apply Safety Standards and Practices in Electrical Systems.

List of Experiments:

13. Verification of Ohms Law
14. Verification of KVL and KCL
15. Verification of superposition theorem.
16. Verification of Thevenin's and Norton's theorem.
17. Resonance in series RLC circuit.
18. Calculations and Verification of Impedance and Current of RL, RC and RLC series circuits.
19. Measurement of Voltage, Current and Real Power in primary and Secondary Circuits of a Single Phase Transformer.
20. Load Test on Single Phase Transformer (Calculate Efficiency and Regulation)
21. Three Phase Transformer: Verification of Relationship between Voltages and Currents (Star-Delta, Delta-Delta, Delta-star, Star-Star)
22. Measurement of Active and Reactive Power in a balanced Three-phase circuit.
23. Performance Characteristics of a Separately/Self Excited DC Shunt/Compound Motor.
24. Torque-Speed Characteristics of a Separately/Self Excited DC Shunt/Compound Motor.
25. Performance Characteristics of a Three-phase Induction Motor.
26. Torque-Speed Characteristics of a Three-phase Induction Motor.
27. No-Load Characteristics of a Three-phase Alternator.

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(AUTONOMOUS)

2030570: JAVA PROGRAMMING LABORATORY

II Year B.Tech. ECE I – Sem.

L	T	P	C
0	0	2	1

Course Objectives:

- To write programs using abstract classes.
- To write programs for solving real world problems using java collection frame work.
- To write multithreaded programs.
- To write GUI programs using swing controls in Java.
- To introduce java compiler and eclipse platform.
- To impart hands on experience with java programming.

Course Outcomes:

- Develop Java Programs Using Collection Framework for Solving Real-World Problems
- Apply Object-Oriented Programming Concepts for solving complex problems
- Solve Real-World Problems Efficiently Using Java Collection Framework
- Develop Multithreaded Java Applications for Concurrent Task Execution
- Apply Event-Driven Programming for creating Dynamic and Responsive User Interfaces

1. a) Use Eclipse or Net bean platform and acquaint with the various menus. Create a test project, add a test class, and run it. See how you can use auto suggestions, auto fill. Try code formatter and code refactoring like renaming variables, methods, and classes. Try debug step by step with a small program of about 10 to 15 lines which contains at least one if else condition and a for loop.
   b) Write a java program that prints all real solutions to the quadratic equation ax2 +bx+c=0. Read in a, b, c and use the quadratic formula.
   c) Write a java program to implement Fibonacci series.

2. a) Write a java program to implement method overloading and constructors overloading.
   b).Write a java program to implement method overriding.

3. a) Write a java program to check whether a given string is palindrome.
   b) Write a Java program to create an abstract class named Shape that contains two integers and an empty method named print Area (). Provide three classes named Rectangle, Triangle, and Circle such that each one of the classes extends the class Shape. Each one of the classes contains only the method print Area () that prints the area of the given shape.

4. a) Write a Java program that creates a user interface to perform integer divisions. The user enters two numbers in the text fields, Num1 and Num2. The division of Num1 and Num 2 is displayed in the Result field when the Divide button is clicked. If Num1 or Num2 were not an integer, the program would throw a Number Format Exception. If Num2 were Zero, the program would throw an Arithmetic Exception. Display the exception in a message dialog box.
   b) Write a java program to create user defined exception class and test this class.

5. a) Write a Java program to list all the files in a directory including the files present in all its subdirectories.
   b) Write a java program that displays the number of characters, lines and words in a text file.

6. a) Write a Java program that implements a multi-thread application that has three threads. First thread generates random integer every 1 second and if the value is even, second thread computes the square of the number and prints. If the value is odd, the third thread will print the value of cube of the number.

b) Write a Java program that correctly implements the producer – consumer problem using the concept of interthread communication.

7. Suppose that a table named Table.txt is stored in a text file. The first line in the file is the header, and the remaining lines correspond to rows in the table. The elements are separated by commas. Write a java program to display the table using Labels in Grid Layout.

8. Write a Java program that loads names and phone numbers from a text file where the data is organized as one line per record and each field in a record are separated by a tab (\t). It takes a name or phone number as input and prints the corresponding other value from the hash table (hint: use hash tables).

9. a)Write a Java program that handles all mouse events and shows the event name at the center of the window when a mouse event is fired (Use Adapter classes).

b) Write a java program to demonstrate the key event handlers.

10. a) Develop an applet in Java that displays a simple message.

b) Develop an applet in Java that receives an integer in one text field, and computes its factorial Value and returns it in another text field, when the button named “Compute” is clicked.

11. Write a Java program that works as a simple calculator. Use a grid layout to arrange buttons for the digits and for the +, -,*, % operations. Add a text field to display the result. Handle any possible exceptions like divided by zero.

12. Write a Java program that simulates a traffic light. The program lets the user select one of three lights: red, yellow, or green with radio buttons. On selecting a button, an appropriate message with “Stop” or “Ready” or “Go” should appear above the buttons in selected color. Initially, there is no message shown.

13. Develop Swing application which uses JList, JTree, JTable, JTabbedPane and JScrollPane.

14. Write a Java program that implements Quick sort algorithm for sorting a list of names in ascending order

15. Write a Java program that implements Bubble sort algorithm for sorting in descending order and also shows the number of interchanges occurred for the given set of integers.

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203023: CONSTITUTION OF INDIA

(MANDATORY COURSE)

II Year B.Tech. ECE I – Sem.

L	T	P	C
2	0	0	2

The Constitution of India is the supreme law of India. Parliament of India cannot make any law which violates the Fundamental Rights enumerated under the Part III of the Constitution. The Parliament of India has been empowered to amend the Constitution under Article 368, however, it cannot use this power to change the "basic structure" of the constitution, which has been ruled and explained by the Supreme Court of India in its historical judgments. The Constitution of India reflects the idea of "Constitutionalism" – a modern and progressive concept historically developed by the thinkers of "liberalism" – an ideology which has been recognized as one of the most popular political ideology and result of historical struggles against arbitrary use of sovereign power by state. The historic revolutions in France, England, America and particularly European Renaissance and Reformation movement have resulted into progressive legal reforms in the form of "constitutionalism" in many countries. The Constitution of India was made by borrowing models and principles from many countries including United Kingdom and America.

The Constitution of India is not only a legal document but it also reflects social, political and economic perspectives of the Indian Society. It reflects India's legacy of "diversity". It has been said that Indian constitution reflects ideals of its freedom movement; however, few critics have argued that it does not truly incorporate our own ancient legal heritage and cultural values. No law can be "static" and therefore the Constitution of India has also been amended more than one hundred times. These amendments reflect political, social and economic developments since the year 1950. The Indian judiciary and particularly the Supreme Court of India has played an historic role as the guardian of people. It has been protecting not only basic ideals of the Constitution but also strengthened the same through progressive interpretations of the text of the Constitution. The judicial activism of the Supreme Court of India and its historic contributions has been recognized throughout the world and it gradually made it "as one of the strongest court in the world".

Course content

1. Meaning of the constitution law and constitutionalism
2. Historical perspective of the Constitution of India
3. Salient features and characteristics of the Constitution of India
4. Scheme of the fundamental rights
5. The scheme of the Fundamental Duties and its legal status
6. The Directive Principles of State Policy – Its importance and implementation
7. Federal structure and distribution of legislative and financial powers between the Union and the States
8. Parliamentary Form of Government in India – The constitution powers and status of the President of India
9. Amendment of the Constitutional Powers and Procedure
10. The historical perspectives of the constitutional amendments in India
11. Emergency Provisions: National Emergency, President Rule, Financial Emergency
12. Local Self Government – Constitutional Scheme in India
13. Scheme of the Fundamental Right to Equality
14. Scheme of the Fundamental Right to certain Freedom under Article 19
15. Scope of the Right to Life and Personal Liberty under Article 21

II-II

MARRI LAXMAN REDDY INSTITUTE OF TECHNOLOGY AND MANAGEMENT
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2040401: ANALOG AND PULSE CIRCUITS

II Year B.Tech. ECE II – Sem. **L T P C**

3 0 0 3

Pre-requisite: Knowledge on Electronic Devices and Circuits.

Course Objectives:

- To understand the design concepts of multistage amplifiers
- To study the design concepts of transistor amplifiers at high frequency
- To know the concepts of feedback in amplifier circuits
- To design various multi-vibrators using transistors and sweep circuits
- To analyze different types of Oscillators and Large Signal Amplifiers

Course Outcomes:

At the end of this course, students will be able to

- Review the transistor operation at high frequencies based on understanding of multistage amplifiers, and it's performance.
- Understand the principles of feedback and its effects on amplifiers characteristics
- Acquire a deep understanding of oscillator theory, focusing on both RC and LC oscillators and their stability along with applications in electronic systems.
- Evaluate the performance of tuned amplifiers, by considering Q-factor, frequency response, and tuning techniques.
- Comprehend the general features and methods of transistor-based generating time base waveforms, for improving linearity.

UNIT – I

Multistage Amplifiers: Classification of Amplifiers, BJT AND MOSFET Amplifiers, Differential Amplifiers, Distortion in amplifiers, Different coupling schemes used in amplifiers, Frequency response and Analysis of multistage amplifiers, Cascade amplifier, Darlington pair. Transistor at High Frequency: Hybrid – π model of Common Emitter transistor model, f_α, β and Unity gain bandwidth, and Gain bandwidth product.

Learning Outcomes: At the end of this unit, the student will be able to

- Analyze different types of multistage amplifiers like cascade amplifiers, Darlington Pair and their operation
- Conclude the use of different coupling schemes in multistage amplifiers
- Design the small signal high frequency amplifiers using hybrid model

UNIT – II

Feedback Amplifiers: Concepts of feedback – Classification of feedback amplifiers – General characteristics of Negative feedback amplifiers – Effect of Feedback on Amplifier characteristics – Voltage series, Voltage shunt, Current series and Current shunt Feedback configurations.

Learning Outcomes: At the end of this unit, the student will be able to

- Find the difference between types of feedback amplifiers
- Understand the characteristics of the negative feedback amplifiers
- Acquire knowledge on different types of feedback configurations

UNIT – III

Oscillators: Condition for Oscillations, RC type Oscillators-RC phase shift and Wien-bridge Oscillators, LC type Oscillators –Generalized analysis of LC Oscillators, Hartley and Colpitts Oscillators, Frequency and amplitude stability of Oscillators, Crystal Oscillator – Operations and

Applications.

Learning Outcomes: At the end of this unit, the student will be able to

- Understand the concept of oscillations
- Explain the working operation of different types of oscillators and calculate their resonant frequency
- Identify the difference between types of Oscillators

UNIT – IV

Large Signal Amplifiers: Class A Power Amplifier- Series fed and Transformer coupled, Conversion Efficiency, Class B Power Amplifier- Push Pull and Complimentary Symmetry configurations, Conversion Efficiency, Principle of operation of Class AB and Class C Amplifiers.

Tuned Amplifiers: Single Tuned Amplifiers – Q-factor, Frequency response of tuned amplifiers, Concept of stagger tuning and synchronous tuning.

Learning Outcomes: At the end of this unit, the student will be able to

- Design the different types of large signal amplifiers
- Understand the working operation of different types of power amplifiers and their output waveforms
- Analyze the frequency response of single tuned amplifier

UNIT – V

Multivibrators: Introduction to Multivibrators, Types of Triggering, Analysis and Design of Bistable, Monostable, A stable Multivibrators and Schmitt trigger using Transistors. Time Base Generators: General features of a Time base Signal, Methods of Generating Time Base Waveform, concepts of Transistor Miller and Bootstrap Time Base Generator, and Methods of Linearity improvement.

Learning Outcomes: At the end of this unit, the student will be able to

- Analyze and design the different types of multi vibrators using transistors
- Apply the methods of generating time base waveforms
- Understand the operation of different types of time base generators

TEXT BOOKS:

1. Millman J., Halkias C.C. and Satyabrata Jit, Electronic Devices and Circuits, 3rd edition, Tata McGraw-Hill, 2011.
2. Jacob Millmann and Herbert Taub, “Pulse, Digital and Switching waveforms”, 2nd Edition, Edition, Tata McGraw- Hill publishing company Limited, New Delhi, 2007

REFERENCES:

1. Salivahanan, Suresh Kumar and Vallavaraj, “Electronic Devices and Circuits,” 2nd edition, Tata McGraw-Hill, 2010.
2. Ramakanth A. Gayakwad, “Op-amps and Linear Integrated Circuits”, 3rd Edition, Prentice-Hall of India private Limited, New Delhi, 1995.
3. David A.Bell, “Solid State pulse circuits”, 4th Edition, Prentice-Hall of India Private Limited, New Delhi, 2000.

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2040413: ANALOG AND DIGITAL COMMUNICATIONS

II Year B.Tech. ECE II – Sem. **L T P C**

3 1 0 4

Pre-requisite: Knowledge on Signals and Fourier Transforms.

Course Objective:

- Develop ability to analyze system requirements of analog and digital communication systems
- Design the generation and detection of various analog and digital modulation techniques
- Acquire theoretical knowledge of each block in AM/FM transmitters and receivers
- Understand the concepts of baseband transmissions and various source & channel coding techniques
- Study of various noise sources and SNR/Figure of Merit calculations

Course Outcome:

At the end of this course, the students will be able to

- Understand the necessity and significance of modulation in efficient transmission, noise reduction, multiplexing, and bandwidth optimization.
- Analyze the principles of angle modulation and their respective performance in terms of bandwidth efficiency, noise immunity and signal power requirements.
- Explain the fundamental concepts of digital modulation schemes for converting analog signals into digital form through sampling, quantization, and encoding.
- Compare the efficiency, robustness, and power requirements of ASK, FSK, PSK for assessing trade-offs in terms of complexity, bandwidth and error rate.
- Analyze the impact of noise in communication systems for enhancing performance based on noise characteristics and coding methods.

UNIT– I

Amplitude Modulation: Significance of modulation, Amplitude Modulation - Time and frequency domain description, power relations in AM waves, Generation of AM waves -Switching modulator, Detection of AM signal - Envelope detector, Generation of DSBSC signal - Balanced Modulators, Detection of DSB-SC Modulated signal, SSB modulation, Frequency discrimination and Phase discrimination methods, Demodulation of SSB signal, Vestigial side band modulation. AM receivers-tuned radio frequency and super heterodyne receivers.

Learning Outcomes: At the end of this unit, the students will be able to

- Demonstrate the all AM-SC systems: generation and detection techniques
- Design of AM transmitters & receivers
- Plot the Spectrum of all AM Systems and calculate its bandwidth

UNIT – II

Angle Modulation: Introduction to Angle Modulation, Frequency Modulation - Narrow band FM and Wide band FM, bandwidth calculations, constant average power, FM signal generation- Armstrong method, Detection of FM Signal- balanced slope detector, Phase locked loop, Concepts of phase modulation, Comparison of AM, FM and PM, Pre-emphasis and de-emphasis. FM receiver, Comparison of TDM and FDM.

Learning Outcomes: At the end of this unit, the students will be able to

- Design of FM transmitters & receivers

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- Plot the Spectrum of FM and calculate its transmission bandwidth
- Design of Pre-emphasis and de-emphasis networks

UNIT – III

Introduction to Digital Communications: Block diagram of digital communication system, advantages of digital communication systems, digital representation of analog signals.

Baseband Data Transmission: Introduction**,** sampling process, PAM, PWM, PPM, pulse code modulation, differential pulse code modulation, delta modulation, ADM, noise considerations in PCM and DM. Inter symbol Interference, Nyquist criterion for zero ISI, eye diagrams, probability of error, optimum receiver, matched filter receiver.

Learning Outcomes: At the end of this unit, the students will be able to

- Design of Baseband PAM transmission model
- Demonstrate the generation and reconstruction of various pulse modulation systems
- Plot the Spectrum of PAM, PWM and calculate its transmission bandwidth

UNIT– IV

Passband Data Transmission: Amplitude shift keying, Frequency shift keying, and Phase shift keying, ASK generation and detection, FSK generation and detection, PSK generation and detection, DPSK generation and detection, M-ary schemes- QAM and QPSK. Probability of error of ASK, FSK, and PSK.

Learning Outcomes: At the end of this unit, the students will be able to

- Understand the difference between analog and digital modulation techniques
- Demonstrate the generation and detection of various modulation techniques
- Plot the Spectrum of ASK, FSK and PSK and also calculate its transmission bandwidth

UNIT– V

Noise, Information Theory and Coding: Types of noise, Gaussian and white noise characteristics, resistive/thermal noise, narrow band noise- In-phase and quadrature representation and its properties. noise in AM and FM systems, SNR and figure of merit calculations.

Information Theory and Coding: Entropy, mutual information, channel capacity theorem, trade of between bandwidth and SNR, source coding: Shannon fano coding and Huffman coding, channel coding – linear block code and hamming codes, fundamentals of error detection and correction codes.

Learning Outcomes: At the end of this unit, the students will be able to

- Design of AM and FM receiver model for noise calculations
- Understand the significance and effects of noise on transmitted signals
- Analyzes the performance of communication system over noise

TEXT BOOKS:

1. Simon Haykin, “Analog and digital communications,” John Wiley, 4th edition 2005.
2. Sudakshina Kundu, “Analog and digital communications,” Pearson India, 1st edition 2010.

REFERENCES:

1. Herbert Taub, Donald L Schiling, Goutam Saha, “Principles of communication systems,” Mcgraw- Hill, 3rd edition, 2008.
2. Dennis Roddy and John Coolean, “Electronic communications,” PEA, 4th Edition, 2004.
3. Wayne Tomasi, “Electronics communication systems,” PHI, 5th edition, 2009.

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2040414: DIGITAL SYSTEM DESIGN

II Year B.Tech. ECE II – Sem. **L T P C**

3 1 0 4

Pre-requisite: Nil

Course Objectives:

- Understand the number systems in logic circuits
- Learn basic techniques for the design of digital circuits and fundamental concepts used in the design of digital systems
- Implement simple logical operations using combinational logic circuits and design of sequential logic circuits
- Analyze sequential circuits systems in terms of state machines
- Analyze the concepts of programmable logic devices

Course Outcomes:

At the end of this course, the students will be able to:

- Understand the concepts of Number Systems, Perform conversions between different number systems
- Implement optimized digital circuits with minimal gate count and reduced power consumption by applying simplification methods.
- Explore practical considerations in flip-flop design, such as metastability and timing errors, while learning techniques for converting one type of flip-flop to another.
- Design small sequential circuits and devices while utilizing standard sequential function blocks for constructing larger, more complex circuits.
- Synthesize complex switching functions and logic designs by programming PLDs for efficient digital circuit design and optimization.

UNIT – I

Number Systems: Number systems, Complements of numbers, Codes- weighted and Non-weighted codes and its properties, Parity check code and Hamming code.

Boolean Algebra: Basic theorems and properties, Switching functions- Canonical and standard form, Algebraic simplification, Digital logic gates, EX-OR gates, Universal gates, Multilevel NAND/NOR realizations, and their applications.

Learning Outcomes: At the end of this unit, the students will be able to

- Understand the concept of various number systems and its importance in digital circuits
- Know the negative numbers in binary number systems
- Realization of the minimization of logic expressions using Boolean laws and logic gates and their operation with their truth tables

UNIT – II

Minimization of Boolean Functions: Karnaugh Map method - Up to five variables, Don't Care map entries, Quine Mc Cluskey, and Tabular method.

Combinational Logic Circuits: Adders, Subtractors, Comparators, Multiplexers, Demultiplexers, Encoders, Decoders and Code converters, Hazards and Hazard Free relations.

Learning Outcomes: At the end of this unit, the students will be able to

- Understand the minimization of logic expressions using k-map & Tabular Method.
- Design combinational circuits and to use standard combinational functions to build larger more complex circuits
- Realization of code converters & designing of Hazard Free circuits.

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UNIT – III

Sequential Circuits Fundamentals: Basic architectural distinctions between combinational and sequential circuits, SR latch, flip flops: SR, JK, JK master slave, D and T type flip flops, Excitation table of all flip flops, Timing and triggering consideration, Conversion from one type of flip-flop to another.

Registers and Counters: Shift registers – left, right and bidirectional Shift Registers, Applications of shift registers - Design and operation of ring and twisted ring counter, Operation of asynchronous and synchronous counters.

Learning Outcomes: At the end of this unit, the students will be able to

- Understand about memory element and its applications in digital circuits
- Convert one flip-flop to another flip-flop
- Design various shift registers & Counter Real Time Applications

UNIT – IV

Sequential Machines: Finite state machines, Synthesis of synchronous sequential circuits- Serial binary adder, Sequence detector, Parity-bit generator, Synchronous modulo N –counters. Finite state machine-Capabilities and limitations, Mealy and Moore models.

Learning Outcomes: At the end of this unit, the students will be able to

- Understand synchronous and asynchronous counters
- Realization of pattern generators and modulo-N counters
- Design serial adders and sequence detectors using flip-flops

UNIT – V

Programmable Logic Devices, **Threshold Logic**: Basic PLD's-ROM, PROM, PLA, and PLD Realization of Switching functions using PLD's. Capabilities and limitations of threshold gate, Synthesis of threshold functions, Multigate Synthesis.

Learning Outcomes: At the end of this unit, the students will be able to

- Design the circuits using programmable logic models
- Understand the operation of Threshold and multi gates
- Know the basics about field programmable devices

TEXT BOOKS:

1. Zvi Kohavi & Niraj K. Jha, "Switching and finite automata theory," 3rd edition, Cambridge, 2010.
2. M.Morris Mano, Michael D. Ciletti, "Digital design," Pearson, 4th edition, 2012.

REFERENCES:

1. R. P. Jain, "Modern digital electronics," Tata McGraw-Hill, 3rd edition, 2007.
2. Charles H. Roth, "Fundamentals of logic design," Cengage Learning, 5th edition, 2004.
3. A. Anand Kumar, "Switching theory and logic design," PHI, 2nd edition, 2013.

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2040505: PYTHON PROGRAMMING

II Year B.Tech. ECE II – Sem. **L T P C**

2 0 0 2

Prerequisites: Nil

Course Objectives:

- Handle Strings and Files in Python.
- Understand Lists, Dictionaries and Regular expressions in Python.
- Understand FILES, Multithread programming in Python.
- Understand GUI in Python.

Course Outcomes: The students should be able to

- Understand Python object types, identify them, then perform operations with integers, floats, and complex numbers using Python's built-in number operators and functions.
- Demonstrate the ability of using built-in functions of lists, tuples, dictionaries, and sets for manipulating and analyzing data structures in Python.
- Utilize file attributes and standard file operations for reading and writing files, handling file execution, and managing persistent storage with relevant Python modules.
- Develop proficiency in defining and using functions, applying functional programming techniques, and managing Python modules for modular, reusable code.
- Gain expertise in multithreaded programming and GUI development in Python for creating concurrent applications and interactive user interfaces.

UNIT - I

Python Basics

Python Objects: Standard Types, Built-in Types, Internal Types, Standard Type Operators, Standard Type Built-in Functions, Categorizing the Standard Types, Unsupported Types.

Python Numbers: Introduction to Numbers, Integers, Floating Point Real Numbers, Complex Numbers, Operators, Built-in Functions.

UNIT - II

Conditionals and Loops-if, else, elif, for, while, break, continue, pass, List comprehensions, Generator expressions.

Sequences: Strings, Lists, and Tuples- Built-in Functions, Special features.

Mapping and Set Types: Dictionaries, Sets- Built-in Functions.

UNIT-III

Files and Input / Output: File Objects, File Built-in Functions, File Built-in Methods, File Built-in Attributes, Standard Files, Command-line Arguments, File System, File Execution, Persistent Storage Modules, Related Modules.

Exceptions: Exceptions in Python, Detecting and Handling Exceptions, Context Management, Exceptions as Strings, Raising Exceptions, Assertions, Standard Exceptions, Creating Exceptions, Exceptions and the sys Module.

UNIT-IV

Functions and Functional Programming –Calling Functions , Creating Functions, Passing Functions , Formal Arguments, Variable-Length Arguments, Functional Programming.

Modules–Modules and Files, Namespaces, Importing Modules, Module Built-in Functions, Packages, Related modules.

UNIT – V

Multithreaded Programming: Introduction, Threads and Processes, Python Threads, the Global Interpreter Lock, Thread Module, Threading Module.

GUI Programming: Introduction, Tkinter and Python Programming, Brief Tour of Other GUIs, Related Modules and Other GUIs.

MARRI LAXMAN REDDY INSTITUTE OF TECHNOLOGY AND MANAGEMENT

(AUTONOMOUS)

TEXT BOOKS:

1. Core Python Programming, Wesley J. Chun, Second Edition, Pearson.

REFERENCE BOOKS:

1. Think Python, Allen Downey, Green Tea Press
2. Introduction to Python, Kenneth A. Lambert, Cengage
3. Python Programming: A Modern Approach, VamsiKurama, Pearson
4. Learning Python, Mark Lutz.

MARRI LAXMAN REDDY INSTITUTE OF TECHNOLOGY AND MANAGEMENT
(AUTONOMOUS)

2040415: ELECTROMAGNETIC THEORY AND TRANSMISSION LINES

II Year B.Tech. ECE II – Sem. **L T P C**
3 0 0 3

Pre-requisite: Knowledge on Vector calculus

Course Objectives:

- Familiarize about 3D vector co-ordinate systems and electromagnetic field concepts
- Have skills in selecting appropriate Maxwell's equations in electromagnetic theory for a given application and analyze the problem
- Investigate the propagation characteristics of electromagnetic waves at boundary of different media
- Demonstrate the ability to compute various parameters for transmission lines using smith chart and classical theory
- To calculate various line parameters by conventional and graphical methods

Course Outcomes:

At the end of this course, the students are able to

- Apply electrostatics principles in real-world systems, calculating electric field intensity from point charges and various charge distributions.
- Understand magnetostatic principles for solving problems involving induced electromotive force (EMF) and current due to changing magnetic fields.
- Learn the concepts of wave attenuation, loss tangent, intrinsic impedance, and their implications in electromagnetic wave propagation, while interpreting surface impedance in wave propagation and reflection problems.
- Analyze different types of transmission lines and use the concept of infinite lines for calculating key transmission line parameters
- Illustrate input impedance for UHF transmission lines and its significance in signal transmission

UNIT – I

Electrostatics: Coulomb's law, Electric field intensity, Fields due to different charge distributions; Electric flux density, Gauss law and its applications; Scalar electric potential; Energy density, Illustrative problems; Conductors and dielectrics-characterization; Convection and conduction currents; Dielectric constant, isotropic and homogeneous dielectrics; Continuity equation and relaxation time, conductivity, power absorbed in conductor, Poisson's and Laplace's equations; Capacitance: Parallel plate, Co axial, Spherical capacitors; Illustrative problems

Learning Outcomes: At the end of this unit, the students will be able to

- Solve problems on E fields using Maxwell's equations
- Illustrate the importance of continuity equation and Gauss's law
- Learn about different types of capacitors

UNIT – II

Magnetostatics: Biot-savart law; Ampere's circuital law and applications; Magnetic flux density; Magnetic scalar and vector potentials; Forces due to magnetic fields; Ampere's force law; Boundary conditions: Dielectric- dielectric, Dielectric conductor interfaces; Inductances and magnetic energy; Illustrative problems; Maxwell's equations (Time varying fields): Faraday's law; Inconsistency of ampere's law for time varying fields and definition for displacement current density; Maxwell's equations in differential form, Integral form and word statements

Learning Outcomes: At the end of this unit, the students will be able to

- Illustrate the importance of Ampere's Circuit's law and its applications
- Distinguish between magnetic scalar and vector potentials

- Analyze the concept of displacement current density

UNIT – III

Uniform Plane Waves: Wave equations for conducting and perfect dielectric media; Relation between E and H; Wave propagation in lossless and conducting media, Loss tangent, Intrinsic impedance; Skin depth; Polarization, Illustrative problems

Reflection/Refraction of Plane Waves: Reflection and refraction at normal incidence, Reflection and refraction at oblique incidence; Standing waves; Brewster angle, Critical angle, Total internal reflection, Surface impedance; Poynting vector and poynting theorem-applications; Power loss in plane conductor; Illustrative problems

Learning Outcomes: At the end of this unit, the students will be able to

- Analyze the electromagnetic waves at different interfaces
- Interpret the concept of polarization
- Estimate the power using poynting theorem

UNIT – IV

Transmission Lines Characteristics: Transmission line characteristics: Types; Transmission line parameters; Transmission line equations; Characteristic impedance, propagation constant; Phase and group velocities; Infinite line concepts, Loss less /low loss transmission line characterization; Condition for distortion less and minimum attenuation in transmission lines; Loading: Types of loading; Illustrative problems

Learning Outcomes: At the end of this unit, the students will be able to

- Compute primary secondary constants, of transmission line
- Compare distortion less and lossless lines
- Understand the concept of loading of transmission lines

UNIT – V

UHF Transmission Lines and Applications: Input impedance relations; SC and OC lines; Reflection coefficient, VSWR; UHF lines as circuit elements, λ/4, λ/2 and λ/8 lines, impedance transformations, significance of Z_{min} and Z_{max}; Smith chart: Configuration and applications, Illustrative problems.

Learning Outcomes: At the end of this unit, the students will be able to

- Compute input impedance of Transmission line
- Analyze λ/4, λ2, λ/8 Lines for impedance transformation
- Understand the applications of smith chart in transmission lines

TEXT BOOKS:

1. E.C. Jordan, K.G. Balmain, “Electromagnetic waves and Radiating Systems,” PHI 2nd Edition, 2000.
2. Matthew N.O. Sadiku, “Elements of Electromagnetics,” Oxford University Press, 4th Edition, 2009.

REFERENCES:

1. William H. Hayt Jr., John A. Buck, “Engineering electromagnetic,” Tata McGraw Hill, 7th Edition, 2006.
2. Nathan Ida, “Engineering Electromagnetic,’’ Springer (India) Pvt. Ltd, 2nd Edition, 2005
3. G. Sashibushana Rao, “Electromagnetic field theory and Transmission lines,’’ Wiley (India) 1st Edition, 2013.

MARRI LAXMAN REDDY INSTITUTE OF TECHNOLOGY AND MANAGEMENT
(AUTONOMOUS)

2040471: ANALOG AND PULSE CIRCUITS LABORATORY

II Year B.Tech. ECE II – Sem.

L	T	P	C
0	0	3	1.5

Course Objectives:

- Analyze single stage and multi stage amplifiers
- Design the feedback amplifiers and oscillators through simulation.
- Find the frequency response of Power Amplifiers
- Implementation of circuits for linear and nonlinear wave shaping
- Measure the characteristics of different multivibrators

Course Outcomes:

At the end of the laboratory work, students will be able to

- Develop practical skills in designing oscillators for real-world applications, ensuring stable frequency generation and reliable operation within electronic systems.
- Verify the performance of feedback amplifiers and oscillators, ensuring that the designs meet real-world applications and system requirements.
- Analyze the performance of linear and nonlinear wave shaping circuits, using theoretical and practical approaches for ensuring proper signal conditioning and quality
- Design various multivibrator circuits by analyzing their behavior and applications in digital and analog systems.
- Design single-stage and multi-stage amplifiers, and review their behavior, performance, and applications

LIST OF EXPERIMENTS:

Experiments marked with * has to be designed, simulated and verify in hardware laboratory.

1. Two Stage RC Coupled Amplifier **(*)**.
2. Cascade Amplifier circuit / Darlington Pair circuit **(*)**.
3. Current Shunt Feedback Amplifier **(*)**.
4. Voltage Series Feedback Amplifier **(*)**.
5. RC Phase Shift Oscillator using Transistors **(*)**.
6. Hartley and Colpitts's Oscillator circuit **(*)**.
7. Class A Power Amplifier (Transformer less) **(*)**.
8. Class B Complementary Symmetry Amplifier **(*)**.
9. Single Tuned Amplifier circuit **(*)**.
10. Monostable Multivibrator **(*)**.
11. Bistable Multivibrator **(*).**
12. Astable Multivibrator **(*)**.
13. Schmitt Trigger using transistor **(*)**.

14. Verify the output characteristics of Miller Sweep Circuit.
15. Verify the output characteristics of Bootstrap Time Base Generator.

NOTE: Minimum of 12 experiments to be conducted.

MARRI LAXMAN REDDY INSTITUTE OF TECHNOLOGY AND MANAGEMENT
(AUTONOMOUS)

2040575: PYTHON PROGRAMMING LABORATORY

II Year B.Tech. ECE II – Sem. **L T P C**

0 0 2 1

Prerequisites: Nil

Course Objectives:

- Handle Strings and Files in Python.
- Understand Lists, Dictionaries and Regular expressions in Python.
- Understand FILES, Multithread programming in Python.
- Understand GUI in python.

Course Outcomes: The students should be able to

- Demonstrate a comprehensive understanding of Python syntax, semantics, and control flow, and effectively utilize functions for implementing modular programs.
- Implement functions that create modular, reusable code, handling arguments, return values, and variable-length arguments for solving complex problems efficiently.
- Understand different file modes (e.g., read, write, append) for performing tasks like file creation, reading, writing, closing, and error handling during file operations.
- Apply built-in methods and functions for lists and dictionaries for solving problems involving data organization, search, and retrieval, while ensuring the efficient management of data in Python programs
- Develop event-driven programs that respond to user actions and incorporate basic GUI features while creating intuitive and responsive user interfaces.

Exercise 1 –Python Numbers

a) Write a program to determine whether a given year is a leap year, using the following formula: a leap year is one that is divisible by four, but not by one hundred, unless it is also divisible by four hundred. For example, 1992, 1996, and 2000 are leap years, but 1967 and 1900 are not. The next leap year falling on a century is 2400.

b) Write a program to determine the greatest common divisor and least common multiple of a pair of integers.

c) Create a calculator application. Write code that will take two numbers and an operator in the format: N1 OP N2, where N1 and N2 are floating point or integer values, and OP is one of the following: +, -, *, /, %, **, representing addition, subtraction, multiplication, division, modulus/remainder, and exponentiation, respectively, and displays the result of carrying out that operation on the input operands.

Hint: You may use the string split() method, but you cannot use the exal () built-in function.

Exercise –2 Control Flow

a) Write a Program for checking whether the given number is a prime number or not.

b) Write a program to print Fibonacci series upto given n value.

c) Write a program to calculate factorial of given integer number.

Exercise 3 Control Flow -Continued

a) Write a program to calculate value of the following series 1+x-x2+x3-x4+----xn.

b) Write a program to print pascal triangle.

Exercise 4 – Python Sequences

a) Write a program to sort the numbers in ascending order and strings in reverse alphabetical order.

b) Given an integer value, return a string with the equivalent English text of each digit. For example, an input of 89 results in "eight-nine" being returned. Write a program to implement it.

Exercise 5– Python Sequences

a) Write a program to create a function that will return another string similar to the input string, but with its case inverted. For example, input of "Mr. Ed" will result in "mR.eD" as the output string.

b) Write a program to take a string and append a backward copy of that string, making a palindrome.

Exercise 6– Python Dictionaries

a) Write a program to create a dictionary and display its keys alphabetically.

b) Write a program to take a dictionary as input and return one as output, but the values are now the keys and vice versa.

Exercise - 7 Files

a) Write a program to compare two text files. If they are different, give the line and column numbers in the files where the first difference occurs.

b) Write a program to compute the number of characters, words and lines in a file.

Exercise - 8 Functions

a) Write a function ball collide that takes two balls as parameters and computes if they are colliding. Your function should return a Boolean representing whether or not the balls are colliding.

b) Hint: Represent a ball on a plane as a tuple of (x, y, r), r being the radius

c) If (distance between two balls centers) <= (sum of their radii) then (they are colliding)

d) Find mean, median, mode for the given set of numbers in a list.

e) Write simple functions max2() and min2() that take two items and return the larger and smaller item, respectively. They should work on arbitrary Python objects. For example, max2(4, 8) and min2(4, 8) would each return 8 and 4, respectively.

Exercise - 9 Functions - Continued

a) Write a function nearlyequal to test whether two strings are nearly equal. Two strings a and b are nearly equal when a can be generated by a single mutation on b.

b) Write a function dups to find all duplicates in the list.

c) Write a function unique to find all the unique elements of a list.

Exercise - 10 - Functions - Problem Solving

a) Write a function cumulative_ product to compute cumulative product of a list of numbers.

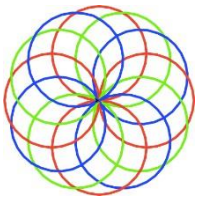
b) Write a function reverse to reverse a list. Without using the reverse function.

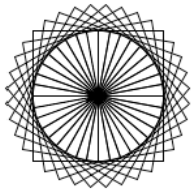
c) Write function to compute GCD, LCM of two numbers. Each function shouldn"t exceed one line.

Exercise - 11 GUI, Graphics

a) Write a GUI for an Expression Calculator usingtk

b) Write a program to implement the following figures using turtle





TEXT BOOKS:

1. Core Python Programming, Wesley J. Chun, Second Edition, Pearson.

REFERENCE BOOKS:

1. Think Python, Allen Downey, Green Tea Press
2. Introduction to Python, Kenneth A. Lambert, Cengage
3. Python Programming: A Modern Approach, VamsiKurama, Pearson

MARRI LAXMAN REDDY INSTITUTE OF TECHNOLOGY AND MANAGEMENT
(AUTONOMOUS)

2040474: BASIC SIMULATION & DIGITAL SYSTEM DESIGN LABORATORY

II Year B.Tech. ECE II – Sem.

L	T	P	C
0	0	3	1.5

Course Objectives:

- To introduce MATLAB and use it as a computation and visualization tool
- To expose the applications of signal analysis and system design
- To acquire the basic knowledge of digital logic levels and to design and verify basic digital electronics circuits
- To introduce to the students the topics that include combinational and sequential circuit analysis and design
- To design optimization methods using random logic gates, multiplexers, decoders, registers, counters

Course Outcomes:

At the end of the laboratory work, students will be able to

- Demonstrate the ability in generating and manipulating various types of signals and classify the characteristics of random processes in signal processing.
- Utilize Boolean algebra and Karnaugh maps for simplifying digital circuits, ensuring accurate implementation and efficient performance in digital electronic systems.
- Develop the ability in modeling both combinational and sequential digital systems, ensuring correct functionality, timing, and optimization for real-world applications.
- Apply Laplace and Fourier transforms for converting time-domain signals into the frequency domain, facilitating analysis of signal behavior and system characteristics.
- Design sequential circuits, including registers and counters, for implementing efficient state machines and storage elements.

List of Experiments:

- **Basic Simulation Lab:**

1. Generation of Various Signals and Sequences (Periodic and Aperiodic).
2. Operations on Signals and Sequences such as Addition, Multiplication, Scaling, Shifting, Folding, Computation of Energy and Average Power.
3. Convolution and for Correlation (ACF and CCF) Signals and sequences.
4. Verification of Linearity and Time Invariance Properties of a given Continuous/Discrete System.
5. Computation of Unit sample, Unit step and Sinusoidal responses of the given LTI system.
6. Gibbs Phenomenon Simulation.
7. Finding the Fourier Transform of a given signal and plotting its magnitude and phase spectrum.
8. Locating the Zeros and Poles and plotting the Pole-Zero maps in S-plane and Z-Plane for the given transfer function.
9. Verification of Sampling Theorem.
10. Checking a Random Process for Stationary in Wide sense.

- **Digital System Design Lab:**
  1. Realization of Boolean expressions using gates.
  2. Generation of clock using NAND / NOR gates.
  3. Design a 4 – bit adder/subtractor.
  4. Design and realization of a 4-bit gray to binary and binary to gray Converter.
  5. Design and realization of an 8-bit parallel load and serial out shift register using flip-flops.
  6. Design and realization of a synchronous and asynchronous counter using flip-flops.
  7. Design and realization of 8x1 MUX using 2x1 MUX.
  8. Design and realization of 4-bit comparator.
  9. Design a Ring counter and Twisted ring counter using a 4-bit shift register
  10. Design and Realization of a sequence detector-a finite state machine.

Note:

- All the Basic Simulation Lab experiments are to be simulated using MATLAB/SCI LAB or equivalent software.
- Minimum of 14 experiments (7 from Basic Simulation and 7 from Digital System Design Lab) are to be completed.

MARRI LAXMAN REDDY INSTITUTE OF TECHNOLOGY AND MANAGEMENT
(AUTONOMOUS)

2040022: GENDER SENSITIZATION
(Mandatory Course)

II Year B.Tech. ECE II – Sem.

L	T	P	C
2	0	0	0

Course Objectives:
- To develop students' sensibility with regard to issues of gender in contemporary India.
- To provide a critical perspective on the socialization of men and women.
- To introduce students to information about some key biological aspects of genders.
- To expose the students to debates on the politics and economics of work.
- To help students reflect critically on gender violence.
- To expose students to more egalitarian interactions between men and women.

Course Outcomes:
- Develop a critical understanding of the key issues related to gender in contemporary India, with an emphasis on social, cultural, and political perspectives.
- Explore the implications of gender socialization on power dynamics, inequality, gender-based discrimination
- Attain a deeper understanding of the mechanisms of gender discrimination in society and develop strategies to challenge and overcome it.
- Introduce the key biological aspects of gender, exploring the relationship between biology and gender identity.
- Acquire insight into the gendered division of labor and its relationship with politics and economics.

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UNIT – I

UNDERSTANDING GENDER
Gender: Why Should We Study It? (*Towards a World of Equals:* Unit -1)
Socialization: Making Women, Making Men (*Towards a World of Equals:* Unit -2)
Introduction. Preparing for Womanhood. Growing up Male. First lessons in Caste. Different Masculinities.

UNIT - II
GENDER AND BIOLOGY
Missing Women: Sex Selection and Its Consequences (*Towards a World of Equals:* Unit -4)
Declining Sex Ratio. Demographic Consequences.
Gender Spectrum: Beyond the Binary (*Towards a World of Equals:* Unit -10)
Two or Many? Struggles with Discrimination.

UNIT - III
GENDER AND LABOUR
Housework: the Invisible Labour (*Towards a World of Equals:* Unit -3)
"My Mother doesn't Work." "Share the Load."
Women's Work: Its Politics and Economics (*Towards a World of Equals:* Unit -7)
Fact and Fiction. Unrecognized and Unaccounted work. Additional Reading: Wages and Conditions of Work.

UNIT - IV
ISSUES OF VIOLENCE

Sexual Harassment:
Say No! (*Towards a World of Equals:* Unit -6), Sexual Harassment, not Eve-teasing- Coping with Everyday Harassment- Further Reading: "Chupulu".
Domestic Violence: Speaking Out (*Towards a World of Equals:* Unit -8)
Is Home a Safe Place? -When Women Unite [Film]. Rebuilding Lives. Additional Reading: New Forums for Justice.
Thinking about Sexual Violence (*Towards a World of Equals:* Unit -11)
Blaming the Victim-"I Fought for my Life…." - Additional Reading: The Caste Face of Violence.

UNIT – V
GENDER: CO – EXISTENCE
Just Relationships:
Being Together as Equals (*Towards a World of Equals:* Unit -12)
Mary Kom and Onler. Love and Acid just do not Mix. Love Letters. Mothers and Fathers. Additional Reading: Rosa Parks-The Brave Heart.

TEXTBOOKS:
1. *A Bilingual Textbook on Gender*" written by A. Suneetha, Uma Bhrugubanda, Duggirala Vasanta, Rama Melkote, Vasudha Nagaraj, Asma Rasheed, Gogu Shyamala, Deepa Sreenivas and Susie Tharu and published by Telugu Akademi, Hyderabad,Telangana State in the year 2015.

REFERENCE BOOKS:
1. Menon, Nivedita. Seeing like a Feminist. New Delhi: Zubaan-Penguin Books, 2012
2. Abdulali Sohaila. "I Fought For My Life…and Won."
   Available online at: http://www.thealternative.in/lifestyle/i-fought-for-my-lifeand-won-sohaila-abdulal/

III - I

MARRI LAXMAN REDDY INSTITUTE OF TECHNOLOGY AND MANAGEMENT
(AUTONOMOUS)

2050237: CONTROL SYSTEMS

III Year B.Tech. ECE I – Sem. **L T P C**

2 1 0 3

Pre-requisites: Linear Algebra and Calculus, Ordinary Differential Equations and Multivariable Calculus Laplace Transforms, Numerical Methods and Complex variables

Course Objectives:

- To understand the different ways of system representations such as Transfer function representation and state space representations and to assess the system dynamic response
- To assess the system performance using time domain analysis and methods for improving it
- To assess the system performance using frequency domain analysis and techniques for improving the performance
- To design various controllers and compensators to improve system performance

CourseOutcomes:

At the end of this course, students will be able to

- Develop the ability in modeling linear-time-invariant systems using transfer functions, analyzing system behavior in the Laplace domain.
- Analyze the stability of LTI systems in both the time and frequency domains for reliable and stable operation of control sytems.
- Understand the concept of system stability and it's assessment using Routh's stability Criterion and Root locus.
- Evaluate the stability, transient response, and steady-state behavior of systems, using tools such as transfer functions, Nyquist Plot, Bode plot and compensators.
- Analyze the modeling of linear time invarient systems using state space representation

UNIT - I

Introduction to Control Systems:

Classification of control systems. Feed-Back Characteristics, Effects of feedback - Mathematical modeling of Electrical and Mechanical systems -Transfer function- Transfer function of Potentiometer, synchro, AC servo motor, DC servo motor - Block diagram reduction techniques, signal flow graph, Mason’s gain formula.

UNIT - II

Time Domain Analysis:

Standard test signals - Time response of first order systems - Transient response of second order system for unit step input, Time domain specifications - Steady state response - Steady state errors and error constants - Effects of P, PD, Pl and PID controllers.

UNIT – III

Stability Analysis in S-Domain:

The concept of stability - Routh's stability Criterion, Absolute stability and relative stability- limitations of Routh's stability.

Root Locus Technique:

The root locus concept - construction of root loci- Effects of adding poles and zeros on the root loci.

UNIT – IV

Frequency Response Analysis:

Introduction to frequency response - Frequency domain specifications - Bode plot - Stability analysis from Bode plots - Determination of transfer function from the Bode Diagram - Polar Plots, Nyquist Plots, Stability Analysis, Gain margin and phase margin.

Control System Design:

Introduction - Lag, Lead and Lag-Lead Compensator design in frequency Domain.

UNIT - V

State Space Analysis:

Concepts of state, State variables and state model, Derivation of state models of linear time invariant systems - Controllable, Observable and Diagonal state models - State transition matrix - Solution of state equation - Concepts of Controllability and Observability.

TEXT BOOKS:

1. M. Gopal, “Control Systems: Principles and Design”, McGraw Hill Education, 1997.
2. B. C. Kuo, “Automatic Control System”, Prentice Hall, 1995.

REFERENCE BOOKS:

1. K. Ogata, “Modern Control Engineering”, Prentice Hall, 1991.
2. I. J. Nagrath and M. Gopal, “Control Systems Engineering”, New Age International, 2009

MARRI LAXMAN REDDY INSTITUTE OF TECHNOLOGY AND MANAGEMENT
(AUTONOMOUS)

2050416: LINEAR AND DIGITAL IC APPLICATIONS

III Year B.Tech. ECE I – Sem. **L T P C**

3 1 0 4

Pre-requisites: Knowledge on Basic Electrical Engineering and Semiconductor Devices

Course Objectives:

- Understand the basic building blocks of linear integrated circuits
- Theoretical aspects and applications of multivibrators and voltage regulators
- Analyze the concepts of active filters and PLL
- Development of A/D and D/A converters
- Design and analysis of the various combinational and sequential circuits

CourseOutcomes:

At the end of this course, the student will be able to

- Understand the fundamental characteristics of operational amplifiers (Op-Amps) and ICs in analog and digital circuit applications.
- Categorize applications of Op-Amps and IC timers in real-world digital and analog systems.
- Analyze functionality, accuracy, and suitability of various A/D and D/A converters for different applications.
- Utilize combinational logic ICs for implementing digital systems.
- Apply sequential logic components and memory technologies for solving practical engineering problems in digital circuit design and systems.

UNIT – I

Integrated Circuits and Operational Amplifier: Introduction, Classification of IC's, IC chip size and circuit complexity, basic concepts of Op-Amp IC741 Op- Amp and its features, the ideal Op-Amp, Op-Amp internal circuit, Op-Amp characteristics - DC and AC analysis. Inverting and non-inverting amplifiers, adder, subtractor, Instrumentation amplifier, AC amplifier, V to I and I to V converters, Integrator and differentiator, Sample and Hold circuit, Log and Antilog amplifier, multiplier and divider, Comparators, Schmitt trigger and Multivibrators.

UNIT – II

Applications of Op-Amp: Triangular and Square waveform generators, Oscillators types and principle of operation –RC, Wein and Quadrature type, IC Voltage Regulators, IC 723 general purpose regulators, Introduction, Butterworth filters – 1st order, 2nd order low pass and high pass filters, band pass, band reject and all pass filters.

IC-555 & IC-565 Timer Applications: Introduction to IC 555 timer, description of functional diagram, monostable, Astable operations and applications, Schmitt trigger, PLL, Principles and description of individual blocks of 565.

UNIT – III

A/D and D/A Converters: Introduction, basic DAC techniques, D/A converter – specifications - weighted resistor type, R-2R Ladder DAC, A/D Converters – specifications – Counter type, Flash type - Successive Approximation type - Single Slope type – Dual Slope type ADC.

UNIT – IV

Digital Integrated Circuits: Classification of Integrated Circuits, Comparison of Various Logic Families, Combinational Logic ICs –Specifications and Applications of TTL-74XX & Code Converters, Decoders, Demultiplexers, Encoders, Priority Encoders, Multiplexers, Demultiplexers, Priority Generators/Checkers, Parallel Binary Adder/Subtractor, Magnitude Comparators.

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UNIT – V

Sequential Logic IC's and Memories: Familiarity with commonly available 74XX & CMOS 40XX Series ICs –All Types of Flip-flops, Synchronous Counters, Decade Counters, Shift Registers. Memories -ROM Architecture, Types of ROMS & Applications, RAM Architecture, Static & Dynamic RAMs.

TEXT BOOKS:

1. Ramakanth A. Gayakwad, "Op-Amps & Linear ICs," PHI, 4th Edition, 2003.
2. Floyd and Jain, "Digital Fundamentals," Pearson Education, 11th Edition, 2010.

REFERENCES:

1. D. Roy Chowdhury, "Linear Integrated Circuits," New Age International (p) Ltd, 11th Edition, 2018.
2. K. Lal Kishore, "Operational Amplifiers with Linear Integrated Circuits," Pearson, 2nd Edition, 2009.
3. S. Salivahanan, "Linear Integrated Circuits and Applications," Tata McGraw-Hill Education, 3rd Edition, 2018.

MARRI LAXMAN REDDY INSTITUTE OF TECHNOLOGY AND MANAGEMENT
(AUTONOMOUS)

2050010: BUSINESS ECONOMICS & FINANCIAL ANALYSIS

III Year B.Tech. ECE I – Sem. **L T P C**
3 0 0 3

Pre-requisite: Nil

Course Objectives:
- To learn the basic Business types, impact of the economy on business and firms specifically.
- To analyze the business from the financial perspective.

Course Outcomes:
At the end of this course, the student will be able to
- Explore the different types of business structures and evaluate their advantages, disadvantages, and suitability for different business goals.
- Comprehend the principles of demand and supply, analyzing how market equilibrium is established and influenced by shifts in demand and supply curves.
- Interpret financial data for making informed business decisions, while evaluating the impact of financial performance on business strategy and investment decisions.
- Develop the ability in applying demand forecasting methods, for predicting future demand patterns and guiding business decision-making.
- Use break-even analysis in evaluating business viability, setting pricing strategies, and guiding production and investment decisions that maximize profitability.

UNIT – I
Introduction to Business and Economics:
Business: Structure of Business Firm, Types of Business Entities, Limited Liability Companies, Economics: Significance of Economics, Micro and Macro Economic Concepts, Business Cycle, Features and Phases of Business Cycle. Nature and Scope of Business Economics, Role of Business Economist.

UNIT – II
Demand Analysis and Elasticity of Demand:
Elasticity, Types of Elasticity, Law of Demand, Measurement and Significance of Elasticity of Demand, Factors affecting Elasticity of Demand, Demand Forecasting: Steps in Demand Forecasting, Methods of Demand Forecasting.

UNIT – III
Production, Cost, Market Structures & Pricing:
Production, Cost, Market Structures & Pricing: Production Analysis: Factors of Production, Production Function, Different Types of Production Functions. Cost analysis: Types of Costs, Short run and Long run Cost Functions. Market Structures: Features of Perfect competition, Monopoly, Oligopoly, and Monopolistic Competition. Pricing: Types of Pricing, Break Even Analysis, and Cost Volume Profit Analysis.

UNIT – IV
Capital Budgeting:
Importance of Capital Budgeting, methods of Capital Budgeting: Traditional Methods: Pay Back Period, Accounting Rate of Return, and Discounting Methods: Net Present Value, Profitability Index, Internal Rate of Return; Financial Analysis through Ratios: Concept of Ratio Analysis, Liquidity Ratios, Turnover Ratios, Profitability Ratios, Proprietary Ratios, Solvency, Leverage Ratios (simple problems).

UNIT – V
Financial Accounting:
Accounting concepts and Conventions, Accounting Equation, Double-Entry system of Accounting, Rules for maintaining Books of Accounts, Journal, Posting to Ledger, Preparation of Trial Balance, Elements of Financial Statements, and Preparation of Final Accounts.

TEXT BOOKS:

1. D. D. Chaturvedi, S. L. Gupta, Business Economics - Theory and Applications, International Book

House Pvt. Ltd. 2013.
2. Dhanesh K Khatri, Financial Accounting, Tata McGraw Hill, 2011.
3. Geethika Ghosh, Piyali Gosh, Purba Roy Choudhury, Managerial Economics, 2nd Edition, Tata McGraw Hill Education Pvt. Ltd. 2012.
4. I.M. Pandey, Financial Management, 11th Edition, Kindle Edition, 2015.

REFERENCE BOOKS:

1. Paresh Shah, Financial Accounting for Management 2e, Oxford Press, 2015.
2. S. N. Maheshwari, Sunil K Maheshwari, Sharad K Maheshwari, Financial Accounting, 5th Edition, Vikas Publications, 2013

MARRI LAXMAN REDDY INSTITUTE OF TECHNOLOGY AND MANAGEMENT
(AUTONOMOUS)

2050417: PROBABILITY THEORY AND STOCHASTIC PROCESSES

III Year B.Tech. ECE I – Sem. **L T P C**

3 0 0 3

Pre-requisite: Knowledge on probability and integration

Course Objectives:

- Learn the basic concepts of probability and its various concepts
- Understand different types of random variables, their density distribution functions and its operations
- Gain knowledge on the functions of two random variables probability density distribution of the joint random variables
- Acquire the knowledge on concepts of the random processes or distribution functions
- Learn the concepts of temporal and spectral characteristics of random process

Course Outcomes:

At the end of this course, the student will be able to

- Understand the concepts of probability for solving problems involving sample space, determining the likelihood of various outcomes in random experiments.
- Apply concepts of probability density functions (PDF) in communication systems for analyzing signal behavior and noise characteristics.
- Comprehend the properties and behavior of vector random variables, joint distribution functions, and marginal distributions for analyzing multiple random variables in real-world systems.
- Analyze stationary and non-stationary processes, including first-order, second-order, wide-sense, and strict-sense stationary processes, and their significance in modeling real-world random phenomena.
- Characterize the response of Linear Time-Invariant (LTI) systems when driven by a stationary random process for analyzing system behavior in communication and signal processing applications.

UNIT I

Probability: Probability, Probability introduced through sets and relative frequency, Experiments and sample spaces, Discrete and continuous sample spaces, Events, Probability definitions and axioms, Mathematical model of experiments, Probability as a relative frequency, Joint probability, Conditional probability, Total probability, Bayes' theorem and independent events.

Random Variable: Definition of a random variable, Conditions for a function to be a random variable, Discrete, Continuous and mixed random variables

UNIT II

Distribution & Density Functions: Distribution and density functions and their properties - Binomial, Poisson, Uniform, Gaussian, Exponential, Rayleigh and conditional distribution, Methods of defining conditional event, Conditional density, and its properties.

Operations on One Random Variable: Introduction, Expected value of a random variable, Moments about the origin, Central moments, Variance and Skew, Chebyshev's inequality, Characteristic function, Moment generating function, Transformations of a random variable: Monotonic transformations for a continuous random variable, Non-monotonic transformations of continuous random variable and Transformation of a discrete random variable.

UNIT III

Multiple Random Variables: Vector random variables, Joint distribution function, Properties of joint distribution, Marginal distribution functions, Conditional distribution and density – Point conditioning,

Conditional distribution and density – Interval conditioning, Statistical independence, Sum of two random variables, Sum of several random variables, Central limit theorem (proof not expected).

Operations on Multiple Random Variables: Expected value of a function of random variables: Joint moments about the origin, Joint central moments, Joint characteristic function, Jointly gaussian random variables - two random variables case.

UNIT - IV

Stochastic Processes – Temporal Characteristics: The stochastic process concept, Classification of processes, Deterministic and nondeterministic processes, Distribution and density functions, Concept of stationary and statistical independence, First-order stationary processes, Second- order and wide-sense stationary, N^{th} order and strict-sense stationary. Time averages and ergodicity, Mean-ergodic processes, Correlation-ergodic processes, Autocorrelation function and its properties, Cross-correlation function and its properties, Covariance and its properties. Linear system response of mean, mean-squared value, Autocorrelation and cross-correlation functions. Gaussian and Poisson random process.

UNIT - V

Stochastic Processes – Spectral Characteristics: The power spectrum: Properties, Relationship between power spectrum and autocorrelation function, Cross-power density spectrum, Properties of PSD, Relationship between cross-power spectrum and cross-correlation function. Spectral characteristics of linear system response: Power density spectrum of linear system response, Cross-power density spectrums of input and output of a linear system.

TEXT BOOKS:

1. Peyton Z. Peebles, “Probability, Random Variables & Random Signal Principles,” TMH, 4^{th} Edition, 2005.
2. Herbert Taub & Donald L Schilling, “Principles of Communication Systems,” Tata McGraw-Hill, 4^{th} Edition, 2013.

REFERENCE BOOKS:

1. Athanasios Papoulis and S. Unnikrishnan Pillai, “Probability, Random Variables and Stochastic Processes,” PHI, 4^{th} Edition, 2002.
2. K. Murugesan, P. Guruswamy, “Probability, Statistics & Random Processes”, Anuradha Agencies, 3^{rd} Edition, 2003.
3. B.P. Lathi, “Signals, Systems & Communications,” B.S. Publications, 3^{rd} Edition, 2003.

MARRI LAXMAN REDDY INSTITUTE OF TECHNOLOGY AND MANAGEMENT
(AUTONOMOUS)

2050441: DIGITAL DESIGN USING VERILOG
(Professional Elective – I)

III Year B.Tech. ECE I – Sem. **L T P C**

3 0 0 3

Pre-requisites: Knowledge on C-Programming and Digital logic design

Course Objectives:

- Familiarize with various modeling methods: structural, dataflow and behavioral of Verilog HDL
- Develop combinational and sequential circuits using various modeling styles of Verilog HDL
- Design and develop Verilog HDL models of data path and control units of CPU
- Learn Synthesis and FPGA design flow
- Design and develop real time applications: Booth's multiplier, Divider, hardwired control for basic CPU and FIR filter

Course Outcomes:

At the end of this course, students will be able to

- Implement and distinguish different Verilog HDL modeling methods
- Construct and analyze Verilog HDL models of combinational and sequential circuits
- Design and develop Verilog HDL modeling and test bench for digital systems
- Understand the FPGA design flow and timing analysis
- Understand the process of development of IP cores

UNIT– I

Introduction: Evolution of CAD Design, Typical Design Flow, Importance of HDLs, Concurrency, Simulation and Synthesis,

Constructs and Conventions: Design Methodologies and 4-bit Ripple Carry Counter, Modules, Instances, Components of a Simulation, Lexical Conventions, Data Types, System Tasks, Compiler Directives, Internals of the module, Ports, Hierarchical Names, Gate Types and Gate Delays.

UNIT – II

Gate-Level Modeling: Modeling using basic Verilog gate primitives, description of and/or and buf/not type gates, rise, fall and turn-off delays, min, max, and typical delays.

Dataflow Modeling: Continuous assignments, delay specification, expressions, operators, operands and operator types.

UNIT – III

Behavioral Modeling: Structured procedures, initial and always, blocking and nonblocking statements, delay control, generate statement, event control, conditional statements, multiway branching, loops, sequential and parallel blocks, examples.

UNIT – IV

Synthesis: Introduction to synthesis, impact of logic synthesis, Verilog HDL constructs and operators for logic synthesis, synthesis design flow, verification of synthesized circuits, Synthesis of combinational logic, Synthesis of sequential logic, Synthesis of explicit and implicit state machines.

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UNIT – V

Programmable Logic Devices: PLA, PAL, Complex PLDs, Altera MAX 7000 CPLD, XILINX XC9500 CPLDs, FPGAs, Altera flex 10 FPGAs, XILINX XC4000 series FPGA, XILINX Spartan II FPGAs, Synthesis with FPGAs.

TEXT BOOKS:

3. Samir Palnitkar, “Verilog HDL A Guide to Digital Design and Synthesis,” Pearson Education, 2nd Edition, 2006.
4. Michael D. Ciletti, “Advanced Digital Design with the Verilog HDL,” Pearson Education, 2nd Edition, 2017.

REFERENCES:

6. J. Bhasker, “Verilog HDL Synthesis: A Practical Primer,” BS Publications, 3rd Edition, 2001.
7. B. Bala Tripura Sundari and T. R. Padmanabhan, “Design through Verilog HDL,” 3rd Edition Wiley, 2009.
8. Ming-Bo Lin, Digital System Designs and Practices: Using Verilog HDL and FPGA,” 1st Edition, Wiley, 2008.

MARRI LAXMAN REDDY INSTITUTE OF TECHNOLOGY AND MANAGEMENT
(AUTONOMOUS)

2050442: ELECTRONIC MEASUREMENTS AND INSTRUMENTATION
(Professional Elective – I)

III Year B.Tech. ECE I – Sem.

L	T	P	C
3	0	0	3

Prerequisite: Basics of Electrical and Electronics Engineering

Course Objectives:

- Study the functioning of various measuring systems and performance characteristics
- Know the principle of operation and working of signal generators, signal analyzers,
- Understand and analyze the characteristics of general and special purpose oscilloscopes
- Learn concepts related to various transducers
- Gain knowledge on various measuring techniques for measurement of different physical parameters using different classes of transducers.

Course Outcomes:

At the end of this course, students will be able to

- Develop the ability in choosing the appropriate signal generation and analysis equipment based on frequency range, signal integrity, resolution, and system compatibility.
- Analyze various signal parameters, such as amplitude, frequency, phase, rise time, and waveform distortion, using oscilloscopes, and interpret the results for accurate measurements in different contexts.
- Comprehend the working principles, characteristics, and types of transducers and their applications in measurement and control systems.
- Justify the significance of transducers in measuring various forms of energy and understand their critical role in converting physical energy into measurable electrical signals for effective monitoring and control.
- Assess the performance of transducers in terms of accuracy, sensitivity, and response time, for precise and reliable data acquisition.

UNIT - I

Performance Characteristics of Systems: Static Characteristics: Accuracy, Precision, Resolution, Types of Errors, Dynamic Characteristics: Fidelity, Lag, Repeatability, Reproducibility.

Measuring Instruments: D'Arsonval Movement, DC Voltmeters, DC Current Meters, AC Voltmeters and Current Meters, Ohmmeters, Multimeters, Meter Protection, Extension of Range.

UNIT - II:

Signal Generators: Oscillators, AF, RF Signal Generators, Standard AF Sine and Square wave Generator, Pulse and Square wave Generators, Function Generators, Video Signal Generators.

Signal Analyzers: AF, HF Wave Analyzers, Harmonic Distortion, Heterodyne wave Analyzers, Spectrum Analyzers, Power Analyzers, Capacitance-Voltage Meters.

UNIT - III

General Purpose Oscilloscopes: CRT, Block Schematic of CRO, Time Base Circuits, Lissajous Figures, CRO Probes, High Frequency CRO Considerations, Delay lines, Applications: Measurement of Time, Period and Frequency Specifications.

Special Purpose Oscilloscopes: Dual Trace, Dual Beam CROs, Sampling Oscilloscopes, Storage Oscilloscopes, Digital Storage CROs.

UNIT - IV

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Transducers: Classification, Strain Gauges, Bounded, unbounded; Force and Displacement Transducers, Resistance Thermometers, Thermistors and Sensistors, Hotwire Anemometers, LVDT, Thermocouples, Piezoelectric Transducers, Variable Capacitance Transducers, Magneto Strictive Transducers, gyroscopes, accelerometers.

Measurement of Physical Parameters: Measurement of Humidity and Moisture, Velocity, Data Acquisition Systems.

UNIT - V

DC and AC Bridges: DC: Wheat Stone Bridge, DC Kelvin Bridge, AC: Maxwell Bridge, Hay's Bridge, Schering Bridge, Resonance Bridge.

Bio-Medical Instrumentation: Basics of biomedical signals and electrodes, ECG, EEG and MRI.

TEXT BOOKS:

1. H. S. Kalsi, "Electronic Instrumentation," TMH, 4th Edition, 2019.
2. A.D. Helbincs, W. D. Cooper, "Modern Electronic Instrumentation and Measurement Techniques," PHI, 5th Edition 2003.

REFERENCES:

1. K. Lal Kishore, "Electronic Measurements and Instrumentation," Pearson Education, 2010, 2nd Edition, 2012.
2. David A. Bell, "Electronic Instrumentation and Measurements," Oxford Univ. Press, 3rd Edition, 2013.
3. Dr. R. S. Sedha, S. Chand, "Electronic Measurements and Instrumentation," 1st Edition 2013.

MARRI LAXMAN REDDY INSTITUTE OF TECHNOLOGY AND MANAGEMENT
(AUTONOMOUS)

2050443: SPREAD SPECTRUM COMMUNICATIONS
(Professional Elective – I)

III Year B.Tech. ECE I – Sem. **L T P C**

3 0 0 3

Prerequisite: Basics of communication systems

Course Objectives:

- Acquire the knowledge on Spread Spectrum and study various types of Spread spectrum sequences and their generation
- Understand the principles of Code Division Multiple Access (CDMA) and use of Spread spectrum concept in CDMA
- Know the various Code tracing loops for optimum tracking of wideband signals viz spread spectrum signals
- Develop procedures for synchronization of receiver for receiving the Spread spectrum signal.
- Study the performance of spread spectrum systems in Jamming environment, systems with Forward Error Correction and Multiuser detection in CDMA cellular radio

Course Outcomes:

At the end of this course, students will be able to

- Generate various types of Spread spectrum sequences and simulate CDMA system (Both Transmitter & Receiver)
- Analyze the performance of Spread spectrum systems in Jamming environment and systems with Forward Error Correction
- Understand the theoretical aspects and basic spread spectrum techniques in mobile wireless systems
- Analyze and solve simple problems in the field of spread spectrum communications
- Analyze detection and cancellation techniques for Multiusers in CDMA cellular radio

UNIT– I

Introduction to Spread Spectrum Systems: Fundamental Concepts of Spread Spectrum Systems, Pseudo Noise Sequences, Direct Sequence Spread Spectrum, Frequency Hop Spread Spectrum, Hybrid Direct Sequence Frequency Hop Spread Spectrum and Code Division Multiple Access.

Binary Shift Register Sequences for Spread Spectrum Systems: Introduction, Definitions, Mathematical Background and Sequence Generator Fundamentals, Maximal Length Sequences, Gold Codes.

UNIT – II

Code Tracking Loops: Introduction, Optimum Tracking of Wideband Signals, Base Band Delay-Lock Tracking Loop, Tau-Dither Non- Coherent Tracking Loop, Double Dither Non-Coherent Tracking Loop.

UNIT – IV

Cellular Code Division Multiple Access (CDMA) Principles: Introduction, Wide Band Mobile Channel, The Cellular CDMA System, Single User Receiver in a Multi User Channel, CDMA System Capacity.

Multi-User Detection in CDMA Cellular Radio: Optimal Multi-User Detection, Linear Suboptimal

Detectors, Interference Combat Detection Schemes, Interference Cancellation Techniques.

UNIT – V

Performance of Spread Spectrum Systems in Jamming Environments: Spread Spectrum Communication System Model, Performance of Spread Spectrum Systems without Coding.

Performance of Spread Spectrum Systems with Forward Error Correction: Elementary Block Coding Concepts, Optimum Decoding Rule, Calculation of Error Probability, Elementary Convolution Coding Concepts, Viterbi Algorithm, Decoding and Bit-Error Rate.

TEXT BOOKS:

1. J. Rodger, E Ziemer, Roger L. Peterson and David E Borth, “Introduction to Spread Spectrum Communication,” Pearson, 2nd Edition, 2013.
2. Mosa Ali Abu-Rgheff, “Introduction to CDMA Wireless Communications,” Elsevier Publications, 3rd Edition, 2008.

REFERENCES:

1. D. George R. Cooper, Clare D. Mc Gillem, “Modern Communication and Spread Spectrum,” McGraw Hill, 4th Edition,1986.
2. Andrew J. Viterbi, “CDMA: Principles of spread spectrum communication,” Pearson Education, 1st Edition, 1995.
3. Steve Lee, “Spread Spectrum CDMA”, McGraw Hill, 2nd Edition 2002.

MARRI LAXMAN REDDY INSTITUTE OF TECHNOLOGY AND MANAGEMENT
(AUTONOMOUS)

2050444: FPGA PROGRAMMING
(Professional Elective – I)

III Year B.Tech. ECE I – Sem.

L	T	P	C
3	0	0	3

Pre-requisites: Digital System Design

Course Objectives:

- Acquire Knowledge about various architectures and device techniques of PLD 's
- Understand the concepts of FPGA architectures
- Acquire knowledge on various programming models in HDL platform
- Design various digital building blocks using Verilog HDL platform
- Comparative analysis of various task functions and verifications

Course Outcomes:

At the end of this course, students will be able to

- Differentiate various types of programmable logic devices
- Understand the types of FPGA's and their programming technologies
- Optimize logic for various performance goals related to timing, frequency, area and power
- Utilize commercial FPGA development programming models for compilation, simulation, and synthesis
- Apply functional, timing, and formal verification methods at various design abstractions of VLSI circuits

UNIT– I

Introduction: Digital system design options and tradeoffs, Design methodology and technology overview, High Level System Architecture and Specification. Overview of Programmable logic devices- Architectures of SPLD's- PROM, PLA, PAL, Architecture of CPLD, Programmable interconnects and elements.

UNIT – II

Overview of FPGA architectures and technologies: FPGA Architectural options, granularity of function and wiring resources, coarse V/s fine grained, vendor specific issues (emphasis on Xilinx and Altera), Logic block architecture: FPGA logic cells, timing models, power dissipation I/O block architecture: Input and Output cell characteristics, clock input, Timing, Power dissipation. Programmable interconnect - Partitioning and Placement, Routing resources, delays.

UNIT – III

Hardware Description Language (HDL): Design Methodologies, Structure of Verilog HDL, Lexical conventions, Number specifications, Data types, system tasks and compiler directives, modules and ports.

Gate-level Modeling: Structure of the gate-level modeling- Gate types, Array of instances, gate delays, Examples.

UNIT – IV

Data Flow Modeling: Structure of the dataflow modeling, Continuous assignment Statements, delays, Expressions, Operators, and Operands. Examples.

Behavioral Modeling: Structure of the Behavioral modeling, initial statement, always statement, Procedural assignments, Timing controls, conditional statements, CASE & LOOP statements.

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UNIT – V

Tasks, Functions and Verification: Difference between tasks and functions, declaration, invocation, Examples. Verification: Introduction to verification, simulation, static timing Analysis, Association languages and formal verification**.**

TEXT BOOKS:

1. Bob Zeidman, “Designing with FPGAs and CPLDs,” CRC Press, 1st Edition, 2002.
2. Samir Palnitkar, “Verilog HDL, A guide to Digital System Design and Synthesis,” Pearson, 2nd Edition, 2009.

REFERENCES:

1. D. D. Gajski, N. D. Dutt, A.C.-H. Wu and S.Y.-L. Lin, “High-level Synthesis: Introduction to Chip and System Design,” Springer, 1st Edition, 1992.
2. Charles H. Roth, Jr., Larry L Kinney “Fundamentals of Logic Design,” Cengage Learning, 7th Edition, 2013.
3. Miron Abramovici, Melvin A. Breuer and Arthur D. Friedman, “Digital Systems Testing and Testable Design,” Wiley-IEEE press, 2nd Edition, 1994.

MARRI LAXMAN REDDY INSTITUTE OF TECHNOLOGY AND MANAGEMENT
(AUTONOMOUS)

2050503: DATABASE MANAGEMENT SYSTEMS
(Common to CSE, IT, CSIT, CSM, CSD, CSC, EEE, ECE)

III Year B.Tech. ECE I – Sem. **L T P C**

3 0 0 3

Pre-requisites: A course on "Data Structures"

Course Objectives:

- To understand the basic concepts and the applications of database systems.
- To master the basics of SQL and construct queries using SQL.
- Topics include data models, database design, relational model, relational algebra, transaction control, concurrency control, storage structures and access techniques.

Course Outcomes:

- Understand the core concepts of DBMS, including data models, DBMS architecture, relational database management systems (RDBMS), and SQL.
- Utilize relational algebra in querying for data retrieval, insertion, deletion, and modification while optitimizing operations for better performance.
- Develop proficiency in using SQL commands for querying and manipulating data in relational databases while managing relationships using SQL.
- Apply various concurrency control mechanisms for managing concurrent database access and prevent anomalies like deadlocks and data inconsistency.
- Analyze how different storage and access techniques are used for improving database performance, reliability, and scalability in real-world applications.

UNIT - I

Database System: A Historical Perspective, File Systems versus a DBMS, the Data Model, Levels of Abstraction in a DBMS, Data Independence, Structure of a DBMS

Introduction to Database Design: Database Design and ER Diagrams, Entities, Attributes, and Entity Sets, Relationships and Relationship Sets, Additional Features of the ER Model, Conceptual Design with the ER Model

UNIT - II

Relational Model: Integrity constraint over relations, enforcing integrity constraints, querying relational data, logical data base design, introduction to views, destroying/altering tables and views

Relational Algebra and Calculus: Relational algebra, Tuple relational Calculus, Domain relational calculus.

UNIT - III

SQL: Queries, Constraints, Triggers: form of basic SQL query, UNION, INTERSECT, and EXCEPT, Nested Queries, aggregation operators, NULL values, complex integrity constraints in SQL, triggers and active data bases.

Schema Refinement: Problems caused by redundancy, decompositions, problems related to decomposition, reasoning about functional dependencies, FIRST, SECOND, THIRD normal forms, BCNF, lossless join decomposition, multi-valued dependencies, FOURTH normal form, FIFTH normal form.

UNIT - IV

Transaction Management: ACID Properties, Transaction and schedules, Concurrent execution of transactions, Lock-based Concurrency control, Performance of locking, Transaction support in SQL, Introduction to Crash Recovery

Concurrency Control: Serializability and Recoverability, Introduction to lock management, Lock conversions, dealing with deadlocks, specialized locking techniques, Concurrency control without

locking

UNIT - V

Storage and Indexing: Data on External Storage, File Organization and Indexing, Cluster Indexes, Primary and Secondary Indexes, Index data Structures, Hash Based Indexing, Tree base Indexing, Comparison of File Organizations, Indexes and Performance Tuning, Intuitions for tree Indexes, Indexed Sequential Access Methods (ISAM), B+ Trees: A Dynamic Index Structure.

TEXT BOOKS:

1. Database Management Systems, Raghurama Krishnan, Johannes Gehrke, Tata Mc Graw Hill 3rd Edition
2. Database System Concepts, Silberschatz, Korth, McGraw hill, 5th Edition.

REFERENCE BOOKS:

1. Database Systems design, Implementation, and Management, Peter Rob & Carlos Coronel, 7th Edition.
2. SQL The Complete Reference, James R. Groff, Paul N. Weinberg, 3rd Edition,
3. Oracle for Professionals, The X Team, S.Shah and V. Shah,SPD.
4. Database Systems Using Oracle: A Simplified guide to SQL and PL/SQL, Shah ,PHI.

MARRI LAXMAN REDDY INSTITUTE OF TECHNOLOGY AND MANAGEMENT
(AUTONOMOUS)

2050475: ANALOG AND DIGITAL COMMUNICATIONS LABORATORY

III Year B.Tech. ECE I – Sem.

L	T	P	C
0	0	3	1.5

Pre-requisites: Basic concepts of analog and digital communications

Course Objectives:

- Implement various analog & digital modulation techniques in communications
- Study of various spectrums of analog modulation systems using spectrum analyzer
- Understand the importance of automatic gain control and Phase locked loop
- Explore receiver characteristics in analog & digital communications
- Observe the performance of typical telecommunication system in presence of noise

Course Outcomes:

At the end of the laboratory work, the students are able to:

- Analyze different modulation and demodulation techniques used in communication system
- Design pre-emphasis and de-emphasis circuits used in frequency modulation (FM) systems for improving signal quality and mitigate noise.
- Implement PLL circuits, digital phase detectors, and synchronous detectors, evaluating their performance in real-time systems for various applications
- Understand the differences between NBFM and WBFM, including their frequency deviation, bandwidth requirements, and applications in communication systems.
- Apply various digital modulation schemes for effective communication and ensure the performance of each modulation technique.

List of Experiments:

1. Amplitude modulation: Generation and detection.
2. Double sideband modulation: Generation and detection.
3. Single modulation (phase shift method): Generation and detection.
4. Frequency modulation: Generation and detection.
5. Study of spectrum analyzer using AM/FM signals.
6. Design & Implementation of pre-emphasis & de-emphasis filters.
7. Time division multiplexing & de-multiplexing of any two band limited signals.
8. Verification of sampling theorem.
9. Pulse amplitude modulation: Generation and detection.
10. Pulse code modulation: Generation and detection.
11. Differential pulse code modulation: Generation and detection.
12. Delta modulation: Generation and detection.
13. Amplitude shift keying: Generation and detection.
14. Frequency shift keying: Generation and detection.
15. Phase shift keying: Generation and detection.

NOTE: Minimum of 12 experiments to be conducted.

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2050573: DATABASE MANAGEMENT SYSTEMS LABORATORY

III Year B.Tech. ECE I – Sem.

L	T	P	C
0	0	2	1

Pre-requisites: A course on “Data Structures”

Course Objectives:

- Introduce ER data model, database design and normalization
- Learn SQL basics for data definition and data manipulation

Course Outcomes:

At the end of the laboratory work, the students are able to:

- Comprehend the basic concepts of computer networks, including network topologies, architecture, and the OSI and TCP/IP models, understanding the role of each layer in communication.
- Construct Entity-Relationship (E-R) diagrams for modeling database systems and effectively representing the relationships between entities in a structured way.
- Design a database schema for a given application and apply normalization techniques for ensuring data integrity, eliminate redundancy, and improve database efficiency.
- Acquire skills in using SQL commands for data definition and manipulation, efficiently managing and interacting with relational databases.
- Analyze the performance impact and best practices for using stored procedures, cursors, and triggers in real-world database applications for ensureing efficient, scalable, and reliable solutions..

Problem Statement

Roadway Travels

"Roadway Travels" is in business since 1997 with several buses connecting different places in India. Its main office is located in Hyderabad.

The company wants to computerize its operations in the following areas:

- Reservation and Ticketing
- Cancellations

Reservation & Cancellation:

Reservations are directly handled by booking office. Reservations can be made 30 days in advanceand tickets issued to passenger. One Passenger/person can book many tickets (to his/her family).

Cancellations are also directly handed at the booking office.

In the process of computerization of Roadway Travels you have to design and develop a Database which consists the data of Buses, Passengers, Tickets, and Reservation and cancellation details. You should also develop query's using SQL to retrieve the data from database.

The above process involves many steps like

1. Analyzing the problem and identifying the Entities and Relationships,
2. E-R Model
3. Relational Model
4. Normalization
5. Creating the database
6. Querying. Students are supposed to work on these steps week wise and finally create a complete "Database System" to Roadway Travels. Examples are given at every experiment for guidance to students.

Experiment 1: E-R Model

Analyze the carefully and come up with the entities in it. Identify what data has to be persisted inthe database. This contains the entities, attributes etc.

Identify the primary keys for all the entities. Identify the others keys like candidate keys, partial keys, if any.

Example: Entities:

1. BUS
2. Ticket
3. Passenger

Relationships:

1. Reservation
2. Cancellation

Primary Key Attributes:

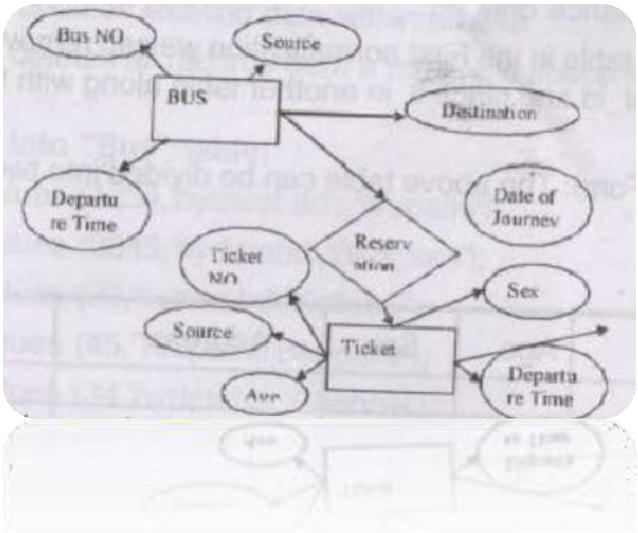
1. Ticket ID (Ticket Entity)
2. Passport ID (Passenger Entity)
3. Bus No (Bus Entity)

A part from the above-mentioned entities you can identify more. The above mentioned are few. Note: The students are required to submit a document by writing the Entities and keys to the labteacher.

Experiment 2: Concept design with E-R Model

Relate the entities appropriately. Apply cardinalities for each relationship. Identify strong entities and weak entities (if any). Indicate the type of relationships (total / partial). Try to incorporate generalization, aggregation, specialization etc wherever required.

Example: E-R diagram for bus



Note: The students are required to submit a document by drawing the E-R Diagram to the lab teacher.

Experiment 3: Relational Model

Represent all the entities (Strong, Weak) in tabular fashion. Represent relationships in a tabular fashion. There are different ways of representing relationships as tables based on the requirement. Different types of attributes (Composite, Multi-valued, and derived) have different way of representation.

Example: The passenger tables look as below. This is an example. You can add more attributes based on E-R model. This is not a normalized table.

Passenger:

Name	Age	Sex	Address	Ticket_id	Passport ID

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Note: The students are required to submit a document by Represent relationships in a tabular fashion to the lab teacher.

Experiment 4: Normalization
Database normalization is a technique for designing relational database tables to minimize duplication of information and, in so doing, to safeguard the database against certain types of logical or structural problems, namely data anomalies. For example, when multiple instances of a given piece of information occur in a table, the possibility exists that these instances will not be kept consistent when the data within the table is updated, leading to a loss of data integrity. A table that is sufficiently normalized is less vulnerable to problems of this kind, because its structure reflects the basic assumptions for when multiple instances of the same information should be represented by a single instance only.

For the above table in the First normalization, we can remove the multiple valued attribute Ticket_id and place it in another table along with the primary key of passenger.

First Normal Form: The above table can divide into two tables as shown below.

Passenger:

Name	Age	Sex	Address	Passport ID

Passport ID	Ticket_id

You can do the second and third normal forms if required. Any how Normalized tables are given at the end.

Experiment 5: Installation of MySQL and practice DDL commands

Installation of MySQL. In this week you will learn Creating databases, How to create tables, altering the database, dropping tables and databases if not required. You will also try truncate, rename commands etc.

Example for creation of a normalized "Passenger" table. CREATE TABLE Passenger(

Passport_id INTEGER PRIMARY KEY, Name VARCHAR(50) NOT NULL, Age INTEGER NOT NULL,

Sex CHAR,

Address VARCHAR(50) NOT NULL

);

Similarly create all other tables.

Note: Detailed creation of tables is given at the end.

Experiment 6: Practicing DML commands
DML commandsare used for managing data within schema objects. Some examples:
SELECT - retrieve data from the database
INSERT - insert data into a table
UPDATE - updates existing data within a table
DELETE - deletes all records from a table, the space for the records remain

insert values into "Bus" table:

insert into Bus values (1234, 'hyderabad', 'tirupathi');

insert values into "Passenger" table:

insert into Passenger values(1, 45, 'ramesh', 45, 'M',

'abc123');insert into Passenger values(56, 22, 'seetha',
32, 'F', 'abc55');

Few more Examples of DML commands:
SELECT * FROM Bus; (selects all the attributes and
displays)UPDATE Bus SET Bus_No = 1 WHERE
Bus_No = 2;

Experiment 7: Querying
In this week you are going to practice queries(along with sub queries) using ANY, ALL, IN,EXISTS, NOT EXIST, UNION, INTERSECT, Constraints etc.

Practice the following Queries:

1. Display unique PNR_No of all passengers.
2. Display all the names of male passengers.
3. Display the ticket numbers and names of all the passengers.
4. Find the ticket numbers of the passengers whose name start with 'r' and ends with 'h'.
5. Find the names of passengers whose age is between 30 and 45.
6. Display all the passengers names beginning with 'A'
7. Display the sorted list of passengers names.

Experiment 8 and Experiment 9: Querying (continued...)
You are going to practice queries using Aggregate functions (COUNT, SUM, AVG, MAX,andMIN), GROUP BY, HAVING and Creation and dropping of VIEWS.

1. Write a Query to display the information present in the Passenger and cancellation tables.Hint: Use UNION Operator.
2. Display the number of days in a week on which the 9W01 bus is available.
3. Find number of tickets booked for each PNR_No using GROUP BY CLAUSE. Hint: UseGROUP BY on PNR_No.
4. Find the distinct PNR numbers that are present.
5. Find the number of tickets booked by a passenger where the number of seats is greater than 1. Hint: Use GROUP BY, WHERE and HAVING CLAUSES.
6. Find the total number of cancelled seats.

Experiment 10: Triggers
In this week you are going to work on Triggers. Creation of insert trigger, delete trigger, updatetrigger. Practice triggers using the above database.
E.g:
CREATE TRIGGER updatecheck BEFORE UPDATE ON passenger FOR EACH
ROWBEGIN
IF NEW.TickentNO> 60 THEN
SET New.TickentNO =
TicketNo;ELSE
SET New.TicketNo
= 0;END IF;
END

Experiment 11; Procedures
In this session you are going to learn Creation of stored procedure, Execution of procedure and modification of procedure. Practice procedures using the database.

E.g:

```
CREATE PROCEDURE
myproc()BEGIN
SELECT
                COU
NT(Tickets)FROM
                Tick
et
WHERE            age >= 40;
END;
```

Experiment 12: Cursors

In this week you need to do the following: Declare a cursor that defines a result set.
Open the cursor to establish the result set. Fetch the data into local variables as needed from thecursor, one row at a time. Close the cursor when done

```
CREATE PROCEDURE
myproc(in_customer_id INT)BEGIN
DECLARE v_id INT;
DECLARE v_nameVARCHAR(30);

DECLARE c1 CURSOR FOR
SELECT stdid, stdFirstname FROM studentsss WHERE stdid - in_customer_id;

OPEN c1;
FETCH c1 INTO v_id,
v_name;CLOSE c1;
END;
```

Tables:

BUS

Bus No: VARCAHR :
PK(primary key)Source:
VARCHAR
Destination: VARCHAR

Passenger

PPNO:
VARCHAR(15) :
PKName:
VARCHAR(15)
Age: INT(4)
Sex: CHAR(10) :
Male/Female
Address:
VARCHAR(20)

Passenger_Tickets

PPNO: VARCHAR(15) : PK
Ticket_No: NUMERIC(9)

Reservation

PNR_No: NUMERIC(9) : FK
Journey_date:
DATETIME(8)
No_of_seats:
INT(8) Address:
VARCHRA(50)
Contact_No: NUMERIC(9) --> Should not less than 9 and Should not accept any other characterother than interger
STATUS: CHAR(2) : Yes/No

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Cancellation

PNR_No: NUMERIC(9) : FK
Journey_date:
DATETIME(8)
No_of_seats:
INT(8) Address:
VARCHRA(50)
Contact_No: NUMERIC(9) --> Should not less than 9 and Should not accept any other characterother than interger
STATUS: CHAR(2) : Yes/No

Ticket

Ticket_No:
NUMERIC(9) : FK
Journey_date:
DATETIME(8) Age:
INT(4)
Sex: CHAR(10) :
Male/FemaleSource:
VARCHAR
Destination:
VARCHAR
Dep_time:
VARCHAR

REFERENCE BOOKS:

1. Introduction to SQL, Rick F.vanderLans, Pearson education.
2. Oracle PL/SQL, B.Rosenzweig and E.Silvestrova, Pearson education.
3. Oracle PL/SQL Programming, Steven Feuerstein, SPD.
4. SQL & PL/SQL for Oracle 10g, Black Book, Dr. P.S. Deshpande, Dream Tech.
5. Oracle Database 11g PL/SQL Programming, M. Mc Laughlin, TMH.
6. SQL Fundamentals, J.J. Patrick, Pearson Education.

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2050075: ADVANCED ENGLISH LANGUAGE COMMUNICATION SKILLS LABORATORY

III Year B.Tech. ECE I – Sem. **L T P C**

0 0 2 1

1. INTRODUCTION:

The introduction of the Advanced Communication Skills Lab is considered essential at 3rd year level. At this stage, the students need to prepare themselves for their careers which may require them to listen to, read, speak and write in English both for their professional and interpersonal communication in the globalized context.

The proposed course should be a laboratory course to enable students to use 'good' English and perform the following:

- Gathering ideas and information to organize ideas relevantly and coherently.
- Engaging in debates.
- Participating in group discussions.
- Facing interviews.
- Writing project/research reports/technical reports.
- Making oral presentations.
- Writing formal letters.
- Transferring information from non-verbal to verbal texts and vice-versa.
- Taking part in social and professional communication.

2. OBJECTIVES:

This Lab focuses on using multi-media instruction for language development to meet the following targets:

- Enhance fluency in English by expanding vocabulary and language comprehension through multimedia exercises.
- Apply listening comprehension strategies for improving the ability to follow complex spoken content and engage effectively in real-time conversations.
- Demonstrate situational awareness by responding appropriately across different social and professional cues, fostering positive relationships and effective communication in varied settings.
- Develop the ability in writing clear, structured, and well-organized documents, ensuring ideas are presented logically and effectively for the intended purpose and audience.
- Build self-confidence and improve personal presentation, excelling in placement interviews and making a positive impact on future career opportunities.

3. SYLLABUS:

The following course content to conduct the activities is prescribed for the Advanced English Communication Skills (AECS) Lab:

- Activities on Fundamentals of Inter-personal Communication and Building Vocabulary - Starting a conversation – responding appropriately and relevantly – using the right body language
  - Role Play in different situations & Discourse Skills- using visuals - Synonyms and antonyms, word roots, one-word substitutes, prefixes and suffixes, study of word origin, business vocabulary, analogy, idioms and phrases, collocations & usage of vocabulary.
- Activities on Reading Comprehension –General Vs Local comprehension, reading for facts, guessing meanings from context, scanning, skimming, inferring meaning, critical reading& effective googling.
- Activities on Writing Skills – Structure and presentation of different types of writing – letter writing/Resume writing/ e-correspondence/Technical report writing/ – planning for writing – improving one's writing.
- Activities on Presentation Skills – Oral presentations (individual and group) through JAM sessions/seminars/PPTs and written presentations through posters/projects/reports/ e-mails/assignments etc.
- Activities on Group Discussion and Interview Skills – Dynamics of group discussion, intervention, summarizing, modulation of voice, body language, relevance, fluency and organization of ideas

and rubrics for evaluation- Concept and process, pre-interview planning, opening strategies, answering strategies, interview through tele-conference & video-conference and Mock Interviews.

4. MINIMUM REQUIREMENT:

The Advanced English Communication Skills (AECS) Laboratory shall have the following infrastructural facilities to accommodate at least 35 students in the lab:

- Spacious room with appropriate acoustics.
- Round Tables with movable chairs
- Audio-visual aids
- LCD Projector
- Public Address system
- P – IV Processor, Hard Disk – 80 GB, RAM–512 MB Minimum, Speed – 2.8 GHZ
- T. V, a digital stereo & Camcorder
- Headphones of High quality

5. SUGGESTED SOFTWARE:

- The software consisting of the prescribed topics elaborated above should be procured and used.
- Oxford Advanced Learner's Compass, 7th Edition
- DELTA's key to the Next Generation TOEFL Test: Advanced Skill Practice.
- Lingua TOEFL CBT Insider, by Dream tech
- TOEFL & GRE (KAPLAN, AARCO & BARRONS, USA, Cracking GRE by CLIFFS)

TEXT BOOKS:

1. Effective Technical Communication by M Asharaf Rizvi. McGraw Hill Education (India) Pvt. Ltd. 2nd Edition
2. Academic Writing: A Handbook for International Students by Stephen Bailey, Routledge, 5th Edition.

REFERENCE BOOKS:

1. Learn Correct English – A Book of Grammar, Usage and Composition by Shiv K. Kumar and Hemalatha Nagarajan. Pearson 2007
2. Professional Communication by Aruna Koneru, McGraw Hill Education (India) Pvt. Ltd, 2016.
3. Technical Communication by Meenakshi Raman & Sangeeta Sharma, Oxford University Press 2009.
4. Technical Communication by Paul V. Anderson. 2007. Cengage Learning pvt. Ltd. New Delhi.
5. English Vocabulary in Use series, Cambridge University Press 2008.
6. Handbook for Technical Communication by David A. McMurrey & Joanne Buckley. 2012. Cengage Learning.
7. Communication Skills by Leena Sen, PHI Learning Pvt Ltd., New Delhi, 2009.
8. Job Hunting by Colm Downes, Cambridge University Press 2008.
9. English for Technical Communication for Engineering Students, Aysha Vishwamohan, Tata Mc Graw-Hill 2009.

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2050024: INTELLECTUAL PROPERTY RIGHTS

(MANDATORY COURSE)

III Year B.Tech. ECE I – Sem.

L	T	P	C
2	0	0	0

UNIT – I

Introduction to Intellectual property: Introduction, types of intellectual property, international organizations, agencies and treaties, importance of intellectual property rights.

UNIT – II

Trade Marks: Purpose and function of trademarks, acquisition of trade mark rights, protectable matter,selecting, and evaluating trade mark, trade mark registration processes.

UNIT – III

Law of copy rights: Fundamental of copy right law, originality of material, rights of reproduction, rights to perform the work publicly, copy right ownership issues, copy right registration, notice of copy right, international copy right law.

Law of patents: Foundation of patent law, patent searching process, ownership rights and transfer.

UNIT – IV

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

Unfair competition: Misappropriation right of publicity, false advertising.

UNIT – V

New development of intellectual property: new developments in trade mark law; copy right law, patent law, intellectual property audits.

International overview on intellectual property, international – trade mark law, copy right law, international patent law, and international development in trade secrets law.

TEXT & REFERENCE BOOKS:

1. Intellectual property right, Deborah. E. Bouchoux, Cengage learning.
2. Intellectual property right – Unleashing the knowledge economy, Prabuddha Ganguli, Tata McGraw Hill Publishing company ltd.

III - II

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2060418: DIGITAL SIGNAL PROCESSING

III Year B.Tech. ECE II – Sem.

L	T	P	C
3	1	0	4

Pre-requisite: Signals and Systems

Course Objectives:

- Understand the basic concepts related to the analysis and processing of digital signals
- Understand the fast computation of DFT and appreciate the FFT processing
- Study the designs of IIR digital filters and analyze and synthesize
- Designs of FIR digital filters and analyze and synthesize
- Realize the structures of digital filters and acquaint in multi-rate signal processing techniques

Course Outcomes:

At the end of this course, the student will be able to

- Explain the fundamental concepts of digital signal processing for understanding system characteristics.
- Evaluate various discrete Fourier transformations for real world problems.
- Design IIR digital filters for evaluating their performance in discrete-time signal processing systems.
- Apply different design techniques for FIR filters for achieving specific frequency-domain requirements.
- Analyze the realization of digital filters in various forms, in relation to multi-rate digital signal processing systems.

UNIT–I

Introduction: Introduction to digital signal processing. Classification of discrete time signals & systems, Conversion of continuous to discrete time signal. Linear constant coefficient difference equations, Solution of linear constant coefficient difference equation: Zero input response, Zero state response, Impulse response, and Step response. Frequency domain representation of discrete time signals and systems.

UNIT– II

Discrete Fourier series: DFS representation of periodic sequences, Properties of DFS.

Discrete Fourier Transforms: Properties of DFT, Linear convolution of sequences using DFT, Computation of DFT: Over-lap Add method, Over-lap Save method, Relation between DTFT, DFS, DFT and Z-Transform.

Fast Fourier Transforms: Fast Fourier Transforms (FFT) - Radix-2 Decimation-in-Time and Decimation-in-Frequency FFT Algorithms, Inverse FFT.

UNIT –III

IIR Digital Filters- Analog filter approximations- Butterworth and Chebyshev filters, Design of IIR Digital Filters from Analog Filters, Step and Impulse invariant techniques, Bilinear transformation method, Spectral transformations.

UNIT –IV

FIR Digital Filters - Characteristics of FIR digital filters, Frequency response. Design of FIR Filters:

Fourier method, Digital filters using window techniques, Frequency sampling technique, Comparison of IIR & FIR filters.

UNIT –V

Realization of Digital Filters: Applications of Z-transforms, Solution of difference equations of digital filters, System function, Stability criterion, Frequency response of stable systems. Realization of digital filters – Direct, Canonic, Cascade and Parallel forms.

Multirate Digital Signal Processing: Introduction, Decimation by a factor D, Spectrum of decimator, Interpolation by a factor I, Spectrum of interpolator, Sampling rate conversion by a rational factor I/D, Spectrum of sampling rate converter.

TEXT BOOKS:

1. John G. Proakis, Dimitris G. Manolakis, “Digital signal processing, principles, algorithms and applications,” Prentice Hall, 4th Edition, 2015.
2. A.V. Oppenheim, R.W. Schaffer, “Discrete time signal processing,” PHI, 2nd Edition, 2015.

REFERENCE BOOKS:

1. S. Salivahanan, Vallavaraj, Gnanapriya, “Digital signal processing,” Tata McGraw-Hill Education, 2nd Edition, 2009.
2. A. Nagoorkani, “Digital signal processing,” Tata McGraw-Hill Education, 2nd Edition, 2012.
3. P. Ramesh Babu, “Digital signal processing,” SCI Tech, 7th Edition, 2018.

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2060403: MICROPROCESSORS AND MICROCONTROLLERS

III Year B.Tech. ECE II – Sem.

L	T	P	C
3	0	0	3

Pre-requisites: Knowledge on digital systems and designs.

Course Objectives:

- Understanding the architecture of microprocessors
- Gain knowledge about the programming of microprocessors
- Study the architecture of microcontrollers and programming for various applications
- Learn about interfacing devices and interfacing techniques
- Understand the basic concepts of ARM architecture

Course Outcomes:

At the end of this course, students will be able to

- Understand the Architecture and Operation of the 8086 Microprocessor.
- Develop Assembly Language Programs for Processor Applications.
- Design and Implement Practical Applications Using Microprocessors.
- Apply ARM Processor Architecture in System Design and Development.
- Design and Integrate Embedded Systems for Practical Automation Applications.

UNIT – I

Introduction of microprocessor, Review and evolution of advanced microprocessors:8085,8086,8088, 80186/286/386/486/Pentium.

Introduction to 8086 Processor: features of 8086, Register organization of 8086, Architecture of 8086, signal description of 8086, Memory Segmentation, Physical Memory Organization. Minimum mode and Maximum mode 8086 systems and timings diagram.

UNIT II

Instruction Set and Assembly Language Programming of 8086: Instruction formats, Addressing modes, Instruction set, Assembler Directives, Macros, and Simple Programs involving Logical, Branch and Call Instructions, Sorting, String Manipulations. Interrupts of 8086, Interrupt Procedure.

UNIT – III

Introduction to Microcontrollers: Overview of 8051 Microcontroller, Architecture, I/O Ports, Memory Organization, Addressing Modes and Instruction set of 8051.

8051 Real Time Control: Programming Timer Interrupts, Programming External Hardware Interrupts, Programming the Serial Communication Interrupts, Programming 8051 Timers and Counters.

UNIT - IV

Introduction to the various interfacings' chips like 8255, 8253, 8251, 8257, Interfacings key boards, LCD, Stepper motor, ADC, DAC and memory Interfacing.

UNIT – V

ARM Architecture: ARM Processor fundamentals, ARM Architecture – Register, CPSR, Pipeline, exceptions and interrupts interrupt vector table.

ARM instruction set – Data processing, Branch instructions, load store instructions, Software interrupt instructions, Program status register instructions, loading constants, Conditional execution, Introduction to Thumb instructions.

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TEXT BOOKS:

1. A. K. Ray and K.M. Bhurchandani, “Advanced Microprocessors and Peripherals,” MHE, 3rd Edition 2017.
2. Kenneth. J. Ayala, “The 8051 Microcontroller,” Delmar Cengage Learning, 3rd Edition, 2015.
3. Andrew Sloss, Dominic Symes, Chris Wright, “ARM System Developers guide,” Elsevier, 2nd Edition, 2012.

REFERENCE BOOKS:

1. D. V. Hall, "Microprocessors and Interfacing,” MGH, 3rd Edition 2017.
2. K. Uma Rao, Andhe Pallavi, “The 8051 Microcontrollers, Architecture and Programming and Applications,” Pearson, 3rd Edition, 2019.

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2060445: DIGITAL IMAGE PROCESSING
(Professional Elective – II)

III Year B.Tech. ECE II – Sem. **L T P C**

3 0 0 3

Pre-requisites: Knowledge on signals and transforms.

Course Objectives:

- Provide the Fundamentals of digital Image Processing
- Understand the various techniques of image enhancement
- Study special purpose filters for image restoration
- To learn the basic concepts of image morphology
- Design and analysis of different image compression coding techniques

Course Outcomes:

At the end of this course, students will be able to

- Understand the Basic Concepts of Digital Image Processing
- Analyze the Effectiveness of Different Image Enhancement Methods
- Apply Image Enhancement and Restoration Techniques for Improved Image Quality
- Explain Effective Image Segmentation Techniques for Object Detection
- Analyze the Effectiveness of Different Image Compression Algorithms

UNIT– I

Digital image fundamentals: Sampling and quantization, Relationship between pixels.

Image Transforms: 2-D FFT, Properties, Walsh transform, Hadamard transform, Discrete Cosine Transform, Haar Transform, Slant Transform, Hottelling Transform.

UNIT – II

Image enhancement (spatial domain): Introduction, Image enhancement in spatial domain, enhancement through point operation, types of point operation, histogram manipulation, linear and non-linear gray level transformation, local or neighborhood operation, median filter, spatial domain high-pass filtering.

Image enhancement (frequency domain): Filtering in frequency domain, Obtaining frequency domain filters from spatial filters, Generating filters directly in the frequency domain, Low pass (smoothing) and High pass (sharpening) Filters in Frequency Domain.

UNIT – III

Image restoration: Degradation model, Algebraic approach to restoration, Inverse filtering, least mean square filters, Constrained Least squares Restoration, Interactive Restoration.

UNIT – IV

Image segmentation: Detection of discontinuities, Edge linking, boundary detection, Thresholding, Region oriented segmentation.
Morphological image processing: Dilation and Erosion, structuring Element Decomposition, Combining Dilation and Erosion, Opening and closing, the hit or miss Transformation.

UNIT – V

Image compression: Redundancies and their removal methods, Fidelity criteria, Image Compression models, Huffman and Arithmetic Coding, Error Free Compression, Lossy and Lossless Predictive Coding, Transform Based Compression, JPEG 2000 standards

TEXT BOOKS:

1. Rafael C. Gonzalez, Richard E. Woods, “Digital Image Processing,” Pearson, 4th Edition, 2018.
2. S Jayaraman, S. Esakkirajan, T Veerakumar, “Digital Image Processing,” TMH, 2nd Edition, 2010.

REFERENCES:

1. Rafael C. Gonzalez, Richard E. Woods, Steven L. Eddins “Digital Image Processing using MATLAB,” Gatesmark Publishing, 4th Edition, 2020.
2. A. K. Jain, “Fundamentals of Digital Image Processing, PHI, 1st Edition, 2015.
3. Somka, Hlavac, Boyle, “Digital Image Processing and Computer Vision,” Cengage learning publisher, publication, 1st Edition, 2008.

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2060446: CELLULAR AND MOBILE COMMUNICATIONS
(Professional Elective – II)

III Year B.Tech. ECE II – Sem. **L T P C**

3 0 0 3

Prerequisite: Basics of communication systems

Course Objectives:

- Understand the cellular concept, frequency Reuse and hand-off strategies
- Analyze wireless and mobile cellular communication systems
- Learn the concepts of coverage for signal and traffic, diversity techniques and mobile antennas
- Study frequency management, channel assignment and types of handoffs

Course Outcomes:

At the end of this course, students will be able to

- Analyze and design wireless and mobile cellular systems
- Understand the fundamental techniques to overcome the different fading effects and impairments due to multipath fading channel
- Gain the knowledge on co-channel and non-co-channel interferences
- Familiar with cell coverage for signal and traffic, diversity techniques and mobile antennas
- Analyze frequency management, Channel assignment, and types of handoffs

UNIT– I

Introduction to Cellular Mobile Radio Systems: Limitations of Conventional Mobile Telephone Systems, Basic Cellular Mobile System, First, Second, Third and Fourth Generation Cellular Wireless Systems, Uniqueness of Mobile Radio Environment- Fading -Time Dispersion Parameters, Coherence Bandwidth, Doppler Spread and Coherence Time.

Fundamentals of Cellular Radio System Design: Concept of Frequency Reuse, Co-Channel Interference, Co-Channel Interference Reduction Factor, Desired C/I From a Normal Case in a Omni Directional Antenna System, System Capacity, Trunking and Grade of Service, Improving Coverage and Capacity in Cellular Systems- Cell Splitting, Sectoring, Microcell Zone Concept.

UNIT – II

Co-Channel Interference: Measurement of Real Time Co-Channel Interference, Design of Antenna System, Antenna Parameters and Their Effects, Diversity Techniques-Space Diversity, Polarization Diversity, Frequency Diversity, Time Diversity.

Non-Co-Channel Interference: Adjacent Channel Interference, Near End Far End Interference, Cross Talk, Effects on Coverage and Interference by Power Decrease, Antenna Height Decrease, Effects of Cell Site Components.

UNIT – III

Cell Coverage for Signal and Traffic: Signal Reflections in Flat and Hilly Terrain, Effect of Human Made Structures, Phase Difference Between Direct and Reflected Paths, Constant Standard Deviation, Straight Line Path Loss Slope, General Formula for Mobile Propagation Over Water and Flat Open Area, Near and Long-Distance Propagation, Path Loss from a Point-to-Point Prediction Model in Different Conditions, Merits of Lee Model.

Cell Site and Mobile Antennas: Space Diversity Antennas, Umbrella Pattern Antennas, Minimum Separation of Cell Site Antennas, Mobile Antennas.

UNIT – IV

Frequency Management and Channel Assignment: Numbering and Grouping, Setup Access and Paging Channels, Channel Assignments to Cell Sites and Mobile Units, Channel Sharing and Borrowing, Sectorization, Overlaid Cells, Non-Fixed Channel Assignment.

UNIT – V

Handoffs and Dropped Calls: Handoff Initiation, Types of Handoff, Delaying Handoff, Advantages of Handoff, Power Difference Handoff, Forced Handoff, Mobile Assisted and Soft Handoff, Intersystem Handoff, Introduction to Dropped Call Rates and their Evaluation.

TEXT BOOKS:

1. W.C.Y. Lee, “Mobile Cellular Telecommunications,” Mc Graw Hill, 2nd Edition, 2017.
2. Theodore. S. Rapport, Wireless Communications,” Pearson Education, 4th Edition, 2010.

REFERENCES:

1. Gordon L. Stuber, “Principles of Mobile Communications,” Springer International, 4th Edition, 2017.
2. Simon Haykin, Michael Moher, “Modern Wireless Communications,” Pearson Education, 2nd Edition, 2011.
3. Asrar U. H. Sheikh, “Wireless Communications Theory and Techniques,” Springer, 2nd Edition, 2004.

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2060571: ARTIFICIAL NEURAL NETWORKS
(Professional Elective – II)

III Year B.Tech. ECE II – Sem. **L T P C**

3 0 0 3

Prerequisite:

Course Objectives:

- To provide the student with the basic understanding of neural networks fundamentals.
- To train in related algorithms and design the required and related systems

Course Outcomes:

At the end of this course, students will be able to

- Demonstrate ANN structure and activation Functions
- Define foundations and learning mechanisms and state-space concepts
- Identify structure and learning of perceptions
- Explain Feed forward, multi-layer feed forward networks and Back propagation algorithms
- Analyze Radial Basis Function Networks, Theory Regularization and RBF networks

UNIT-I: Introduction and ANN Structure, Biological neurons and artificial neurons. Model of an ANN. Activation functions used in ANNs. Typical classes of network architectures.

UNIT-II: Mathematical Foundations and Learning mechanisms. Re-visiting vector and matrix algebra, State-space concepts, Concepts of optimization, Error-correction learning. Memory- based learning, Hebbian learning. Competitive learning.

UNIT-III: Single layer perceptrons, Structure and learning of perceptrons, Pattern classifier, introduction and Bayes' classifiers, Perceptron as a pattern classifier, Perceptron convergence. Limitations of a perceptrons.

UNIT-IV: Feed forward ANN, Structures of Multi-layer feed forward networks. Back propagation algorithm, Back propagation - training and convergence, Functional approximation with back propagation. Practical and design issues of back propagation learning.

UNIT-V: Radial Basis Function Networks, Pattern separability and interpolation, Regularization Theor Regularization and RBF networks.RBF network design and training. Approximation properties of RBF.

Text Books:

1. Simon Haykin, "Neural Networks: A comprehensive foundation", Second Edition, Pearson EducationAsia.
2. Satish Kumar, "Neural Networks: A classroom approach", Tata McGraw Hill,2004.

Reference Books:

1. Robert J. Schalkoff, "Artificial Neural Networks", McGraw-Hill International Editions, 1997

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2066703: R-PROGRAMMING
(Professional Elective – II)

III Year B.Tech. ECE II – Sem.

L	T	P	C
3	0	0	3

Prerequisite: Nil

Course Objectives:

- To use different functions in R, how to read data into R, accessing R packages, writing R functions, debugging, and organizing data using R functions.
- To learn basics of statistical data analysis with examples.

Course Outcomes:

At the end of this course, students will be able to

- Understand the Fundamentals of R.
- Understands data the loading, retrieval techniques of data.
- Understand how is analyzed and visualized using statistic functions.

UNIT I

Introduction to Data Science: Data Analytics, Data Manipulation, Data Import Techniques, Exploratory Data Analysis, Data Visualization

Introduction to R: What is R? – Why R? – Advantages of R over Other Programming Languages - R Studio: R command Prompt, R script file, comments – Handling Packages in R: Installing a R Package, Few commands to get started: installed.packages(), packageDescription(), help(), find.package(), library() - Input and Output – Entering Data from keyboard – Printing fewer digits or more digits – Special Values functions : NA, Inf and –inf.

UNIT II

R Data Types: Vectors, Lists, Matrices, Arrays, Factors, Data Frame.
R - Variables: Variable assignment, Data types of Variable, Finding Variable ls(), Deleting Variables.
R Operators: Arithmetic Operators, Relational Operators, Logical Operator, Assignment Operators, Miscellaneous Operators.
R Decision Making: if statement, if – else statement, if – else if statement, switch statement.
R Loops: repeat loop, while loop, for loop - Loop control statement: break statement, next statement.

UNIT III

R-Function : function definition, Built in functions: mean(), paste(), sum(), min(), max(), seq(), user-defined function, calling a function, calling a function without an argument, calling a function with argument values. **R-Strings** – Manipulating Text in Data: substr(), strsplit(), paste(), grep(), toupper(), tolower() .

UNITIV

Data Frames –Create Data Frame, Data Frame Access, Understanding Data in Data Frames: dim(), nrow(), ncol(), str(), Summary(), names(), head(), tail(), edit() functions - Extract Data from Data Frame, **Expand Data Frame**: Add Column, Add Row - Joining columns and rows in a Data frame rbind() and cbind() – Merging Data frames merge() – Melting and Casting data melt(), cast().

UNIT V

Data Visualization in R

Understanding on Data Visualization, graphical functions present in R, plot various graphs like tableplot, histogram, Boxplot, customizing Graphical Parameters to improvise plots, understanding GUIs like Deducer and R Commander, introduction to Spatial Analysis.

Loading and handling Data in R: Getting and Setting the Working Directory – getwd(), setwd(), dir() - **R-CSV Files -** Input as a CSV file, Reading a CSV File, Analyzing the CSV File: summary(), min(), max(), range(), mean(), median(), apply() - Writing into a CSV File – **R -Excel File** – Reading the Excel file.

TEXT BOOKS:

MARRI LAXMAN REDDY INSTITUTE OF TECHNOLOGY AND MANAGEMENT

(AUTONOMOUS)

1. Sandip Rakshit, R Programming for Beginners, McGraw Hill Education (India),2017, ISBN: 978-93-5260-455-5.

REFERENCE BOOKS:

1. Seema Acharya, Data Analytics using R, Mc Graw Hill Education (India), 2018, ISBN: 978-93-5260-524-8.
2. Andrie de Vries, Joris Meys, R for Dummies A Wiley Brand, 2nd Edition, John Wiley and Sons, Inc, 2015, ISBN:978-1-119-05580-8

MARRI LAXMAN REDDY INSTITUTE OF TECHNOLOGY AND MANAGEMENT
(AUTONOMOUS)

2060419: VLSI DESIGN

III Year B.Tech. ECE II – Sem.

L	T	P	C
3	0	0	3

Pre-requisites: Electronic Circuit Analysis; Switching Theory and Logic Design

Course Objectives:

- Understand the different steps involved in the fabrication of ICs
- Explain electrical properties of MOS and BiCMOS devices to analyze the behavior of inverters designed with various loads
- Understand the design rules to be followed to draw the layout of any logic circuit
- Provide design concepts to design building blocks of data path of sub-system using gates
- Understand basic programmable logic devices and testing of CMOS circuits

Course Outcomes:

At the end of this course, students will be able to

- Apply Knowledge of IC Fabrication Techniques in Designing Semiconductor Devices
- Analyze the Behavior of Inverters with Various Loads Using MOS and BiCMOS Technologies
- Design and Optimize Layouts for Logic Circuits Following Industry Standards
- Analyze and Implement Complex Data Path Architectures for Digital Sub-Systems
- Understand the Functionality of Basic Programmable Logic Devices (PLDs)

UNIT– I

Introduction: Introduction to IC Technology, MOS, PMOS, NMOS, CMOS, BiCMOS.

Basic Electrical Properties: Basic Electrical Properties of MOS and BiCMOS Circuits: Ids – Vds relationships, MOS Transistor Threshold Voltage, gm, gds, Figure of merit, Pass Transistor, NMOS Inverter, Various Pull-ups, CMOS inverter analysis and design, BiCMOS Inverters.

UNIT – II

VLSI Circuit Design Processes: VLSI Design Flow, MOS Layers, Stick Diagrams, Design Rules and Layout, Transistors Layout Diagrams for NMOS and CMOS Inverters and Gates, Scaling of MOS circuits.

UNIT – III

Gate Level Design: Logic Gates, Other Complex Gates, Switch Logic, Alternate Gate Circuits, Time Delays, Driving Large Capacitive Loads, Wiring Capacitance, Fan-in, Fan-out.

UNIT – IV

Data Path Sub Systems: Sub System Design, Shifters, Adders, ALUs, Multipliers, Parity Generators, Comparators, Zero/One Detectors, Counters.

Array Sub Systems: SRAM, DRAM, ROM, Serial Access Memories.

UNIT – V

Programmable Logic Devices: Design Approach –PLA, PAL, Standard Cells, FPGAs, CPLDs.

CMOS Testing: CMOS TESTING, Test Principles, Design Strategies for Test, Chip Level Test Techniques.

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(AUTONOMOUS)

TEXT BOOKS:

1. Kamran Eshraghian, Eshraghian Dougles and A. Pucknell, “Essentials of VLSI Circuits and Systems,” PHI, 2nd Edition 2009.
2. Neil H. E. Weste, David Harris, Ayan Banarjee, “CMOS VLSI DESIGN - A Circuits and Systems Perspective,” 4th Edition, Pearson, 2nd Edition, 2015.

REFERENCES:

1. Ming- BO Lin, “Introduction to VLSI Systems: A Logic, Circuit and system Perspective.” CRC Press, 2011.
2. John. P. Uyemura, “CMOS Logic Circuit Design,” Springer, 2nd Edition, 2013.
3. Wayne Wolf, “Modern VLSI Design,” Pearson Education, 4th Edition, 2015.

MARRI LAXMAN REDDY INSTITUTE OF TECHNOLOGY AND MANAGEMENT
(AUTONOMOUS)

2060472: MICROPROCESSORS AND MICROCONTROLLERS LABORATORY

III Year B.Tech. ECE II – Sem.

L	T	P	C
0	0	2	1

Pre-requisites: Basic concepts of microprocessors and microcontrollers

Course Objectives:

- Know the arithmetic and string operations on 16 bit and 32-bit data
- Perform sorting and searching operation an array for 8086
- Study the bit level logical operations, rotate, shift, swap and branch operations
- Know the interfacing of 8051
- Understand the communication between 8051 to interfacing devices

Course Outcomes:

At the end of the laboratory work, students will be able to

- Implement and Debug Complex Operations in Assembly Language for 8086 Microprocessor.
- Apply Interfacing Techniques for External Devices with the 8051 Microcontroller.
- Analyze and Optimize the Performance of Triangular Wave Generation Using 8051 and DAC.
- Write a program for establishing Serial Communication Using 8051.
- Create Sequence Generation Using Serial Communication in 8051.

List of Experiments:

The following experiments are performed using 8086 Processor Kits and/or Assembler

15. Write a program for 16-bit arithmetic operations for 8086 (using Various Addressing Modes).
16. Write a program for sorting an array for 8086.
17. Write a program for searching for a number or character in a string for 8086.
18. Write a program for string manipulations for 8086.
19. Write a program for rotate, shift and branch instruction for 8086.

The following experiments are performed using 8051 Processor Kits and interfacing Kits

20. Write a program using arithmetic, logical and bit manipulation instructions of 8051.
21. Perform interfacing ADC to 8051.
22. Generate Triangular wave through DAC interfacing with 8051.
23. Program and verify interrupt handling in 8051.
24. Perform Time delay Generation Using Timers of 8051.
25. Perform serial Communication from / to 8051 to / from I/O devices.
26. Perform interfacing to 8086 and programming to control stepper motor.
27. Perform interfacing matrix/keyboard to 8051.

NOTE: Minimum of 12 experiments to be conducted.

MARRI LAXMAN REDDY INSTITUTE OF TECHNOLOGY AND MANAGEMENT
(AUTONOMOUS)

2060476: DIGITAL SIGNAL PROCESSING LABORATORY

III Year B.Tech. ECE II – Sem.

L	T	P	C
0	0	3	1.5

Pre-requisites: Basic concepts of digital signal processing

Course Objectives:

- Implementation of Linear and Circular Convolution.
- Implementation of FIR and IIR filters
- Predict time and frequency response of discrete-time systems using various techniques like Z Transform, DFT, FFT
- Study the architecture of DSP processor
- Demonstration of Finite word length effects

Course Outcomes:

At the end of the laboratory work, students will be able to

- Understand and Apply Basic Signal Processing Operations
- Design and Simulate Digital Signal Processing Systems Using MATLAB
- Apply Window Functions for Signal Processing optimization in Frequency Domain
- Analyze the filter Performance and enhance Designs for Practical Applications
- Develop Signal Processing Algorithms Using MATLAB

List of Experiments:

16. Generate Sinusoidal Waveform / Signal based on Recursive Difference Equations.
17. Histogram of White Gaussian Noise and Uniformly Distributed Noise.
18. Find DFT/IDFT of a DT signal/Sequence.
19. Find Frequency Response of a given System given in Transfer Function/ Differential equation form.
20. Obtain Fourier series coefficients by formula and using FET and compare for half sine wave.
21. Implement FFT for a given Sequence.
22. Determine Power Spectrum of a given Signal (s).
23. Implement LP FIR Filter for a given Sequence/Signal.
24. Implement HP IIR Filter for a given Sequence/Signal.
25. Generate Narrow Band Signal through Filtering.
26. Generate DTMF Signals.
27. Implement Decimation Process.
28. Implement Interpolation Process.
29. Implement of I/D Sampling Rate Converters.
30. Impulse Response of First order and Second Order Systems.

NOTE: Minimum of 12 experiments to be conducted.

MARRI LAXMAN REDDY INSTITUTE OF TECHNOLOGY AND MANAGEMENT
(AUTONOMOUS)

2060477: LINEAR AND DIGITAL IC APPLICATIONS LABORATORY

III Year B.Tech. ECE II – Sem.

L	T	P	C
0	0	2	1

Pre-requisites: Basic concepts of linear and digital IC applications

Course Objectives:

- Know the characteristics of op-amp
- Study the filter characteristics using IC741
- Learn the operation of IC 555
- Design combinational circuits using ICs
- Implement the sequential circuits using ICs

Course Outcomes:

At the end of the laboratory work, students will be able to

- Apply IC 741 and IC 555 in Practical Circuit Design
- Design and Implement Timer-Based Circuits Using IC 555
- Implement and Optimize IC 741 Filter Circuits for Signal Conditioning
- Analyze the Performance of Combinational Circuits
- Design sequential Circuits Using Digital ICs

List of Experiments:

1. Adder and Subtractor using Op Amp
2. Comparators using Op Amp.
3. Integrator and differentiator Circuits using IC 741.
4. Active Filter Applications –LPF, HPF (first order)
5. IC 741 Waveform Generators –Sine, Square wave and Triangular waves.
6. Mono-stable Multivibrator using IC 555
7. Three Terminal Voltage Regulators –7805, 7809, 7912
8. Design a 16-bit comparator using 4-bit Comparators.
9. Design a 450 KHz clock using NAND / NOR gates.
10. Design a 4-bit pseudo random sequence generator using 4 –bit ring counter.
11. Design a 16 x 1 multiplexer using 8 x 1 multiplexer.
12. Plot the transform Characteristics of 74H, LS, HS series IC's.
13. Design a 4 –bit Gray to Binary and Binary to Gray Converter
14. Design a Ring counter and Twisted ring counter using a 4-bit shift register
15. Design a 4-digit hex counter using synchronous one-digit hex counters.

NOTE: Minimum of 12 experiments to be conducted.

MARRI LAXMAN REDDY INSTITUTE OF TECHNOLOGY AND MANAGEMENT

(AUTONOMOUS)

2060025: PROFESSIONAL ETHICS
(MANDATORY COURSE)

III Year B.Tech. ECE II – Sem. **L T P C**

2 0 0 0

Prerequisite: Nil

Course Objectives:

- To make the students understand the types of roles they are expected to play in the society as practitioners of the civil engineering profession
- To develop some ideas of the legal and practical aspects of their profession.

Course Outcomes:

At the end of the laboratory work, students will be able to:

- Demonstrate the Role of Values and Ethics in Personal and Professional Decision-Making
- Apply Ethical Decision-Making Frameworks for Engineering Challenges
- Analyze Safety and Risk-Benefit Factors in Engineering Decision-Making
- Understand and Practice the Role of a Global Citizen in a Professional Context
- Develop Problem-Solving and Critical Thinking Skills, Thriving in Competitive Environments

UNIT - I

Professional Practice and Ethics: Definition of Ethics, Professional Ethics - Engineering Ethics, Personal Ethics; Code of Ethics - Profession, Professionalism, Professional Responsibility, Conflict of Interest, Gift Vs Bribery, Environmental breaches, Negligence, Deficiencies in state-of-the-art; Vigil Mechanism, Whistle blowing, protected disclosures. Introduction to GST- Various Roles of Various Stake holders

UNIT - II

Law of Contract: Nature of Contract and Essential elements of valid contract, Offer and Acceptance, Consideration, Capacity to contract and Free Consent, Legality of Object. Unlawful and illegal agreements, Contingent Contracts, Performance and discharge of Contracts, Remedies for breach of contract. Contracts-II: Indemnity and guarantee, Contract of Agency, Sale of goods Act -1930: General Principles, Conditions & Warranties, Performance of Contract of Sale.

UNIT - III

Arbitration, Conciliation and ADR (Alternative Dispute Resolution) system: Arbitration – meaning, scope and types – distinction between laws of 1940 and 1996; UNCITRAL model law – Arbitration and expert determination; Extent of judicial intervention; International commercial arbitration; Arbitration agreements – essential and kinds, validity, reference and interim measures by court; Arbitration tribunal appointment, challenge, jurisdiction of arbitral tribunal, powers, grounds of challenge, procedure and court assistance; Distinction between conciliation, negotiation, mediation and arbitration, confidentiality, resort to judicial proceedings, costs; Dispute Resolution Boards; Lok Adalats.

UNIT - IV

Engagement of Labour and Labour & other construction-related Laws: Role of Labour in Civil Engineering; Methods of engaging labour- on rolls, labour sub-contract, piece rate work; Industrial Disputes Act, 1947; Collective bargaining; Industrial Employment (Standing Orders) Act, 1946; Workmen's Compensation Act, 1923; Building & Other - Construction Workers (regulation of employment and conditions of service) Act (1996) and Rules (1998); RERA Act 2017, NBC 2017.

UNIT - V

Law relating to Intellectual property: Introduction – meaning of intellectual property, main forms of IP, Copyright, Trademarks, Patents and Designs, Secrets; Law relating to Copyright in India including Historical evolution of Copy Rights Act, 1957, Meaning of copyright – computer programs, Ownership of copyrights and assignment, Criteria of infringement, Piracy in Internet – Remedies and procedures in India; Law relating to Patents under Patents Act, 1970

MARRI LAXMAN REDDY INSTITUTE OF TECHNOLOGY AND MANAGEMENT

(AUTONOMOUS)

TEXT BOOKS:

1. Professional Ethics: R. Subramanian, Oxford University Press, 2015.
2. Ravinder Kaur, Legal Aspects of Business, 4e, Cengage Learning, 2016.

REFERENCE BOOKS:

1. RERA Act, 2017.
2. Wadhera (2004), Intellectual Property Rights, Universal Law Publishing Co.
3. T. Ramappa (2010), Intellectual Property Rights Law in India, Asia Law House.
4. O.P. Malhotra, Law of Industrial Disputes, N.M. Tripathi Publishers

IV - I

MARRI LAXMAN REDDY INSTITUTE OF TECHNOLOGY AND MANAGEMENT
(AUTONOMOUS)

2070011: FUNDAMENTALS OF MANAGEMENT

IV Year B.Tech. ECE I – Sem. **L T P C**

3 0 0 3

Pre-requisites: Nil

Course Objectives:

- To understand the management concepts, applications of concepts in practical aspects of business and development of managerial Skills.

Course Outcomes:

At the end of this course, students will be able to

- Understand management principles articulate key management concepts and their historical development.
- Apply planning techniques develop strategic, tactical, and operational plans for achieving organizational goals.
- Analyze organizational structures evaluate different organizational designs and their effectiveness in various contexts.
- Implement control mechanisms and utilize performance measurement tools, accessing and improving organizational effectiveness, leadership skills
- Enhance decision making abilities employ analytical and creative problem solving techniques in decision –making scenarios and controlling budgetary and non budgetary

UNIT – I

Introduction to Management: Definition, Nature and Scope, Functions, Managerial Roles, Levels of Management, Managerial Skills, Challenges of Management; Evolution of Management- Classical Approach- Scientific and Administrative Management; The Behavioral approach; The Quantitative approach; The Systems Approach; Contingency Approach, IT Approach.

UNIT – II

Planning and Decision Making: General Framework for Planning - Planning Process, Types of Plans, Management by Objectives; Development of Business Strategy. Decision making and Problem Solving - Programmed and Non-Programmed Decisions, Steps in Problem Solving and Decision Making; Bounded Rationality and Influences on Decision Making; Group Problem Solving and Decision Making, Creativity and Innovation in Managerial Work.

UNIT – III

Organization and HRM: Principles of Organization: Organizational Design & Organizational Structures; Departmentalization, Delegation; Empowerment, Centralization, Decentralization, Recentralization; Organizational Culture; Organizational Climate and Organizational Change. Human Resource Management & Business Strategy: Talent Management, Talent Management Models and Strategic Human Resource Planning; Recruitment and Selection; Training and Development; Performance Appraisal.

UNIT – IV

Leading and Motivation: Leadership, Power and Authority, Leadership Styles; Behavioral Leadership, Situational Leadership, Leadership Skills, Leader as Mentor and Coach, Leadership during adversity and Crisis; Handling Employee and Customer Complaints, Leadership. Motivation - Types of Motivation; Relationship between Motivation, Performance and Engagement, Content Motivational Theories - Needs Hierarchy Theory, Two Factor Theory, Theory X and Theory Y.

UNIT – V

MARRI LAXMAN REDDY INSTITUTE OF TECHNOLOGY AND MANAGEMENT

(AUTONOMOUS)

Controlling: Control, Types and Strategies for Control, Steps in Control Process, Budgetary and Non-Budgetary Controls. Characteristics of Effective Controls, Establishing control systems, Control frequency and Methods.

TEXT BOOKS:

1. Management Fundamentals, Robert N Lussier, 5e, Cengage Learning, 2013.
2. Fundamentals of Management, Stephen P. Robbins, Pearson Education, 2009.

REFERENCES:

1. Essentials of Management, Koontz Kleihrich, Tata McGraw Hill.
2. Management Essentials, Andrew DuBrin, 9e, Cengage Learning, 2012

MARRI LAXMAN REDDY INSTITUTE OF TECHNOLOGY AND MANAGEMENT
(AUTONOMOUS)

2070420: ANTENNAS AND MICROWAVE ENGINEERING

IV Year B.Tech. ECE I – Sem. **L T P C**

3 1 0 4

Pre-requisites: Knowledge on Electromagnetic fields and Maxwell equations

Course Objectives:

- Understand the basic concepts of antennas
- Analyze the characteristics of VHF, UHF and Microwave antennas
- Analyze the characteristics of microstrip antennas and antenna arrays
- Understand the basic concepts of Microwave tubes
- Understand the basic concepts of Microwave solid state devices and measurements

Course Outcomes:

At the end of this course, students will be able to

- Understand the mechanism of radiation and gain knowledge on antenna parameters.
- Examine the working principles, radiation patterns, and performance characteristics of various antennas for communication systems.
- Illustrate the geometry, parameters, and characteristics of VHF, UHF, and microwave antennas to meet specific application requirements.
- Distinguish the performance characteristics of 2-cavity klystrons, reflex klystrons, and magnetrons, and estimate their efficiency levels.
- Analyze various solid-state devices for different microwave junctions to set up a microwave bench based on their S-Matrix.

UNIT– I

Antenna Basics: Introduction, Basic Antenna Parameters – Patterns, Beam Area, Radiation Intensity, Beam Efficiency, Directivity-Gain-Resolution, Antenna Apertures, Effective Height, Illustrative Problems. Fields from Oscillating Dipole, Field Zones, Front - to-back Ratio, Radiation, Retarded Potentials

Thin Linear Wire Antennas: Radiation from Small Electric Dipole, Quarter Wave Monopole and Half Wave Dipole – Current Distributions, Field Components, Radiated Power, Radiation Resistance, Beam Width, Directivity, Effective Area and Effective Height, Natural Current Distributions, Far Fields and Patterns of Thin Linear Centre-fed Antennas of Different Lengths, Illustrative Problems. Loop Antennas - Introduction, Small Loop, Comparison of Far Fields of Small Loop and Short Dipole (Qualitative Treatment).

UNIT – II

VHF, UHF and Microwave Antennas - I: Arrays with Parasitic Elements, Yagi-Uda Array, Folded Dipoles and their Characteristics, Helical Antennas – Helical Geometry, Helix Modes, Practical Design Considerations for Mono filar Helical Antenna in Axial and Normal Modes, Horn Antennas – Types, Fermat's Principle, Optimum Horns, Design Considerations of Pyramidal Horns, Illustrative Problems.

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(AUTONOMOUS)

UNIT – III

VHF, UHF and Microwave Antennas - II: Micro strip Antennas – Introduction, Features, Advantages and Limitations, Rectangular Patch Antennas – Geometry and Parameters, Characteristics of Micro strip Antennas. Reflector Antennas.

Antenna Arrays: Point Sources – Definition, Patterns**,** arrays of 2 Isotropic Sources **-** Different Cases, Principle of Pattern Multiplication, Uniform Linear Arrays – Broadside Arrays, End fire Arrays, EFA with Increased Directivity, Binomial Arrays, Illustrative Problems.

UNIT – IV

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, Reentrant Cavities, Velocity Modulation Process and Applegate Diagram, Bunching Process and Small Signal Theory – Expressions for O/P Power and Efficiency. Reflex Klystrons – Structure, Velocity Modulation and Applegate Diagram, Mathematical Theory of Bunching, Power Output, Efficiency, Oscillating Modes and O/P Characteristics, Illustrative Problems.

M-Type Tubes: Introduction, Cross-field Effects, Magnetrons – Different Types, Cylindrical Traveling\Wave Magnetron – Hull Cut-off and Hartree Conditions, Modes of Resonance and PI-Mode Operation.

UNIT – V

Microwave Solid State Devices: Introduction, Classification, Applications. TEDs – Introduction, Gunn Diodes – Principle, RWH Theory, Characteristics, Modes of Operation - Gunn Oscillation Modes, wave guide attenuators, Phase shifters, wave guide junctions E-plane and H plane Tees, Magic Tee, ferrite components-Gyrator, Circulator and Isolator, scattering matrix calculations for wave guide junctions.

Microwave Measurements: Description of Microwave Bench – Different Blocks and their Features, Errors and Precautions, Microwave Power Measurement, Measurement of Attenuation – Measurement of Low and High VSWR.

TEXT BOOKS:

5. J.D. Kraus, R.J. Marhefka and Ahmad S. Khan “Antennas and Wave Propagation,” MCH, New Delhi, 5th Edition, 2017.
6. E.C. Jordan and K.G. Balmain “Electromagnetic Waves and Radiating Systems,” PHI, 2nd Edition, 2015.

REFERENCES:

9. C.A. Balanis, “Antenna Theory,” John Wiley & Sons, 4th Edition, 2021.
10. K.D. Prasad, Satya Prakashan, “Antennas and Wave Propagation,” Tech India Publications, New Delhi, 1st Edition, 2019.
11. “Foundations for Microwave Engineering,” – R.E. Collin, IEEE Press, John Wiley, 2nd Edition, 2007.

MARRI LAXMAN REDDY INSTITUTE OF TECHNOLOGY AND MANAGEMENT
(AUTONOMOUS)

2070447: WIRELESS COMMUNICATIONS AND NETWORKS
(Professional Elective-III)

IV Year B.Tech. ECE I – Sem.

L	T	P	C
3	0	0	3

Pre-requisites: Knowledge on basics of communication systems

Course Objectives:

- Understand the concept of frequency reuse and design of mobile cellular system
- Design and analysis of the traditional and emerging wireless networks
- Understand the architecture and operation of GSM, IS-95, GPRS and SMS
- Understand wireless LAN architectures and operation
- Understand the emerging technique OFDM and its importance in the wireless communications

Course Outcomes:

At the end of this course, students will be able to

- Gain the knowledge on the principles of wireless communications
- Analyze various multiple access techniques used in wireless communication
- Gain the knowledge on the wireless wide area networks and their performance analysis
- Demonstrate wireless local area networks and their specifications
- Get the knowledge on the concept of orthogonal frequency division multiplexing

UNIT– I

The Cellular Concept-System Design Fundamentals: Introduction, Frequency Reuse, Channel Assignment Strategies, Handoff Strategies-Prioritizing Handoffs, Practical Handoff Considerations, Interference and system capacity – Co channel Interference and system capacity, Channel planning for Wireless Systems, Adjacent Channel interference, Power Control for Reducing interference, Trunking and Grade of Service, Improving Coverage & Capacity in Cellular Systems- Cell Splitting, Sectoring.

UNIT – II

Mobile Radio Propagation: Large-Scale Path Loss: Introduction to Radio Wave Propagation, Free Space Propagation Model, Relating Power to Electric Field, The Three Basic Propagation Mechanisms, Reflection-Reflection from Dielectrics, Brewster Angle, Reflection from prefect conductors, Ground Reflection (Two-Ray) Model, Diffraction-Fresnel Zone Geometry, Knife-edge Diffraction Model, Multiple knife-edge Diffraction, Scattering, Outdoor Propagation Models- Longley-Ryce Model, Okumura Model, Hata Model, PCS Extension to Hata Model, Walfisch and Bertoni Model, Wideband PCS Microcell Model, Indoor Propagation Models-Partition losses (Same Floor), Partition losses between Floors, Log-distance path loss model, Ericsson Multiple Breakpoint Model, Attenuation Factor Model, Signal penetration into buildings, Ray Tracing and Site-Specific Modeling.

UNIT – III

Mobile Radio Propagation: Small –Scale Fading and Multipath: Small Scale Multipath propagation-Factors influencing small scale fading, Doppler shift, Impulse Response Model of a multipath channel- Relationship between Bandwidth and Received power, Small-Scale Multipath Measurements-Direct RF Pulse System, Spread Spectrum Sliding Correlator Channel Sounding, Frequency Domain Channels Sounding, Parameters of Mobile Multipath Channels-Time Dispersion Parameters, Coherence Bandwidth, Doppler Spread and Coherence Time, Types of Small-Scale

Fading-Fading effects Due to Multipath Time Delay Spread, Flat fading, Frequency selective fading, Fading effects Due to Doppler Spread-Fast fading, slow fading, Statistical Models for multipath Fading Channels-Clarke's model for flat fading, spectral shape due to Doppler spread in Clarke's model, Simulation of Clarke and Gans Fading Model, Level crossing and fading statistics, Two-ray Rayleigh Fading Model.

UNIT – IV

Equalization and Diversity: Introduction, Fundamentals of Equalization, Training A Generic Adaptive Equalizer, Equalizers in a communication Receiver, Linear Equalizers, Nonlinear Equalization-Decision Feedback Equalization (DFE), Maximum Likelihood Sequence Estimation (MLSE) Equalizer, Algorithms for adaptive equalization-Zero Forcing Algorithm, Least Mean Square Algorithm, Recursive least squares algorithm. Diversity Techniques-Derivation of selection Diversity improvement, Derivation of Maximal Ratio Combining improvement, Practical Space Diversity Consideration-Selection Diversity, Feedback or Scanning Diversity, Maximal Ratio Combining, Equal Gain Combining, Polarization Diversity, Frequency Diversity, Time Diversity, RAKE Receiver.

UNIT – V

Wireless Networks: Introduction to wireless Networks, Advantages and disadvantages of Wireless Local Area Networks, WLAN Topologies, WLAN Standard IEEE 802.11, IEEE 802.11 Medium Access Control, Comparison of IEEE 802.11 a,b,g and n standards, IEEE 802.16 and its enhancements, Wireless PANs, Hiper Lan, WLL..

TEXT BOOKS:

1. Theodore, S. Rappaport J, "Wireless Communications Principles & Practice," 5th Edition, PHI, 2009.
2. Andrea Goldsmith, "Wireless Communications," Cambridge University Press, 2nd Edition, 2009.

REFERENCES:

1. Kaveh Pah Laven and P. Krishna Murthy, "Principles of Wireless Networks," 2nd Edition, PE, 2002.
2. William Stallings, "Wireless Communication and Networking," PHI, 2nd Edition, 2004.
3. Kamilo Feher, "Wireless Digital Communications," PHI, 3rd Edition, 2015.

MARRI LAXMAN REDDY INSTITUTE OF TECHNOLOGY AND MANAGEMENT
(AUTONOMOUS)

2070517: INTERNET OF THINGS
(Professional Elective-III)

IV Year B.Tech. ECE I – Sem.

L	T	P	C
3	0	0	3

Pre-requisites: Nil

Course Objectives:

- To introduce the terminology, technology and its applications
- To introduce the concept of M2M (machine to machine) with necessary protocols
- To introduce the Python Scripting Language which is used in many IoT devices
- To introduce the Raspberry PI platform, that is widely used in IoT applications
- To introduce the implementation of web-based services on IoT devices

Course Outcomes:

At the end of this course, students will be able to

- Understand the key characteristics of IoT and their essential role in enabling seamless and efficient data exchange among IoT devices.
- Develop IoT and M2M network configurations that enable reliable device communication, effective data transfer and remote management across multiple network layers.
- Compare the scalability, security, and reliability of different network connectivity solutions for smart objects in diverse IoT applications.
- Utilize serial communication protocols (UART, SPI, I2C) for optimized IoT device integration
- Develop IoT applications that utilize IoT Cloud for real-time connectivity and device interaction

UNIT – I

Introduction to Internet of Things –Definition and Characteristics of IoT, Physical Design of IoT – IoT Protocols, IoT communication models, IoT Communication APIs IoT enabled Technologies – Wireless Sensor Networks, Cloud Computing, Big data analytics, Communication protocols, Embedded Systems, IoT Levels and Templates Domain Specific IoTs – Home, City, Environment, Energy, Retail, Logistics, Agriculture, Industry, health and Lifestyle.

UNIT – II

IoT and M2M – Software defined networks, network function virtualization, difference between SDN and NFV for IoT Basics of IoT System Management with NETCOZF, YANG- NETCONF, YANG, SNMP, NETOPEER

UNIT - III

Introduction to Python - Language features of Python, Data types, data structures, Control of flow, functions, modules, packaging, file handling, data/time operations, classes, Exception handling Python packages - JSON, XML, HTTPLib, URLLib, SMTPLib

UNIT - IV

IoT Physical Devices and Endpoints - Introduction to Raspberry PI-Interfaces (serial, SPI, I2C) Programming – Python program with Raspberry PI with focus of interfacing external gadgets, controlling output, reading input from pins.

UNIT - V

IoT Physical Servers and Cloud Offerings – Introduction to Cloud Storage models and communication APIs Webserver – Web server for IoT, Cloud for IoT, Python web application framework, Designing a RESTful web API

TEXT BOOKS:

1. Internet of Things - A Hands-on Approach, Arshdeep Bahga and Vijay Madisetti, Universities Press, 2015, ISBN: 9788173719547
2. Getting Started with Raspberry Pi, Matt Richardson & Shawn Wallace, O'Reilly (SPD), 2014, ISBN: 9789350239759

MARRI LAXMAN REDDY INSTITUTE OF TECHNOLOGY AND MANAGEMENT
(AUTONOMOUS)

2070448: RADAR SYSTEMS
(Professional Elective-III)

IV Year B.Tech. ECE I – Sem.

L	T	P	C
3	0	0	3

Pre-requisites: Knowledge on Antennas and communication systems.

Course Objectives:

- Understand the working principle of a radar, formulating radar equation
- Identify the need for modulation and Doppler effect for working of CW and FM-CW radar
- Impart the knowledge of functioning of MTI radar, variants and its limitations
- Understand the principles of operation of Tracking Radar
- Concepts of a Matched Filter in radar receiver and its characteristics

Course Outcomes:

At the end of this course, students will be able

- Explain the working principle of a pulse radar and implement the radar range equation
- Understand the need and functioning of CW, FM-CW and MTI radars
- Illustrate DLC characteristics, range gated Doppler filter bank, and MTI radar performance
- Distinguish between Sequential Lobing, Conical Scan, Monopulse type of Tracking Radars
- Derive the matched filter response characteristics for radar applications

UNIT– I

Basics of Radar: Introduction, Maximum Unambiguous Range, Simple form of Radar Equation, Radar Block Diagram and Operation, Radar Frequencies and Applications. Prediction of Range Performance, Minimum Detectable Signal, Receiver Noise, Modified Radar Range Equation, Illustrative Problems.

Radar Equation: SNR, Envelope Detector – False Alarm Time and Probability, Integration of Radar Pulses, Radar Cross Section of Targets, Transmitter Power, PRF and Range Ambiguities, System Losses (qualitative treatment), Illustrative Problems.

UNIT – II

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. Illustrative Problems.

FM-CW Radar: Range and Doppler Measurement, Block Diagram and Characteristics, FM- CW altimeter.

UNIT – III

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, Staggered PRFs. Range Gated Doppler Filters. MTI Radar Parameters, Limitations to MTI Performance, MTI versus Pulse Doppler Radar.

UNIT – IV

Tracking Radar: Tracking with Radar, Sequential Lobing, Conical Scan, Mono pulse Tracking Radar – Amplitude Comparison Mono pulse (one- and two- coordinates), Phase Comparison Mono pulse, Tracking in Range, Acquisition and Scanning Patterns, Comparisonof Trackers.

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(AUTONOMOUS)

UNIT – V

Detection of Radar Signals in Noise: Introduction, Matched Filter Receiver – Response Characteristics and Derivation, Correlation Function and Cross-correlation Receiver, Efficiency of Non-matched Filters, Matched Filter with Non-white Noise.

Radar Receivers: Noise Figure and Noise Temperature, Displays – types. Duplexers – Branch type and Balanced type, Circulators as Duplexers. Introduction to Phased Array Antennas – Basic Concepts, Radiation Pattern, Beam Steering and Beam Width changes, Applications, Advantages and Limitations.

TEXT BOOKS:

1. Merrill I. Skolnik, “Introduction to Radar Systems,” Mc Graw Hill, 3rd Edition, 2017.
2. Byron Edde, “Radar: Principles, Technology, Applications,” Pearson Education, 1st Edition, 2004.

REFERENCES:

1. Peebles, Jr., P.Z, “Radar Principles,” Wiley, New York, 1st Edition, 2007.
2. Nicolaos S Tzannes, “Communication and Radar Systems,” iUniverse, 1st Edition, 2000.
3. G. Sasi Bhushana Rao, “Microwave & Radar Engineering,” Pearson, 1st Edition, 2014.

MARRI LAXMAN REDDY INSTITUTE OF TECHNOLOGY AND MANAGEMENT
(AUTONOMOUS)

2070449: SATELLITE COMMUNICATIONS
(Professional Elective-III)

IV Year B.Tech. ECE I – Sem. **L T P C**

3 0 0 3

Pre-requisites: Knowledge on analog and digital communication systems.

Course Objectives:

- Acquire the basic knowledge of satellite communication principles
- Overview of orbital mechanics and launches for the satellite communication
- Basic knowledge of link design of a satellite and multiple access systems
- Understand the basic concepts of earth station technology and their various types
- Gain knowledge on LEO, GEO and GPS

Course Outcomes:

At the end of this course, students will be able to

- Understand the historical background, basic concepts and frequency allocations for satellite communication
- Demonstrate orbital mechanics, launch vehicles and launchers
- Design satellite links for specified C/N with system design examples
- Visualize satellite sub systems like Telemetry, tracking, command and monitoring, power systems
- Understand the LEO, GEO and GPS

UNIT– I

Introduction: Origin of Satellite Communications, Historical Back-ground, Basic Concepts of Satellite Communications, Frequency Allocations for Satellite Services, Applications, Future Trends of Satellite Communications.

Orbital Mechanics and Launchers: Orbital Mechanics, Look Angle determination, Orbital Perturbations, Orbit determination, Launches and Launch vehicles, Orbital Effects in Communication Systems Performance.

UNIT – II

Satellite Subsystems: Attitude and Orbit Control System, Telemetry, Tracking, Command and Monitoring, Power Systems, Communication Subsystems, Satellite Antennas, Equipment Reliability and Space Qualification.

UNIT – III

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 Examples.

Multiple Access: Frequency Division Multiple Access (FDMA), Intermodulation, Calculation of C/N, Time Division Multiple Access (TDMA), Frame Structure, Examples, Satellite Switched TDMA Onboard Processing, DAMA, Code Division Multiple Access (CDMA), Spread Spectrum Transmission and Reception.

UNIT – IV

Earth Station Technology: Introduction, Transmitters, Receivers, Antennas, Tracking Systems, Terrestrial Interface, Primary Power Test Methods.

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(AUTONOMOUS)

UNIT – V

Low Earth Orbit and Geo-Stationary Satellite Systems: Orbit Considerations, Coverage and Frequency Consideration, Delay & Throughput Considerations, System Considerations, Operational NGSO Constellation Designs.

Satellite Navigation & Global Positioning System: Radio and Satellite Navigation, GPS Position Location Principles, GPS Receivers and Codes, Satellite Signal Acquisition, GPS Navigation Message, GPS Signal Levels, GPS Receiver Operation, GPS C/A Code Accuracy, Differential GPS.

TEXT BOOKS:

1. Timothy Pratt, Charles Bostian and Jeremy Allnutt, “Satellite Communications,” WSE, Wiley Publications, 3rd Edition, 2020.
2. Wilbur L. Pritchard, Robert A Nelson and Henri G. Suyderhoud, “Satellite Communications Engineering,” 2nd Edition, Pearson Publications, 2003.

REFERENCES:

1. M. Richharia, “Satellite Communications: Design Principles,” BS Publications, 2nd Edition, 2003.
2. D.C Agarwal, “Satellite Communication,” Khanna Publications, 5th Edition,1989.
3. K.N. Raja Rao, “Fundamentals of Satellite Communications,” PHI, 2nd Edition, 2004.

MARRI LAXMAN REDDY INSTITUTE OF TECHNOLOGY AND MANAGEMENT
(AUTONOMOUS)

2070450: EMBEDDED SYSTEM DESIGN
(Professional Elective-IV)

IV Year B.Tech. ECE I – Sem. **L T P C**

3 0 0 3

Pre-requisites: Microprocessor & Microcontroller concepts and applications, Operating system concepts.

Course Objectives:

- Understand the basics of an embedded system
- Programing an embedded system
- Designing an Embedded System for different applications
- Understand various operating systems concepts and choosing RTOS
- Design, implement and test an embedded system

Course Outcomes:

At the end of this course, students will be able to

- Understand the Key Concepts and Components of Embedded Systems
- Design Embedded Systems by Integrating Various Components Effectively
- Apply Software Development Methodologies for Embedded Systems Firmware
- Understand RTOS Concepts in Embedded System Design
- Evaluate and Implement Communication Methods in Embedded Systems

UNIT– I

Introduction to Embedded Systems: Definition of Embedded System, Embedded Systems Vs General Computing Systems, History of Embedded Systems, Classification, Major Application Areas, Purpose of Embedded Systems, Characteristics and Quality Attributes of Embedded Systems.

UNIT – II

The Typical Embedded System: Core of the Embedded System: General Purpose and Domain Specific Processors, ASICs, PLDs, Commercial Off- The-Shelf Components (COTS), Memory: ROM, RAM, Memory according to the type of Interface, Memory Shadowing, Memory selection for Embedded Systems, Sensors and Actuators, Communication Interface: Onboard and External Communication Interfaces.

UNIT – III

Embedded Firmware: Reset Circuit, Brown-out Protection Circuit, Oscillator Unit, Real Time Clock, Watchdog Timer, Embedded Firmware Design Approaches and Development Languages.

UNIT – IV

RTOS Based Embedded System Design: Operating System Basics, Types of Operating Systems, Tasks, Process and Threads, Multiprocessing and Multitasking, Task Scheduling.

UNIT – V

Task Communication: Shared Memory, Message Passing, Remote Procedure Call and Sockets, Task Synchronization: Task Communication/ Synchronization Issues, Task Synchronization Techniques, Device Drivers, How to Choose an RTOS.

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TEXT BOOKS:

1. Shibu K.V, “Introduction to Embedded Systems,” Mc Graw Hill, 3rd Edition, 2017.
2. Morgan Kaufmann, “Computers as Components,” Wayne Wolf, 4th Edition, 2019.

REFERENCES:

1. Raj Kamal, “Embedded Systems-Architecture, programming and Design,” TMH, 2nd Edition, 2007.
2. Frank Vahid, Tony Givargis, “Embedded System Design- Unified Hardware / Software Introduction,” John Wiley, 1st Edition, 2006.
3. Lyla B. Das, “Embedded Systems- An integrated approach,” Pearson, 1st Edition, 2013.

MARRI LAXMAN REDDY INSTITUTE OF TECHNOLOGY AND MANAGEMENT
(AUTONOMOUS)

2070547: CRYPTOGRAPHY & NETWORK SECURITY
(Professional Elective-IV)

IV Year B.Tech. ECE I – Sem.

L	T	P	C
3	0	0	3

Pre-requisites: Basic concepts of Computer Networks

Course Objectives:

- To impart knowledge on network security issues, services, goals and mechanisms.
- To analyze the security of communication systems, networks and protocols.
- To apply algorithms used for secure transactions in real world applications.

Course Outcomes:

At the end of this course, students will be able to

- Demonstrate the knowledge of cryptography and network security concepts and applications.
- Understand and apply the concepts of symmetric encryption.
- Identify and investigate of Cryptographic Hash Functions.
- Understand the concepts of email security and PGP.
- Understand and apply web security mechanisms.

UNIT - I

Security Attacks (Interruption, Interception, Modification and Fabrication), Security Services (Confidentiality, Authentication, Integrity, Non-repudiation, access Control and Availability) and Mechanisms, A model for Internetwork security, Cryptography Concepts and Techniques: Introduction, plain text and cipher text, substitution techniques, transposition techniques, encryption and decryption, symmetric and asymmetric key cryptography, steganography, key range and key size, possible types of attacks.

UNIT - II

Symmetric key Ciphers: Block Cipher principles, DES, AES, Blowfish, RC4, RC5, Block cipher operation, Stream ciphers, Asymmetric key Ciphers: Principles of public key cryptosystems, RSA algorithm, Elgamal Cryptography, Diffie-Hellman Key Exchange, Knapsack Algorithm.

UNIT-III

Cryptographic Hash Functions: Message Authentication, Secure Hash Algorithm (SHA512), Message authentication codes: Authentication requirements, HMAC, CMAC, Digital signatures, Elgamal Digital Signature Scheme. Key Management and Distribution: Symmetric Key Distribution Using Symmetric & Asymmetric Encryption, Distribution of Public Keys, Kerberos, X.509 Authentication Service, Public – Key Infrastructure.

UNIT-IV

Email Privacy: 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 Design principles, Trusted Systems, Intrusion Detection Systems.

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(AUTONOMOUS)

TEXT BOOKS:

1. Cryptography and Network Security by Atul Kahathe MC Graw Hill, 2nd edition.
2. Cryptography and Network Security by William Stallings 6th Edition, Pearson Education.

REFERENCES:

1. Cryptography and Network Security by Behrouz A.Forouzan.
2. Applied Cryptography" by Bruce Schneier.

MARRI LAXMAN REDDY INSTITUTE OF TECHNOLOGY AND MANAGEMENT
(AUTONOMOUS)

2070543: ARTIFICIAL INTELLIGENCE
(Professional Elective-IV)

IV Year B.Tech. ECE I – Sem.

L	T	P	C
3	0	0	3

Pre-requisites:

- A course on “Computer Programming and Data Structures”
- Some background in linear algebra, and probability will be helpful

Course Objectives:

- To learn the distinction between optimal reasoning Vs. human like reasoning
- To understand the concepts of state space representation, exhaustive search, heuristic search together with the time and space complexities.
- To learn different knowledge representation techniques.
- To understand the applications of AI, namely game playing, theorem proving, and machine learning.

Course Outcomes:

At the end of this course, students will be able to

- Formulate an efficient problem space for a problem expressed in natural language.
- Select a search algorithm for a problem and estimate its time and space complexities.
- Possess the skill for representing knowledge using the appropriate technique for a given problem.
- Apply AI techniques to solve problems of game playing, and machine learning.

UNIT I

Artificial Intelligence: What is AI, Foundations and History of AI.

Intelligent Agents: Introduction, how Agents Should Act, Structure of Intelligent Agents, Agent programs, Simple reflex agents, Goal based agents, Utility based agents, Environments and Environment programs.

Problem Solving by Search: Problem-Solving Agents, Formulating Problems, Example Problems, Searching for Solutions, Search Strategies (Breadth-first search, Uniform cost search, Depth-first search, Iterative deepening Depth-first search, Bidirectional search).

UNIT II

Informed Search Methods: Best-First Search, Heuristic Functions, Memory Bounded Search, Iterative Improvement Algorithms.

Game Playing: Introduction, Games as Search Problems, Perfect Decisions in Two-Person Games, Imperfect Decisions, Alpha-Beta Pruning, Games That Include an Element of Chance, State-of-the- Art Game Programs.

UNIT III

Knowledge and reasoning: A Knowledge-Based Agent, The Wumpus World Environment, Representation, Reasoning, and Logic, Prepositional Logic, An Agent for the Wumpus World.

First-Order Logic: Syntax and Semantics, Extensions and Notational Variations, Using First- Order Logic, Logical Agents for the Wumpus World, A Simple Reflex Agent, RepresentingChange in the World

Building a Knowledge Base: Properties of Good and Bad Knowledge Bases, Knowledge Engineering, The Electronic Circuits Domain, General Ontology, Application: The Grocery Shopping World.

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(AUTONOMOUS)

UNIT-IV

Inference in First-Order Logic: Inference Rules Involving Quantifiers, An Example Proof, Generalized Modus Ponens, Forward and Backward Chaining, Resolution: A Complete Inference Procedure, Completeness of resolution.

Logical Reasoning Systems: Introduction, Indexing, Retrieval, and Unification, Logic Programming Systems, Theorem Provers, Forward-Chaining Production Systems, Frame Systems and Semantic Networks, Description Logics, Managing Retractions, Assumptions, and Explanations.

UNIT-V

Planning: A Simple Planning Agent, From Problem Solving to Planning, Planning in Situation Calculus, Basic Representations for Planning, A Partial-Order Planning Example, A Partial-Order Planning Algorithm, Knowledge Engineering for Planning.

Practical Planning: Practical Planners, Hierarchical Decomposition, Analysis of Hierarchical Decomposition, Resource Constraints.

TEXT BOOKS:

1. Artificial Intelligence A Modern Approach, Stuart Russell and Peter Norvig, 3rd Edition, Pearson Education.

REFERENCES:

1. Artificial Intelligence, E.Rich and K.Knight, , 3rd Edition, TMH
2. Artificial Intelligence, Patrick Henny Winston, 3rd Edition, Pearson Education.
3. Artificial Intelligence, ShivaniGoel, Pearson Education.
4. Artificial Intelligence and Expert systems – Patterson, Pearson Education

MARRI LAXMAN REDDY INSTITUTE OF TECHNOLOGY AND MANAGEMENT
(AUTONOMOUS)

2070510: OPERATING SYSTEM
(Professional Elective-IV)

IV Year B.Tech. ECE I – Sem.

L	T	P	C
3	0	0	3

Pre-requisites: Nil

Course Objectives:

- Provide an introduction to operating system concepts (i.e., processes, threads, scheduling, synchronization, deadlocks, memory management, file and I/O subsystems and protection).
- Introduce the issues to be considered in the design and development of operating system
- Introduce basic Unix commands, system call interface for process management, inter-process communication and I/O in Unix.

Course Outcomes:

At the end of this course, students will be able to

- Control access to a computer and the files that may be shared
- Demonstrate the knowledge of the components of computer and their respective rolesin computing.
- Ability to recognize and resolve user problems with standard operating environments.
- Gain practical knowledge of how programming languages, operating systems,and architectures interact and how to use each effectively.

UNIT - I

Operating System Introduction: What is an operating system do, computer system organization, computer system architecture, operating system structure - operating system operations, process management, memory management, operating system services, system calls, types of system calls.

UNIT - II

Process: Process concepts, process scheduling, Operations on processes, Interposes Communication, multithreading models, thread libraries.
Process Scheduling: -Scheduling Criteria, scheduling algorithms, thread scheduling Multiple - Processor Scheduling.

UNIT - III

Synchronization: background, the critical section problem, peters"s solution, synchronization hardware, semaphores classical problems of synchronization, monitors.
Deadlocks - System Model, Deadlocks Characterization, Methods for Handling Deadlocks, Deadlock Prevention, Deadlock Avoidance, Deadlock Detection, and Recovery from Deadlock.

UNIT - IV

Memory Management and Virtual Memory: Background, swapping, contiguous memory allocation, paging structure of the page table, segmentation.
Virtual memory-background, demant paging page replacement allocation of framesthrashing.

UNIT – V

File Systems:

File system and implementing file system, file concept access methods, directory and disk structure, file system mounting file sharing, protection file system structure, file system implementation, directory implementation, allocation methods, free space management efficiency and performance, recovery, NFS.

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TEXT BOOKS

1. Operating System concepts- Abraham Silberchatz, Peter B. Galvin, Greg Gagne 8th Edition, John Wiley
2. Advanced programming in the Unix environment, W.R. Stevens, Pearson education.

REFERENCES:

1. Operating Systems – Internals and Design Principles, Stallings, 5th Edition, Pearson Education/PHI, 2005.
2. Operating System A Design Approach-Crowley, TMH.
3. Modern Operating Systems, Andrew S Tanenbaum 2nd Edition, Pearson/PHI
4. Unix programming environment, Kernighan and Pike, PHI. / Pearson Education
5. Unix Internals The New Frontiers, U.Vahalia, Pearson Education.

MARRI LAXMAN REDDY INSTITUTE OF TECHNOLOGY AND MANAGEMENT
(AUTONOMOUS)

2070478: E-CAD & VLSI DESIGN LABORATORY

IV Year B.Tech. ECE I – Sem.

L	T	P	C
0	0	3	1.5

Pre-requisites: Basics of VLSI Design.

Course Objectives:

- Know the utilization of FPGA board by logic circuits
- Measure the static and dynamic power of sequential and combinational circuits
- Study the simulation analysis of logic gates
- Know the RTL schematic of logic circuits
- Designing of the combinational circuits

Course Outcomes:

At the end of the laboratory work, students will be able to

- Analyze and Optimize CMOS Logic Circuits for Performance and Scalability
- Utilize Software Tools for Circuit Simulation and Analysis
- Design CMOS Circuit Layouts Using Industry-Standard Tools
- Apply Design Rule Checking (DRC) and Layout Versus Schematic (LVS) Verification for Analog Circuit.
- Evaluate and Optimize the Performance of Combinational Circuits

PART-A: E-CAD Programs

All the following experiments have to be implemented using HDL

28. Realize all the logic gates.
29. Design an 8 to 3 encoder (without and with priority) and 2 to 4 decoder.
30. Design an 8 to1 multiplexer and 1-to-8 demultiplexer.
31. Design a 4-bit binary to gray code converter.
32. Design a 4-bit comparator.
33. Design a Full adder using 3 modeling styles.
34. Design of flip flops: SR, D, JK and T.
35. Design a 4-bit binary, BCD counters (synchronous/asynchronous reset) or any sequence counter.
36. Design a Finite State Machine.

PART-B: VLSI Programs

Layout, physical verification, placement & route for complex design, static timing analysis, IR drop analysis and crosstalk analysis for the following:

1. Basic logic gates.
2. CMOS inverter.
3. CMOS NOR/ NAND gates.
4. CMOS XOR and MUX gates.
5. Static / Dynamic logic circuit (register cell).

6. Latch.
7. Pass transistor.
8. Layout of any combinational circuit (complex CMOS logic gate).
9. Analog Circuit simulation (AC analysis) – CS & CD amplifier.

NOTE: Minimum of 12 experiments to be conducted (any **SIX** experiments from each part are to be conducted).

MARRI LAXMAN REDDY INSTITUTE OF TECHNOLOGY AND MANAGEMENT
(AUTONOMOUS)

2070479: MICROWAVE ENGINEERING LABORATORY

IV Year B.Tech. ECE I – Sem.

L	T	P	C
0	0	2	1

Pre-requisites: Basics of antennas and microwave engineering.

Course Objectives:

- Defining the range of frequencies for operation in microwave engineering.
- Understand the functioning of microwave components.
- Verify the various Characteristics of Active and Passive Microwave Devices Practically
- Measure radiation pattern of an Antenna
- Analyse the radiation characteristics of UHF and microwave antennas

Course Outcomes:

At the end of the laboratory work, students will be able to

- Design and Select Appropriate Microwave Sources for Specific Applications
- Apply Wavelength Estimation Techniques in Microwave and Communication System design
- Analyze and Interpret Waveguide Propagation Characteristics
- Evaluate the Effect of Attenuation and Frequency on Communication System Performance
- Understand the Radiation Patterns and Characteristics of UHF and Microwave Antennas

List of Experiments:

16. Analyse the Reflex Klystron Characteristics.
17. Analyse the Gunn diode Characteristics.
18. Measurement of standing wave pattern, VSWR measurement, Low & High VSWR.
19. Measurement of guided wavelength, group and phase velocity.
20. Measurement of Frequency.
21. Analyse the Directional Coupler Characteristics & Coupling, Directivity and Isolation Measurements.
22. Attenuation Measurement.
23. Measurement of Scattering Parameters of a E plane Tee.
24. Measurement of Scattering Parameters of a H plane Tee.
25. Measurement of Scattering Parameters of a Magic Tee.
26. Measurement of Scattering Parameters of a Circulator.
27. Measurement of principle plane radiation patterns for horn, Yagi Uda, folded dipole (any one antenna).

NOTE: Minimum of 10 experiments to be conducted.

IV - II

MARRI LAXMAN REDDY INSTITUTE OF TECHNOLOGY AND MANAGEMENT
(AUTONOMOUS)

2080451: SYSTEM DESIGN USING FPGAs
(Professional Elective-V)

IV Year B.Tech. ECE II – Sem. **L T P C**

3 0 0 3

Pre-requisites: Knowledge on Digital System Design.

Course Objectives:

- Acquire Knowledge about the modeling and performance aspects of digital system design
- Knowledge on various programming models in HDL
- Model various combinational and sequential design blocks using Verilog HDL
- Study various Xilinx/Altera FPGA architectures
- Design of advanced digital hardware systems with help of FPGA tools

Course Outcomes:

At the end of this course, students will be able to

- Understand the design aspects of various digital system blocks
- Design and optimize complex combinational and sequential digital circuits
- Model combinational and sequential digital circuits by Verilog HDL
- Design and model digital circuits with Verilog HDL at behavioral, structural, and RTL Levels
- Differentiate various types of FPGA architectures

UNIT– I

Introduction: Digital system design options and tradeoffs, Design methodology and technology overview, Simple Programmable Logic Devices – Read Only Memories, Programmable Logic Arrays, Programmable Array Logic, Programmable Logic Devices/Generic Array Logic, Complex Programmable Logic Devices.

UNIT – II

Verilog HDL Coding Style: Lexical Conventions, Ports and Modules, Operators, Gate Level Modeling, System Tasks & Compiler Directives, Test Bench, Data Flow Modeling, Behavioral level Modeling, Tasks & Functions.

UNIT – III

FPGA Modeling of Combinational & Sequential Circuits: Behavioral, Data Flow and Structural Realization, Adders, Multipliers, Comparators, Flip Flops, Realization of Shift Register, Realization of a Counter, Synchronous and Asynchronous FIFO, Single port and Dual port RAM, Pseudo Random LFSR, Cyclic Redundancy Check.

UNIT – IV

FPGA Modeling of Synchronous Sequential Circuit Blocks: State diagram, state table, state assignment, choice of flip-flops, Timing diagram, One hot encoding, Mealy and Moore state machines, Design of serial adder using Mealy and Moore state machines, State minimization, Sequence detection, Design of vending machine using One Hot Controller.

UNIT – V

FPGA and its Architectures: FPGA Generic Architecture, The Xilinx XC2000, XC3000 and XC4000 Architectures, ALTERA Cyclone II Architecture, SOPC Builder, NIOS-II Soft-core Processor- System Design Examples using Xilinx/Altera FPGAs – Traffic light Controller, Real Time Clock - Interfacing using FPGA.

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(AUTONOMOUS)

TEXT BOOKS:

1. Bob Zeidman, “Designing with FPGAs and CPLDs,” CRC Press, 1st Edition, 2002.
2. Samir Palnitkar, “Verilog HDL, A guide to Digital System Design and Synthesis,” Pearson, 2nd Edition, 2009.

REFERENCES:

1. D. D. Gajski, N. D. Dutt, A.C.-H. Wu and S.Y.-L. Lin, “HighLevel Synthesis: Introduction to Chip and System Design”, Springer, 1st Edition, 1992.
2. Charles H. Roth, Jr., Larry L Kinney “Fundamentals of Logic Design”, Cengage Learning, 7th Edition, 2013.
3. S. Ramachandran, “Digital VLSI System Design: A Design Manual for implementation of Projects on FPGAs and ASICs Using Verilog” Springer Publication, 1st Edition, 2007.

MARRI LAXMAN REDDY INSTITUTE OF TECHNOLOGY AND MANAGEMENT
(AUTONOMOUS)

2080452: OPTICAL COMMUNICATIONS
(Professional Elective-V)

IV Year B.Tech. ECE II – Sem.

L	T	P	C
3	0	0	3

Pre-requisites: Knowledge on the basics of communication system.

Course Objectives:

- Study the significance of optical fiber communications (OFC)
- Understand the construction and characteristics of OFC cable
- Develop the knowledge of optical signal sources and power launching
- Identify and understand the operation of various optical detectors
- Understand the design of optical systems and WDM

Course Outcomes:

At the end of this course, students will be able to

- Understand the constructional parameters of optical fibers, including their composition, types, and applications in modern communication systems.
- Design a basic Optical Fiber Communication system incorporating key components such as transmitters, receivers, and optical fibers for efficient signal transmission.
- Assess losses from attenuation, absorption, scattering, and bending in Optical Fiber Communication systems and evaluate their impact on overall performance.
- Evaluate the performance characteristics of various optical detectors, including sensitivity, response time, and noise
- Design and analyze optical communication systems by considering various key aspects

UNIT– I

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, V number, Mode Coupling, Step Index Fibers, Graded Index Fibers.

Single Mode Fibers- Cut Off Wavelength, Mode Field Diameter, Effective Refractive Index, Fiber Materials Glass, Halide, Active Glass, Chalgenide Glass, Plastic Optical Fibers.

UNIT – II

Signal Distortion in Optical Fibers: Attenuation, Absorption, Scattering and Bending Losses, Core and Cladding Losses, 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

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.

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(AUTONOMOUS)

Source to Fiber Power Launching: - Output Patterns, Power Coupling, Power Launching, Equilibrium Numerical Aperture, Laser Diode to Fiber Coupling.

UNIT – IV

Optical Detectors: Physical Principles of PIN and APD, Detector Response Time, Temperature Effect on Avalanche Gain, Comparison of Photo Detectors, 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

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. Gerd Keiser, “Optical Fiber Communications,” Mc Graw Hill publication, 4th Edition, 2008.
2. John M. Senior, “Optical Fiber Communications,” Pearson Education, 3rd Edition, 2009.

REFERENCES:

1. D.K. Mynbaev, S.C. Gupta and Lowell L. Scheiner, “Fiber Optic Communications,” Pearson Education, 1st Edition, 2005.
2. S.C.Gupta, “Text Book on Optical Fibre Communication and its Applications,” PHI, 3rd Edition, 2018.
3. Govind P. Agarwal, “Fiber Optic Communication Systems,” John Wiley, 5th Edition, 2021.

MARRI LAXMAN REDDY INSTITUTE OF TECHNOLOGY AND MANAGEMENT
(AUTONOMOUS)

2080518: MACHINE LEARNING
(Professional Elective-V)

IV Year B.Tech. ECE II – Sem. **L T P C**

3 0 0 3

Pre-requisites: Knowledge on Data Structures, and Statistical methods

Course Objectives:

- This course explains machine learning techniques such as decision tree learning, Bayesian learning etc.
- To understand computational learning theory.
- To study the pattern comparison techniques.

Course Outcomes:

At the end of this course, students will be able

- Understand and Apply Core Machine Learning Algorithms
- Apply Neural Networks for Pattern Recognition Problems
- Implement and Modify Algorithms for Practical Applications
- Design and Implement Hypothesis Space Search Algorithms
- Evaluate and Optimize Models Using Inductive and Analytical Learning.

UNIT-I

Introduction - Well-posed learning problems, designing a learning system, Perspectives and issues in machine learning, supervised versus unsupervised learning. Concept learning and the general to specific ordering – introduction, a concept learning task, concept learning as search, FIND-S: finding a maximally specific hypothesis, version spaces and the candidate elimination algorithm, remarks on version spaces and candidate elimination, inductive bias.

Decision Tree Learning – Introduction, decision tree representation, appropriate problems for decision tree learning, the basic decision tree learning algorithm, hypothesis space search in decision tree learning, inductive bias in decision tree learning, issues in decision tree learning.

UNIT–II

Artificial Neural Networks– Introduction, neural network representation, appropriate problems for neural network learning, perceptions, multilayer networks and the back-propagation algorithm, Remarks on the Back-Propagation algorithm, An illustrative example: face recognition, advanced topics in artificial neural networks.

Evaluation Hypotheses – Motivation, estimation hypothesis accuracy, basics of sampling theory, a general approach for deriving confidence intervals, difference in error of two hypotheses, comparing learning algorithms.

UNIT–III

Bayesian learning – Introduction, Bayes theorem, Bayes theorem and concept learning, Maximum Likelihood and least squared error hypotheses, maximum likelihood hypotheses for predicting probabilities, minimum description length principle, Bayes optimal classifier, Gibbs algorithm, Naïve.

Bayes classifier, an example: learning to classify text, Bayesian belief networks. Computational learning theory – Introduction, probably learning an approximately correct (PAC) hypothesis, the mistake bound model of learning.

Instance-Based Learning- Introduction, k-nearest neighbour (KNN) algorithm, locally weighted regression, radial basis functions, remarks on lazy and eager learning.

UNIT–IV

Genetic Algorithms – Motivation, Genetic algorithms, an illustrative example, hypothesis space search, Genetic programming.

Learning Sets of Rules – Introduction, sequential covering algorithms, learning rule sets: summary, learning First-Order rules, learning sets of First-Order rules: FOIL, Induction as inverted deduction, inverting resolution.

Reinforcement Learning – Introduction, the learning task, Q–learning.

UNIT - V

Analytical Learning- Introduction, learning with perfect domain theories: PROLOG-EBG, remarks on explanation-based learning, explanation-based learning of search control knowledge.

Combining Inductive and Analytical Learning – Motivation, inductive-analytical approaches to learning, using prior knowledge to initialize the hypothesis, Using prior knowledge to alter the search objective, using prior knowledge to augment search operators.

TEXTBOOKS:

1. Machine Learning – Tom M. Mitchell, - MGH

REFERENCES:

1. Machine Learning: An Algorithmic Perspective, Stephen Marshland, Taylor & Francis

MARRI LAXMAN REDDY INSTITUTE OF TECHNOLOGY AND MANAGEMENT
(AUTONOMOUS)

2080453: INTRODUCTION TO NANO TECHNOLOGY
(Professional Elective-V)

IV Year B.Tech. ECE II – Sem. **L T P C**

3 0 0 3

Pre-requisites: Knowledge on Basic Semiconductor Physics.

Course Objectives:

- Study the basic concepts of Nanotechnology
- Learn Nanoparticles and Nanostructured Materials
- Analyze nano devices operation and their issues
- Understand the concepts of Nano systems
- Study the Bio-nanotechnology and Impact of nanotechnology

Course Outcomes:

At the end of this course, students will be able

- Define nanotechnology and its basics
- Analyze semiconducting nanoparticles and nanostructures
- Construct and analyze nano devices with its physical operation
- Gain knowledge on the design of nano systems and materials applications
- Understand the Bio-nanotechnology and Impact of nanotechnology

UNIT– I

Introduction: Definitions and Concepts, An Ostensive Definition of Nanotechnology, A Brief History of Nanotechnology, Biology as Paradigm, Why Nanotechnology? Solid State Structure, Energy Bands, Localized Particles, Microscopy, Spectroscopy.

UNIT – II

Nanoparticles and Nanostructured Materials: Metal Nanoclusters, Semiconducting Nanoparticles, Rare Gas and Molecular Clusters, Methods of Synthesis, Solid Disordered Nanostructures, Nanostructured Crystals.

UNIT – III

Nanodevices: Issues of Miniaturization, Digital Information Processing, Quantum Computing, Electronic Devices, Trends in the Miniaturization of Electronics, Spintronics (Magnetic Devices), Photonic Devices, Mechanical Devices, Fluidic Devices, Micro-Electro-Mechanical Systems (MEMSs), Nano-Electro-Mechanical Systems (NEMSs),

UNIT – IV

Nano systems and their Design: Systems, Materials selection, Defects in Nanograins, Spacial Distribution of Defects, Strategies to Overcome Component Failure, Computational Modeling, “Evolutionary” Design, Performance Criteria, Scale out, Standardization, Creative Design, Producibility, Graphene, Carbon Nanotubes, Carbon Nanoparticles (Fullerenes), Materials Applications, Device Components and Devices.

UNIT – V

Bio-Nanotechnology and Impact of Nanotechnology: The Structural Nature of Biomolecules, Some General Characteristics of Biological Molecules, The Mechanism of Biological Machines, DNA as Construction Material, Biosensors, Bio photonic Devices, Technical Revolutions, Scientific Impacts, Technical Impacts, Commercial and Economic Impacts, Environmental Impacts, Social Implications,

Impacts on Individual Psychology, Some Ethical Issues.

TEXT BOOKS:

1. Jeremy Ramsden, “Nanotechnology: An Introduction,” Elsevier, 2nd Edition, 2016.
2. Charles P. Poole, Jr. and Frank J. Owens, “Introduction to Nanotechnology,” John Wiley & Sons, 2nd Edition, 2003.

REFERENCES:

1. Mark Ratner and Daniel Ratner, “Nanotechnology: A Gentle Introduction to the Next Big Idea,” Pearson, 2nd Edition, 2003.
2. Risal Singh and Shipra Mital Gupta, “Introduction to Nanotechnology,” Oxford University Press, 1st Edition, 2016.
3. William Illsey Atkinson, “Nanotechnology,” Jaico Publishing House, 1st Edition, 2006.

MARRI LAXMAN REDDY INSTITUTE OF TECHNOLOGY AND MANAGEMENT
(AUTONOMOUS)

2080565: CYBER SECURITY
(Professional Elective-VI)

IV Year B.Tech. ECE II – Sem.

L	T	P	C
3	0	0	3

Pre-requisites: Nil

Course Objectives:

- To familiarize various types of cyber-attacks and cyber-crimes
- To give an overview of the cyber laws
- To study the defensive techniques against these attacks

Course Outcomes:

At the end of this course, students will be able

- Understand cyber-attacks, types of cybercrimes, cyber laws
- Know how to protect them self and the entire Internet community from Cyber Attacks

UNIT – I

Introduction to Cyber Security: Basic Cyber Security Concepts, layers of security, Vulnerability, threat, Harmful acts, Internet Governance – Challenges and Constraints, Computer Criminals, CIA Triad, Assets and Threat, motive of attackers, active attacks, passive attacks, Software attacks, hardware attacks, Spectrum of attacks, Taxonomy of various attacks, IP spoofing, Methods of defense, Security Models, risk management, Cyber Threats-Cyber Warfare, Cyber Crime, Cyber terrorism, Cyber Espionage, etc., Comprehensive Cyber Security Policy.

UNIT - II

Cyberspace and the Law & Cyber Forensics: Introduction, Cyber Security Regulations, Roles of International Law. The INDIAN Cyberspace, National Cyber Security Policy. Introduction, Historical background of Cyber forensics, Digital Forensics Science, The Need for Computer Forensics, Cyber Forensics and Digital evidence, Forensics Analysis of Email, Digital Forensics Lifecycle, Forensics Investigation, Challenges in Computer Forensics, Special Techniques for Forensics Auditing.

UNIT - III

Cybercrime: Mobile and Wireless Devices: Introduction, Proliferation of Mobile and Wireless Devices, Trends in Mobility, Credit card Frauds in Mobile and Wireless Computing Era, Security Challenges Posed by Mobile Devices, Registry Settings for Mobile Devices, Authentication service Security, Attacks on Mobile/Cell Phones, Mobile Devices: Security Implications for Organizations, Organizational Measures for Handling Mobile, Organizational Security Policies and Measures in Mobile Computing Era, Laptops.

UNIT- IV

Cyber Security: Organizational Implications: Introduction, cost of cybercrimes and IPR issues, web threats for organizations, security and privacy implications, social media marketing: security risks and perils for organizations, social computing and the associated challenges for organizations. Cybercrime and Cyber terrorism: Introduction, intellectual property in the cyberspace, the ethical dimension of cybercrimes the psychology, mindset and skills of hackers and other cyber criminals.

UNIT - V

Privacy Issues: Basic Data Privacy Concepts: Fundamental Concepts, Data Privacy Attacks, Data linking and profiling, privacy policies and their specifications, privacy policy languages, privacy in different domains- medical, financial, etc. Cybercrime: Examples and Mini-Cases Examples: Official Website of Maharashtra Government Hacked, Indian Banks Lose Millions of Rupees, Parliament Attack, Pune City Police Bust Nigerian Racket, e-mail spoofing instances. Mini-Cases: The Indian Case of online Gambling, An Indian Case of Intellectual Property Crime, Financial Frauds in Cyber Domain.

TEXT BOOKS:

MARRI LAXMAN REDDY INSTITUTE OF TECHNOLOGY AND MANAGEMENT

(AUTONOMOUS)

1. Nina Godbole and Sunit Belpure, Cyber Security Understanding Cyber Crimes, Computer Forensics and Legal Perspectives, Wiley.
2. B. B. Gupta, D. P. Agrawal, Haoxiang Wang, Computer and Cyber Security: Principles, Algorithm, Applications, and Perspectives, CRC Press, ISBN 9780815371335, 2018.

REFERENCES:

1. Cyber Security Essentials, James Graham, Richard Howard and Ryan Otson, CRC Press.
2. Introduction to Cyber Security, Chwan-Hwa(john) Wu,J. David Irwin, CRC Press T&F Group.

MARRI LAXMAN REDDY INSTITUTE OF TECHNOLOGY AND MANAGEMENT
(AUTONOMOUS)

2080454: ANALOG CMOS IC DESIGN
(Professional Elective-VI)

IV Year B.Tech. ECE II – Sem. **L T P C**

3 0 0 3

Pre-requisites: Knowledge on circuit design and microelectronics, familiarity with SPICE tool.

Course Objectives:

- Familiarize with MOS devices and its modeling
- Learn and design analog CMOS sub-circuits
- Analyze CMOS based amplifiers and their architectures
- Learn and design Operational Amplifiers with CMOS technology
- Design and analyze comparator circuits

Course Outcomes:

At the end of this course, students will be able

- Understand the operation of MOS transistors and CMOS device modeling concepts for the analysis of integrated circuits.
- Analyze fundamental analog CMOS sub-circuits and various current mirror configurations by considering their design principles, current matching accuracy, and applications.
- Design efficient, high-performance analog circuits through the analysis of fundamental CMOS amplifier architectures.
- Apply measurement techniques for designing CMOS operational amplifiers
- Classify the characteristics and efficiency of various comparator circuits and explore techniques for enhancing their practical application.

UNIT– I

MOS Devices and Modeling: The MOS Transistor, Passive Components- Capacitor & Resistor, Integrated circuit Layout, CMOS Device Modeling – Simple MOS Large-Signal Model, Other Model Parameters, Small-Signal Model for the MOS Transistor, Computer Simulation Models, Sub-threshold MOS Model.

UNIT – II

Analog CMOS Sub-Circuits: MOS Switch, MOS Diode, MOS Active Resistor, Current Sinks and Sources, Current Mirrors-Current mirror with Beta Helper, Degeneration, Cascade current Mirror and Wilson Current Mirror, Current and Voltage References, Band gap Reference.

UNIT – III

CMOS Amplifiers: Inverters, Differential Amplifiers, Cascade Amplifiers, Current Amplifiers, Output Amplifiers, High Gain Amplifiers Architectures.

UNIT – IV

CMOS Operational Amplifiers: Design of CMOS Op Amps, Compensation of Op Amps, Design of Two-Stage Op Amps, Power- Supply Rejection Ratio of Two-Stage Op Amps, Cascade Op Amps, Measurement Techniques of OP Amp.

UNIT – V

Comparators: Characterization of Comparator, Two-Stage, Open-Loop Comparators, Other Open Loop Comparators, Improving the Performance of Open-Loop Comparators, Discrete-Time Comparators.

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(AUTONOMOUS)

TEXT BOOKS:

1. Philip E. Allen and Douglas R. Holberg, “CMOS Analog Circuit Design,” Oxford University Press, International 2nd Edition, 2010.
2. Paul R. Gray, Paul J. Hurst, S. Lewis and R. G. Meyer, “Analysis and Design of Analog Integrated Circuits,” Wiley India, 5th Edition, 2010.

REFERENCES:

1. David A. Johns, Ken Martin, “Analog Integrated Circuit Design,” Wiley, 2nd Edition, 2011.
2. Behzad Razavi, “Design of Analog CMOS Integrated Circuits”, TMH, 2nd Edition, 2000.
3. Baker, Li and Boyce, “CMOS: Circuit Design, Layout and Simulation”, PHI, 3rd Edition, 2002.

MARRI LAXMAN REDDY INSTITUTE OF TECHNOLOGY AND MANAGEMENT
(AUTONOMOUS)

2080455: GLOBAL NAVIGATION SATELLITE SYSTEM
(Professional Elective-VI)

IV Year B.Tech. ECE II – Sem. **L T P C**

3 0 0 3

Pre-requisites: Knowledge on the communication systems.

Course Objectives:

- Familiarize with Satellite based navigation
- Understand the steps involved in the evaluation of GPS user positions
- Understand the different types of GPS errors
- Understand the DGPS and GPS coordinate system
- Discuss the practical applications of GPS

Course Outcomes:

At the end of this course, students will be able to

- Learn to global positioning
- Know types of signals used in the GPS systems and accuracy limits
- Find latest versions of GPS and its application
- Understand satellite positioning and navigation
- Find how satellites positions objects on and above surface of the Earth, as well as in space

UNIT– I

GPS Fundamentals: INS, Trilaiteration, Hyperbolic navigation, Transit, GPS principle of operation, architecture, operating frequencies, orbits, Keplerian elements.

UNIT – II

GPS Signals: GPS and UTC Time, Signal structure, C/A and P-Code, ECEF and ECI coordinate systems and WGS 84 datum, Important components of receiver and specifications, link budget.

UNIT – III

GPS Error Models: Ionospheric error, Tropospheric error, Ephemeris error, Clock errors, Satellite and receiver instrumental biases, Antenna Phase center variation, multipath; estimation of Total Electron Content (TEC) using dual frequency measurements, Various DOPs, UERE.

UNIT – IV

Modernization and DGPS: Future GPS satellites, new signals and their benefits, principle of operation of DGPS, architecture and errors, Spoofing and Anti-spoofing.

UNIT – V

Other Constellations and Augmentation systems: GLONASS, Galileo and IRNSS System. Relative advantages of SBAS, SBAS: Features and Principle of operation of Wide area augmentation system (WAAS) and GAGAN

TEXT BOOKS:

1. Hoffman-Wellenhof, B., H. Lichtenegger and Collins., J., “GPS Theory and Practice,” Springer, New York, 5th Edition, 2005.
2. E. D. Kaplan and Christopher J. Hegarty, “Understanding GPS Principles and Applications,” Artech House Boston, 2nd Edition 2006.

MARRI LAXMAN REDDY INSTITUTE OF TECHNOLOGY AND MANAGEMENT (AUTONOMOUS)

REFERENCES:

1. Mohinder S. Grewal, Lawrence R. Weill, Angus P. Andrews, “Global positioning systems – Inertial Navigation and Integration,” John wily & sons, 2nd Edition, 2007.
2. Misra Pratap and Per Enge, “Global Positioning System: Signals, Measurements and Performance,” Ganga- Jamuna Press, Lincoln, Massachusetts, USA, 2nd Edition, 2010.
3. Bradford W, Parkinson and James J.Spilker Jr., “Global Positioning System: Theory and Application Volume I and II,” American Institute of Aeronautics and Astronautics Inc., Washington DC, 1st Edition, 1996

MARRI LAXMAN REDDY INSTITUTE OF TECHNOLOGY AND MANAGEMENT
(AUTONOMOUS)

2080456: COMPUTER VISION
(Professional Elective-VI)

IV Year B.Tech. ECE II – Sem. **L T P C**

3 0 0 3

Pre-requisites: Knowledge on the digital image processing.

Course Objectives:

- Explore the difference between human vision and computer vision
- Understanding the various features extraction methods
- Knowledge on shape representation and segmentation
- Familiarize the concepts of motion detection and estimation
- Understand various algorithms used for object recognition

Course Outcomes:

At the end of this course, students will be able to

- Understand the image formation models and feature extraction for computer vision
- Perform segmentation and motion detection on video
- Develop small applications and detect the objects in various applications
- Implement algorithms for object detection and classification
- Understand the concepts of stereo vision

UNIT-I

Image Formation Models: Monocular imaging system, Orthographic & Perspective Projection, Camera model and Camera calibration, Binocular imaging systems, Perspective, Binocular Stereopsis: Camera and Epipolar Geometry; Homography, Rectification, DLT, RANSAC, 3-D reconstruction framework; Auto-calibration. Apparel, Stereo vision.

UNIT-II

Feature Extraction: Image representations (continuous and discrete), Edge detection, Edge linking, corner detection, texture, binary shape analysis, boundary pattern analysis, circle and ellipse detection, Light at Surfaces; Phong Model; Reflectance Map; Albedo estimation; Photometric Stereo; Use of Surface Smoothness Constraint; Shape from Texture, color, motion and edges.

UNIT-III

Shape Representation and Segmentation: Deformable: Curves and surfaces, Snakes and active contours Level set representations, Fourier and wavelet descriptors, Medial representations, multi-resolution analysis, Region Growing, Edge Based approaches to segmentation, Graph-Cut, Mean-Shift, MRFs, Texture Segmentation.

UNIT-IV

Motion Detection and Estimation: Regularization theory, Optical computation, Stereo Vision Motion estimation, Background Subtraction and Modelling, Optical Flow, KLT, Spatio-Temporal Analysis, Dynamic Stereo; Motion parameter estimation, Structure from motion, Motion Tracking in Video.

UNIT-V

Object recognition: Hough transforms and other simple object recognition methods, Shape correspondence and shape matching, Principal component analysis, Shape priors for recognition.

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TEXT BOOKS:

1. D. Forsyth and J. Ponce, “Computer Vision - A modern approach,” Pearson Prentice Hall, 2nd Edition, 2012.
2. Szeliski Richard, “Computer Vision: Algorithms and Applications,” Springer- Verlag London Limited, 1st Edition, 2011.

REFERENCES:

1. Richard Hartley and Andrew Zisserman, “Multiple View Geometry in Computer Vision,” Cambridge University Press, 2nd Edition, 2004.
2. K. Fukunaga, “Introduction to Statistical Pattern Recognition,” Morgan Kaufmann, 2nd Edition, 1990.
3. Rafael C. Gonzalez and Richard E. Woods,” Digital Image Processing,” PHI, 4th Edition. 2018.

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(AUTONOMOUS)

List of Open Electives Applicable For 2020-21 Admitted Batch

Branch	Open Elective-I (OE – I)	Open Elective-II (OE – II)	Open Elective-III (OE – III)
Electronics and Communication Engineering	2060404: Electronic Communications & Applications	2070405: Introduction to VLSI & Embedded Systems	2080406: Global Navigation Satellite System & Applications

***Note:** Students should take Open Electives from the List of Open Electives Offered by Other Departments/Branches Only.

MARRI LAXMAN REDDY INSTITUTE OF TECHNOLOGY AND MANAGEMENT
(AUTONOMOUS)

2060404: ELECTRONIC COMMUNICATIONS & APPLICATIONS
(Open Elective – I)

III Year B.Tech. ECE I – Sem. **L T P C**

3 0 0 3

Pre-requisites: Knowledge on the basics of communication systems

Course Objectives:

- Study the system requirements of analog communication systems
- Design the generation and detection of various digital modulation techniques
- Realize the significance of optical fiber communications
- Explore the concepts of radar and its frequency bands
- Acquire the basic knowledge of satellite communication principles

Course Outcomes:

At the end of this course, students will be able to

- Understand the basic knowledge of AM and FM Transmission & Reception
- Analyze the error performance of digital modulation techniques
- Understand and analyze the constructional parameters of optical fibers
- Derive the complete radar range equation
- Understand the historical background, basic concepts and frequency allocations for satellite communication

UNIT– I

Amplitude Modulation: Need for modulation, Amplitude Modulation - Time and frequency domain description, power relations in AM waves, Generation of AM waves -Switching modulator, Detection of AM signal - Envelope detector, Generation of DSBSC signal - Balanced Modulators, Detection of DSB-SC Modulated signal, SSB modulation, Frequency discrimination and Phase discrimination methods, Demodulation of SSB signal, Vestigial side band modulation. Applications: Audio, video, telephony, wireless communication, radar, emergency services etc.

UNIT – II

Introduction to Digital Communications: Model of digital communication system, advantages of digital communication systems, digital representation of analog signals.

Baseband Data Transmission: Introduction**,** sampling process, PAM, PWM, PPM, pulse code modulation, differential pulse code modulation, delta modulation, ADM, noise considerations in PCM and DM. Applications: telephony for text messaging, speech processing, data compression etc.

UNIT – III

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, V number, Mode Coupling, Step Index Fibers, Graded Index Fibers.

Single Mode Fibers- Cut Off Wavelength, Mode Field Diameter, Effective Refractive Index, Fiber Materials Glass. Applications: telecommunications, internet communications, and broadcasting etc.

UNIT – IV

Basics of Radar: Maximum Unambiguous Range, Simple form of Radar Equation, Radar Block Diagram and Operation, Radar Frequencies. Prediction of Range Performance, Modified Radar Range Equation. Applications: defence weapons systems and in safety and navigation applications etc.

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(AUTONOMOUS)

UNIT – V

Introduction: Origin of Satellite Communications, Historical Back-ground, Basic Concepts of Satellite Communications, Frequency Allocations for Satellite Services, Future Trends of Satellite Communications. Orbital Mechanics, Look Angle determination, Orbital Perturbations, Orbit determination, Launches and Launch vehicles, Orbital Effects in Communication Systems Performance. Applications- Radio and TV broadcast, Weather forecasting and Global mobile communication etc.

TEXT BOOKS:

3. Simon Haykin, “Analog and digital communications,” John Wiley, 5th Edition 2009.
4. Gerd Keiser, “Optical Fiber Communications,” MC GRAW HILL publication, 5th Edition, 2017.

REFERENCES:

1. Sudakshina Kundu, “Analog and digital communications,” Pearson India, 2nd Edition 2020.
2. Merrill I. Skolnik, “Introduction to Radar Systems,” TMH Special Indian Edition, 3rd Edition, 2017.
3. Timothy Pratt, Charles Bostian and Jeremy Allnutt, “Satellite Communications,” WSE, Wiley Publications, 3rd Edition, 2019.

MARRI LAXMAN REDDY INSTITUTE OF TECHNOLOGY AND MANAGEMENT
(AUTONOMOUS)

2070405: INTRODUCTION TO VLSI & EMBEDDED SYSTEMS
(Open Elective - II)

IV Year B.Tech. ECE I – Sem. **L T P C**

3 0 0 3

Pre-requisites: Knowledge on basic semiconductor devices, micro processors and controllers.

Course Objectives:

- Familiarize with basic concepts of VLSI design
- Develop system components with its physical design
- Design and develop a system with its clocking styles by testing
- Learn different embedded processors and their architectures
- Analyze embedded architectures quantitively and their security concerns

Course Outcomes:

At the end of this course, students will be able

- Design logic gates and other modules with design architectures
- Construct and analyze VLSI building blocks with system components and physical design approaches
- Draw and analyze system clocks with design considerations and Test Generation Methods
- Understand the design of embedded processor architectures with its memory models and scheduling
- Analyze processor execution time and cryptographic security primitives

UNIT– I

An Overview of VLSI: Complexity and Design, Basic Concepts, Integrated Circuit Layers, MOSFETs, CMOS Layers, Designing FET Arrays, Physical Design of Logic Gates, Design Hierarchies.

UNIT – II

VLSI System Components and Physical Design: Multiplexors, Equality Detectors and Comparators, Priority Encoder, Shift and Rotation Operations, Latches, D Flip-Flop, Registers, The Role of Synthesis. Large-Scale Physical Design, Interconnect Delay Modeling, Crosstalk, Interconnect Scaling, Floor-planning and Routing, Input and Output Circuits, Power Distribution and Consumption, Low-Power Design Considerations.

UNIT – III

VLSI Clocking and Testing: Clocked Flip-flops, CMOS Clocking Styles, Pipelined Systems, Clock Generation and Distribution, System Design Consideration, General Concepts, CMOS Testing, Test Generation Methods.

UNIT – IV

Embedded Processors and Architectures: Types of Processors, Parallelism, Memory Technologies, Memory Hierarchy, Memory Models, I/O Hardware, Sequential Software in a Concurrent World, Basics of Scheduling, Multiprocessor Scheduling.

UNIT – V

Quantitative Analysis and Security: Problems of Interest, Programs as Graphs, Factors Determining Execution Time, Basics of Execution Time Analysis, Other Quantitative Analysis Problems, Cryptographic Primitives, Protocol and Network Security, Software Security, Information Flow, Advanced Topics.

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(AUTONOMOUS)

TEXT BOOKS:

1. John P. Uyemura, “Introduction to VLSI Circuits and Systems,” 2nd Edition, Wiley, 2011.
2. E. A. Lee and S. A. Seshia, “Introduction to Embedded Systems - A Cyber-Physical Systems Approach,” 2nd Edition, MIT Press, 2017.

REFERENCES:

1. Ming-Bo Lin, “Introduction to VLSI Systems: A Logic, Circuit, and System Perspective,” 2nd Edition, CRC Press, 2019.
2. Carver Mead and Lynn Conway, “Introduction to VLSI systems,” 3rd Edition, Addison-Wesley Longman Publishing Corporation, US, 2009.
3. David Russell, “Introduction to Embedded Systems-Using ANSI C and the Arduino Development Environment,” 1st Edition, Morgan & Claypool Publishers, 2010.

MARRI LAXMAN REDDY INSTITUTE OF TECHNOLOGY AND MANAGEMENT
(AUTONOMOUS)

2080406: GLOBAL NAVIGATION SATELLITE SYSTEM & APPLICATIONS
(Open Elective-III)

IV Year B.Tech. ECE II – Sem.

L	T	P	C
3	0	0	3

Pre-requisites: Basic knowledge of GIS and Remote Sensing.

Course Objectives:

- Get familiarize with Satellite based navigation.
- Understand the concept of Position fixing GPS.
- Introduce state of the art technique for comparing the positional accuracy.
- Demonstrate a clear understanding of the GPS signal, codes and biases
- Discuss the practical applications of GPS and the implications of its modernization

Course Outcomes:

At the end of this course, students will be able to

- Introduction to global positioning
- Learn types of signals used in the GPS systems and accuracy limits
- Know latest versions of GPS and its application
- Understand satellite positioning and navigation
- Know how satellites positions objects on and above surface of the Earth, as well as in space

UNIT– I

Introduction: Concept of digital elevation model (DEM) and it's implementation. Various techniques to generate digital elevation models-Basic principle of satellite navigation, GPS time, GPS signal structure, structure of navigation data, Importance of spatial resolution with DEMs

UNIT – II

Signal Characteristics: Accessing the quality of DEM, Integration of DEMs with satellite data, Common derivatives and crashing network.

UNIT – III

GPS receivers & data errors: DEMs derivatives - 1, DEMs derivatives - 2, DEMs derivatives - 3, DEMs derivatives -4, DEM based Surface Hydrologic Modeling -1.

UNIT – IV

Differential GPS: DEMs based Surface Hydrologic Modeling DEMs and dam simulation and its application in groundwater hydrology Applications of DEMs in solar.

UNIT – V

GPS APPLICATIONS: wind energy potential estimations Applications of DEMs in Viewshed and Flood Hazard Mapping DEMs Sources Limitations and future of Digital Elevation Models

TEXT BOOKS:

1. Hofmann-Wellenhof, B., Lichtenegger, H., Wasle, E., “GNSS – Global Navigation Satellite Systems,” 5th Edition, Springer, Verlag Wien, 2012.
2. Awange, J. L., “Environmental Monitoring using GNSS: Global Navigation Satellite Systems,” 2nd Edition, Springer, 2010.

REFERENCES:

MARRI LAXMAN REDDY INSTITUTE OF TECHNOLOGY AND MANAGEMENT

(AUTONOMOUS)

1. Hofmann-Wellenhof, B., Lichtenegger, H., Collins, J., “Global Positioning System Theory and Practice,” 1st Edition, Springer, Verlag Wien, 2001.
2. Bhatta, B., “Global Navigation Satellite Systems: Insights Into GPS, Glonass, Galileo, Compass, and Others,” 2nd Edition, BS Publications, 2010.
3. Grewal, M. S., Weill, L. R., Andrews, A. P., “Global Positioning Systems, Inertial Navigation, and Integration,” 1st Edition, John Wiley & Sons, New York, 2010.