BACHELOR OF TECHNOLOGY

Electronics & Communication Engineering

COURSE STRUCTURE& SYLLABUS

(Batches admitted from the Academic Year 2022 - 2023)

DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING

MALLA REDDY ENGINEERING COLLEGE FOR WOMEN

(Autonomous Institution-UGC, Govt. of India)

Accredited by NBA & NAAC with 'A' Grade

NIRF Indian Ranking, Accepted by MHRD, Govt. of India | Rank Band – Excellent by ARIIA, Accepted by MHRD, Govt. of India

Approved by AICTE, Affiliated to JNTUH, ISO9001:2015 Certified Institution

Platinum Rated by AICTE-CII Survey, AAAA+ Rated by Digital Learning Magazine, AAA+ Rated by Careers 360, National Ranking-Top 100 Rank band by Outlook Magazine, 2nd Rank by CSR, National Ranking-Top 100 Rank band by Times News Magazine, 141 Rank by India Today-Best Engineering Colleges of India Rankings-2020.

Maisammaguda, Dhulapally, Secunderabad, Kompally-500100.

1.1 Institute Vision and Mission

Vision

- Visualizing a great future for the intelligentsia by imparting state-of the art Technologies in the field of Engineering and Technology for the bright future and prosperity of the students
- To offer world class training to the promising Engineers

Mission

- To nurture high level of Decency, Dignity and Discipline in women to attain high intellectual abilities.
- To produce employable students at National and International levels by effective training programmes.
- To create pleasant academic environment for generating high level learning attitudes

Department Vision and Mission

Vision

- To establish the Department of Electronics and Communication Engineering as a center of excellence, nurturing a culture of innovation, continuous learning and research.
- To impart students with a strong foundation in technical knowledge, practical skills, analytical thinking, and problem-solving abilities., empowering them to contribute to technological advancements and enhance the quality of life in society

Mission

- To create an academic environment that empowers students with strong technical knowledge and critical thinking abilities essential for success in the field of electronics and communication engineering.
- To inculcate a culture of innovation and research, enabling our graduates to effectively contribute to technological advancements and meet the constantly changing demands of industry and society.
- To Impart technical education with a strong emphasis on dignity, decency, and discipline to develop professional engineers who are both technically competent and socially responsible.

1.2 PROGRAM EDUCATIONAL OBJECTIVES (PEOs) (5)

PEO1 - Professional Development

To equip students with the ability to acquire knowledge of Mathematics, Science, Engineering, and Technology, applying it professionally within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability, while upholding ethical responsibility.

PEO 2:Core Proficiency

To enable students to identify, formulate, comprehend, analyze, design, and solve engineering problems through hands-on experience in various technologies, utilizing modern tools essential for engineering practice and research to meet the needs of society and industry.

PEO 3: Technical Accomplishments

To equip students with the ability to design, simulate experiment, analyze, optimize, and interpret core applications, harnessing their creativity and innovation through multidisciplinary concepts and contemporary learning to develop them as professional engineers.

PEO4 – Professionalism

To provide training, exposure and awareness on importance of soft skills for better career and holistic personality development as well as professional attitude towards ethical issues, team work, responsibility, accountability, multidisciplinary approach and capability to relate engineering issues to broader social context.

PEO5 - Learning Environment

To provide students with an academic environment and make them aware of excellence, develop the urge of discovery, creativity, inventiveness and the life-long learning to become a successful professional in Electronics and Communication Engineering.

1.3 PROGRAM SPECIFIC OBJECTIVES (PEOs) (3)

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PSO1

The ability to analyze, design and implement application specific electronic system for complex engineering problems for analog, digital domain, communications and signal processing applications by applying the knowledge of basic sciences, engineering mathematics and engineering fundamentals.

PSO2

The ability to adapt for rapid changes in tools and technology with an understanding of societal and ecological issues relevant to professional engineering practice through life-long learning

PSO3

Excellent adaptability to function in multi-disciplinary work environment, good interpersonal skills as a leader in a team in appreciation of professional ethics and societal responsibilities.

COURSE STRUCTURE

I Year B. Tech – I Semester (I Semester)

S.NO	SUBJECT CODE	SUBJECT	L	T	P	C	Max. Marks	
							INT	EXT
1	2200BS01	Linear Algebra and Differential Equations	3	1	-	4	40	60
2	2205ES01	Programming for Problem Solving	3	1	-	4	40	60
3	2200BS05	Applied Physics	3	-	-	3	40	60
4	2203ES01	Computer Aided Engineering Graphics	1	-	4	3	40	60
5	2200HS01	English	1	-	3	2.5	40	60
6	2200BS61	Applied Physics Lab	-	-	3	1.5	40	60
7	2200HS61	English Language & Communication Skills Lab	-	-	2	1	40	60
8	2205ES61	Programming for Problem Solving Lab	-	-	2	1	40	60
9	2200MC02	Foreign Language: French	2	--	-	-	100	-
10		Induction Programme	-	-	-	-	-	-
		TOTAL	**14**	**2**	**14**	**20**	**420**	**480**

***Mandatory course: Non-credit course, 50% of scoring is required for the award of the degree**

I Year B. Tech – II Semester (II Semester)

S.NO	SUBJECT CODE	SUBJECT	L	T	P	C	Max. Marks	
							INT	EXT
1	2200BS02	Advanced Calculus	3	1	-	4	40	60
2	2205ES02	Python Programming	3	-	-	3	40	60
3	2202ES01	Basic Electrical Engineering	3	1	-	4	40	60
4	2200BS06	Engineering Chemistry	3	-	-	3	40	60
5	2203ES61	Engineering Workshop	1		3	2.5	40	60
6	2202ES61	Basic Electrical Engineering Lab	-	-	2	1	40	60
7	2205ES62	Python Programming Lab	-	-	3	1.5	40	60
8	2200BS62	Engineering Chemistry Lab	-	-	2	1	40	60
9	2200MC01	Environmental science	1	-	-	-	100	-
		TOTAL	**14**	**2**	**10**	**20**	420	480

***Mandatory course: Non-credit course, 50% of scoring is required for the award of the degree**

II Year B. Tech – I Semester (III Semester)

S.NO	SUBJECT CODE	SUBJECT	L	T	P	C	Max. Marks	
							INT	EXT
1	2204PC01	Probability Theory & Stochastic Process	3	1	-	4	40	60
2	2204PC02	Electronic Devices & Circuits	3	-	-	3	40	60
3	2204PC03	Signals & Systems	3	-	-	3	40	60
4	2204PC04	Network Analysis	3	-	-	3	40	60
5	2205ES03	Computer Organization & Operating Systems	3	-	-	3	40	60
6	2204PC61	Electronic Devices & Circuits Lab	-	-	3	1.5	40	60
7	2204PC62	Basic Simulation Lab	-	-	3	1.5	40	60
8	2204PR01	Innovative Product Development -I			2	1	40	60
9*	2200MC03	Indian Constitution	2	-	-	-	100	-
		TOTAL	**17**	**1**	**8**	**20**	**420**	**480**

***Mandatory course: Non-credit course, 50% of scoring is required for the award of the Degree**

II Year B. Tech – II Semester (IV Semester)

S.NO	SUBJECT CODE	SUBJECT	L	T	P	C	Max. Marks	
							INT	EXT
1	2204PC05	Analog Circuits	3	-	-	3	40	60
2	2204PC06	Analog and Digital Communications	3	-	-	3	40	60
3	2204PC07	Control Systems	3	-	-	3	40	60
4	2200BS03	Complex Variables and Transform Technique	3	1	-	4	40	60
5	2200HS03	Managerial Economics & Financial Analysis	3	-	-	3	40	60
6	2204PC63	Analog Circuits Lab	-	-	3	1.5	40	60
7	2204PC64	Analog & Digital Communication Lab	-	-	3	1.5	40	60
8	2204PR02	Innovative Product Development -II			2	1	40	60
9*	2200MC04	Human Values and Professional Ethics	2	-	-	-	100	-
		TOTAL	**17**	**1**	**8**	**20**	**420**	**480**

***Mandatory course: Non-credit course, 50% of scoring is required for the award of the Degree**

III Year B. Tech – I Semester (V Semester)

S.NO	SUBJECT CODE	SUBJECT	L	T	P	C	Max. Marks	
							INT	EXT
1	2204PC08	Digital Logic Design	3	-	-	4	40	60
2	2204PC09	Electromagnetic Waves	3	-	-	3	40	60
3		**Professional Elective -I**						
	2204PE01	Artificial Intelligence and Machine Learning	3	-	-	3	40	60
	2204PE02	FPGA Based System Design						
	2204PE03	Speech Processing						
	2204PE04	Advanced Computer Architecture						
	2204PE05	Information Theory Coding						
	2204PE06	Electronic Measurement & Instrumentation						
4		**Professional Elective -II**						
	2204PE07	Deep Learning	3	-	-	3	40	60
	2204PE08	CMOS Analog & Digital Design						
	2204PE09	Digital Image Processing						
	2204PE10	Digital Control Systems						
	2204PE11	Mobile Communications						
	2204PE12	Consumer Electronics						
5		**Open Elective -I**	3	-	-	3	40	60
6	2200HS05	Design Thinking	-	-	2	1	40	60
7	2204PC65	Digital Logic Design Through Verilog / VHDL	-	-	3	1.5	40	60
8	2204PC66	Electromagnetic Waves Lab	-	-	3	1.5	40	60
9	2204PR03	Innovative Product Development -III	-	-	2	1	40	60
10	2200MC06	Technical Communication& Soft skills	2	-	-	-	100	-
		TOTAL	**17**	**1**	**8**	**20**	420	480

III Year B. Tech – II Semester (VI Semester)

S.NO	SUBJECT CODE	SUBJECT	L	T	P	C	Max. Marks	
							INT	EXT
1	2200HS02	Professional English	3	-	-	3	40	60
2	2204PC10	Digital Signal Processing	3	1	-	4	40	60
3	2204PC11	Linear & Digital IC Applications	3	-	-	3	40	60
4		**Professional Elective -III**	3	-	-	3	40	60
	2204PE13	Large Language Model	3	-	-	3	40	60
	2204PE14	VLSI Design						
	2204PE15	Digital Video Signal Processing						
	2204PE16	IoT Architecture						
	2204PE17	Satellite Communications						
	2204PE18	Biomedical Electronics						
5		**Open Elective -II**	3	-	-	3	40	60
6	2204PC67	Digital Signal Processing Lab	-	-	3	1.5	40	60
7	2204PC68	Linear & Digital IC Applications Lab	-	-	3	1.5	40	60
8	2204PR04	Innovative Product Development -IV			2	1	40	60
9	2200MC05	Indian Traditional Knowledge	2	-	-	-	100	-
		TOTAL	**17**	**1**	**8**	**20**	**420**	**480**

IV Year B. Tech – I Semester (VII Semester)

S.NO	SUBJECT CODE	SUBJECT	L	T	P	C	Max. Marks	
							INT	EXT
1	2200HS04	Fundamentals of Management and Entrepreneurship	3	-	-	3	40	60
2	2204PC12	Computer Networks	3	-	-	3	40	60
3	2204PC13	Microprocessors & Microcontrollers	3	-	-	3	40	60
4		**Professional Elective -IV**						
	2204PE19	Natural Language Processing	3	-	-	3	40	60
	2204PE20	CMOS Mixed Signal Design						
	2204PE21	Pattern Recognition						
	2204PE22	Antenna & Wave Propagation						
	2204PE23	Hardware and Software Co-design						
	2204PE24	High Speed Electronics						
5		**Open Elective -III**	3	-	-	3	40	60
6	2204PC69	Computer Networks Lab	-	-	3	1	40	60
7	2204PC70	Microprocessors & Microcontrollers Lab	-	-	3	1	40	60
8	2204PR05	Innovative Product Development -V			2	1	40	60
9	2204PR06	Industry Oriented Mini Project /Internship	-	-	2	1	40	60
10	2204PR07	Research Project -I	-	-	2	1	40	60
11	2200MC07*	Research Methodology and IPR	2	-	-	-	100	-
		TOTAL	**17**	**-**	**14**	**20**	**500**	**600**

IV Year B. Tech – II Semester (VIII Semester)

S.NO	SUBJECT CODE	SUBJECT	L	T	P	C	Max. Marks	
							INT	EXT
1		**Professional Elective -V**						
	2204PE25	Quantum Computing	3	-	-	3	40	60
	2204PE26	Low Power VLSI Design						
	2204PE27	Computer Vision						
	2204PE28	5G Communication						
	2204PE29	Embedded System Design						
	2204PE30	Automotive Electronics						
2		**Professional Elective -VI**						
	2204PE31	Cognitive Computing	3	-	-	3	40	60
	2204PE32	ASIC Design						
	2204PE33	DSP Processors and Architectures						
	2204PE34	Wireless Sensor Networks						
	2204PE35	Cryptography and Network Security						
	2204PE36	Nano Electronics						
3		**Open Elective –IV**	3	-	-	3	40	60
4	2204PR08	Technical Seminar	-	-	4	2	100	-
5	2204PR09	Innovation- Start-Up & Entrepreneurship	-	-	6	3	50	100
6	2204PR10	Research Project – II	-	-	12	6	50	100
7	2200MC08*	Gender Sensitization	2	-	-	-	100	-
		TOTAL	**9**	**-**	**14**	**20**	**320**	**380**

Semester	**I-I**	**I-II**	**II-I**	**II-II**	**III-I**	**III-II**	**IV-I**	**IV-II**	**TOTAL**
Credits	**20**	**20**	**20**	**20**	**20**	**20**	**20**	**20**	**160**

TOTAL Credits: 160

PROFESSIONAL ELECTIVES					
Professional Elective-I		**Professional Elective -II**		**Professional Elective -III**	
2204PE01	Artificial Intelligence and Machine Learning	2204PE07	Deep Learning	2204PE13	Large Language Model
2204PE02	FPGA Based System Design	2204PE08	CMOS Analog & Digital Design	2204PE14	VLSI Design
2204PE03	Speech Processing	2204PE09	Digital Image Processing	2204PE15	Digital Video Signal Processing
2204PE04	Advanced Computer Architecture	2204PE10	Digital Control Systems	2204PE16	IoT Architecture
2204PE05	Information Theory Coding	2204PE11	Mobile Communications	2204PE17	Satellite Communications
2204PE06	Electronic Measurement & Instrumentation	2204PE12	Consumer Electronics	2204PE18	Biomedical Electronics
Professional Elective -IV		**Professional Elective -V**		**Professional Elective -VI**	
2204PE19	Natural Language Processing	2204PE25	Quantum Computing	2204PE31	Cognitive Computing
2204PE20	CMOS Mixed Signal Design	2204PE26	Low Power VLSI Design	2204PE32	ASIC Design
2204PE21	Pattern Recognition	2204PE27	Computer Vision	2204PE33	DSP Processors and Architectures
2204PE22	Antenna & Wave Propagation	2204PE28	5G Communication	2204PE34	Wireless Sensor Networks
2204PE23	Hardware and Software Co-design	2204PE29	Embedded System Design	2204PE35	Cryptography and Network Security
2204PE24	High Speed Electronics	2204PE30	Automotive Electronics	2204PE36	Nano Electronics

List of Open Electives offered by E.C.E Departments for other Dept.
B.Tech. III & IV Year

Department	Open Elective-I	Open Elective-II	Open Elective-III	Open Elective-IV
CSE	1.Fundamentals of DBMS (2205OE01) 2. Computer Organization &Operating Systems (2205OE02)	1. Data Structures (2205OE03) 2.Advanced Compiler Design (2205OE04)	1. Java Programming (2205OE05) 2. Case Tools & Software Testing(2205OE06)	1. Data and Knowledge Mining(2205OE07) 2. Full StackWeb Application Development (2205OE08)
IT	1. AdvancedComputer Architecture(2212OE01) 2. Advanced Operating Systems(2212OE02)	1. Embedded Systems (2212OE03) 2. Scripting Languages (2212OE04)	1. Advanced Computer Networks (2212OE05) 2. Advanced Algorithms (2212OE06)	1.Computational Complexity (2212OE07) 2.Robotic Process Automation(2212OE08)
AIML	1. Knowledge representation andReasoning (2266OE01) 2. Neural Networks (2266OE02)	1. Advanced Artificial Intelligence (2266OE03) 2. Reinforcement Learning (2266OE04)	1. Deep Learning Using Python (2266OE05) 2. Edge Analytics (2266OE06)	1. Cognitive computing & Applications(2266OE07) 2. Quantum Computing (2266OE08)
DS	1. Computer Oriented Statistical Methods (2267OE01) 2.Data Visualization Techniques (2267OE02)	1. Data Wrangling using Python (2267OE03) 2.Data Science Tools (2267OE04)	1.Big Data Architecture(2267OE05) 2. Data Science Applications (2267OE06)	1. Business Analytics (2267OE07) 2. Big Data Management(2267OE08)
CS	1.Ethical hacking(2262OE01) 2. Cyber security essentials(2262OE02)	1. Cloud Security Essentials(2262OE03) 2. Vulnerability assessment and penetration testing (2262OE04)	1. Social media security (2262OE05) 2. Authorization and Authentication (2262OE06)	1. Cyber Security and laws(2262OE08) 2. Security incidentand response management (2262OE07)
ECE	1.Principles of Electronics Communication(2204OE01) 2. Computer Organization (2204OE02) 3. Signals and Systems (2204OE03)	1.Principles of Computer Communication and Networks (2204OE04) 2. Computer Architectures (2204OE05) 3. Image and Video Processing(2204OE06)	1. Cellular Mobile Communication (2204OE07) 2. Embedded System Design(2204OE08) 3. Pattern Recognition(2204OE09)	1. 5G Technology (2204OE10) 2. RTOS and System Programming (2204OE11) 3. Computer Vision (2204OE12)

I - YEAR SYLLABUS

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(2200BS01) LINEAR ALGEBRA AND DIFFERENTIAL EQUATIONS

B.TECH I YEAR I SEMESTER **L/ T/ P/ C**
3 1 0 4

Course Objectives : To learn

- 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.
- Methods of solving the linear differential equations of first order, equations solvable for p, y and x.
- Methods of solving the linear differential equations of higher order.
- Partial differentiation, concept of total derivative, finding maxima and minima of function of two and three variables.

Course Outcomes:

After learning the contents of this paper, the student must be able to

- Identify and classify different types of matrices, determine the rank and inverse of non-singular matricesand solve systems of linear equations using various methods.
- Evaluate the Eigen values and Eigenvectors and reduce the quadratic form to canonical form using orthogonal
- transformations.
- Identify whether the given differential equationof first order is exact or not and solve the first order differential equations.
- Solve higher differential equation and apply the concept of differential equation to real world problems.
- Define partial derivative, total derivative, functional dependence, compute them for functions of multiple variables.
- Find the extreme values of functions of two variables with/ without constraints.

UNIT-I:

Matrices: Types of Matrices, Symmetric; Skew-symmetric; Hermitian; Skew-Hermitian; Orthogonal matrices; Unitary Matrices; Rank of a matrix by Echelon form and 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.

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 powers of a matrix by Cayley-Hamilton Theorem; Linear Transformation and Orthogonal Transformation; Quadratic forms and

Nature of the Quadratic Forms; Reduction of Quadratic form to Canonical form by Orthogonal Transformation.

UNIT-III:

First Order ODE: Exact, Linear and Bernoulli's equations; Newton's law of cooling, Law of Natural Growth and Decay; Equations not of first degree: Equations solvable for p, y and x, Clairaut's type.

UNIT-IV:

Ordinary Differential Equations of Higher Order: Second order linear differential equations with constant coefficients: Non-Homogeneous terms of the type e^{ax}, *sin ax, cos ax*, polynomials in x, $e^{ax}V(x)$ and $x\,V(x)$, Method of Variation of Parameters.

UNIT-V:

Multivariable Calculus: Definitions of Limit and Continuity. 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's multipliers.

TEXTBOOKS:

1. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 36th Edition, 2010.
2. R. K. Jain and S.R.K. Iyengar, Advanced Engineering Mathematics, Narosa Pubishers, 4th Edition, 2014.

REFERENCES:

1. Michael Greenberg, Advanced Engineering Mathematics, Pearson Education, 2nd Edition, 1998.
2. Erwin Kreyszig, Advanced Engineering Mathematics, John Wiley & Sons,
3. Ramana B.V., Higher Engineering Mathematics, Tata McGraw Hill New Delhi, 11th Reprint, 2017.

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(2205ES01) PROGRAMMING FOR PROBLEM SOLVING

B.TECH I YEAR I SEMESTER **L /T/ P/ C**

3/ 0/ 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: The student will learn

- Differentiate between primary components of a computer system and an Understanding on algorithms designing.
- Transform structured algorithms and flowcharts to solve problems and construct program solutions
- Apply control structures and looping to design logical flows and demonstrate usage of arrays and strings for efficient data manipulation.
- Implement functions to develop reusable code and evaluate the impact of storage classes and scope on program behavior.
- Analyze and utilize data structures and pointers to create modular and memory-efficient code.
- Construct file handling operations and compare basic searching and sorting algorithms

UNIT I:

Introduction: Introduction to components of a computer system: disks, primary and secondary memory, processor, operating system, compilers, creating, compiling and executing a program etc., Number systems.

Introduction to Algorithms: steps to solve logical and numerical problems. Representation of Algorithm, Flowchart/Pseudo code with examples, Program design and structured programming. Introduction to C Programming Language:

Structure of a C program, Identifiers, variables (with data types and space requirements), Syntax and Logical Errors in compilation, object and executable code, Operators- Arithmetic operators, relational and logical operators, increment and decrement operators, Bitwise operators, conditional operator, assignment operator, expressions and precedence, Expression evaluation, type conversion, typedef, The main method and command line arguments.

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

UNIT II:

Conditional Branching and Loops: Writing and evaluation of conditionals and consequent branching with if, if-else, switch-case, ternary operator, goto, Iteration with for, while, do while loops

Arrays: one and two dimensional arrays, creating, accessing and manipulating elements of arrays.

Strings: Introduction to strings, handling strings as array of characters, basic string functions available in C (strlen, strcat, strcpy, strstr etc.), arrays of strings

UNIT – III

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, passing pointers to functions, idea of call by reference, Some C standard functions and libraries, Passing 1-D arrays, 2-D arrays to functions

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

Storage Classes - extern, auto, register, static, scope rules, block structure.

UNIT IV:

Structures: Defining structures, initializing structures, unions, Array of structures

Pointers: Idea of pointers, Defining pointers, Pointers to Arrays and Structures, pointers to pointers ,Use of Pointers in self-referential structures, usage of self referential structures in linked list (no implementation) Enumeration data type and bit-fields.

Dynamic Memory Management functions, Preprocessing Directives, Preprocessor: Commonly used Preprocessor commands like include, define, undef, if, ifdef, ifndef .

UNIT – V

File Handling: Files: Text and Binary files, Creating and Reading and writing text and binary files, Appending data to existing files, Writing and reading structures using binary files, Random access using fseek, ftell and rewind functions

Introduction to Algorithms: Algorithms for finding roots of quadratic equations, finding minimum and maximum numbers of a given set, finding if a number is prime number, etc. Basic searching in an array of elements (linear and binary search techniques), Basic algorithms to sort array of elements (Bubble, Insertion and Selection sort algorithms), Basic concept of order of complexity through the example programs

Text Books:

1. Computer Science: A Structured Programming Approach Using C, B. A. ForouzanandR. F.Gilberg, Third Edition, Cengage Learning.

2. Programming in C. P. Dey and M Ghosh , Second Edition, Oxford University Press.

Reference Books:

1. The C Programming Language, B.W. Kernighan and Dennis M. Ritchie, Second Edition,Pearson education.

2. Programming with C, B. Gottfried, 3rd edition, Schaum's outlines, McGraw Hill Education(India) PvtLtd.

3. C From Theory to Practice, G S. Tselikis and N D. Tselikas,CRCPress.Basic computation and Programming with C, Subrata Saha and S. Mukherjee, Cambridge

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(2200BS06) APPLIED PHYSICS

B.TECH I YEAR I SEMESTER **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.
- 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: Upon graduation:

- Understand the fundamental concepts of black body radiation, quantum physics and Quantum behavior of matter in its atomic and subatomic state.
- Classify the energy bands of semiconductors, interpret the direct and indirect band gap semiconductors, identify the type of semiconductor using Hall Effect and identify the applications of semiconductors in electronic devices
- Classify different optoelectronic devices and their applications in modern technology
- Understand the basic concepts of LASER light Sources, identifies the engineering applications of lasers, classify optical fibres based on refractive index profile and mode of propagation and identify the applications of optical fibers in various fields.
- Analyze characterization and study of properties of material help the students to prepare new materials for various engineering applications.
- Exposed to the phenomena of electromagnetism and also to have exposure on magnetic materials and dielectric materials.

UNIT-I: Quantum Mechanics:

Introduction to quantum physics, Black body radiation, Photoelectric effect, Compton effect experiment and Compton shift, Wave-particle duality, de-Broglie's hypothesis, Davisson and Germer experiment, Heisenberg's Uncertainty principle, physical significance of Wave function (ψ), Schrodinger's time independent wave equation, Particle in one dimensional box.

UNIT-II: Semiconductor Physics:

Intrinsic and Extrinsic semiconductors, Fermi level in intrinsic and extrinsic semiconductors, calculation of carrier concentration in intrinsic and extrinsic semiconductors, Carrier generation and recombination, Carrier transport: diffusion and drift, Hall effect: determination of Hall coefficient and experiment, Hall voltage, direct and indirect band gap semiconductors, p-n junction diode: energy band diagram for open and closed circuits, Zener diode and its V-I Characteristics and applications.

UNIT-III: Optoelectronics:

Radiative and non-radiative recombination mechanisms in semiconductors, Types of luminescence: Electro luminescence and Photo luminescence, LED: Device structure, Materials, Characteristics and figures of merit, Semiconductor photo detectors: Solar cell: working principle, structure, Materials, PIN and Avalanche photo detectors: working principle, structure, Materials, and Characteristics and applications.

UNIT-IV: Lasers and Optical fibers:

Lasers: Characteristics of Lasers, interaction of radiation with matter: stimulated absorption, spontaneous and stimulated emission, Einstein's relations, Principle and working of Laser: Population inversion, Pumping mechanisms, Types of Lasers: Ruby laser, He-Ne laser, Semiconductor lasers, Applications of laser. Fiber Optics: Introduction to Optical fiber, Optical fiber as a dielectric wave guide, Total internal reflection, Acceptance angle, Acceptance cone and Numerical aperture, mode and transmission of signal through Step and Graded index fibers, Losses associated with optical fibers, Applications of optical fibers in communication system (block diagram) and in other fields.

UNIT-V: Dielectric and Magnetic Properties of Materials:

Electric dipole, dipole moment, dielectric constant, polarizability, electric displacement, electric susceptibility, types of polarization: electronic, ionic and orientation (qualitative) polarizations, calculation of polarizabilities of electronic and ionic polarization, Internal fields in a solid, Clausius-Mossotti equation, Ferroelectrics, Piezo electrics and Pyro electrics, Applications of dielectrics, Magnetization, field intensity, magnetic field induction, permeability and susceptibility, Bohr magneton, Classification of magnetic materials on the basis of magnetic moment, explanation of hysteresis curve based on domain theory, soft and hard magnetic materials, applications of 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
4. "Semiconductor Physics and Devices", Mc Graw Hill, 4th Edition by Donald Neamen
5. Introduction to Solid State Physics by Charles kittel, wiley student edition.
6. S.M.Sze, Semiconductor Devices: Physics and Technology, wiley (2008).

MALLA REDDY ENGINEERING COLLEGE FOR WOMEN
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(2203ES01) COMPUTER AIDED ENGINEERING GRAPHICS

B.TECH I YEAR I SEMESTER **L/T/ P/ C**
1/ 0/ 4/ 3

Course Objectives:

- To enable the students with various concepts like Dimensioning, Conventions and standards related to working drawing in order to become professionally efficient and to introduce fundamental concepts of curves used in engineering,
- Students are capable to understand the Orthographic Projections of Points and Lines and are able to improve their visualization skills so that they can apply these skills in developing the new products.
- Understands and becomes efficient in applying the concept of Orthographic Projections of Points, Lines and Planes in industrial applications
- Can employ freehand 3D pictorial sketching to aid in the visualization process and to efficiently communicate ideas graphically.
- Analyze a drawing and can efficiently communicate ideas graphically and Draw the 3D views using CAD.

Course Outcomes:

- Demonstrate proficiency in using AutoCAD software to create, edit, and manipulate 2D engineering drawings..
- Apply the concepts of engineering drawing for sketching conic sections and cycloids
- Analyze position of points and lines for representing their orthographic projections..
- Sketch orthographic projections of planes and solids to analyze their different orientations.
- Apply the principle of projections for sketching the isometric views.
- Interpret the given orthographic projections to convert isometric view and vice versa

UNIT-I:

Introduction to AutoCAD Software:

The Menu System, Toolbars (Standard, Object Properties, Draw, Modify and Dimension), Drawing Area (Background, Crosshairs, Coordinate System), Dialog boxes and windows, Shortcut menus (Button Bars), The Command Line, The Status Bar, Different methods of zoom as used in CAD, Select and erase objects.

Introduction to Engineering Drawing:

Principles of Engineering drawing and their significance, Conventions, Drawing Instruments

Engineering Curves: Construction of Ellipse, Parabola and Hyperbola – General and Special methods; Cycloidal curves- Epicycloids and Hypocycloids.

UNIT-II:

Orthographic Projections, Projections of Points & Straight Lines: Principles of Orthographic Projections – Conventions; Projections of Points in all positions; Projections of lines Parallel to one Plane and Perpendicular to other Plane and Vice-versa - Inclined to one Plane and Parallel to other Plane and Vice-versa - Surface inclined to both the Planes.

UNIT-III:

Projections of Planes: Projections of Planes- Surface Parallel to one Plane and Perpendicular to other Plane and Vice-versa – Surface Inclined to one Plane and Parallel to other Plane and Vice-versa - Surface Inclined to both the Planes.

UNIT-IV:

Projections of Regular Solids: Projections of Regular Solids-Parallel to one Plane and Perpendicular to other Plane and vice-versa- inclined to one Plane and Parallel to other Plane and vice-versa- Inclinedto both the Planes– Prisms, Pyramids, Cylinder and Cone.

UNIT-V:

Isometric Projections: Principles of Isometric projection – Isometric Scale, Isometric Views,Conventions; Isometric Views of lines, Planes, Simple and Compound Solids
Conversion of Isometric Views to Orthographic Views and Vice-versa, Conventions
Introduction to Solid Modeling: Creation of simple solid models relevant to the domain.

TEXT BOOKS

1. Engineering Drawing, N.D. Bhatt – N.D. Bhatt & V.M Panchal, 48th Edition, 2005 CharotarPublishing House, and Gujarat.
2. "Computer Aided Engineering Drawing"by Dr. M H Annaiah, Dr C N Chandrappa and Dr B Sudheer Premkumar Fifth edition, New Age International Publishers.
3. Engineering Drawing by K.Venu Gopal& V.Prabu Raja New Age Publications.

REFERENCES

1. Engineering drawing – P.J. Shah .S.Chand Publishers.
2. Engineering Drawing / Basant Agarwal and McAgarwal / McGraw Hill
3. Engineering Drawing- Johle/Tata Macgraw Hill Book Publisher.
4. Computer Aided Engineering Drawing – S. Trymbaka Murthy, - I.K. International Publishing House Pvt. Ltd., New Delhi, 3rd revised edition-2006.

MALLA REDDY ENGINEERING COLLEGE FOR WOMEN
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(2200HS01) ENGLISH

B.TECH I YEAR I SEMESTER **L/ T/ P/ C**
2/ 0/ 0/ 2

INTRODUCTION

In view of the growing importance of English as a tool for global communication and the consequent emphasis on training students to acquire language skills, the syllabus of English has been designed to develop linguistic, communicative and critical thinking competencies of Engineering students.

In English classes, the focus should be on the skills development in the areas of vocabulary, grammar, reading and writing. For this, the teachers should use the prescribed text for detailed study. The students should be encouraged to read the texts leading to reading comprehension and different passages may be given for practice in the class. The time should be utilized for working out the exercises given after each excerpt, and also for supplementing the exercises with authentic materials of a similar kind, for example, newspaper articles, advertisements, promotional material etc. The focus in this syllabus is on skill development, fostering ideas and practice of language skills in various contexts and cultures.

Course Objectives: The course will help to:

- Improve the language proficiency of students in English with an emphasis on Vocabulary, Grammar, Reading and Writing skills.
- To enhance competencies in writing essays and gist of the passage in words.
- Equip students to study academic subjects more effectively and critically using the theoretical and practical components of English syllabus.
- Develop study skills and communication skills in formal and informal situations.

Course Outcomes: Students should be able to:

- Use English Language effectively in spoken and written forms.
- Comprehend the given texts and respond appropriately.
- Communicate confidently in various contexts and different cultures
- The students will be able to understand meaning of words, phrases and sentences in context.
- Acquire basic proficiency in English including reading and listening,
- Understand and express simple narratives, descriptions and day to day conversations.

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: Identifying Common Errors in Writing with Reference to 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 ofProper Punctuation- Techniques for writing precisely – Paragraph writing – Types, Structures and Features of a Paragraph - Creating Coherence-Organizing Principles of Paragraphs in documents.

UNIT –II

'Ancient Architecture in India' from the prescribed textbook 'English for Engineers' published by Cambridge University Press.

Vocabulary: Homonyms, Homophones and Homographs. 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 Noun-pronoun Agreement andSubject- 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 ofRequisition, Job Application with Resume.

UNIT –III

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

Vocabulary: Synonyms and Antonyms

Grammar: Identifying Common Errors in Writing with Reference to Misplaced Modifiers and Tenses and **Question Tags.**

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, E-mail writing and practices.

UNIT –IV

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

Vocabulary: Idioms and phrases, **Phrasal Verbs** and One-word substitutions.

Grammar: Active voice and Passive voice- 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.

UNIT –V

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

Vocabulary: Standard Abbreviations in English and Technical Vocabulary and their usage.

Grammar: Reported speech and Common Errors in English.

Reading: Reading Comprehension-Exercises for practice.

Writing: Report writing - Introduction – Characteristics of a Report – Categories of Reports, Formats- Structure of Reports (Manuscript Format) -Types of Reports - Writing aReport.

Prescribed Text book:

1. **Sudarshana, N.P. and Savitha, C. (2018). English for Engineers. Cambridge UniversityPress.**

References:

1. Swan, M. (2016). Practical English Usage. Oxford University Press.
2. Kumar, S and Lata, P.(2018). Communication Skills. Oxford University Press.
3. Wood, F.T. (2007).Remedial English Grammar.Macmillan.
4. Zinsser, William. (2001). On Writing Well. Harper Resource Book.
5. Hamp-Lyons, L. (2006).Study Writing. Cambridge University Press.
6. Exercises in Spoken English. Parts I –III. CIEFL, Hyderabad. Oxford University Press.

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(2200BS61) APPLIED PHYSICS LAB

B.TECH I YEAR I SEMESTER. **L/ T/ P/ C**
0/ 0/ 3/ 1.5

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 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: Upon graduation

- Understand the fundamental concepts of black body radiation, quantum physics and Quantum behavior of matter in its atomic and subatomic state.
- Classify the energy bands of semiconductors, interpret the direct and indirect band gap semiconductors, identify the type of semiconductor using Hall Effect and identify the applications of semiconductors in electronic devices
- Classify different optoelectronic devices and their applications in modern technology
- Understand the basic concepts of LASER light Sources, identifies the engineering applications of lasers, classify optical fibres based on refractive index profile and mode of propagation and identify the applications of optical fibers in various fields.
- Analyze characterization and study of properties of material help the students to prepare new materials for various engineering applications.
- Exposed to the phenomena of electromagnetism and also to have exposure on magnetic materials and dielectric materials

.List of Experiments

Note: Any 8 Experiments to be performed

1. **Energy gap of a PN junction diode**

   To determine the energy band gap of a semiconductor p-n junction diode

2. **Solar Cell**

   To study the Characteristics of a given Solar Cell

3. **Light Emitting Diode**

To study the V-I characteristics of a Light Emitting Diode

4. Stewart and Gee's Experiment

To determine the magnetic induction at the center and at several points on the axis of a circular coil

5. HALL Effect Experiment

Determination of hall coefficient and Hall voltage

To calculate the Hall coefficient and the carrier concentration of the sample material.

6. Photoelectric Effect

To determine the work function of a given material.

7. LASER

To study the characteristics of LASER diode Sources.

8. A) Optical Fiber Numerical Aperture

To determine the numerical Aperture (NA) of the given optical fiber

B) Optical Fiber Bending Loss

To determine the loss caused in optical fibers in dB due to macro bending of the fiber

9. A) LCR series Circuit

To study the frequency response of LCR series circuits and to determine the Resonant Frequency.

B) LCR Parallel Circuit

To study the frequency response of LCR parallel circuits and to determine the Resonant Frequency.

10. R-C Circuit

To determine the time constant of the given RC circuit

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(2200HS61) ENGLISH LANGUAGE AND COMMUNICATION SKILLS LAB

B.TECH I YEAR I SEMESTER **L/ T/ P/ C**
0/ 0/ 2/ 1

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

Course Objectives:

- To facilitate computer-assisted multi-media instruction enabling individualized and independent language learning
- To sensitize students to the nuances of English speech sounds, word accent, intonation and rhythm
- To bring about a consistent accent and intelligibility in students' pronunciation of English by providing an opportunity for practice in speaking
- To improve the fluency of students in spoken English and neutralize their mother tongue influence
- To train students to use language appropriately for public speaking and interviews
- To foster better understanding of nuances of English language through audio- visual experience and group activities
- To inculcate neutralization of accent for intelligibility
- To enhance students' speaking skills with clarity and confidence which in turn enhances their employability skills

COURSE OUTCOMES:

- Understand the nuances of English language through audio- visual experience and group activities.
- Neutralize their accent for intelligibility
- Speak with clarity and confidence which in turn enhances their employability skills
- Acquire basic proficiency in LSRW skills, the main pillars of communication
- Expose students to a variety of self-instructional, learner-friendly modes of language learning
- Students will be able to strengthen their individual and collaborative work strategies

Syllabus

English Language and Communication Skills Lab (ELCS) shall have two parts:

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

Listening Skills

Objectives:

1. To enable students develop their listening skills so that they may appreciate its role in the LSRW skills approach to language and improve their pronunciation.

2. To 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:

1. To involve students in speaking activities in various contexts
2. To 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 Discussion – Group activities

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.

Exercises – 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 conversation.

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: Telephonic Etiquette, How to make Formal Presentations.
Practice: Formal Telephone conversation and Formal Presentations.

Exercise – IV

CALL Lab:
Understand: Consonant Clusters, Plural and Past tense Markers
Practice: Words often Misspelled – Confused/ Misused.

ICS Lab:
Understand: Public Speaking – Exposure to Structured Talks.
Practice: Making a Short Speech – Extempore.

Exercise – V

CALL Lab:
Understand: Listening for General and Specific Details.
Practice: Listening Comprehension Tests.

ICS Lab:
Understand: Group Discussion *and* Interview Skills.
Practice: Case study Group Discussions *and* Mock Interviews.

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Minimum Requirement of infrastructural facilities for ELCS Lab:

1. Computer Assisted Language Learning (CALL)Lab:

The Computer Assisted Language Learning Lab has to accommodate 40 students with 40 systems, with one Master Console, LAN facility and English language learning software for self- study by students.

System Requirement (Hardware component):

Computer network with LAN facility (minimum 40 systems with multimedia) with the following specifications:

i) Computers with Suitable Configuration
ii) High Fidelity Headphones

2. Interactive Communication Skills (ICS)Lab:

The Interactive Communication Skills Lab: A Spacious room with movable chairs and audio- visual aids with a Public-Address System, a LCD and a projector etc.

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(2205ES61) PROGRAMMING FOR PROBLEM SOLVING LAB

B.TECH I YEAR I SEMESTER **L/ T/ P/ C**
0/ 0/ 3/ 1.5

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 write programs using the Dynamic Memory Allocation concept.
- To create, read from and write to text and binary files

Course Outcomes: The candidate is expected to be able to:

- Formulate the algorithms and translate it to a working and correct program
- Identify and correct logical syntax errors encountered during execution
- Represent and manipulate data with arrays, strings and structures
- Use pointers of different types
- Create, read and write to and from simple text and binary files
- Modularize the code with functions so that they can be reused

Practice sessions:

1. Write a simple program that prints the results of all the operators available in C (including pre/ post increment, bitwise and/or/not, etc.). Read required operand values from standard input.
2. Write a simple program that converts one given data type to another using auto conversion and casting. Take the values form standard input.

Simple numeric problems:

a) Write a program for fiend the max and min from the three numbers.
b) Write the program for the simple, compound interest.
c) WriteprogramthatdeclaresClassawardedforagivenpercentageofmarks,wheremark <40%= Failed, 40% to <60% = Second class, 60% to <70%=First class, >= 70% = Distinction.Read percentage from standard input.
d) Write a program that prints a multiplication table for a given number and the number of rows in the table.

For example, for a number 5 and rows = 3, the output should be:
5 x 1 = 5

5 x 2=10
5 x 3=15

e) Write a program that shows the binary equivalent of a given positive number between 0 to 255.

Expression Evaluation:

i) A building has 10 floors with a floor height of 3 meters each. A ball is dropped from the top of the building. Find the time taken by the ball to reach each floor. (Use the formulas = ut+(1/2)at^2 where u and a are the initial velocity in m/sec (= 0) and acceleration in m/sec^2 (= 9.8m/s^2)).

ii) 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)

iii) Write a program that finds if a given number is a prime number

iv) Write a C program to find the sum of individual digits of a positive integer and test given number is palindrome.

v) 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.

vi) Write a C program to generate all the prime numbers between 1 and n, where n is a value supplied by the user.

vii) Write a C program to find the roots of a Quadratic equation.

viii) Write a C program to calculate the following, where x is a fractional value. 1-x/2 +x^2/4-x^3/6

ix) WriteaCprogramtoreadintwonumbers,xandn,andthencomputethesumofthis geometricprogression:1+x+x^2+x^3+..... +x^n.Forexample:ifnis3andxis5, then the program computes 1+5+25+125.

Arrays and Pointers and Functions:

a) Write a C program to find the minimum, maximum and average in an array of integers.

b) Write a functions to compute mean, variance, Standard Deviation, sorting of n elements in single dimension array.

c) Write a C program that uses functions to 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 C programs that use both recursive and non-recursive functions

To find the factorial of a given integer.

i) To find the GCD (greatest common divisor) of two given integers.

ii) To find x^n

e) Write a program for reading elements using pointer into array and display the values using array.

f) Write a program for display values reverse order from array using pointer.

g) Write a program through pointer variable to sum of n elements from array.

Strings

a) Write a C program to convert a Roman numeral ranging from I to L to its decimal equivalent.
b) Write a C program that converts a number ranging from 1 to 50 to Roman equivalent
c) Write a C program that uses functions to perform the following operations:
   - To insert a sub-string in to a given main string from a given position.
   - To delete n Characters from a given position in a given string.
d) Write a C program to determine if the given string is a palindrome or not (Spelled same in both directions with or without a meaning like madam, civic, noon, abcba,etc.)
e) Write a C program that displays the position of a character ch in the string S or – 1 if S doesn‘t contain ch.
f) Write a C program to count the lines, words and characters in a given text.

Structures & Unions:

a) Write a C program that uses functions to perform the following operations using Structure
   - Reading a complex number
   - Writing Complex Number
   - Addition of 2 Complex Numbers
   - Multiplication of two complex numbers
b) Write a C program to store information of 5 students using structures.
c) Write a C program to Access all structures members using pointer structure variable.
d) Write a C program to access members of union?

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 number of times a character occurs in a text file. The file name and the character are supplied as command line arguments.
d) Write a C program that does the following:
e) It should first create a binary file and store 10 integers, where the file name and 10 values aregiveninthecommandline.(hint:convertthestringsusingatoifunction)Nowthe program asks for an index and a value from the user and the value at that index should be changed to the new value in the file. (hint: use fseek function).The program should then read all 10 values and print them back.
f) Write a C program to merge two files into a third file (i.e., the contents of the firs t file

followed by those of the second are put in the third file).

Miscellaneous:

a. Write a menu driven C program that allows a user to enter n numbers and then choose between finding the smallest, largest, sum, or average. The menu and all the choices are to be functions. Use a switch statement to determine what action to take. Display an error message if an invalid choice is entered.
b. Write a C Program to construct a pyramid of numbers as follows:1

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

c. Write a C Program implement Student Data Base System Using Files &Structures.

Sorting and Searching:

a. Write a C program that uses non recursive function to search for a Key value in a given list of integers using linear search method.
b. Write a C program that uses non recursive function to search for a Key value in a given sorted list of integers using binary search method.
c. Write a C program that implements the Bubble sort method to sort a given list of integers in ascending order.
d. Write a C program that sorts the given array of integers using selection sort in descending order
e. Write a C program that sorts the given array of integers using insertion sort in ascending order
f. Write a C program that sorts a given array of names

Suggested Reference Books for solving the problems:

i. Byron Gottfried, Schaum's Outline of Programming with C, McGraw-Hill
ii. B.A. Forouzan and R.F. Gilberg C Programming and Data Structures, Cengage Learning, (3rd Edition)
iii. Brian W. Kernighan and Dennis M. Ritchie, The C Programming Language, Prentice Hall of India
iv. R.G. Dromey, How to solve it by Computer, Pearson(16thImpression)
v. Programming in C, Stephen G. Kochan, Fourth Edition, Pearson Education.
vi. Herbert Schildt, C: The Complete Reference, Mc Graw Hill,4thEdition

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(2200MC02) FRENCH LANGUAGE

B.TECH I YEAR I SEMESTER **L/ T/ P/ C**

2/ 0/ 0/ 0

Introduction:

In view of the growing importance of foreign languages as a communication tool in some countries of the world, French has been identified as one of the most popular languages after English. As a result, French program is introduced to develop the linguistic and communicative skills of engineering students and to familiarize them to the French communication skills. This course focuses on basic oral skills.

Course Objectives:

- To inculcate the basic knowledge of the French language.
- To hone the basic sentence constructions in day to day expressions for communication in their vocation.

Course Outcomes

- Students will be able to communicate in French at A1 level.
- Sentence construction in day to day expressions.
- Communicate confidently in various contexts and different cultures where French is an official language.
- The students will be able to understand meaning of words, phrases and sentences in context.
- Acquire basic proficiency in including reading and listening,
- Understand and express simple narratives, descriptions and day to day conversations.

UNIT - I:

Speaking: Introduction to the French language and culture – Salutations - French alphabet - Introducing people

Writing: Understand and fill out a form

Grammar: The verbs “to be ' and “to have " in the present tense of the indicative Vocabulary:The numbers from 1 to 20 - Professions - Nationalities

UNIT - II:

Speaking: Talk about one’s family – description of a person - express his tastes and preferences -express possession - express negation Writing:

Write and understand a short message

Grammar: Nouns (gender and number) - Articles - The –er verbs in the present – Possessive adjectives - Qualifying adjectives

Vocabulary: The family – Clothes - Colors - The numbers from 1 to 100 - The classroom

UNIT - III

Speaking: Talk about your daily activities - be in time - ask and indicate the date and time –talk about sports and recreation - express the frequency Writing: A letter to a friend

Grammar - The expression of time – Their verbs in the present - The verbs do, go, take, come, -Adverbs - Reflexive verbs

Vocabulary - The days and months of theyear-The sports -Hobbies

UNIT - IV

Speaking: Express the quantity - ask and give the price - express the need, the will and thecapacity - compare (adjective) - speak at the restaurant / in the shops

Writing: A dialogue between a vendor and a customer at the market

Grammar: Verbs “to want”, “to can” - Express capacity / possibility - Express will / desire –the future tense

Vocabulary: The food – Meals - Fruits and vegetables – The parts of the body

UNIT - V

Speaking: Express the prohibition and the obligation - describe an apartment - talk about the weather / ask the weather - ask the opinion - give your opinion - express your agreement or disagreement

Writing: Descriptions

Grammar: Demonstrative adjectives -Prepositions - The verb 'must' to indicate obligation and necessity in the present

Vocabulary: Seasons – Holidays - The city – Furniture

NOTE: The students are exposed to simple listening and reading activities.

REFERENCE BOOKS

1. Apprenons le Français 1& 2, New Saraswati House,2015
2. A propos, A1, Langers International,2010
3. Easy French Step-by-step by Myrna Bell Rochester
4. Ultimate French Beginner-Intermediate (Course book) By Livid Language
5. Ã L' Aventure: An Introduction to French Language and Francophone Cultures by Evelyne Charvier-Berman, Anne C. Cummings.

MALLA REDDY ENGINEERING COLLEGE FOR WOMEN
(Autonomous Institution- UGC, Govt. of India)

(2200BS03) ADVANCED CALCULUS & TRANSFORM TECHNIQUES

B.TECH I YEAR II SEMESTER **L/ T/ P/ C**
3 / 1/ 0/ 4

Course Objectives: To learn

- Geometrical approach to the mean value theorems, their application to the mathematical problems and Evaluation of improper integrals using Beta and Gamma functions
- Evaluation of multiple integrals and their applications.
- The physical quantities involved in engineering field related to vector valued functions and their applications to line, surface and volume integrals.
- A periodic function by Fourier series and a non-periodic function by Fourier transform and properties.
- Properties of Laplace transforms, solving ordinary differential equations using Laplace transforms techniques. Also, Z- transform of a sequence and properties.

Course Outcomes: After learning the contents of this paper the student must be able to

- Solve the applications on mean value theorems
- Evaluate the improper integrals using Beta and Gamma functions
- Evaluate the multiple integrals and apply the concept to find areas, volumes.
- Find the directional derivatives, Irrotational and Solenoid function and angle between the surfaces.
- Evaluate the line, surface and volume integrals and converting them from one to another
- Understand the foundational concepts of analytic functions, including continuity, differentiable, and the Cauchy-Riemann equations.

UNIT-I:

Differential Calculus: Rolle's theorem (without proof), Lagrange's Mean value theorem (without proof) with their Geometrical Interpretation, Cauchy's Mean value Theorem (without proof). Definition of Improper Integral; Definition of Beta and Gamma functions, properties, relation between them.

UNIT-II:

Multiple Integrals: Evaluation of Double Integrals (Cartesian); Change of order of integration (only Cartesian form); Evaluation of Triple Integrals.Areas (by double integrals) and Volumes (by double integrals and triple integrals).

UNIT-III:

Vector Differentiation: Vector point functions and Scalar point functions. Gradient, Divergence and Curl. Directional derivatives, Scalar potential functions.

Vector Integration: Line and Surface integrals

UNIT – IV

Fourier series: Introduction, Fourier series definition, Dirichlet's conditions, Even and odd functions.

Fourier Transforms: Fourier integral theorem (without proof), Fourier sine and cosine integrals, sine and cosine transforms, properties, inverse Fourier transforms.

UNIT – V

Laplace Transforms:
Definition of Laplace transform, Laplace transform of standard functions, and properties Definition of Inverse Laplace transform ,Inverse Laplace transforms of standard functions Convolution theorem, Solution of ordinary differential equations by Laplace transforms.
Z- transforms: Z- transforms inverse z-transforms, properties .convolution theorem, solution of difference equation by z-transforms.

TEXTBOOKS:
1. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 36thEdition, 2010.

2. R. K. Jain and S.R.K. Iyengar, Advanced Engineering Mathematics, Narosa Pubishers, 4th Edition, 2014.

REFERENCES:

1. Erwin Kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.

2. Staff, E. B. and A. D. Snider , Fundamentals of Complex Analysis , Pearson.
3. S. L. Ross, Differential Equations, 3rd Ed., Wiley India, 1984.

MALLA REDDY ENGINEERING COLLEGE FOR WOMEN
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(2205ES02) PYTHON PROGRAMMING

B.TECH I YEAR II SEMESTER **L/ T/ P/ C**
3/ 0/ 0/ 3

Course Objectives:
This course will enable students to
- Learn Syntax and Semantics and create Functions in Python.
- Handle Strings and Files in Python.
- Understand Lists, Dictionaries and Regular expressions in Python.
- Implement Object Oriented Programming concepts in Python.
- Build GUI Programming in Python.

Course Outcomes:
The students should be able to
- Understand the features, applications, and versions of Python programming and set up Python environments for development in Windows and Linux systems
- Demonstrate the use of Python syntax, literals, variables, and operators, and perform data type conversions and manipulations effectively
- Construct Python programs utilizing conditional statements, loops, and control structures for problem-solving
- Analyze and implement advanced data structures in Python, such as lists, tuples, sets, and dictionaries, for efficient data organization and processing
- Apply Python functions, including built-in, user-defined, and
- lambda functions, to modularize and enhance the efficiency of programs
- Utilize string operations and built-in string functions to perform advanced string manipulations for practical applications

UNIT I
PYTHON Programming Introduction, History of Python, Python is Derived from?, Python Features, Python Applications, Why Python is Becoming Popular Now a Day?, Existing Programming Vs Python Programming, Writing Programs in Python, Top Companies Using Python, Python Programming Modes, Interactive Mode Programming, Scripting Mode Programming, Flavors in Python, Python Versions, Download & Install the Python in Windows & Linux, How to set Python Environment in the System?, Anaconda - Data Science Distributor, Downloading and Installing Anaconda, Jupyter Notebook & Spyder, Python IDE - Jupyter Notebook Environment, Python IDE – Spyder Environment, Python Identifiers(Literals), Reserved Keywords, Variables, Comments, Lines and Indentations, Quotations, Assigning Values to Variables

UNIT II
Data Types in Python, Mutable Vs Immutable, and Fundamental Data Types: int, float,

complex, bool, str, Number Data Types: Decimal, Binary, Octal, Hexa Decimal & Number Conversions,

Inbuilt Functions in Python, Data Type Conversions, Priorities of Data Types in Python, Python Operators, Arithmetic Operators, Comparison (Relational) Operators, Assignment Operators, Logical Operators, Bitwise Operators, Membership Operators, Identity Operators, Slicing & Indexing, Forward Direction Slicing with +ve Step, Backward Direction Slicingwith -ve Step, Decision Making Statements, if Statement, if-else Statement, elif Statement, Looping Statements, Why we use Loops in python?, Advantages of Loops

for Loop, Nested for Loop, Using else Statement with for Loop, while Loop, Infinite while Loop, Using else with Python while Loop, Conditional Statements, break Statement, continue Statement, Pass Statement

UNIT III

Advanced Data Types: List, Tuple, Set, Frozenset, Dictionary, Range, Bytes & Bytearray, None, List Data Structure, List indexing and splitting Updating List values, List Operations, Iterating a List, Adding Elements to the List, Removing Elements from the List, List Built-in Functions, List Built-in Methods, Tuple Data Structure, Tuple Indexing and Splitting, Tuple Operations, Tuple Inbuilt Functions, Where use Tuple, List Vs Tuple, Nesting List and Tuple, Set Data Structure, Creating a Set, Set Operations, Adding Items to the Set, Removing Items from the Set, Difference Between discard() and remove(), Union of Two Sets, Intersection of Two Sets, Difference of Two Sets, Set Comparisons, Frozenset Data Structure, Dictionary Data Structure, Creating the Dictionary, Accessing the Dictionary Values, Updating Dictionary Values, Deleting Elements Using del Keyword, Iterating Dictionary, Properties of Dictionary Keys, Built-in Dictionary Functions, Built-in Dictionary Methods, List Vs Tuple Vs Set Vs Frozenset Vs Dictionary, Range, Bytes, Bytearray & None

UNIT IV

Python Functions, Advantage of Functions in Python, Creating a Function, Function Calling, Parameters in Function, Call by Reference in Python, Types of Arguments, Required Arguments, Keyword Arguments, Default Arguments, Variable-Length Arguments, Scope of Variables, Python Built-in Functions, Python Lambda Functions, String with Functions, Strings Indexing and Splitting String Operators, Python Formatting Operator, Built-in String Functions, Python File Handling, Opening a File, Reading the File, Read Lines of the File, Looping through the File, Writing the File, Creating a New File Using with Statement with Files, File Pointer Position, Modifying File Pointer Position Renaming the File & Removing the File, Writing Python Output to the Files File Related Methods, Python Exceptions, Common Exceptions, Problem without Handling Exceptions, except Statement with no Exception, Declaring Multiple Exceptions, Finally Block, Raising Exceptions, Custom Exception,

UNIT V

Python Packages, Python Libraries, Python Modules, Collection Module, Math Module, OS Module, Random Module, Statistics Module, Sys Module, Date & Time Module, Loading the Module in our Python Code, import Statement, from-import Statement, Renaming a Module, Regular Expressions, Command Line Arguments, Object Oriented Programming (OOPs), Object-oriented vs Procedure-oriented Programming languages, Object, Class, Method,

Inheritance, Polymorphism, Data Abstraction, Encapsulation, Python Class and Objects, Creating Classes in Python, Creating an Instance of the Class, Python Constructor, Creating the, Constructor in Python, Parameterized Constructor, Non-Parameterized Constructor, In-built Class Functions, In-built Class Attributes, Python Inheritance, Python Multi-Level

Inheritance, Python Multiple Inheritance, Method Overriding, Data Abstraction in Python, Graphical User Interface (GUI) Programming, Python Tkinter, Tkinter Geometry, pack() Method, grid() Method, place() Method, Tkinter Widgets

TEXT BOOK:

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

REFERENCE BOOK:

1. Programming Languages, A.B. Tucker, R.E. Noonan, TMH.
2. Programming Languages, K. C. Louden and K A Lambert., 3rd edition, Cengage Learning.
3. Programming Language Concepts, C Ghezzi and M Jazayeri, Wiley India.
4. Programming Languages 2nd Edition Ravi Sethi Pearson.
5. Introduction to Programming Languages Arvind Kumar Bansal CRC Press.

MALLA REDDY ENGINEERING COLLEGE FOR WOMEN
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(2202ES01) BASIC ELECTRICAL ENGINEERING

B.TECH I YEAR II SEMESTER **L/ T/ P/ C**
3/ 1/ 0/ 3

Course Objectives:

- To introduce the concepts of electrical circuits and its components
- To understand DC circuits and AC single phase & three phase circuits
- To study and understand the different types of DC/AC machines and Transformers.
- To import the knowledge of various electrical installations.
- To introduce the concept of power, power factor and its improvement.

Course Outcomes:

After learning the course the student will be able to

- Understand and solve the DC circuits using fundamental theorems and time-domain analysis to design and troubleshoot the practical DC circuits.
- Analyze and apply AC circuit principles such as phasor representation, power calculations, and power factor to optimize the efficiency of electrical systems.
- Evaluate voltage and current relationships in three-phase circuits to design the balanced three-phase systems.
- Assess transformer principles and operations including equivalent circuit analysis, efficiency, and three phase connections to enhance the performance of power distribution systems.
- Demonstrate knowledge of three-phase induction motors, DC motors, and synchronous generators for effective industrial application.
- Identify and evaluate components of low-tension switchgear and battery systems to ensure safe and efficient electrical installations in various applications.

UNIT-I:

D.C. Circuits: Electrical circuit elements (R, L and C), voltage and current sources, KVL&KCL, analysis of simple circuits with DC excitation. Superposition, Thevenin and Norton Theorems. Time-domain analysis of first-order RL and RC circuits.

UNIT-II

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

UNIT-III:

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

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. Single-phase induction motor. Construction, working, torque-speed characteristic and speed control of separately excited DC motor. Construction and working of synchronous generators.

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.

Text-Books:

1. Basic Electrical Engineering - D.P. Kothari and I.J. Nagrath, 3rd edition 2010, Tata McGrawHill.
2. D.C. Kulshreshtha, "Basic Electrical Engineering", McGraw Hill,2009.
3. L.S. Bobrow, Fundamentals of Electrical Engineering", Oxford University Press,2011

Reference-Books:

1. Electrical and Electronics Technology, E. Hughes, 10th Edition, Pearson,2010
2. Electrical Engineering Fundamentals, Vincent Deltoro, Second Edition, Prentice Hall India,1989.

MALLA REDDY ENGINEERING COLLEGE FOR WOMEN
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(2200BS07)ENGINEERING CHEMISTRY

B.TECH I YEAR II SEMESTER **L/ T/ P/ C**
3 / 0/ 0/ 3

COURSE OBJECTIVES: To learn

- 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:

The basic concepts included in this course will help the student to gain:

- Ability to perform experiments illustrating the principles of chemistry relevant to the study of science and engineering.
- To record the amount of hardness and chloride content in water and interpret the significance of its presence in water.
- Understand the kinetics of a reaction from a change in concentration of reactants or products as a function of time.
- To evaluate and repot the amount of analyze by using instruments like conductimetry, potentiometry and pH metry.
- To analyze and predict the significance of properties like adsorption, viscosity and surface tension.
- To demonstrate the technique of Thin Layer Chromatography (TLC) and synthesis drug molecules widely used in industry.

UNIT - I:

Molecular structure and Theories of Bonding: Atomic and Molecular orbital's. Linear Combination of Atomic Orbital's (LCAO), molecular orbital's of diatomic molecules, molecular orbital energy level diagrams of N_2, O_2 and F_2 molecules. π molecular orbital's of butadiene and benzene.

Crystal Field Theory (CFT): Salient Features of CFT – Crystal Field Splitting of transition metal ion d-orbital's in Tetrahedral, Octahedral and square planar geometries. Band structure of solids and effect of doping on conductance.

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 complexo metric method. Potable water and its specifications. Boiler troubles: Scales and Sludge's,

Priming and Foaming, Caustic Embrittlement. Steps involved in treatment of water – Disinfection of water by chlorination and ozonization. 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. Numerical problems.

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 quinhydrone and glass electrode. Electrochemical series and its applications. Numerical problems. Potentiometric titrations.

Electrochemical sensors: Potentiometric Sensors and voltametric sensors. Examples:analysis of Glucose and urea.

Batteries – Primary: Lithium cell, secondary batteries : Lead – acid storage battery and Lithium ion battery, Fuel cells: H_2-O_2 Fuel cell, CH_3OH-O_2 Fuel cell.

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- Cathodic protection – Sacrificial anode and impressed current cathodic methods. Surface coatings – metallic coatings – methods of application: Galavanising , Tinning , Metal Cladding, Electro-deposition, Electroless plating of Nickel.

UNIT - IV:

Stereochemistry, Reaction Mechanism and synthesis of drug molecules: Introduction to representation of 3-dimensional structures, Structural and stereoisomers, configurations, symmetry and chirality. Enantiomers, diastereomers, optical activity and Absolute configuration. Conformation analysis of n- butane.

Substitution reactions: Nucleophilic substitution reactions: Mechanism of SN^1, SN^2 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 $KMnO_4$ and chromic acid. Reduction reactions: Reduction of carbonyl compounds using $LiAlH_4$ & $NaBH_4$.Hydroboration of olefins. Structure, synthesis and pharmaceutical applications of Paracetamol and Aspirin.

UNIT – V

Spectroscopic techniques and applications: Principles of electronic spectroscopy: Beer Lamberts law, Numerical problems, types of electronic excitations , applications of UV –Visible spectroscopy. IR Spectroscopy: Principle, Modes of vibrations, selection rules, Force Constant ,Some common organic functional groups Wave number regions (C-H, NH_2, OH, -COOH, C=O, C ≡ N, C=C, C ≡ C), Á́pplications of IR Spectroscopy, ^{1}H-NMR(NMR Spectroscopy), Principles of NMR spectroscopy, chemical shift, Chemical shifts of some organic protons , Introduction to Magnetic resonance imaging.

Suggested Text Books:

1. Physical Chemistry, by P.W. Atkins
2. Engineering Chemistry by P.C.Jain & M.Jain; Dhanpat Rai Publishing Company (P)Ltd., New Delhi.
3. Fundamentals of Molecular Spectroscopy, by C.N. Banwell
4. Organic Chemistry: Structure and Function by K.P.C. Volhardt and N.E.Schore, 5thEdition.
5. University Chemistry, by B.M. Mahan, Pearson IV Edition.
6. Engineering Chemistry (NPTEL Web-book), by B.L. Tembe, Kamaluddin and M.S.Krishnan. ॥

MALLA REDDY ENGINEERING COLLEGE FOR WOMEN
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(2203ES61) ENGINEERING WORKSHOP

B.TECH I YEAR II SEMESTER **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.
- To study commonly used carpentry joints and to have practical exposure to variouswelding and joining processes.

COURSE OUTCOMES: At the end of the course, the student will be able to:

- Identify and make use of various tools to perform a range of basic manufacturing operations in different trades to make/ repair engineering components with workshop safety regulations.
- Illustrate knowledge of varioustrade operations based on requirements of the job.
- Illustrate knowledge of various trade tools based on requirements of the job.
- Interpret and establish residential wiring circuits according to givenspecifications and circuit diagram.
- Demonstrate working principles of power tools in different trades to use and to make with them engineering components.
- Develop model various basic prototypes to explore its functions and features of a innovative system.

I. Carpentry
1. Cross lap joint
2. Mortise & tenon joint

II. Fitting
1. V- fitting
2. Semi - Circular Fitting

III. Tin Smithy
1. Making of Rectangular Tray
2. Making of Conical Funnel

IV. Housing wiring
1. Two points controlled by two-one way switches (parallel connection)
2. One point controlled by two-two way switches (stair case connection)

V. Foundry

1. Single piece pattern
2. Multi-piece pattern

VI. Black Smithy

1. Round to Square
2. S - Hook

Trades for Demonstration:

1. Plumbing
2. Welding
3. Machine Shop
4. Metal Cutting (Water Plasma)

TEXT BOOKS:

1. Workshop Manual, P. Kannaiah and K. L. Narayana, 3rd Edition, Scitech, 2015
2. Elements of Workshop Technology Vol.1 & 2, S. K. Hajra Choudhury, A. K. Hajra Choudhury and Nirjhar Roy, 13th Edition, Media Promoters & Publishers Pvt. Ltd., 2010.

REFERENCE BOOKS:

1. Workshop Manual / Venkat Reddy/ BSP
2. Workshop Manual / K Venu Gopal / Anuradha

MALLA REDDY ENGINEERING COLLEGE FOR WOMEN
(Autonomous Institution- UGC, Govt. of India)

(2202ES61) BASIC ELECTRICAL ENGINEERING LAB

B.TECH I YEAR II SEMESTER **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:
After learning the lab course the student will be able to
- Get an exposure to basic electrical laws by applying Ohm's Law, KCL and KVL.
- Understand the response of different types of electrical circuits to different excitations.
- Illustrate the concept of resonance in series RLC circuits.
- Calculate and analyze the impedance of RL, RC, and RLC series circuits.
- Analyze performance of dc motors, transformers and three phase induction motors.
- Understand the measurement and calculation of voltage-current in a balanced three phase circuits.

List of experiments/demonstrations
1. Verification of Ohms Law
2. Verification of KVL and KCL
3. Transient Response of Series RL and RC circuits using DC excitation
4. Transient Response of RLC Series circuit using DC excitation
5. Resonance in series RLC circuit
6. Calculations and Verification of Impedance and Current of RL, RC and RLC series circuits
7. Measurement of Voltage, Current and Real Power in primary and Secondary Circuits of a Single Phase Transformer
8. Load Test on Single Phase Transformer (Calculate Efficiency and Regulation)
9. Three Phase Transformer: Verification of Relationship between Voltages and Currents (Star-Delta, Delta-Delta, Delta-star, Star-Star)
10. Measurement of Active and Reactive Power in a balanced Three-phase circuit
11. Performance Characteristics of a Separately/Self Excited DC Shunt/Compound Motor
12. Torque-Speed Characteristics of a Separately/Self Excited DC Shunt/Compound Motor
13. Performance Characteristics of a Three-phase Induction Motor
14. Torque-Speed Characteristics of a Three-phase Induction Motor
15. No-Load Characteristics of a Three-phase Alternator

MALLA REDDY ENGINEERING COLLEGE FOR WOMEN
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(2205ES62) PYTHON PROGRAMMING LAB

B.TECH I YEAR II SEMESTER **L/ T/ P/ C**

0/ 0/ 3/ 1.5

Course Objectives:

- Introduce core programming basics and program design with functions using Python programming language.
- To understand a range of Object-Oriented Programming, as well as in-depth data and information processing techniques.
- To understand the high-performance programs designed to strengthen the practical expertise.

Course Outcomes:

- Understand basic Python programs to perform arithmetic operations, input/output operations, and string manipulations.
- Apply programming techniques to develop mathematical problem solving skills.
- Utilize control structures and data types to manipulate and process data.
- Demonstrate the ability to define and call functions to encapsulate code for specific tasks, enhancing code reusability
- Develop skills in debugging and testing their programs to identify and resolve errors.
- Awareness to the basic concepts of object-oriented programming (OOP) in Python, laying the foundation for more advanced programming techniques.

Week 1:

1. Python program to print "Hello Python"
2. Write a program that computes and prints the result of $512 - 282 / 47 \cdot 48 + 5$.
   It is roughly .1017
3. Ask the user to enter a number. Print out the square of the number but use the sep optional argument to print it out in a full sentence that ends in a period. Sample output is shown below.
   Enter a number: 5
   The square of 5 is 25.
4. Ask the user to enter a number x. Use the sep optional argument to print out x, 2x, 3x, 4x, and 5x, each separated by three dashes, like below.
   Enter a number: 7
   7---14---21---28---35

Week 2:

1. Write a program that asks the user to enter three numbers (use three separate input statements). Create variables called total and average that hold the sum and average of the three numbers and print out the values of total and average.
2. A lot of cell phones have tip calculators. Write one. Ask the user for the price of the meal and the percent tip they want to leave. Then print both the tip amount and the total bill with the tip included.
3. Write a program which will find all such numbers which are divisible by 7 but are not a multiple of 5,between 2000 and 3200 (both included). The numbers obtained should be printed in a comma-separated sequence on a single line.

Hints: Consider use range(#begin, #end) method

4. Write a program that calculates and prints the value according to the given formula: Q = Square root of [(2 * C * D)/H]
   Following are the fixed values of C and H:C is 50. H is 30.D is the variable whose values should be input to your program in a comma-separated sequence, let us assume the following comma separated input sequence is given to the program: 100,150,180The output of the program
   Hint:
   If the output received is in decimal form, it should be rounded off to its nearest value (for example, if the output received is 26.0, it should be printed as 26)18, 22,24should be:

Week 3:

1. Write a program that asks the user to enter a length in centimeters. If the user enters a negative length, the program should tell the user that the entry is invalid. Otherwise, the program should convert the length to inches and print out the result. There are 2.54 centimeters in an inch.
2. Ask the user for a temperature. Then ask them what units, Celsius or Fahrenheit, the temperature is in. Your program should convert the temperature to the other unit. The conversions are F = 9 5 C + 32 and C = 5 9 (F − 32)
3. Ask the user to enter a temperature in Celsius. The program should print a message based on the temperature: • If the temperature is less than -273.15, print that the temperature is invalid because it is below absolute zero. • If it is exactly -273.15, print that the temperature is absolute 0. • If the temperature is between -273.15 and 0, print that the temperature is below freezing. • If it is 0, print that the temperature is at the freezing point. • If it is between 0 and 100, print that the temperature is in the normal range. • If it is 100, print that the temperature is at the boiling point. • If it is above 100, print that the temperature is above the boiling point
4. Write a program that asks the user how many credits they have taken. If they have taken 23 or less, print that the student is a freshman. If they have taken between 24 and 53, print that they are a sophomore. The range for juniors is 54 to 83, and for seniors it is 84 and over.

Week 4:

1. A year is a leap year if it is divisible by 4, except that years divisible by 100 are not leap years unless they are also divisible by 400. Write a program that asks the user for a year and prints out whether it is a leap year or not
2. Write a multiplication game program for kids. The program should give the player ten randomly generated multiplication questions to do. After each, the program should tell them whether they got it right or wrong and what the correct answer is.

   Question 1: 3 x 4 = 12
   Right!
   Question 2: 8 x 6 = 44
   Wrong.
   The answer is 48.
   ...

...
Question 10: 7 x 7 = 49
Right.

3. A jar of Halloween candy contains an unknown amount of candy and if you can guess exactly how much candy is in the bowl, then you win all the candy. You ask the person in charge the following: If the candy is divided evenly among 5 people, how many pieces would be left over? The answer is 2 pieces. You then ask about dividing the candy evenly among 6 people, and the amount left over is 3 pieces. Finally, you ask about dividing the candy evenly among 7 people, and the amount left over is 2 pieces. By looking at the bowl, you can tell that there are less than 200 pieces. Write a program to determine how many pieces are in the bowl
   Write a program that asks the user to enter a value n, and then computes (1+ 1 2 + 1 3 +⋯+ 1 n)− ln(n). The ln function is log in the math module

Week 5:

1. A number is called a perfect number if it is equal to the sum of all of its divisors, not including the number itself. For instance, 6 is a perfect number because the divisors of 6 are 1, 2, 3, 6 and 6 = 1 + 2 + 3. As another example, 28 is a perfect number because its divisors are 1, 2, 4, 7, 14, 28 and 28 = 1 + 2 + 4 + 7 + 14. However, 15 is not a perfect number because its divisors are 1, 3, 5, 15 and 15 6= 1 + 3 + 5. Write a program that finds all four of the perfect numbers that are less than 10000.
2. . Ask the user to enter 10 test scores. Write a program to do the following:
   (a) Print out the highest and lowest scores.
   (b) Print out the average of the scores.
   (c) Print out the second largest score.
   (d) If any of the scores is greater than 100, then after all the scores have been entered, print a message warning the user that a value over 100 has been entered.
   (e) Drop the two lowest scores and print out the average of the rest of them
3. Write a program that computes the factorial of a number. The factorial, n!, of a number n is the product of all the integers between 1 and n, including n. For instance, 5! = 1 · 2 · 3 · 4 · 5 = 120. [Hint: Try using a multiplicative equivalent of the summing technique.]

Week 6:

1. Write a program that asks the user for a number and then prints out the sine, cosine, and tangent of that number.
2. The Fibonacci numbers are the sequence below, where the first two numbers are 1, and each number thereafter is the sum of the two preceding numbers. Write a program that asks the user how many Fibonacci numbers to print and then prints that many.
   1, 1, 2, 3, 5, 8, 13, 21, 34, 55, 89 . . .
3. Use a for loop to print a triangle like the one below. Allow the user to specify how high the triangle should be.

```
*
**
***
****
*****
```

Week 7:

1. Use for loops to print a diamond like the one below. Allow the user to specify how high the diamond should be.

```
*
***
*****
*******
*****
***
*
```

2. Write a program that asks the user to enter an angle between -180° and 180° . Using an expression with the modulo operator, convert the angle to its equivalent between 0° and 360° .
3. (a) One way to find out the last digit of a number is to mod the number by 10. Write a program that asks the user to enter a power. Then find the last digit of 2 raised to that power.

   (b) One way to find out the last two digits of a number is to mod the number by 100. Write a program that asks the user to enter a power. Then find the last two digits of 2 raised to that power.

   (c) Write a program that asks the user to enter a power and how many digits they want. Find the last that many digits of 2 raised to the power the user entered

Week 8:

1. The GCD (greatest common divisor) of two numbers is the largest number that both are divisible by. For instance, gcd(18, 42) is 6 because the largest number that both 18 and 42 are divisible by is 6. Write a program that asks the user for two numbers and computes their gcd. Shown below is a way to compute the GCD, called Euclid's Algorithm.
   - First compute the remainder of dividing the larger number by the smaller number
   - Next, replace the larger number with the smaller number and the smaller number with the remainder.
   - Repeat this process until the smaller number is 0. The GCD is the last value of the larger number.
2. Write a program that asks the user to enter a string. The program should then print the following:
   (a) The total number of characters in the string
   (b) The string repeated 10 times
   (c) The first character of the string (remember that string indices start at 0)
   (d) The first three characters of the string
   (e) The last three characters of the string
   (f) The string backwards
   (g) The seventh character of the string if the string is long enough and a message otherwise
   (h) The string with its first and last characters removed
   (i) The string in all caps
   (j) The string with every a replaced with an e

(k) The string with every letter replaced by a space

Week 9:

1. Write a program that asks the user to enter a string. The program should create a new string called new string from the user's string such that the second character is changed to an asterisk and three exclamation points are attached to the end of the string. Finally, print new string. Typical output is shown below: Enter your string: Qbert Q*ert!!!
2. Write a program that computes the net amount of a bank account based a transaction log from console input. The transaction log format is shown as following:
   D 100 W 200 D means deposit while W means withdrawal.
   Suppose the following input is supplied to the program:D 300D 300 W200D 100Then,
   the output should be: 500

Week 10:

1. A website requires the users to input username and password to register. Write a program to check the validity of password input by users.
   Following are the criteria for checking the password:
   1. At least 1 letter between [a-z]
   2. At least 1 number between [0-9]
   1. At least 1 letter between [A-Z]
   3. At least 1 character from [$#@]
   4. Minimum length of transaction password: 6
   5. Maximum length of transaction password: 12

   Your program should accept a sequence of comma separated passwords and will check them according to the above criteria. Passwords that match the criteria are to be printed, each separated by a comma.
   Example
   If the following passwords are given as input to the program:
   ABd1234@1,a F1#,2w3E*,2We3345

   Then, the output of the program should be:
   ABd1234@1
2. Write a program that accepts sequence of lines as input and prints the lines after making all characters in the sentence capitalized
   Suppose the following input is supplied to the program:
   Hello world
   Practice makes perfect
   Then, the output should be:
   HELLO WORLD
   PRACTICE MAKES PERFECT

3. The goal of this exercise is to see if you can mimic the behavior of the in operator and the count and index methods using only variables, for loops, and if statements.
   (a) Without using the in operator, write a program that asks the user for a string and a letter and prints out whether the letter appears in the string.
   (b) Without using the count method, write a program that asks the user for a string and

a letter and counts how many occurrences there are of the letter in the string.

(c) Without using the index method, write a program that asks the user for a string and a letter and prints out the index of the first occurrence of the letter in the string. If the letter is not in the string, the program should say so.

TEXT BOOK:

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

MALLA REDDY ENGINEERING COLLEGE FOR WOMEN
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(2200BS62) ENGINEERING CHEMISTRY LAB

B.TECH I YEAR II SEMESTER **L/ T/ P/ C**
0/ 0/ 2/ 1

COURSE OBJECTIVES:
The course consists of experiments related to the principles of chemistry required for engineering student. The student will learn:

- 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:
- Ability to perform experiments illustrating the principles of chemistry relevant to the study of science and engineering.
- To record the amount of hardness and chloride content in water and interpret the significance of its presence in water.
- Understand the kinetics of a reaction from a change in concentration of reactants or products as a function of time.
- To evaluate and repot the amount of analyze by using instruments like conductimetry, potentiometer and pH metry.
- To analyze and predict the significance of properties like adsorption, viscosity and surface tension.
- To demonstrate the technique of Thin Layer Chromatography (TLC) and synthesis drug molecules widely used in industry.

List of Experiments
1. Determination of total hardness of water by complexometric method using EDTA
2. Determination of chloride content of water by Argentometry
3. Estimation of an HCl by Conductometric titrations
4. Estimation of Acetic acid by Conductometric titrations
5. Estimation of HCl by Potentiometric titrations
6. Estimation of Fe^{2+} by Potentiometry using $KMnO_4$
7. Determination of rate constant of acid catalysed hydrolysis of methyl acetate
8. Synthesis of Aspirin and Paracetamol
9. Thin layer chromatography calculation of R_f values. eg ortho and para nitro phenols

10. Determination of acid value of coconut oil
11. Verification of freundlich adsorption isotherm-adsorption of acetic acid on charcoal
12. Determination of viscosity of castor oil and ground nut oil by using Ostwald's viscometer.
13. Determination of partition coefficient of acetic acid between n-butanol and water.
14. 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.

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(2200MC01) ENVIRONMENTAL SCIENCE

B.TECH I YEAR II SEMESTER **L/ T/ P/ C**
1/ 0/ 0/ 0

COURSEOBJECTIVES:

- Understandingtheimportanceofecologicalbalanceforsustainabledevelopment.
- Recognize ,the significance of natural resources, their classifications. Alternative energy for the sustainability of the environment by appropriate maintance of natural resources.
- Understand the biodiversity & type of biodiversity along with the value &conservation of biodiversity
- Categorize, the type of environmental pollution & various treatment technologies for diminution of environmental pollutants summarize the global environmental issues
- Understand the sustainable development concept & importance of green buildings ,EIA, EIS,EMP.

COURSEOUTCOMES:

- Develop critical-thinking skills, analyze real-world problems, and understand the power of narrative to create sustainable solutions for local and global communities.
- Understand the scarcity of natural resources and will be able to replace them with alternative energy resources for the sustainability of environmental society & economy.
- Recognize the type of biodiversity along the values & conservation biodiversity and know about the biogeographically regions.
- Categorize the types of environmental pollution & the various treatment technologies for the diminution of environmental pollutants and contaminants.
- Summarize the global environmental issues to create awareness about the international conventions and protocols for extenuating global environmental issues.
- Understand the importance of environmental legislation policies, sustainable development and concept of green building

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, Biomagnifications, 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 eco system 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-wild life 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:** Climate 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.

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 life style.

TEXTBOOKS:

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

REFERENCEBOOKS:

1. Environmental Science :towards a sustainable future by Richard T.Wright. 2008PHL Learning Private Ltd. New Delhi.
2. Environmental Engineering and science by Gilbert M.Masters and Wendel lP.Ela. 2008PHI Learning Pvt.Ltd.
3. Environmental Science by Daniel B.Botkin & EdwardA.Keller, Wiley INDIA edition.
4. Environmental Studies by Anubha Kaushik, 4thEdition, New age international publishers.

5. Textbook of Environmental Science and Technology-Dr.M.Anji Reddy2007, BS Publications.
6. Introduction to Environmental Science by Y.Anjaneyulu, BS. Publications.

II – YEAR SYLLABUS

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B.Tech. II Year I Sem. **L / T/ P/ C**
3/ 1 / 0/ 4

(2204PC01) PROBABILITY THEORY AND STOCHASTIC PROCESS

COURSE OBJECTIVES:

The main objectives of the course are:

- To provide mathematical background and sufficient experience so that student can read, write and understand sentences in the language of probability theory.
- To introduce students to the basic methodology of "probabilistic thinking" and apply it to problems.
- To understand basic concepts of Probability theory and Random Variables, how to deal with multiple Random Variables.
- To understand the difference between time averages statistical averages.
- To teach students how to apply sums and integrals to compute probabilities, and expectations.

COURSE OUTCOMES:

After completion of the course, the student will be able to:

- Understand probabilities and able to Analyze and Solve problems involving probability calculations, including joint, marginal, and conditional probabilities.
- Analyze random variables and apply different probability distributions (Binomial, Poisson, Uniform, Exponential Gaussian, Rayleigh) to model real-world situations.
- Calculate and interpret the expected value and variance of discrete and continuous random variables.
- Evaluate time averages, ergodicity and able to compute and interpret auto correlation and cross-correlation functions, as well as covariance functions.
- Understand the relationship between the power spectrum density and the correlation function and be able to evaluate the power density spectrum along with its properties.
- Connect the knowledge of mean values, auto correlation, cross- correlation, power density spectra, and cross power spectral densities to evaluate and optimize the performance of linear systems in practical applications.

UNIT I:

Probability and Random Variable

Probability: Set theory, Experiments and Sample Spaces, Discrete and Continuous Sample Spaces, Events, Probability Definitions and Axioms, Mathematical Model of Experiments, Joint Probability, Conditional Probability, Total Probability, Bayes' Theorem, and Independent Events.

The Random Variable: Definition of a Random Variable, Conditions for a Function to be a Random Variable, Discrete and Continuous, Mixed Random Variable

UNIT II:

Distribution and Density Functions-Operations on One Random Variable

Distribution and density functions: Distribution and Density functions, Properties, Binomial, Poisson, Uniform, Exponential Gaussian, Rayleigh and Conditional Distribution, Methods of defining Conditioning Event, Conditional Density function and its properties,

problems.

Operation on One Random Variable: Expected value of a random variable, function of arandom variable, moments about the origin, central moments, variance and skew, characteristic function, moment generating function.

UNIT III:

Multiple Random Variables and Operations on Multiple Random Variables

Multiple Random Variables: Vector Random Variables, Joint Distribution Function and Properties, Joint density Function and Properties, Marginal Distribution and density Functions, conditional Distribution and density Functions, Statistical Independence, Distribution and density functions of Sum of Two Random Variables and Sum of Several Random Variables, Central Limit Theorem - Unequal Distribution, Equal Distributions.

Operations on Multiple Random Variables: Expected Value of a Function of RandomVariables, Joint Moments about the Origin, Joint Central Moments, Joint Characteristic Functions, and Jointly Gaussian Random Variables: Two Random Variables case and N Random Variable case, Properties.

UNIT VI:

Stochastic Processes-Temporal Characteristics

The Stochastic process Concept, Classification of Processes, Deterministic and Nondeterministic Processes, Distribution and Density Functions, Statistical Independence and concept of Stationarity : First-Order Stationary Processes, Second-Order and Wide-Sense Stationarity, Nth-Order and Strict-Sense Stationarity, Time Averages and Ergodicity, Mean-Ergodic Processes, Correlation-Ergodic Processes Autocorrelation Function and Its Properties, Cross-Correlation- -Function and Its Properties, Covariance Functions and its properties, Gaussian Random Processes.

Linear system Response: Mean and Mean-squared value, Autocorrelation, Cross-Correlation Functions.

UNIT V:

Stochastic Processes-Spectral Characteristics

The Power Spectrum and its Properties, Relationship between Power Spectrum and Autocorrelation Function, the Cross-Power Density Spectrum and Properties, Relationship between Cross-Power Spectrum and Cross-Correlation Function.

Spectral characteristics of system response: power density spectrum of response, cross power spectral density of input and output of a linear system

TEXT BOOKS:

1. Probability, Random Variables & Random Signal Principles -Peyton Z. Peebles, TMH, 4th Edition, 2001.
2. Probability and Random Processes-Scott Miller, Donald Childers,2Ed,Elsevier,2012

REFERENCE BOOKS:

1. Theory of probability and Stochastic Processes-Pradeep Kumar Gosh, University Press
2. Probability and Random Processes with Application to Signal Processing - Henry Stark and John W. Woods, Pearson Education, 3rd Edition.
3. Probability Methods of Signal and System Analysis- George R. Cooper, Clave D. MC Gillem, Oxford, 3rd Edition, 1999.
4. Statistical Theory of Communication -S.P. Eugene Xavier, New Age Publications 2003
5. Probability, Random Variables and Stochastic Processes Athanasios Papoulis and S.Unnikrishna Pillai, PHI, 4th Edition, 2002.

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II Year B.Tech ECE-I Sem **L / T / P /C**
3 / 0 / 0 / 3

(2204PC02) ELECTRONIC DEVICES AND CIRCUITS

OBJECTIVES:
The main objectives of the course are:
- To familiarize the student with the principal of operation, analysis and design of junction diode, BJT and FET transistors and amplifier circuits.
- To understand diode as a rectifier.
- To study basic principal of filter of circuits and various types

OUTCOMES:
After completion of the course, the student will be able to:
- Understand the qualitative theory, properties, and behavior of P-N junction diodes, including their Breakdown mechanisms and diode equation.
- Understand the characteristics and operation of special purpose diodes, such as photodiodes, varactor diodes, tunnel diodes, and SCR, at a high level.
- Analyze different kinds of rectifier circuits and filters, evaluating their harmonic content and voltage control ability
- Analyze the design and functionality of BJTs by examining their configurations and computing important parameters. Apply various stabilizing and biasing techniques to BJTs at a high level while investigating how they affect thermal stability.
- Analyze single-stage transistor amplifiers in-depth and at an elevated level. Use the H-Parameter Model to compare performance metrics between configurations
- Analyze the performance of FETs as voltage-variable resistors and contray their characteristics to Bipolar Junction Transistors (BJTs).

UNIT-I
P-N Junction diode: Qualitative Theory of P-N Junction, P-N Junction as a diode , diode equation, volt-ampere characteristics temperature dependence of V-I characteristic , ideal versus practical, Resistance levels(static and dynamic), transition and diffusion capacitances, diode equivalent circuits, load line analysis, breakdown mechanisms in semiconductor diodes.
Special purpose electronic devices: Principal of operation and Characteristics of TunnelDiode with the help of energy band diagrams, Varactar Diode, SCR and photo diode.

UNIT-II
Rectifiers, Filters: P-N Junction as a rectifier ,Half wave rectifier, Full wave rectifier, Bridge rectifier , Harmonic components in a rectifier circuit, Inductor filter, Capacitor filter, L- section filter, π- section filter and comparison of various filters, Voltage regulation using Zener diode.
UNIT-III
Bipolar Junction Transistor: The Junction transistor, Transistor construction, Transistor current components, Transistor as an amplifier, Input and Output characteristics of transistor in Common Base, Common Emitter, and Common collector configurations. α and β Parameters and the relation between them, BJT Specifications.
BJT Hybrid Model: h-parameter representation of a transistor, Analysis of single

stagetransistor amplifier using h-parameters: voltage gain, current gain, Input impedance and Output impedance. Comparison of transistor configurations in terms of A_i, R_i ,A_v,and R_o.

UNIT-IV

Transistor Biasing And Stabilisation: Operating point , the D.C and A.C Load lines,Need for biasing , criteria for fixing operating point, B.J.T biasing, Fixed bias, Collector to base bias, Emitter Feedback bias, Self bias techniques for stabilization, Stabilization factors(s, sI, sII), Bias Compensation using diode and transistor(Compensation against variation in VBE, ICO) Thermal run away, Condition for Thermal stability.

UNIT-V

Field Effect Transistor: JFET (Construction, principal of Operation and Volt –Ampere characteristics)-Pinch- off voltage, Small signal model of JFET. FET as Voltage Variable Resistor, Comparison of BJT and FET. MOSFET (Construction, Principle of Operation and symbol), MOSFET characteristics in Enhancement and Depletion modes.

TEXT BOOKS:

1. Millman's Electronic Devices and Circuits – J. Millman, C.C.Halkias, and Satyabrata Jit, 2 Ed.,1998, TMH.
2. Electronic Devices and Circuits – Mohammad Rashid, Cengage Learing, 2013
3. Electronic Devices and Circuits – David A. Bell, 5 Ed, Oxford

REFERENCE BOOKS:

1. Electronic Devices and Circuits,K.Lal Kishore B.S Publications
2. Electronic Devices and Circuits, S.Salivahanan,N.Sureshkumar, McGraw Hill.
3. Electronic Devices and Circuits,Balbirkumar ,shailb.jain, PHI PrivatedLimted,
4. Electronic Devices and Circuits,A.PGodse, U.A Bakshi , Technical Publications
5. Electronic Devices and Circuits K.S. Srinivasan Anurdha Agencies

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II Year B.Tech ECE-I Sem **L / T / P /C**
3 / 0 / 0 / 3

(2204PC03) SIGNALS & SYSTEMS

COURSE OBJECTIVES:

The main objectives of the course are:

- Coverage of continuous and discrete-time signals and representations and methods that is necessary for the analysis of continuous and discrete-time signals.
- Knowledge of time-domain representation and analysis concepts as they relate to difference equations, impulse response and convolution, etc.
- Knowledge of frequency-domain representation and analysis concepts using Fourier analysis tools, Z-transform.
- Concepts of the sampling process.
- Mathematical and computational skills needed in application areas like communication, signal processing and control, which will be taught in other courses.

COURSE OUTCOMES:

After completion of the course, the student will be able to:

- Classify various signal types (e.g., continuous, discrete) and perform fundamental operations to interpret and manipulate signal characteristics.
- Analyze signals using orthogonal functions and vector spaces, and demonstrate Fourier series and transform applications for both periodic and non-periodic signals.
- Apply the Fourier Transform to transition between time and frequency domains, Analyze signal properties such as bandwidth, sampling, aliasing, and reconstruction.
- Examine signal behavior through linear time-invariant (LTI) systems, assessing conditions for distortion less transmission and understanding filter characteristics.
- Utilize the Laplace Transform for complex signal analysis and relate it to the Fourier Transform in solving real-world signal processing problems.
- Interpret discrete-time systems through Z-transforms, compare it with other transforms, and apply it to practical discrete-time signal problems.

UNIT I:

Introduction to Signals: Elementary Signals**-** Continuous Time (CT) signals, DiscreteTime (DT) signals, Basic Operations on signals, Classification of Signals.

Signal Analysis: Analogy between vectors and signals, orthogonal signal space, Signalapproximation using orthogonal functions, Mean square error, Closed or complete set of orthogonal functions, Orthogonality in complex functions.

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

UNIT II:

Fourier Transforms: Deriving Fourier transform from Fourier series, Fourier transformof arbitrary signal, Fourier transform of standard signals, Fourier transform of periodic signals, Properties of Fourier transforms.

Sampling: 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.

UNIT III:

Signal Transmission through Linear Systems: Introduction to Systems,Classification of Systems, Linear Time Invariant (LTI) systems, system, impulse response, Transfer function of a LTI system. Filter characteristics of linear systems. Distortion less transmission through a system, Signal bandwidth, System bandwidth, Ideal LPF, HPF and BPF characteristics, Causality and Poly-Wiener criterion for physical realization, relationship between bandwidth and rise time.

Convolution of Signals: Concept of convolution in time domain,Graphical representation of convolution.

UNIT-IV:

Laplace Transforms: Review of Laplace transforms, Inverse Laplace transform, Conceptof region of convergence (ROC) for Laplace transforms, Properties of L.T's relation between L.T's, and F.T. of a signal. Laplace transform of certain signals using waveform synthesis.

UNIT-V:

Z–Transforms: Concept of Z- Transform of a discrete sequence. Distinction betweenLaplace, Fourier and Z transforms, Region of convergence in Z-Transform, Inverse Z-Transform, Properties of Z-transforms.

TEXT BOOKS:

1. Signals & Systems - Simon Haykin and Van Veen,Wiley, 2nd Edition.
2. Signals and Systems - A.V. Oppenheim, A.S. Willsky and S.H. Nawab, PHI, 2nd Edn.

REFERENCE BOOKS:

1. Signals and Systems – A. Anand Kumar, PHI Publications, 3rd edition.
2. Signals, Systems & Communications - B.P. Lathi, BS Publications, 2003.
3. Fundamentals of Signals and Systems Michel J. Robert, MGH International Edition, 2008.

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II Year B.Tech ECE-I Sem **L/ T/ P/ C**
3 / 0/ 0/ 3

(2204PC04) NETWORK ANALYSIS

COURSE OBJECTIVES:
The main objectives of the course are:

- To understand the basic concepts on RLC circuits.
- To know the behavior of the steady states and transients states in RLC circuits.
- To know the basic Laplace transforms techniques in periodic waveforms.
- To understand the two port network parameters.
- To understand the properties of LC networks and filters.

COURSE OUTCOMES:
After completion of the course, the student will be able to:

- Formulate mathematical models for physical systems and construct representations of linear time-invariant systems using transfer functions and block diagram.
- Analyze the structure and benefits of open-loop and closed-loop feedback control systems, and apply signal flow graphs and Mason's gain formula to simplify complex control systems.
- Analyze the time response of first and second-order systems for standard test inputs and evaluate system stability using Routh- Hurwitz criteria and Root Locus techniques.
- Apply frequency-response techniques such as Bode and Nyquist plots to evaluate system stability and performance in the frequency domain.
- Design and evaluate controllers and compensators (P, PI, PD, PID) using root locus and frequency-domain mets to improve system performance.
- Formulate state-space models and conduct state variable analysis to assess system controllability and observability.

UNIT - I
Review of R, L,C, RC, RL, RLC circuits, Network Topology, Terminology, Basic cutest and tie set matrices for planar networks, Illustrative Problems, Magnetic Circuits, Self and Mutual inductances, dot convention, impedance, reactance concept, Impedance transformation and coupled circuits, co-efficient of coupling, equivalent T for Magnetically coupled circuits, Ideal Transformer.

UNIT - II
Steady state and transient analysis of RC, RL and RLC Circuits, Circuits with switches, step response, 2nd order series and parallel RLC Circuits, Root locus, damping factor, over damped, under damped, critically damped cases, quality factor and bandwidth for series and parallel resonance, resonance curves.

UNIT - III
Network Analysis using Laplace transform techniques, step, impulse and exponentialvexcitation, response due to periodic excitation, RMS and average value of periodic waveforms.

UNIT - IV

Two port network parameters, Z, Y, ABCD, h and g parameters, Characteristic impedance, Image transfer constant, image and iterative impedance, network function, driving point and transfer functions – using transformed (S) variables, Poles and Zeros.

UNIT - V

Standard T, π , L Sections, Characteristic impedance, image transfer constants, Design of Attenuators, impedance matching network, T and π Conversion, LC Networks and Filters: Properties of LC Networks, Foster's Reactance theorem, design of constant K, LP, HP and BP Filters, Composite filter design.

TEXT BOOKS

1. Network Analysis – ME Van Valkenburg, Prentice Hall of India, 3rd Edition, 2000.
2. Networks, Lines and Fields - JD Ryder, PHI, 2nd Edition, 1999.

REFERENCES

1. Engineering Circuit Analysis – William Hayt and Jack E Kemmerly, MGH, 5th Edition, 1993.
2. Electric Circuits – J. Edminister and M.Nahvi – Schaum's Outlines, MCGRAW HILL EDUCATION, 1999.
3. Network Theory – Sudarshan and Shyam Mohan, Mc Graw Hill Education.

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II Year B.Tech ECE-I Sem **L / T / P /C**
3 /0 / 0 /4

(2205ES03) COMPUTER ORGANIZATION AND OPERATING SYSTEMS

COURSE OBJECTIVES

The main objectives of the course are:

- To have a thorough understanding of the basic structure and operation of a digital computer.
- To discuss in detail the operation of the arithmetic unit including the algorithms & implementation of fixed-point and floating-point addition, subtraction, multiplication & division.
- To study the different ways of communicating with I/O devices and standard I/O interfaces.
- To study the hierarchical memory system including cache memories and virtual memory.
- To demonstrate the knowledge of functions of operating system memory management scheduling, file system and interface, distributed systems, security and dead locks.
- To implement a significant portion of an Operating System.

COURSE OUTCOMES

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

- Basic structure of a digital computer
- Arithmetic operations of binary number system
- The organization of the Control Unit, Arithmetic and Logical Unit, Memory Unit and the I/O unit.
- Operating system functions, types, system calls.
- Memory management techniques and dead lock avoidance
- Operating system files system and implementation and its interface.

UNIT - I:

Basic Structure of Computers: Computer Types, Functional UNIT, Basic Operational Concepts, Bus, Structures, Software, Performance, Multiprocessors and Multi Computers, Data Representation, Fixed Point Representation, Floating - Point Representation.

Register Transfer Language and Micro Operations: Register Transfer Language, Register Transfer Bus and Memory Transfers, Arithmetic Micro Operations, Logic Micro Operations, Shift Micro Operations, Arithmetic Logic Shift Unit, Instruction Codes, Computer Registers Computer Instructions - Instruction Cycle.

Memory - Reference Instructions, Input - Output and Interrupt, STACK Organization, Instruction Formats, Addressing Modes, DATA Transfer and Manipulation, Program Control, Reduced Instruction Set Computer.

UNIT - II:

Micro Programmed Control: Control Memory, Address Sequencing, Microprogram Examples, Design of Control Unit, Hard Wired Control, Microprogrammed Control.

The Memory System: Basic Concepts of Semiconductor RAM Memories, Read-Only Memories, Cache Memories Performance Considerations, Virtual Memories secondary Storage, Introduction to RAID.

UNIT - III:

Input-Output Organization: Peripheral Devices, Input-Output Interface, Asynchronous Data Transfer Modes, Priority Interrupt, Direct Memory Access, Input-Output Processor (IOP), Serial Communication; Introduction to Peripheral Components, Interconnect (PCI) Bus, Introduction to Standard Serial Communication Protocols like RS232, USB, IEEE1394.

UNIT - IV:

Operating Systems Overview: Overview of Computer Operating Systems Functions, Operating Systems Structures- Systems Calls, System Programs **Process Management:** Process,Process States,Process Control Block, CPU Scheduling Algorithams **Memory Management:** Swapping, Contiguous Memory Allocation, Paging, Structure of the Page Table, Segmentation, Virtual Memmory, Demand Paging, Page-Replcement Algorithms, Allocation of Frames, Thrashing

UNIT - V:

Principles of Deadlock: System Model, Deadlock Characterization, Deadlock Prevention, Detection and Avoidance, Recovery from Deadlock.

File System Interface: The Concept of a File, Access Methods, Directory Structure, File System Mounting, File Sharing, Protection.

TEXT BOOKS:

1. Computer Organization - Carl Hamacher, ZvonksVranesic, SafeaZaky, 5th Edition, McGraw Hill.
2. Computer System Architecture - M.Moris Mano, 3rd edition, Pearson

REFERENCE BOOKS:

1. Computer Organization and Architecture - William Stallings 6th Edition, Pearson
2. Operating System Concepts - AbrehamSilberchatz, Peter B. Galvin, Greg Gagne, 8th Edition, John Wiley.
3. Structured Computer Organization - Andrew S. Tanenbaum, 4th Edition, PHI
4. Operating Systems - Internals and Design Principles, Stallings, 6th Edition - 2009, Pearson Education.
5. Modern Operating Systems, Andrew S Tanenbaum 2nd Edition, PHI
6. Principles of Operating System, B. L. Stuart, Cengage Learning, India Edition.

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

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(2204PC61) ELECTRONIC DEVICES AND CIRCUITS LAB

Course Outcomes:

- Examine, the diode's V-I properties
- Design and Analysis of Diode applications of electronic devices and circuits and devices like amplifier and filters
- Understand the working of Amplifiers using small-signal transistors
- Design and Analyze frequency response of different amplifier configurations (CE, CC, CS)
- Analyze and realize different electronic diodes.
- Evaluate the performance of Special purpose electronic diodes such as LEDs & SCRs

PART A: (Only for Viva-voce Examination)

Electronic Workshop Practice (In 3 Lab Sessions):

1. Identification, Specifications, Testing of R, L, C Components (Color Codes), Potentiometers, Switches (SPDT, DPDT, and DIP), Coils, Gang Condensers, Relays, Bread Boards, PCB's
2. Identification, Specifications and Testing of Active Devices, Diodes, BJT's, Low power JFET's, MOSFET's, Power Transistors, LED's, LCD's, SCR, UJT.
3. Study and operation of
   i. Multimeters (Analog and Digital)
   ii. Function Generator
   iii. Regulated Power Supplies
   iv. CRO

1. P-N junction diode characteristics
2. Zener diode characteristics and Zener as voltage regulator
3. Half -Wave Rectifier with and without filter
4. Full - Wave Rectifier with and without filter
5. Input and output characteristics of transistor in CB configuration
6. Input and output characteristics of transistor in CE configuration
7. FET Characteristics
8. h-parameters of CE configuration
9. Frequency response of CE amplifier
10. Frequency response of CC amplifier
11. Frequency response of common source FET amplifier
12. UJT CHARACTERISITCS

1. Regulated Power supplies (RPS)	0-30 V
2. CRO's	0-20 MHz
3. Function Generators	0-1 MHz
4. Multimeters	
5. Decade Resistance Boxes / Rheostats	
6. Decade Capacitance Boxes	
7. Ammeters (Analog or Digital)	0-20 μA, 0-50μA, 0-100μA, 0-200μA, 0-10 mA
8. Voltmeters (Analog or Digital)	0-50V, 0-100V, 0-250V
9. Electronic Components	Resistors, Capacitors, BJT's, SCR's, UJTs, FET's,LED's, MOSFET's, Diodes- Ge & Si type, Transistors – NPN, PNP

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II Year B.Tech ECE-I Sem **L / T / P/ C**
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(2204PC62) BASIC SIMULATION LAB

Course Outcomes:

- Perform basic operations on matrices and generate various types of signals and sequences (e.g., unit impulse, step, sinusoidal) for use in signal processing applications.
- Apply fundamental operations (addition, scaling, shifting, folding) on signals and sequences, and analyze their even and odd components as well as real and imaginary parts.
- Evaluate the convolution and correlation of signals and sequences to determine linearity, time-invariance,
- Demonstrate the synthesis of waveforms using Laplace transforms and compute Fourier transforms of signals, visualizing their magnitude and phase spectra for frequency-domain analysis
- Analyze and plot pole-zero maps in both s-plane and z-plane to interpret system stability and response characteristics, reinforcing theoretical understanding of transfer functions.
- Verify the sampling theorem and examine noise removal using correlation techniques, assessing signal quality and system response under various conditions, including Gaussian noise.

Note:

1. All the experiments are to be simulated using MATLAB or equivalent software
2. Minimum of 15 experiments are to be completed

List of experiments:

1. Basic operations on matrices.
2. Generation on various signals and Sequences (periodic and aperiodic), such as unit impulse, unit step, square, sawtooth, triangular, sinusoidal, ramp, sinc.
3. Operations on signals and sequences such as addition, multiplication, scaling, shifting, folding.
4. Finding the even and odd parts of signal/sequence and real and imaginary part of signal.
5. Convolution between signals and sequences.
6. Auto correlation and cross correlation between signals and sequences.
7. Verification of linearity properties of a given continuous /discrete system.
8. Verification of time invariance properties of a given continuous discrete system.
9. Computation of unit sample, unit step and sinusoidal response of the given LTI system and verifying its stability.
10. Waveform synthesis using Laplace transform.
11. Finding the Fourier transform of a given signal and plotting its magnitude and phase spectrum.

12. Locating the zeros and poles and plotting the pole zero maps in s-plane and z-plane for the given transfer function.
13. Generation of Gaussian Noise (real and complex), computation of its mean, M.S. Value and its skew, kurtosis, and PSD, probability distribution function.
14. Sampling theorem verification.
15. Removal of noise by auto correlation/cross correlation.
16. Verification of Weiner-Khinchine relations.
17. Checking a random process for stationary in wide sense.

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(2200MC03) INDIAN CONSTITUTION

(Mandatory Course)

Course Objective:

To enable the students to be aware of emergence and evolution of Indian Constitution, to understand their fundamental rights and duties and to understand the structure and composition of Election Commission.

Course Outcome:

- Understand the meaning, importance, and evolution of the Indian Constitution and identify its salient features.
- Analyze the scheme of Fundamental Rights, Fundamental Duties, and Directive Principles of State Policy, and evaluate their legal status and significance in governance.
- Describe the structure and functioning of the Union Government, including the roles and powers of the President, Prime Minister, Council of Ministers, Lok Sabha, and Rajya Sabha.
- Discuss the historical perspectives of constitutional amendments and understand the emergency provisions outlined in the Indian Constitution.
- Examine the constitutional framework for local self-government in India and assess its impact on grassroots democracy.
- Analyze the role and functioning of the Election Commission, including the Chief Election Commissioner, State Election Commissions, and institutions supporting the welfare of SC/ST/OBC and women.

UNIT –I Meaning and Importance of Constitution, Evolution of the constitution of India. Salient features of the constitution of India

UNIT –II Scheme of fundamental rights, fundamental duties and its legal status. The Directive Principles of State Policy- Significance and implementation

UNIT –III Government of the Union : President of India – Election and Powers, Prime Minister and Council of Ministers, Lok Sabha – Composition and Powers, Rajya Sabha – Composition and Powers

UNIT –IV The historical perspectives of the constitutional amendments in India. Emergency provisions: National Emergency, President Rule, Financial Emergency, Local self-government-Constitutional scheme in India

UNIT –V Election Commission: Role and Functioning, Chief Election Commissioner and Election Commissioners, State Election Commission: Role and Functioning, Institute and Bodies for the welfare of SC/ST/OBC and women.

TEXTBOOKS:

1. The Constitution of India, 1950 (Bare Act), Government Publication.
2. M. P. Jain, Indian Constitution Law, 7th Edn., Lexis Nexis, 2014.

REFERENCES:

1. D.D. Basu, Introduction to the Constitution of India, Lexis Nexis, 2015
2. ‘Indian Administration’ by Avasti and Avasti

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II Year B.Tech ECE-II Sem **L/ T / P / C**
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(2204PC05) ANALOG CIRCUITS

OBJECTIVES

The main objectives of the course are:

- To introduce circuit realizations with components such as diodes, BJTs andtransistors studied earlier.
- To give understanding of various types of amplifier circuits such as small signal, cascaded, large signal and tuned amplifiers.
- To familiarize the Concept of feedback in amplifiers so as to differentiate between negative and positive feedback.

OUTCOMES

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

- Understand small signal amplifier circuits applying the biasing techniques learnt earlier.
- Understand Cascade different amplifier configurations to obtain the required overall specifications like Gain, Bandwidth, Input and Output interfacing Impedances
- Will have the exposure on JFET ,MOSFET amplifiers
- Utilize the Concepts of negative feedback to improve the stability of amplifiers and positive feedback to generate sustained oscillations.
- Design and realize different classes of Power Amplifiers and tuned amplifiers useable for audio and Radio applications
- Understand small signal amplifier circuits applying the biasing techniques learnt earlier.

UNIT – I

And Design of Small Signal Low Frequency BJT Amplifiers: CE Amplifier with emitter resistance, low frequency response of BJT Amplifiers, effect of coupling and bypass capacitors, Design of single stage RC coupled amplifier Differentcoupling schemes used in amplifiers, Analysis of Cascaded RC Coupled amplifiers, Cascode amplifier, Darlington pair,

UNIT – II

Transistor At High Frequency: The Hybrid- pi – Common Emitter transistor model,CE short circuit current gain, current gain with resistive load, single stage CE transistor amplifier response, Gain-bandwidth product.

UNIT – III

FET Amplifiers: Analysis of JFET Amplifiers, Analysis of CS, CD, CG JFET Amplifiers, comparison of performance with BJT Amplifiers, Basic Concepts of MOS Amplifiers, – MOSFET – MOSFET Characteristics in Enhancement and Depletion mode – MOS Small signal model, Common source amplifier with resistive, Source follower, Common Gate Stage

UNIT –IV

Positive & Negative Feedback In Amplifiers: Classification of 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 – Simple problems. **Oscillators:** Classification of oscillators, Barkhausen criterion, RC phase shift oscillator, Wein bridge oscillator, LC oscillator Hartley and Colpitts oscillator.

UNIT – IV

Large Signal Amplifiers: classification,distortion and amplifiersClass A Power Amplifier, Maximum Value of Efficiency of Class – A Amplifier, Transformer Coupled Amplifier, Push Pull and Complimentary Symmetry Class B and Class AB Power Amplifiers – Transistor Power Dissipation, Heat Sinks.

TEXT BOOKS:

1. Electronic Devices and Circuits, David A. Bell – 5th Edition, Oxford.
2. Electronics circuits and applications , Md H Rashid, Cengage 2014

REFERENCES:

1. Integrated Electronics, Jacob Millman, Christos C Halkias, McGraw Hill Education
2. 2. Electronic Devices and Circuits, S. Salivahanan, N. Suresh Kumar, A Vallvaraj, 5th Edition, MC GRAW HILL EDUCATION.
3. 3. Electronic Devices and Circuits theory– Robert L. Boylestead, Louis Nashelsky, 11th Edition, 2009, Pearson.
4. Electronic Devices Conventional and current version -Thomas L. Floyd 2015.

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(2204PC06) ANALOG AND DIGITAL COMMUNICATIONS

COURSE OBJECTIVES

The main objectives of the course are:

- To develop ability to analyze system requirements of analog communicationsystems.
- To understand the need for modulation
- To understand the generation, detection of various analog modulation techniquesand also perform the mathematical analysis associated with these techniques.
- To understand the pulse modulation techniques.
- To understand the functional block diagram of Digital communication system.
- To understand the need for source and channel coding.
- To study various source and channel coding techniques.

COURSE OUTCOMES

Upon completion of the course, student should possess the following skills:

- Able to analyze and design various modulation and demodulation analog systems.
- Understand the characteristics of noise present in analog systems.
- Study of signal to Noise Ration (SNR) performance, of various Analog Communication systems.
- Understand basic components of Digital Communication Systems.
- Analyze the error performance of Digital Modulation Techniques.
- Understand the redundancy present in Digital Communication by using various sourcecoding techniques.
- Know about different error detecting and error correction codes like blockcodes,cyclic codes and convolution codes

Unit-I: Analog Modulation Schemes: Introduction to communication system, Principles of Amplitude Modulation Systems- DSB, SSB and VSB modulations. Angle Modulation, Representation of FM and PM signals, Spectral characteristics of angle modulated signals.

Unit-II: Noise in Analog Communication:Noise in AM, FOM measurement in AM, DSBSC,SSBSC. Noise in FM, FOM measurement in FM, Pre-emphasis and De-emphasis.
Receivers: TRF Receiver, Super Heterodyne Receiver, Receiver characteristics, TDM, FDM

Unit-III:Pulse Analog modulation Techniques:PAM, PWM, PPM

Introduction to Digital Communication System: Digital Representation of analog signal, Advantages and Disadvantages of Digital Communication,
Waveform Coding Techniques: Pulse code modulation (PCM), Differential pulse code modulation. Delta modulation, Limitations, Adaptive Delta Modulation, S/N Ratio of PCM, DM.

Unit-IV: Information Theory: Information measurement, Entropy, Conditional Entropy, Mutual Information, properties, Information Rate, Discrete Memory less source, channel coding theorem. Source coding techniques-Shannon Fano, Huffman, Shannon Hartley laws. Error control coding: Block codes, Syndrome decoding, cyclic codes, syndrome decoding.

Unit-V: Pass band Digital Modulation schemes-ASK, PSK, FSK Generation-coherent and non coherent detection techniques, QPSK, 8PSK,16PSK, QAM-constellation diagrams.

TEXT BOOKS:

1. Communications system, S.Haykin, Wiley, 4 edition 2009.
2. Digital and Analog Communication Systems Sam Shanmugam, John Wiley, 2005.

REFERENCES:

1. Principles of Communication Systems -Herbert Taub, Donald L Schiling, Goutam Saha,3rd Edition, Mc Graw -Hill, 2008
2. Electronic communication systems, Wayne Tomasi, 5 edition, Pearson
3. Communication Systems: Analog and Digital,R. P. Singh,S. Sapre, McGraw-Hill Education, 2012
4. Digital Communications –John G. Proakis , MasoudSalehi –5th Edition, McGraw-Hill, 2008.

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(2204PC07) CONTROL SYSTEMS

COURSE OBJECTIVES

The main objectives of the course are:

- 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 methodsfor improving it
- To assess the system performance using frequency domain analysis and techniques forimproving the performance
- To design various controllers and compensators to improve system performance

COURSE OUTCOMES

Upon completion of the course, student should possess the following skills:

- Understand the basic concepts of control systems and analyze the effects of feedback on system performance.
- Apply mathematical modeling techniques to develop transfer functions for DC servomotor, AC servo motor and synchro's, and represent them using block diagrams and signal flow graphs.
- Analyze the time response of first- and second-order systems to standard test signals, and evaluate system performance through steady-state errors and error constants.
- Understand stability concepts and evaluate system stability using Routh-Hurwitz criteria and Root Locus techniques.
- Apply frequency-response techniques such as Bode and Nyquist plots to evaluate system stability and performance in the frequency domain.
- Apply state-space mets to represent continuous systems and evaluate state transition matrices for solving time-invariant state equations.

UNIT – I

Introduction: Concepts of Control Systems- Open Loop and closed loop control systems and their differences- Different examples of control systems- Classification of control systems,Feed-Back Characteristics, Effects of feedback. Mathematical models – Differential equations - Impulse Response and transfer functions - Translational and Rotational mechanical systems.

Transfer Function Representation: Transfer Function of DC Servo motor - AC Servo motor- Synchro transmitter and Receiver, Block diagram representation of systems considering electrical systems as examples - Block diagram algebra – Representation by Signal flow graph - Reduction using mason's gain formula.

UNIT-II

Time Response Analysis: Standard test signals - Time response of first order systems – Characteristic Equation of Feedback control systems, Transient response of second order systems - Time domain specifications – Steady state response - Steady state errors and error constants – Effects of proportional derivative, proportional integral systems. UNIT – III

Stability Analysis: The concept of stability - Routh stability criterion – qualitative stability and conditional stability.

Root Locus Technique: The root locus concept - construction of root loci-effects of adding poles and zeros to G(s) H(s) on the root loci.

Frequency Response Analysis: Introduction, Frequency domain specifications-Bode diagrams-Determination of Frequency domain specifications and transfer function from the Bode Diagram-Phase margin and Gain margin-Stability Analysis from Bode Plots.

UNIT – IV

Stability Analysis In Frequency Domain: Polar Plots, Nyquist Plots and applications of Nyquist criterion to find the stability - Effects of adding poles and zeros to G(s)H(s) on the shape of the Nyquist diagrams.

Classical Control Design Techniques: Compensation techniques – Lag, Lead, and Lead-Lag Controllers design in frequency Domain, PID Controllers.

UNIT – V

State Space Analysis of Continuous Systems: Concepts of state, state variables and state model, derivation of state models from block diagrams, Diagonalization- Solving the Time invariant state Equations- State Transition Matrix and its Properties.

TEXT BOOKS:

1. "I. J. Nagrath and M. Gopal", "Control Systems Engineering", New Age International (P) Limited, Publishers, 5th edition, 2009
2. "B. C. Kuo", "Automatic Control Systems", John wiley and sons, 8th edition, 2003.

REFERENCE BOOKS:

1. "N. K. Sinha", "Control Systems", New Age International (P) Limited Publishers, 3rd Edition, 1998.
2. "NISE", "Control Systems Engineering", John wiley, 6th Edition, 2011.
   "Katsuhiko Ogata", "Modern Control Engineering", Prentice Hall of India Pvt. Ltd.,3rd edition, 1998.

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II Year B.Tech ECE-II Sem **L /T/ P / C**
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(2200BS03) COMPLEX ANALYSIS & TRANSFORM TECHNIQUES

Course Objectives: To learn
- Differentiation and integration of complex Valued functions
- Evaluation of integrals using Cauchy's integral formula
- Laurent's series expansion of complex functions
- Evaluation of integrals using Residue theorem
- A periodic function by Fourier series and a non-periodic function by Fourier transform
- z-transform of a sequence and properties

Course Outcomes: After learning the contents of this paper the student must be able to
- Understand and apply complex integration techniques, including line integrals and Cauchy's integral theorem and formula.
- Analyze singularities in complex functions, including isolated singular points, essential singularities, poles, and residues.
- Evaluate residues using the residue theorem and apply it to compute integrals, including improper real integrals.
- Develop and analyze Fourier series and transforms, including Dirichlet's conditions and half-range expansions.
- Apply Laplace transforms to solve ordinary differential equations and evaluate inverse Laplace transforms using various methods.
- Utilize Z-transforms and inverse Z-transforms for the analysis of discrete-time signals and solve difference equations using relevant properties.

UNIT – I

Analytic Functions: Introduction, Continuity, Differentiability, Analyticity,Cauchy-Riemann equations in Cartesian and polar coordinates(without proof)**.** Harmonic and conjugate harmonic functions-Milne-Thompson method(without proof).

UNIT – II

Complex integration: Line integral, Cauchy's integral theorem, Cauchy's integral formula,and Generalized Cauchy's integral formula, Power series: Taylor's series-Laurent series.

UNIT – III

Singularities and Contour Integration: Singular points, isolated singular points essential singularity,Pole, Residue, Cauchy Residue theorem (Without proof) Residue – Evaluation of residue by formula and by Laurent series – Residue theorem. Evaluation of integrals of the type(a) Improper real integrals

$\int_{-x}^{x} f(x)dx$ (b) $\int^{c+2\pi} f(cos\theta, sin\theta)d\theta.$

c

UNIT – IV

Fourier series: Introduction, Fourier series definition, Dirichlet's conditions, Even and odd functions, Half range sine and cosine series.

UNIT – V

Transform Techniques:

Fourier Transforms: Fourier integral theorem (without proof), Fourier sine and cosine integrals, sine and cosine transforms, properties, inverse transforms and finite Fourier transforms.

z-transforms: z- transforms, inverse z-transforms, properties, damping rule, shifting rule, Initial and final value theorems, convolution theorem, solution of difference equation by z-transforms.

TEXT BOOKS:

1. Dr. B. S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 36th Edition, 2010.
2. R. K. Jain and S.R.K. Iyengar, Advanced Engineering Mathematics, Narosa Publishers, 4th Edition, 2014.
3. Erwin Kreyszig, Advanced Engineering Mathematics, John Wiley & Sons,9thEdition, 2006.

REFERENCES:

1. Murray Spigel, Seymour Lischutz, John Schiller, Dennis Spellman, Complex Variables bu Schaum's Outlines, 2nd Edition, 2009.
2. S. Arumugam, A. Tangapandi Isaac, A. Somasundaram, Complex Analysis, Scitech Publications, 2012.

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3/ 0 / 0/ 3

(2000HS03) MANAGERIAL ECONOMICS & FINANCIAL ANALYSIS

OBJECTIVES:

To enable the student to understand and appreciate, with a particular insight, the importance of certain basic issues governing the business operations namely, demand and supply, production function, cost analysis, markets, forms of business organizations, capital budgeting and financial accounting and financial analysis.

OUTCOMES:

At the end of the course, the student will

- Understand the basic aspects of managerial economics including the nature and scope of demand analysis, the various determinants of demand, elasticity of demand, and demand forecasting.
- Assess production and cost concepts such as production function, laws of returns to scale, and be able to perform break-even analysis for effectiveness in the choice of production and cost minimization strategies.
- Analyze among the three broad categories of business competition (perfect competition, monopoly and monopolistic competition) as well as pricing mechanisms and their applicability within the different business contexts.
- Applying capital budgeting mets that include the Payback Period, ARR, and NPV to evaluate the feasibility of the proposed capital investment projects.
- Applying financial statements including the Trading Account, Profit and Loss Account and the Balance Sheet through the relevant accounting concepts to evaluate an organization's position.
- Analyze financial data using cash flow and fund flow techniques in evaluating the operational position and performance of a firm for effective policy formulation.

Unit I: Introduction & Demand Analysis: Definition, Nature and Scope of Managerial Economics. Demand Analysis: Demand Determinants, Law of Demand and its exceptions. Elasticity of Demand: Definition, Types, Measurement and Significance of Elasticity of Demand. Demand Forecasting, Factors governing demand forecasting, methods of demand forecasting.

Unit II: Production & Cost Analysis: Production Function - MRTS, Least Cost Combination of Inputs, Laws of Returns to Scale, Internal and External Economies of Scale. Cost Analysis: Cost concepts. Break-even Analysis (BEA) - Determination of Break-Even Point (simple problems).

Unit III: Markets & New Economic Environment: Types of competition and Markets, Features of Perfect competition, Monopoly and Monopolistic Competition, Pricing: Objectives and Policies of Pricing, Methods of Pricing, Business: Features and evaluation of different forms of Business Organization, Sole Proprietorship, Partnership, Joint Stock

Company, Public Enterprises and their types, New Economic Environment, Changing Business Environment in Post-liberalization scenario.

Unit IV: Capital Budgeting: Capital and its significance, Types of Capital, Estimation of Fixed and Working capital requirements, Methods and sources of raising capital, Capital Budget, Cash Budget, Capital Budgeting: features of capital budgeting proposals, Methods of Capital Budgeting, Payback Method, Accounting Rate of Return (ARR) and Net Present Value Method (simple problems).

Unit V: Introduction to Financial Accounting & Financial Analysis: Accounting concepts and Conventions - Double Entry - Book Keeping, Journal, Ledger, Trial Balance - Final Accounts (Trading Account, Profit and Loss Account and Balance Sheet with simple adjustments), Financial Statement Analysis: cash flow & Funds flow statements (simple problems).

TEXT BOOKS:

1. Varshney & Maheswari: Managerial Economics, Sultan Chand, 2009.
2. S.A. Siddiqui & A.S. Siddiqui, Managerial Economics and Financial Analysis, New Age international Publishers, Hyderabad 2013.
3. M. Kasi Reddy & Saraswathi, Managerial Economics and Financial Analysis, PHI New Delhi, 2012.

REFERENCES:

1. Ambrish Gupta, Financial Accounting for Management, Pearson Education, New Delhi, 2012.
2. H. Craig Peterson & W. Cris Lewis, Managerial Economics, Pearson, 2012.
3. Lipsey & Chrystel, Economics, Oxford University Press, 2012.
4. Domnick Salvatore: Managerial Economics In a Global Economy, Thomson, 2012.
5. Narayanaswamy: Financial Accounting - A Managerial Perspective, Pearson, 2012.
6. S.N. Maheswari & S.K. Maheswari, Financial Accounting, Vikas, 2012.
7. Truet and Truet: Managerial Economics: Analysis, Problems and Cases, Wiley, 2012.
8. Dwivedi: Managerial Economics, Vikas, 2012.
9. Shailaja & Usha: MEFA, University Press, 2012.
10. Aryasri: Managerial Economics and Financial Analysis, TMH, 2012.
11. Vijay Kumar & Appa Rao, Managerial Economics & Financial Analysis, Cengage 2011.
12. J.V. Prabhakar Rao & P.V. Rao, Managerial Economics & Financial Analysis, Maruthi Publishers, 2011.

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(2204PC63) ANALOG CIRCUITS LAB

Course Outcomes:

- Examine the frequency response of BJT amplifiers.
- Examine the frequency response of FET amplifiers.
- Understand the working of Push Pull amplifier & different configurations of feedback amplifier
- Design and Analyze different types of oscillators
- Analyze and realize different classes of Power Amplifiers.
- Evaluate the performance of Tuned amplifiers and estimate the resonant requency useable for audio and Radio applications

Note:

- Minimum 12 experiments should be conducted:
- Experiments are to be simulated using Multisim or P-spice or Equivalent Simulationand then testing to be done in hardware.

LIST OF EXPERIMENTS:

1. Common Emitter Amplifier
2. Common Base Amplifier
3. Common Source amplifier
4. Two Stage RC Coupled Amplifier
5. Current Shunt Feedback Amplifier
6. Voltage Series Feedback Amplifier
7. Cascode Amplifier
8. Wien Bridge Oscillator using Transistors
9. RC Phase Shift Oscillator using Transistors
10. Class A Power Amplifier (Transformer less)
11. Class B Complementary Symmetry Amplifier
12. Hartley Oscillator
13. Colpitt's Oscillator
14. Single Tuned Voltage Amplifier

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(2204PC64) ANALOG & DIGITAL COMMUNICATIONS LAB
Course Outcomes:

- Design and Implementation of different analog modulation and Demodulation techniques
- Apply Time Division Multiplexing concepts in different pulse modulation techniques
- Demonstrate the ability to generate PCM signals from analog signals
- Describe Practical Implementation of base band modulation techniques
- Design and Implement different Pulse Modulation Techniques
- Analyzing Digital Modulation techniques

Part-1: ANALOG COMMUNICATIONS (Any 8 Experiments)

1. Amplitude modulation and demodulation.
2. DSB-SC Modulator & Detector
3. SSB-SC Modulator & Detector (Phase Shift Method)
4. Frequency modulation and demodulation.
5. Study of spectrum analyzer and analysis of AM and FM Signals
6. Pre-emphasis & de-emphasis.
7. Verification of Sampling Theorem
8. Pulse Amplitude Modulation & Demodulation
9. Pulse Width Modulation & Demodulation
10. Pulse Position Modulation & Demodulation

Part-2: DIGITAL COMMUNICATIONS (Any 6 Experiments)

1. PCM Generation and Detection
2. Differential Pulse Code Modulation
3. Delta Modulation
4. Adaptive Delta modulation
5. Frequency Shift Keying: Generation and Detection
6. Phase Shift Keying: Generation and Detection
7. Amplitude Shift Keying: Generation and Detection
8. OFDM: Generation and Detection

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(2200MC04) HUMAN VALUES AND PROFESSIONAL ETHICS
(Mandatory Course)

Course Objective: To enable the students to imbibe and internalize the Values and Ethical Behaviour in the personal and Professional lives.

Course Outcome:

- Evaluate the concepts of human values, including self-exploration and natural acceptance, and assess their role in fostering happiness and prosperity as fundamental human aspirations..
- Analyze the principles of harmony in family and society, including values such as trust and respect, and develop strategies to promote a harmonious, universally unified society.
- Differentiate between personal and professional ethics, including ethical dilemmas, and apply concepts of life skills and emotional intelligence to navigate ethical decisions in a professional context.
- Interpret the ethical responsibilities and moral values in engineering practices by examining real-world case studies, and evaluate the impact of professional codes of conduct on workplace norms and accountability
- Analyzation of global ethical issues, including sustainable development, technology globalization, and corporate governance, and propose solutions
- Assess the ethical implications of emerging global concerns—such as media, war, and bioethics—and develop frameworks for ethical decision-making regarding intellectual property rights and environmental sustainability.

UNIT - I: Introduction to Human Values: Need, basic Guidelines, Content and Process for Value Education, Self Exploration - 'Natural Acceptance' and Experiential Validation. Continuous Happiness and Prosperity - A look at basic Human Aspirations. Right understanding, Relationship and Physical Facilities. Understanding Happiness and Prosperity correctly

UNIT - II:Understanding Harmony in the Family and Society: Harmony in Human - Human Relationship: Understanding harmony in the Family the basic unit of human interaction. Understanding values in human - human relationship; meaning of Nyaya and program for its fulfillment to ensure Ubhay-tripti; Trust (Vishwas) and Respect (Samman) as the foundational values of relationship. Understanding the harmony in the society (society being an extension of family). Visualizing a universal harmonious order in society - Undivided Society (AkhandSamaj), Universal Order (SarvabhaumVyawastha) - from family to world family!

UNIT – III:Introduction to Professional Ethics: Basic Concepts, Governing Ethics, Personal & Professional Ethics, Ethical Dilemmas, Life Skills, Emotional Intelligence, Thoughts of Ethics, Value Education, Dimensions of Ethics, Profession and professionalism, Professional Associations, Professional Risks, Professional Accountabilities, Professional Success, Ethics and Profession.

UNIT – IV:Professional Practices in Engineering: Work Place Rights & Responsibilities, Professions and Norms of Professional Conduct, Norms of Professional Conduct vs. Profession; Responsibilities, Obligations and Moral Values in Professional Ethics, Professional codes of ethics, the limits of predictability and responsibilities of the engineering profession. Central Responsibilities of Engineers – The Centrality of Responsibilities of Professional Ethics; lessons from 1979 American Airlines DC-10 Crash and Kansas City Hyatt Regency Walk away Collapse.

UNIT – V:Global issues in Professional Ethics: Introduction – Current Scenario, Technology Globalization of MNCs, International Trade, World Summits, Issues, Business Ethics and Corporate Governance, Sustainable Development Ecosystem, Energy Concerns, Ozone Depletion, Pollution, Ethics in Manufacturing and Marketing, Media Ethics, War Ethics, Bio Ethics, Intellectual Property Rights.

TEXT BOOKS:

1. R. R. Gaur, R Sangal, G P Bagaria, 2009, A Foundation Course in Human Values andProfessional Ethics.
2. Professional Ethics: R. Subramanian, Oxford University Press, 2015.

REFERENCE BOOKS:

1. Prof. K. V. Subba Raju, 2013, Success Secrets for Engineering Students, SmartStudent Publications, 3rd Edition.
2. Ethics in Engineering Practice & Research, Caroline Whitbeck, 2e, CambridgeUniversity Press 2015.
3. Ivan IIIich, 1974, Energy & Equity, The Trinity Press, Worcester, and HarperCollins,USA
4. Engineering Ethics, Concepts Cases: Charles E Harris Jr., Michael S Pritchard,Michael J Rabins, 4e , Cengage learning, 2015.
5. Business Ethics concepts & Cases: Manuel G Velasquez, 6e, PHI, 2008.

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(2204PC08) DIGITAL LOGIC DESIGN

COURSE OBJECTIVES:

- To understand common forms of number representation in logic circuits
- To learn basic techniques for the design of digital circuits and fundamental concepts used in the design of digital systems.
- To understand the concepts of combinational logic circuits and sequential circuits.
- To understand the Realization of Logic Gates Using Diodes & Transistors.

COURSE OUTCOMES: Upon completing this course, the student will be able to

- Understand the numerical information in different forms and Boolean Algebra theorems
- Postulates of Boolean algebra and to minimize combinational functions
- Analyze combinational circuits
- Analyze and sequential circuits
- Analyze finite state machines
- Known about the logic families and realization of logic gates

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.

UNIT - II:

Minimization of Boolean functions: Karnaugh Map Method - Up to five Variables, Don't Care Map Entries, Tabular Method,

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

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.

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

UNIT – V:

Realization of Logic Gates Using Diodes & Transistors: AND, OR and NOT Gates using Diodes and Transistors, DCTL, RTL, DTL, TTL, CML and CMOS Logic Families and its Comparison, Classification of Integrated circuits, comparison of various logic families, standard TTL NAND Gate- Analysis & characteristics, TTL open collector O/Ps, Tristate TTL, MOS & CMOS open drain and tri- state outputs, CMOS transmission gate, IC interfacing- TTL driving CMOS & CMOS driving TTL.

TEXT BOOKS:

1. Switching and Finite Automata Theory - Zvi Kohavi & Niraj K. Jha, 3rd Edition, Cambridge, 2010.

2. Modern Digital Electronics − R. P. Jain, 3rd Edition, 2007- Tata McGraw-Hill

REFERENCE BOOKS:

1. Digital Design- Morris Mano, PHI, 4th Edition,2006

2. Introduction to Switching Theory and Logic Design − Fredriac J. Hill, Gerald R. Peterson, 3rd Ed, John Wiley & Sons Inc.

3. Fundamentals of Logic Design- Charles H. Roth, Cengage Learning, 5th, Edition, 2004.

4. Switching Theory and Logic Design − A Anand Kumar, PHI, 2013

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(22004PC09) ELECTROMAGNETIC WAVES

COURSE OBJECTIVES:

This is a structured foundation course, dealing with concepts, formulations and applications of Electromagnetic Theory and Transmission Lines, and is the basic primer for all electronic communication engineering subjects. The main objectives of the course are

- To learn the Basic Laws, Concepts and proofs related to Electrostatic Fields and Magnetostatic Fields, and apply them to solve physics and engineering problems.
- To distinguish between static and time-varying fields, and understand the significance and utility of Maxwell's Equations and Boundary Conditions, and gain ability to provide solutions to communication engineering problems.
- To analyze the characteristics of Uniform Plane Waves (UPW), determine their propagation parameters and estimate the same for dielectric and dissipative media.
- To get familiarized with microwave frequency bands, their applications and to understand the limitations and losses of conventional tubes at these frequencies.
- To impart the knowledge of scattering matrix, its formulation and utility and establishing the S-Matrix for various types of multiport junctions.
- To understand the concepts of microwave measurements, identify the equipment required and precautions to be taken, and get familiarized with the methods of measurement of microwave power and various other microwave parameters.

Course Outcomes:

- Having gone through this foundation course, the students would be able to
- Distinguish between the static and time-varying fields, establish the corresponding sets of Maxwell's Equations and Boundary Conditions, and use them for solving engineering problems.
- Analyze the Wave Equations for good conductors and good dielectrics, and evaluate the UPW Characteristics for several practical media of interest.
- Demonstrate the concept of Electromagnetic wave and its characteristics in different propagation media to calculate boundary value problems.
- Determine completely the rectangular waveguides, their mode characteristics, and design waveguides for computing practical microwave transmission line problems.
- Derive the properties of Scattering Matrix, formulate the S-Matrix for various microwave junctions, and understand the utility of S- parameters in microwave component design.
- Set up a microwave bench, establish the measurement procedure and conduct the experiments in microwave lab for measurement of various microwave parameters.

UNIT1:

Electrostatics: Review of Coordinate systems, Coulomb's law, Electric field intensity-Fields due to different charge distributions, Electric flux density, Gauss law and its applications, Electric potential, Relations between Electric Field Intensity (E) and Potential (V), Maxwell 's Equations for electrostatic fields, Energy density. Convention and Conduction currents, Dielectric constant, Linear, Isotropic and Homogeneous Dielectrics, Continuity equation, Relaxation time, Poisson's and Laplace's equations, Uniqueness Theorem, Capacitance- Parallel Plate, Coaxial and Spherical Capacitors, Illustrative Problems.

UNIT-2

Magnetostatics : Biot-Savart's Law, Ampere's Circuital Law and its Applications, Magnetic Flux Density, Maxwell's Equations for Magneto static Fields, Magnetic Scalar and Vector Potentials, Forces due to Magnetic Fields, Ampere's Force Law, Inductance and Magnetic Energy. Maxwell's Equations for Time varying fields: Faraday's Law of induced emf, Inconsistency of Ampere's Law, Conditions at a Boundary Surface: Dielectric-Dielectric and Dielectric– Conductor Interfaces, Illustrative Problems.

UNIT-3

EM Wave Characteristics : Wave Equations for Conducting and Dielectric Media, Uniform Plane Wave, Relation Between E and H, Sinusoidal Variations, Wave Propagation in Lossless and Conducting Media, Conductors and Dielectrics – Characterization, Wave Propagation in Good Conductors and Good Dielectrics, Polarization. Reflection and Refraction of Plane Waves – Normal and Oblique Incidences for both Perfect Conductor and Perfect Dielectrics, Brewster Angle, Critical Angle and Total Internal Reflection, Surface Impedance, Poynting Vector and Poynting's Theorem, Illustrative Problems.

UNIT-4

Waveguides: Electromagnetic Spectrum and Microwave Bands. Rectangular Wave guides – Solution of Wave Equations in Rectangular Coordinates, TE/TM mode and TEM analysis, Expressions for Fields, Characteristic Equation and Cut-off Frequencies, Dominant and Degenerate Modes, Sketches of TE, TM and TEM mode fields in the cross-section, Phase and Group Velocities, Wavelengths and Impedance Relations, Equation of Power Transmission, Impossibility of TEM Mode. Micro strip Lines – Z_o Relations, Effective Dielectric Constant, Illustrative Problems.

UNIT-5

Scattering Matrix– Significance, Formulation and Properties, S Matrix Calculations for – 2 port Junctions, E plane and H plane Tees, Magic Tee, Directional Coupler, Circulator, Isolator and Gyrator, Illustrative Problems.

Microwave Measurements: Description of Microwave Bench – Different Blocks and their Features, Errors and Precautions, Mode Characteristics of Reflex Klystron, Volt-Ampere Characteristics of Gunn Diode, Microwave Power Measurement, Bolometers. Measurement of Attenuation, Frequency Measurement. Standing Wave Measurements – Measurement of Low

and High VSWR, Measurement of Quality factor of Cavity Resonator, Impedance Measurements. Illustrative Problems.

TEXT BOOKS:

1. Principles of Electromagnetics – Matthew N.O. sadiku and S.V. Kulkarni, 6th Ed., Oxford University Press, Aisan Edition,2015.
2. Electromagnetic Waves and Radiating Systems – E.C. Jordan and K.G. Balmain, 2nd Ed. 2000,PHI.
3. Microwave Devices and Circuits – Samuel Y. Liao, Pearson, 3rd Edition,2003.

REFERENCE BOOKS:

1. Engineering Electromagnetics – Nathan Ida, 2nd Ed., 2005, Springer (India) Pvt. Ltd., New Delhi.
2. Engineering Electromagnetics – William H. Hayt Jr. and John A. Buck, 7th Ed., 2006, MC GRAW HILLEDUCATION
3. Microwave and Radar Engineering – M.Kulkarni, Umesh Publications, 3rd Edition,2003

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(2204PE01) ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING
(Professional Elective – I)

COURSE OBJECTIVES:
- Understanding artificial intelligence (AI) principles and approaches.
- Develop a basic understanding of the building blocks of AI as presented in terms of intelligent agents
- Implementing Search techniques, Knowledge representation, inference, logic, and learning.
- To introduce the basic concepts and techniques of machine learning and the need forMachine learning techniques for real world problem
- To provide understanding of various Machine learning algorithms and need for neuralnetworks in real time applications

COURSE OUTCOMES
- Understand key concepts in artificial intelligence, state space and heuristic search techniques, and Assess knowledge representation approaches.
- Understand predicate logic and rules, and Compare procedural and declarative knowledge.
- Apply concepts of probability, Bayes' theorem, and fuzzy logic, while Illustrate probabilistic graphical models, including Bayesian and Markov networks.
- Remember the concept of machines learning from data and Recall of data in model training.
- Analyze gradient descent to optimize single-variablelinear regression models. and Examine the associated cost function to assess model accuracy.
- Remember the fundamentals of unsupervised learning, including the k-means algorithm and Relate its optimization objectives.

UNIT-I
AI Fundamentals: Defining Artificial Intelligence, Defining AI techniques, AI Applications. **State Space Search and Heuristic Search Techniques:** Defining problems as State Space search, Production systems and characteristics, Hill Climbing, Breadth first and depth first search,Best first search
Knowledge Representation Issues: Representations and Mappings, Approaches to knowledgerepresentation

UNIT-II
Using Predicate Logic and Representing Knowledge as Rules:
Representing simple facts in logic, Computable functions and predicates, Procedural vs.Declarative knowledge, Logic Programming, Forward vs. backward reasoning
Symbolic Reasoning under Uncertainty: Non-monotonic Reasoning, Logics for non-monotonic reasoning

UNIT-III

Statistical Reasoning: Probability and Bayes Theorem, Certainty factors, Probabilistic GraphicalModels, Bayesian Networks, Markov Networks, Fuzzy Logic.

Introduction to Machine Learning:

Idea of Machines learning from data, Classification of problem – Regression and Classification, Supervised and Unsupervised learning.

UNIT-IV

Supervised learning: Linear Regression: Model representation for single variable, Single variable Cost Function, Gradient Decent for Linear Regression, Multivariable model representation, Multivariable cost function, Gradient Decent in practice, Normal Equation andnon-invertibility

Logistic Regression

Classification, Hypothesis Representation, Decision Boundary, Cost function, Advanced Optimization, Multi-classification (One vs. All), Problem of Over fitting, Regularization

Classification Problems: Support Vector Machines: Optimization Objective, Large MarginClassifiers, Kernels, SVM practical considerations

UNIT-V

Unsupervised learning: Unsupervised learning introduction, k-Means Algorithm, Optimization objective, Random Initialization, Choosing number of clusters

Neural Networks: Non-linear Hypothesis, Biological Neurons, Model representation, Intuition for Neural Networks, Multiclass classification, Cost Function, Back Propagation Algorithm, Back Propagation Intuition, Weights initialization, Neural Network Training

TEXT BOOKS

1. Artificial Intelligence, Elaine Rich and Knight, McGraw-Hill Publications
2. MACHINE LEARNING An Algorithmic Perspective 2nd Edition, Stephen Marsland,2015, by Taylor & Francis Group, LLC
3. Introduction to Machine Learning ,The Wikipedia Guide

REFERENCE BOOKS

1. Introduction To Artificial Intelligence & Expert Systems, Patterson, PHI
2. Multi Agent systems- a modern approach to Distributed Artificial intelligence, Weiss.G, MITPress.
3. Artificial Intelligence: A modern Approach, Russell and Norvig, Printice Hall

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(2204PE02)FPGA BASED SYSTEM DESIGN
(Professional Elective – I)

Course Objectives:
- Understand Digital system design using HDL.
- Know FPGA architecture, interconnect and technologies.
- Know different FPGA's and implementation methodologies.
- Understand configuring and implementing digital embedded system, microcontrollers, microprocessors, DSP algorithm on FPGA

Course Outcomes:
- 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 behavioural, structural, and RTL Levels.
- Understand the FPGA Architecture
- Implementation of the combinational and sequential digital circuits in FPGA
- Demonstrate the ability to write test benches, verify designs, and debug using simulation tools.

UNIT I: 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 II:Overview of FPGA Architectures and Technologies: FPGA Architectural options, coarse vs fine grained, vendor specific issues (emphasis on Xilinx FPGA), Antifuse, SRAM and EPROM based FPGAs, FPGA logic cells, interconnection network and I/O Pad

UNIT III : Verilog Modelling of Combinational and Sequential Circuits: Behavioral, Data Flow and Structural Realization – Adders – Multipliers- Comparators - Flip Flops - Realization of Shift Register - Realization of a Counter- Synchronous and Asynchronous.

UNIT IV Synchronous Sequential Circuit: State diagram-state table –state assignment-choice of flip flops – Timing diagram –One hot encoding

UNIT V: Mealy and Moore state machines – Design of serial adder using Mealy and Moore state machines - State minimization – Sequence detection- Design examples: Sequence detector, Serial adder, Vending machine using One Hot Controller

Text Book

1. M.J.S. Smith, "Application Specific Integrated Circuits", Pearson, 2000.
2. Peter Ashenden, "Digital Design using VHDL", Elsevier, 2007.
3. Peter Ashenden, "Digital Design using Verilog", Elsevier, 2007.

References:

1. W. Wolf, “FPGA based system design”, Pearson, 2004. 4. Clive Maxfield, “The DesignWarriors’s Guide to FPGAs”, Elsevier, 2004
2. Samir Palnitkar, “Verilog HDL: A Guide to Digital Design and Synthesis” Prentice Hall, Second Edition, 2003. 3. T.R. Padmanabhan, B.Bala Tripura Sundari, “Design through VerilogHDL” Wiley Interscience, 2004.

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(2204PE03)SPECCH PROCESSING
(Professional Elective – I)

Course Objectives: The objectives of this course are to make the student

- Understand the anatomy and Physiology of Speech Production system and perception model and to design an electrical equivalent of Acoustic model for Speech Production.
- To understand the articulatory and acoustic interpretation of various phonemes and their allophones.
- To analyze the speech in time domain and extract various time domain parameters which can be used for various applications like pitch extraction, end point detection, Speech Compression, Speech Synthesis etc.,
- To study the concept of Homomorphic system and its use in extracting the vocal tract information from speech using Cepstrum which is a bye product of Homomorphic processing of Speech.
- To study various Speech Signal Processing applications viz: Speech Enhancement, Speech Recognition, Speaker Recognition.
- To study various Audio coding techniques based on perceptual modeling of the humanear.

Course Outcomes: On completion of this course student will be able to

- Model an electrical equivalent of Speech Production system.
- Extract the LPC coefficients that can be used to Synthesize or compress the speech
- Design a Homomorphic Vocoder for coding and decoding of speech.
- Enhance the speech and can design an Isolated word recognition system using HMM
- Can extract the features for Automatic speaker recognition system which can used for classification.
- Can design basic audio coding methods for coding the audio signal..

UNIT I: Fundamentals of Digital Speech Processing: Anatomy & Physiology of Speech Organs, The Process of Speech Production, The Acoustic theory of speech production-Uniform lossless tube model, effect of losses in vocal tract, effect of radiation at lips, Digital models for speech signals. Perception : Anatomical pathways from the Ear to the Perception of Sound, The Peripheral Auditory system, Hair Celland Auditory Nerve Functions, Properties of the Auditory Nerve. Block schematics of the Peripheral Auditory system.

UNIT II: Time Domain models for Speech Processing: Introduction – Window considerations,Short time energy, average magnitude, average zero crossing rate, Speech vs Silence discriminationusingenergyandzerocrossing,pitchperiodestimationusingaparallelprocessing approach, the short time autocorrelation function, average magnitude difference function, pitchperiod estimation using the autocorrelation function.

UNIT III: Linear Predictive Coding (LPC) Analysis : Basic principles of Linear Predictive Analysis : The Autocorrelation Method, The Covariance method, Solution of LPC Equations : Cholesky Decomposition Solution for Covariance Method, Durbin's Recursive Solution for the Auto correlation Equations, comparison between the methods of solution of the LPC Analysis

Equations, Applications of LPC Parameters : Pitch Detection using LPC Parameters, Formant Analysis using LPC Parameters.

UNIT IV : Homomorphic Speech Processing: Introduction , Homomorphic Systems for Convolution : Properties of the Complex Cepstrum, Computational Considerations , The Complex Cepstrum of Speech, Pitch Detection , Formant Estimation, The Homomorphic Vocoder. Speech Enhancement: Speech enhancement techniques :Single Microphone Approach, Spectral Subtraction, Enhancement byre-synthesis, Combfilter,Wiener filter, MultiMicrophoneApproach.

UNIT V: Automatic Speech Recognition: Basic pattern recognition approaches, parametric representation of Speech, Evaluating the similarity of Speech patterns, Isolated digit Recognition System, Continuous word Recognition system. Elements of HMM, Training & Testing of Speech using HMM. Automatic Speaker Recognition: Recognition techniques, Features that distinguish speakers, MFCC, delta MFCC, Speaker Recognition Systems: Speaker Verification System , Speaker Identification System, Performance Metrics.

TEXTBOOKS:

1. Digital Processing of Speech Signals -L.R.Rabiner and S.W.Schafer.Pearson Education.
2. Digital Audio Signal Processing–UdoZolzer, 2ndEdition, Wiley.
3. Speech & Audio Signal Processing-BenGold &NelsonMorgan,1st Ed.,Wiley

REFENCEBOOKS:

1. Discrete Time Speech Signal Processing: PrinciplesandPractice -ThomasF.Quateri, 1st Ed., PE.
2. Digital Processing of Speech Signals.L.RRabinar and RWJhaung,1978,PHI.
   Speech Communications: Human&Machine -DouglasO'Shaughnessy,2ndEd.,EEE Press

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(2204PE04)ADVANCED COMPUTER ARCHITECTURE

(Professional Elective – I)

Course Objectives:

- To understand the fundamental of computer design
- To know the pipelines and parallelism concepts
- To know the issues in interconnect networks

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

- Familiarize the instruction set, memory addressing of Computer
- Handle the issues in pipelining and parallelism
- Familiarize the practical issues in inter network
- Evaluate multiprocessor systems, interconnection networks, and shared-memory architectures.
- Analyze and design efficient memory hierarchies, including cache and virtual memory systems, for optimized data access.
- Explore instruction-level, data-level, and thread-level parallelism to improve computational throughput.

UNIT - I

Fundamentals of Computer Design: Fundamentals of Computer design, Changing faces of computing and task of computer designer, Technology trends, Cost price and their trends, measuring and reporting performance, quantitative principles of computer design, Amdahl's law. Instruction set principles and examples- Introduction, classifying instruction set-memory addressing- type and size of operands, operations in the instruction set.

UNIT - II

Pipelines: Introduction, basic RISC instruction set, Simple implementation of RISC instruction set, Classic five stage pipe line for RISC processor, Basic performance issues in pipelining, Pipeline hazards, Reducing pipeline branch penalties.

Memory Hierarchy Design: Introduction, review of ABC of cache, Cache performance, Reducing cache miss penalty, Virtual memory.

UNIT - III

Instruction Level Parallelism the Hardware Approach: Instruction-Level parallelism, Dynamic scheduling, Dynamic scheduling using Tomasulo's approach, Branch prediction, high performance instruction delivery- hardware based speculation.

ILP Software Approach: Basic compiler level techniques, static branch prediction, VLIW approach, Exploiting ILP, Parallelism at compile time, Cross cutting issues -Hardware verses Software.

UNIT - IV

Multi Processors and Thread Level Parallelism: Multi Processors and Thread level Parallelism- Introduction, Characteristics of application domain, Systematic shared memory architecture, Distributed shared – memory architecture, Synchronization.

UNIT - V

Inter Connection and Networks: Introduction, Interconnection network media, Practical issues in interconnecting networks, Examples of inter connection, Cluster, Designing of clusters.

Intel Architecture: Intel IA- 64 ILP in embedded and mobile markets Fallacies and pit falls

TEXT BOOK:

1. John L. Hennessy, David A. Patterson, "Computer Architecture: A Quantitative Approach", 3rd Edition, Elsevier.

REFERENCE BOOKS:

1. John P. Shen and Miikko H. Lipasti, "Modern Processor Design: Fundamentals of Super Scalar Processors", 2002, Beta Edition, McGraw-Hill
2. Kai Hwang, Faye A.Brigs., "Computer Architecture and Parallel Processing", Mc GrawHill.
3. DezsoSima, Terence Fountain, Peter Kacsuk, "Advanced Computer Architecture - ADesign Space Approach", Pearson Education

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(2204PE05) INFORMATION THEORY AND CODINNG
(Professional Elective – I)

Course Objectives:

- To develop the student's ability to understand the concept of information theory
- To provide the students about various codes used for data compression
- To develop the student's ability to analyse the error correcting codes used for reliabletransfer of data
- To familiarize the student with the various decoding techniques

Course Outcomes

- At the end of this course students will demonstrate the ability to Determines a random variable's information content using its probability distribution and understand higher probabilities
- Explain the definitions of joint, conditional, and marginal entropies as they apply to probability distributions.
- Analyze how channel capabilities affect data transmission and how different elements like bandwidth and noise affect it.
- Evaluate how well different coding systems preserve data efficiency and integrity in practical settings.
- Evaluate the effects of different source coding techniques on the effectiveness and caliber of data transfer.
- Design of coding scheme that optimally incorporates information resolution and compression properties for a specific application.

UNIT I: Basics of information theory: Entropy for discrete ensembles; Shannon's noiseless coding theorem; Encoding of discrete sources. Markov sources, Shannon's noisy coding theorem and converse for discrete channels, Calculation of channel capacity and bounds for discrete channels, application to continuous channels.

UNIT II: Techniques of coding and decoding: Channel Coding, Block and convolutional codes; majority logic decoding; Viterbi decoding algorithm, Coding gains and performance. Huffmancodes and uniquely detectable codes; Cyclic codes, convolutional arithmetic codes.

UNIT III: Network Information Theory: Overview of multiple access channel (MAC), Achievable result for MAC using successive decoding technique, Outer bound on the capacity region of MAC and its capacity analysis, Gaussian MAC and its capacity analysis.

UNIT IV: Introduction to broadcast channel: Superposition coding scheme and its optimality for the degraded broadcast channel, Relation between the capacity region of Gaussian BC and MAC. Achievable rate for interference limited networks using conventional techniques such as time-sharing and treating interference as noise.

UNIT V: Introduction to channel coding for multi users: Introduction, Block codes for thebinary adder channel, Trellis codes for the multiple access channel.

Text/Reference Books:

1. N. Abramson, Information and Coding, McGraw Hill, 1963.
2. M. Mansurpur, Introduction to Information Theory, McGraw Hill, 1987.
3. R.B. Ash, Information Theory, Prentice Hall, 1970.
4. Shu Lin and D.J. Costello Jr., Error Control Coding, Prentice Hall, 1983.
5. A. El Gamal and Y. H. Kim, Network Information Theory, Cambridge University Press,2011

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(2204PE06) ELECTRONIC MEASUREMENT & INSTRUMENTATION
(Professional Elective – I)

Course Objectives:

- It provides an understanding of various measuring systems functioning and metrics for performance analysis.
- Provides understanding of principle of operation, working of different electronic instruments viz. signal generators, signal analyzers, recorders and measuring equipment.
- Provides understanding of use of various measuring techniques for measurement of different physical parameters using different classes of transducers.
- To introduce the basic principles of all measuring instruments
- To deal with the measurement of voltage, current Power factor, power, energy and Magnetic Measurements.

Course Outcomes:

- Identify the various electronic instruments based on their specifications for carrying out a particular task of measurement.
- Demonstrate how to select and use the appropriate transducer to measure various physical parameters
- Analyze the functions and features of different signal generators and analyzers when used to process various types of real-time
- Compare various electromechanical transducers (e.g., piezoelectric actuators vs. DC motors) based on efficiency, cost, and application suitability. Evaluate which types are best for specific tasks, considering performance and energy efficiency.
- Designs basic instrumentation system for a specific application, selecting appropriate components, sensors, and signal conditioning methods.
- Designs various systems that integrates the measurement of velocity, acceleration, or temperature And specify the devices, data storage, and interface that would allow the data to be processed and analysed effectively.

UNIT – I: Block Schematics of Measuring Systems:

Performance Characteristics, Static Characteristics, Accuracy, Precision, Resolution, Types of Errors, Gaussian Error, Root Sum Squares formula, Dynamic Characteristics, Repeatability, Reproducibility, Fidelity, Lag ;Measuring Instruments: DC Voltmeters, D' Arsonval Movement, DC Current Meters, AC Voltmeters and Current Meters, Ohmmeters, Multimeters, Meter Protection, Extension of Range, True RMS Responding Voltmeters, Specifications of Instruments.

UNIT– II: Potentiometers & Instrument transformers:

Principle and operation of D.C. Crompton's potentiometer – standardization – Measurement of unknown resistance, current, voltage. A.C. Potentiometers: polar and coordinate type's standardization – applications. CT and PT – Ratio and phase angle errors.Errors and compensations, extension of range using shunts and series resistance.Electrostatic Voltmeters-electrometer type and attracted disc type – extension of range of E.S. Voltmeters.

UNIT –III: Measurement of Power & Energy: Single phase dynamometer wattmeter, LPF and UPF, Double element and three element dynamometer wattmeter, expression for deflecting and control torques – Extension of range of wattmeter using instrument transformers – Measurement of active and reactive powers in balanced and unbalanced systems. Single phase induction type energy meter – driving and braking torques – errors and compensations – testing by phantom loading using R.S.S. meter. Three phase energy meter – tri-vector meter, maximum demand meters.

UNIT – IV: Signal Analyzers:

AF, HF Wave Analyzers, Harmonic Distortion, Heterodyne wave Analyzers, Spectrum Analyzers, Power Analyzers, Capacitance-Voltage Meters, Oscillators. Signal Generators: AF, RF Signal Generators, Sweep Frequency Generators, Pulse and Square wave Generators, Function Generators, Arbitrary Waveform Generator, Video Signal Generators, and Specifications.

UNIT – V: 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.

TEXT BOOKS:

1. Electronic Measurements and Instrumentation – K. Lal Kishore,Pearson Education 2010.
2. Electronic Instrumentation: H.S.Kalsi – TMH, 2nd Edition 2004.
3. "G. K. Banerjee", "Electrical and Electronic Measurements", PHI Learning Pvt.Ltd., 2nd Edition, 2016
4. "S. C. Bhargava", "Electrical Measuring Instruments and Measurements",BS Publications, 2012.

REFERENCE BOOKS:

1. "A.K. Sawhney", "Electrical & Electronic Measurement & Instruments",Dhanpat Rai & Co. Publications, 2005.
2. "R. K. Rajput", "Electrical & Electronic Measurement & Instrumentation", S.Chand and Company Ltd., 2007.
3. "Buckingham and Price", "Electrical Measurements", Prentice – Hall, 1988
4. "Reissland, M. U", "Electrical Measurements: Fundamentals, Concepts, Applications", New Age International (P) Limited Publishers,1st Edition 2010.
5. Electronic Instrumentation and Measurements – David A. Bell, Oxford Univ.Press, 1997.
6. Modern Electronic Instrumentation and Measurement Techniques: A.D. Helbincs, W.D.Cooper: PHI 5th Edition 2003
7. Electronic Measurements and Instrumentation: B.M. Oliver, J.M. Cage TMH Reprint 2009.

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III Year B.Tech ECE-II Sem **L / T / P /C**
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(2204PE07)DEEP LEARNING
(Professional Elective – II)

Course Objectives:

- To understand complexity of Deep Learning algorithms and their limitations
- To understand deep Learning algorithms and their applications in real-world data
- To Apply CNN and RNN models for real-world data
- To understand, learn and design GANs for the selected problems
- To understand the concept of Auto-encoder and enhancing GANs using Auto0encoders

Course Outcomes:

- Understand the fundamentals of deep learning, including artificial neural networks, multilayer perception, and back propagation.
- Design and implement convolution neural networks (CNNs) for image classification and computer vision tasks, leveraging popular architectures and techniques.
- Explore recurrent neural networks (RNNs) and advanced variants like LSTM and GRU for sequential data processing.
- Analyze and implement generative models, focusing on Generative Adversarial Networks (GANs) and their applications.
- Apply variousdeep learning techniques, including data augmentation, dropout, and normalization, to optimize model performance.
- Investigate challenges like vanishing gradients and leverage modern architectures for robust deep learning model design.

UNIT-I:

INTRODUCTION TO DEEP LEARNING: Historical Trends in Deep Learning, Why DL is Growing, Artificial Neural Network, Non-linear classification example using Neural Networks: XOR/XNOR, Single/Multiple Layer Perceptron, Feed Forward Network, Deep Feed- forward Neural networks, Stochastic Gradient –Based learning, Hidden Units, Architecture Design, Back- Propagation..

UNIT-II:

CONVOLUTION NEURAL NETWORK (CNN): Introduction to CNNs and their applications in computer vision, CNN basic architecture, Activation functions-sigmoid, tanh, ReLU, Softmax layer, Types of pooling layers, various popular CNN architectures: VGG, Google Net, ResNet etc, Dropout, Normalization, Data augmentation

UNIT-III

RECURRENT NEURAL NETWORK (RNN): Introduction to RNNs and their applications in sequential data analysis, Back propagation through time (BPTT), Vanishing Gradient Problem, gradient clipping Long Short Term Memory (LSTM) Networks, Gated Recurrent Units, Bidirectional LSTMs, Bidirectional RNNs.

UNIT- IV

GENERATIVE ADVERSARIAL NETWORKS (GANS): Generative models, Concept and principles of GANs, Architecture of GANs (generator and discriminator networks), Comparison between discriminative and generative models, Generative Adversarial Networks (GANs), Applications of GANs

UNIT- V

AUTO-ENCODERS: Auto-encoders, Architecture and components of Auto-encoders (encoder and decoder), Deep Boltzmann Machines (DBM), Training an auto-encoder for data compression and reconstruction, Relationship between Auto-encoders and GANs, Hybrid Models: Encoder-Decoder GANs

TEXT BOOKS:

1. Deep Learning : An MIT Press Book by Ian Goodfellow and Yoshua Bengio Aaron Courville.
2. Michael Nielson,Neural Networks and Deep Learning,Determination Press,2015.
3. Satish kumar,Neural networks:A classroom Approach,Tata McGraw-Hill Education,2004

REFERENCES:

1. Deep Learning with Python, Francois Chollet, Manning publications 2018
2. Advanced Deep Learning with Keras, Rowel Atienza, PACKT Publications 2018

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III Year B.Tech ECE-II Sem **L / T / P/ C**
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(2204PE08) CMOS ANALOG AND DIGITAL IC DESIGN
(Professional Elective – II)

Course Objectives: Analog circuits play a very crucial role in all electronic systems and due to continued miniaturization, many of the analog blocks are not getting realized in CMOS technology.

- To understand most important building blocks of all CMOS analog Ics.
- To study the basic principle of operation, the circuit choices and the tradeoffs involved inthe MOS transistor level design common to all analog CMOS ICs.
- To discuss basic CMOS logic gates, implementation of AOI and OAI gates
- Design MOS logic circuits using Transmission gates
- To analyze different delays and power dissipation in number of stages

Course Outcomes: After studying the course, each student is expected to be able to

- Design basic building blocks of CMOS analog ICs.
- Carry out the design of single and two stage operational amplifiers and voltage references.
- Able to design static and dynamic CMOS circuits (both Combinational and sequential)at transistor level and layout level.
- Able to design memory architectures that aids the growth of VLSI designs with reducedaccess time and reduced power consumption

UNIT - I MOS Devices and Modeling The MOS Transistor, Passive Components- Capacitor & Resistor, Integrated circuit Layout, CMOS Device Modeling - Simple MOS Large-Signal Model, Small- Signal Model for the MOS Transistor..

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, Cascode current Mirror and Wilson Current Mirror.

UNIT –III MOS Design: Pseudo NMOS Logic – Inverter, Inverter threshold voltage, Output high voltage, Output Low voltage, Gain at gate threshold voltage, Transient response, Rise time, Fall time, Pseudo NMOS logic gates, Transistor equivalency, CMOS Inverter logic.

UNIT –IV: Combinational MOS Logic Circuits: MOS logic circuits with NMOS loads, Primitive CMOS logic gates – NOR & NAND gate, Complex Logic circuits design – Realizing Boolean expressions using NMOS gates and CMOS gates , AOI and OIA gates, CMOS full adder, CMOS transmission gates, Designing with Transmission gates

UNIT –V: Sequential MOS Logic Circuits: Behavior of Bi-stable elements, SR Latch, Clocked latch and flip flop circuits, CMOS D latch and edge triggered Flip-flop.

TEXT BOOKS:

1. CMOS Analog Circuit Design - Philip E. Allen and Douglas R. Holberg, Oxford UniversityPress, International Second Edition/Indian Edition, 2010.
2. Analysis and Design of Analog Integrated Circuits- Paul R. Gray, Paul J. Hurst, S. Lewis and R.G. Meyer, Wiley India, Fifth Edition, 2010.

REFERENCE BOOKS:

1. Analog Integrated Circuit Design- David A. Johns, Ken Martin, Wiley Student Edn, 2013.
2. Design of Analog CMOS Integrated Circuits- Behzad Razavi, TMH Edition. 3. CMOS: CircuitDesign, Layout and Simulation- Baker, Li and Boyce, PHI.

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(2204PE09) DIGITAL IMAGE PROCESSING
(Professional Elective – II)

Course Objectives:

- To provide a approach towards image processing and introduction about 2D transforms
- To expertise about enhancement methods in time and frequency domain
- To expertise about segmentation and compression techniques
- To understand the Morphological operations on an image

Course Outcomes: Upon completing this course, the student will be able to

- Understand digital image fundamentals, including sampling, quantization, and pixel relationships, and explore various image transforms.
- Apply spatial and frequency domain techniques for image enhancement and filtering.
- Analyze and implement techniques for image restoration using various mathematical models.
- Explore image segmentation techniques and morphological image processing for feature extraction and analysis.
- Understand the concepts of image compression and implement lossless and lossy compression methods.
- Utilize advanced image processing techniques and tools to solve practical problems in the domain.

UNIT - I

Digital Image Fundamentals & Image Transforms: 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, Hotelling Transform.

UNIT - II

Image Enhancement (Spatial Domain): Introduction, Image Enhancement in Spatial Domain, Enhancement through Point Processing, Types of Point Processing,Histogram Manipulation, Linear and Non – Linear Gray Level Transformation, Local or Neighborhood criterion, Median Filter, Spatial Domain High-Pass Filtering.

Image Enhancement (Frequency Domain): Filtering in Frequency Domain, LowPass (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 And Boundary Detection, thresholding, Region Oriented Segmentation.

Morphological Image Processing: Dilation and Erosion: Dilation, Structuring Element Decomposition, Erosion, Combining Dilation and Erosion, Opening and Closing, 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 Compression, Lossy and Lossless Predictive Coding, Transform Based Compression, JPEG 2000 Standards.

TEXT BOOKS:

1. Rafael C. Gonzalez, Richard E. Woods -Digital Image Processing, 3rd Edition, Pearson, 2008
2. S Jayaraman, S Esakkirajan, T Veerakumar - Digital Image Processing- - TMH, 2010.

REFERENCE BOOKS:

1. Scotte Umbaugh- Digital Image Processing and Analysis-Human and Computer Vision Application with using CVIP Tools, 2nd Ed, CRC Press,2011
2. Rafael C. Gonzalez, Richard E Woods and Steven L. Eddings - Digital Image Processing usingMATLAB, 2nd Edition, TMH, 2010.
3. Somka, Hlavac, Boyle-Digital Image Processing and Computer Vision –Cengage Learning(Indian edition) 2008.
4. Adrian low- Introductory Computer Vision Imaging Techniques andSolutions-,2nd Edition, BSPublication, 2008.

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III Year B.Tech ECE-II Sem **L / T / P/ C**
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(2204PE10)DIGITAL CONTROL SYSTEMS
(Professional Elective – II)

Course Objectives:

- To understand the fundamentals of digital control systems representations, z-transforms
- To understand analysis of discrete complex domain: Z-Transforms
- To understand the concepts of state variables analysis for discrete LTIV systems.
- To understand the concepts of controllability and observability of discrete time systems
- To get exposed the design aspects of controllers and for discrete time systems
- To understand the concepts of the stability for discrete LTIV systems
- To understand the design aspects of observers for discrete time systems.

Course Outcomes: At the end of this course, students will demonstrate the ability to

- Understand the discrete representation of continuous systems, including sampling, quantization, and Z-transform properties.
- Analyze discrete-time systems using state-space representations and test system controllability and observability.
- Evaluate the stability of discrete-time systems using z-domain techniques such as the Jury test and Lyapunov methods.
- Design digital controllers, including PID controllers, with conventional methods and address practical issues in implementation
- Develop state feedback controllers and observers for discrete systems, including observer-based controller designs.
- Apply mathematical and computational tools for analyzing and designing discrete-time control systems.

UNIT- I: REPRESENTATION OF DISCRETE TIME SYSTEMS

Basics of Digital Control Systems. Discrete representation of continuous systems. Sampleand hold circuit. Mathematical Modeling of sample and hold circuit. Effects of Sampling and Quantization. Choice of sampling frequency. ZOH equivalent.

Z-Transforms, Mapping from s-plane to z plane, Properties of Z-Transforms and Inverse Z Transforms. Pulse Transfer function: Pulse transfer function of closed loop systems. Solutionof Discrete time systems. Time response of discrete time system, Steady State errors.

UNIT- II: DISCRETE TIME STATE SPACE ANALYSIS

State space representation of discrete time systems, Conversion of pulse transfer function to state space models and vice-versa, Solving discrete time state space equations, State Transition Matrix, Pulse Transfer Function Matrix. Discretization of continuous time state space equations. Concept of Controllability, stabilizability, observability, reachability – Controllability and observability tests. Effect of pole zero cancellation on the controllability&

observability.

UNIT- III: STABILITY ANALYSIS OF DISCRETE TIME SYSTEM

Concept of stability in z-domain, Stability analysis discrete time system: by Jury test, using bilinear transformation. Stability Analysis of discrete time systems using Lyapunov methods.

UNIT- IV: DESIGN OF DIGITAL CONTROL SYSTEM BY CONVENTIONAL METHODS

Design and realization of digital PID Controller, Design of discrete time controllers with bilinear transformation, Design of digital control system with dead beat response, Practical issues with dead beat response design.

UNIT-V: DESIGN STATE FEEDBACK CONTROLLERS AND OBSERVERS

Design of discrete state feedback controllers through pole placement, Design of Discrete Observer for LTI System: Design of full order and reduced observers, Design of observer-based controllers.

TEXT BOOKS:

1. K. Ogata, "Digital Control Engineering", Prentice Hall, Englewood Cliffs, 1995.
2. M. Gopal, "Digital Control Engineering", Wiley Eastern, 1988.
3. V, I, George and C. P. Kurian, Digital Control Systems, CENGAGE Learning, 2012

REFERENCE BOOKS:

1. G. F. Franklin, J. D. Powell and M. L. Workman, "Digital Control of DynamicSystems", Addison-Wesley,1998.
2. B.C. Kuo, "Digital Control System", Holt, Rinehart and Winston, 1980.

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(2204PE11) MOBILE COMMUNICATIONS
(Professional Elective – I)

Course Objectives:
- To provide the student with an understanding of the Cellular concept,Frequency reuse, Hand-off strategies.
- To enable the student to analyze and understand wireless and mobilecellular communication systems over a stochastic fading channel
- To provide the student with an understanding of Co-channel and Non- Co-channel interference
- To give the student an understanding of cell coverage for signal and traffic,diversity techniques and mobile antennas.
- To give the student an understanding of frequency management, Channelassignment and types of handoff.

Course Outcomes
By the end of the course, the student will be able to analyze and design wireless and mobile cellular systems.

- To know the evolution of Mobile communication and cell concept to improve capacity of the system.
- Design and analyze various cellular systems considering interferences.
- Analyze radio channel characteristics in different propagation environments
- Examine different frequency management and channel assignment techniques
- Demonstrate knowledge on different types of hand-off and mechanisms.
- Examine different Multiple access techniques.

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, Designof 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 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. **Coding:** Vocoders, Linear Predictive coders, Selection of Speech Coders for Mobile Communication.

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. Multiple Access Techniques: FDMA, TDMA, CDMA, SDMA, Capacity of Cellular CDMA and SDMA.

TEXT BOOKS

1. Mobile Cellular Telecommunications — W.C.Y. Lee, McGraw Hill, 2nd Edn., 1989.
2. Wireless Communications – Theodore. S. Rapport, Pearson Education, 2ndEdn., 2002.
3. W.C.Y.Lee, "Mobile Communications Engineering: Theory and applications,Second Edition, McGraw-Hill International, 1998.

REFERENCE BOOKS

1. Principles of Mobile Communications — Gordon L. Stuber, SpringerInternational, 2nd Edn., 2001.
2. Modern Wireless Communications-Simon Haykin, Michael Moher,Pearson Education, 2005.
3. Wireless Communications Theory and Techniques, Asrar U. H .Sheikh,Springer, 2004.
4. Wireless Communications and Networking, Vijay Garg, Elsevier Publications, 2007.
5. Wireless Communications —Andrea Goldsmith, Cambridge University Press, 2005.

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(2204PE12) CONSUMER ELECTRONICS
(Professional Elective – II)

COURSE OUTCOMES: Upon the completion of this course, students will demonstrate the ability to:

- Explain the functioning and design of audio systems, including microphones, loudspeakers, and theater sound systems
- Describe video systems and display technologies, including monochrome, color TVs, HDTV, LED, and DTH systems
- Demonstrate the working principles of domestic and consumer appliances like washing machines, microwave ovens, and air conditioners
- Analyze power supply systems like SMPS and UPS and their preventive maintenance techniques
- Evaluate RFID product compliance in terms of electrical safety, EMI/EMC standards, and RF interference design techniques.
- Apply preventive maintenance methods and remote control technologies for enhancing consumer electronics systems.

UNIT-I:
Audio System : Microphones, loudspeakers baffle and enclosure, Acoustics, mono, stereo, Quad, Amplifying System, Equalizers and Mixers Synthesizers, Commercial Sound, Theater Sound System.

UNIT-II:
Video Systems and Displays: Monochrome, Color TV standards, TFT, Plasma, HDTV, LCD,LED TV, Direct-ToHome(DTH- Set Top Box), Video Telephone and VideoConferencing.

UNIT-III:
Domestic & Consumer Appliances: Washing machines, Microwave ovens, Air- conditioners and Refrigerators, Computers office System, Telephone & Mobile Radio System

UNIT-IV
Power Supplies SMPS/UPS and Preventive Maintenance and others systems such as Remote controls, Bar codes.

UNIT-V
RFID Product Compliance: Product safety and liability issues; standards related to electrical safety and fire hazards, EMI/EMC requirements, design techniques for ESD, RF interference and immunity,line current harmonics and mains voltage surge.

TEXT BOOKS

1. Consumer Electronics; SP Bali; Pearson Education.
2. Consumer Electronics; J.S. Chitode; Technical Publications, Pune

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(2200HS05)DESIGN THINKING

COURSE OBJECTIVES

- Inculcate the fundamental concepts of design thinking
- Develop the students as a good designer by imparting creativity and problem solving ability
- Conceive, conceptualize, design and demonstrate innovative ideas using prototypes

COURSE OUTCOMES

- Understand and apply traditional design processes, design thinking, and innovative design concepts.
- Produce great designs, be a more effective engineer, and communicate with high emotional and intellectual impact
- Understand the diverse methods employed in design thinking and establish a workable design thinking framework to use in their practices
- Integrate sustainable product design, ergonomics, and semantics into the design process.
- Conceive, organize, lead and implement projects in interdisciplinary domain and address social concerns with innovative approaches
- Apply storytelling, improvisation, and scenario planning for design development and prototyping; evaluate developer and user perspectives

Unit I

Design process: Traditional design, Design thinking, Existing sample design projects, Study on designs around us, Compositions/structure of a design, Innovative design: Breaking of patterns, Reframe existing design problems, Principles of creativity Empathy: Customer Needs, Insight-leaving from the lives of others/standing on the shoes of others, Observation

Unit II

Design team-Team formation, Conceptualization: Visual thinking, Drawing/sketching, New concept thinking, Patents and Intellectual Property, Concept Generation Methodologies, Concept Selection, Concept Testing, Opportunity identification Prototyping: Principles of prototyping, Prototyping technologies, Prototype using simple things, Wooden model, Clay model, 3D printing; Experimenting/testing.

Unit III

Sustainable product design, Ergonomics, Semantics, Entrepreneurship/business ideas, Product Data Specification, Establishing target specifications, Setting the final specifications. Design projects for teams.

Unit IV

Listening and Empathizing Techniques – observation – structured open ended approach - , Design Thinking Frameworks, Ideation tools – brainstorming, innovation heuristics, behaviour models, overcoming cognitive fixedness – Exercises and case based discussions

Unit V

Use of Diagrams and Maps in Design Thinking – Empathy map. Affinity diagram, mind map, journey map, combining ideas into complex innovation concepts. Story telling – improvisation, scenario planning, development of scenarios, evaluation tools, frog design and prototyping - – Exercises and case-based discussions Assess developer and user perspectives for bias – apply

frameworks to strengthen communication – sustain a culture of innovation

Textbook(s)

- Tim Brown, Change by Design: How Design Thinking Transforms Organizations and Inspires Innovation, HarperCollins Publishers Ltd.
- IdrisMootee, Design Thinking for Strategic Innovation,2013, John Wiley & Sons Inc

Reference(s)

- Brenda Laurel Design Research methods and perspectives MIT press 2003
- Terwiesch, C. & Ulrich, K.T., 2009. Innovation Tournaments: creating and identifying Exceptional Opportunities, Harvard business press.
- Ulrich &Eppinger, Product Design and Development, 3rd Edition, McGraw Hill, 2004
- Stuart Pugh, Total Design: Integrated Methods for Successful Product Engineering, BjarkiHallgrimsson, Prototyping and model making for product design, 2012, Laurence King Publishing Ltd
- Kevin Henry, Drawing for Product designers, 2012, Laurence King Publishing Ltd

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III Year B.Tech ECE-II Sem **L / T / P/ C**
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(2204PC65) DIGITAL LOGIC DESIGN THROUGH VERILOG / VHDL LAB

Course Objectives:

- To enable the students to implement the digital circuits using logic gates
- To know the concepts of Combinational circuits
- To understand the components of Flip-flops, Registers & Counters.

Course Outcomes:

- Understand the language constructs and programming fundamentals of Verilog HDL.
- Choose the suitable abstraction level for a particular digital design
- Construct Combinational and sequential circuits in different modeling styles using Verilog HDL
- Analyze and Verify the functionality of digital circuits/systems using test benches
- Implement clocked sequential circuits and verify their timing characteristics through waveform analysis.
- Design and simulate sequential circuits such as counters, shift registers, and finite state machines (FSMs) using Verilog/VHDL.

LIST OF EXPERIMENTS

(All Experiments must be simulated using Verilog / VHDL and tested on HardwareKits)

1. Study of logic gates.
2. Design and implementation of adders and subtractors
3. Design and implementation of priority Encoder
4. Design and implementation of 3 to 8 Decoder
5. Design a 4 –bit Gray to Binary and Binary to Gray Converter.
6. Design a 450 KHz clock using NAND / NOR gates.
7. Study of by IC's using Universal IC Trainer Kit
8. Design a 16 x 1 multiplexer using 8 x 1 multiplexer.
9. Verification of state tables of RS, JK, T and D flip-flops using NAND & NOR gates.
10. Implementation of SISO
11. Implementation of PLSO.
12. Design a 4 bit Comparator.
13. Design and Implement a Decade counter.

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(2204PC66) ELECTROMAGNETIC WAVES LAB

COURSE OBJECTIVES:

- To gain practical hands on experience to gain various microwave sources and devices.
- To introduce the Microwave Test Bench for measuring different parameters like attenuation, VSWR, Frequency etc.
- To understand the usage of microwave components.
- To impart the Knowledge of Scattering Matrix, its formulation and utility, and establishthe S-Matrix for various types of microwave junctions.
- To understand radiation pattern of antenna measurement

COURSE OUTCOMES:

- Realize the need for solid state microwave sources to find their characteristics.
- Set up a microwave bench, establish the measurement procedure and conduct the experiments in microwave lab for measurement of various microwave parameters.
- Distinguish between the different types of waveguide and ferrite components, explain their functioning and select proper components for solving engineering problems.
- Determine the S-Matrix for various types of microwave junctions to compute S-Parameters.
- Calculate various waveguide parameters to identify microwave structures.
- Analyze various antenna radiation patterns to recognize the types of antennas.

LIST OF EXPERIMENTS

Note: Minimum of 12 experiments to be conducted

1. Reflex Klystron Characteristics
2. Gunn Diode Characteristics
3. Directional Coupler Characteristics
4. Measurement of Scattering Parameters of a E plane Tee
5. Measurement of Scattering Parameters of a H plane Tee
6. Measurement of Scattering Parameters of a Magic Tee
7. Measurement of Scattering Parameters of a Circulator
8. Attenuation Measurement
9. Microwave Frequency Measurement
10. Measurement of Waveguide Parameters
11. VSWR Measurement of Matched load
12. VSWR measurement with open and short circuit loads
13. Measurement of Impedance of a given Load
14. Antenna Pattern Measurements

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(2000MC06) TECHNICAL COMMUNICATION & SOFT SKILLS
(Mandatory Courses)

INTRODUCTION:
Technical Communication and Soft skills focuses on enhancing students' communication. A thorough drill in grammar exercises is given. Various technical writing styles and skills are developed. The future placement needs of the students are met by giving them an exposure to group discussions and mock interviews. The students hone these skills under the guidance of instructor whose constant evaluation helps in the professional development. This course fulfills the need of the aspirants in acquiring and improving the skills required for placements and professional success.

COURSE OBJECTIVES:
- To make the students recognize the role of Technical English in theiracademic and professional fields.
- To improve language proficiency and develop the required professional skills.
- To equip students with tools to organize, comprehend, draft short andlong forms of technical work.

COURSE OUTCOMES:
- The students will be able to understand information which assists in completion of the assigned job tasks more successfully.
- Students will be able to communicate their ideas by writing projects,reports, instructions, diagrams and many other forms of professional writing
- Students will also be able to adhere to ethical norms of scientific communication
- Students will be able to strengthen their individual and collaborative work strategies
- Understanding the social issues and applying analytical abilities to solve the issues
- Practice techniques for handling questions, discussions, and presenting technical content with confidence.

UNIT I – Personal Evaluation
Self-Assessment and Self- Awareness - Self-Esteem - Perception and Attitudes -Values and Beliefs - Time Management- Concord

UNIT 2 - Professional Communication
Extempore - Oral Presentations – Presentation Aids- Email Writing, Business LetterWriting - Memo Writing - Transformation of Sentences

UNIT 3 – Career Planning

Group Discussion, Interviews - Leadership Skills & Team Building - Personal Goal Setting and Career Planning - Complex Problem Solving - Creativity - Role and Responsibilities of an Engineer - Tenses

UNIT 4 - Technical Writing

Principles of Effective Writing - Editing Strategies to Achieve AppropriateTechnical Style – Technical Report Writing - Voice

UNIT 5 - Ethics and Responsibilities

Personality Development in Social and Office Settings – Netiquettes - Work Culture and Cubicle Etiquettes - Correction ofSentences

TEXT BOOKS:

1. David F. Beer and David Mc Murrey, Guide to writing as anEngineer, John Willey. New York,2004
2. Diane Hacker, Pocket Style Manual, Bedford Publication, NewYork, 2003. (ISBN 0312406843)
3. Shiv Khera, You Can Win, Macmillan Books, New York,2003.
4. Raman Sharma, Technical Communications, Oxford Publication,London,2004.

REFERENCE BOOKS:

1. Meenakshi Raman, Prakash Singh, Business communication, Oxford Publication, New Delhi2012.
2. Dale Jung k, Applied Writing for Technicians, McGraw Hill, NewYork, 2004. (ISBN: 07828357-4)
3. Sharma, R. and Mohan, K. Business Correspondence and ReportWriting, TMH New Delhi2002.
4. Xebec, Presentation Book, TMH New Delhi, 2000. (ISBN0402213

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(2200HS02) PROFESSIONAL ENGLISH

INTRODUCTION:

English is a tool for global communication and is the dominant language which is sweeping almost all the fields in the world. It has become a necessity for people to speak in English comfortably, if they want to enter the global workforce. Hence, the course is designed to help the students to meet the global standards. Each unit focuses on English skill-set to improve: Interview skills, giving presentations and professional etiquette.

COURSE OBJECTIVES:

- To enrich students to express themselves appropriately and fluently in professional contexts.
- To enhance their employability through regular participation in group discussionsand interview skills.
- To lay foundation with writing strategies for the future work place needs.
- To acquaint students with different components of professional presentation skills.
- To equip students with necessary training in listening to comprehend dialects of English language.

COURSE OUTCOMES: Students will be able to:

- Draft coherent and unified paragraphs with adequate supporting details.
- Demonstrate problem solvingskills, decision-making skills, analytical skills.
- Comprehend and apply the pre-interview preparation techniques for successful interview.
- Achieve expertise in writing resume and cover letter formats.
- Understand the steps of writing 'Reports and Abstract'.
- Understand and express simple narratives, descriptions and day to day conversations..

UNIT I : FOCUS ON LANGUAGE

Parts of speech - nominal compounds, noun phrases - relative pronoun - adjective - numerical, comparison and contrast, collocation and word combinations - verb - preposition and relative - conjunction- connectives, expressions of purpose and function, cause and effect - articles - adjectives - sentence pattern - tenses - voice - rewriting the sentences in impersonal/abbreviated passive grammatical structures - concord - sentence level verb noun agreement - gerund - rewriting infinitive into gerund - imperative - rewriting imperative into recommendation using should - word formation - varied grammatical function of the same word - affixes - prefixand suffix, number prefix, negative prefix - reported speech - editing strategies - conditional structures
- real, unreal, no possibility, zero condition.
writing formal definition - abbreviation and acronym - idioms and phrases ,varieties of English - British versus American.

UNIT II : LISTENING SKILLS

Comprehension practice - vocabulary development - familiarity to varied types of spoken English and accents - developing ability to understand audio and video media - aiming at overcoming barriers to listening - listening to documentaries, radio news broadcasts, TV news telecasts - active listening in discussions and to lectures - taking notes while listening - extracting information from listening.

UNIT III: SPEAKING SKILLS

Oral practice - role play - interplay - seminar - transcoding visual into oral - participating in short and longer conversation - voice record, replay, correction of intonation, pronunciation and flow of speech - phonemes - vowels, consonants, stress, rhythm, intonation - group discussion - participative learning - acquiring proficiency, fluency, accuracy in oral communication - speaking practice - developing confidence - extempore speech - learning professional/conversational etiquette – Oral presentation skills.

UNIT IV : READING SKILLS

Vocabulary extension - improving vocabulary - intensive reading - reading strategies - identifying topic sentence - guessing meaning from content - picking out specific information - professional reading - reading practice - predicting the content, critical and analytical reading - reading articles in English newspapers, sports magazines, encyclopedias - reading aloud, use of stress and intonation - reading and comprehending technical materials - cloze reading.

UNIT V : WRITING SKILLS

Discourse cohesion - improving writing skills, avoiding common grammatical errors in academic writing - extending the hints - writing shorter sentences - punctuation - dialogue writing - paragraph writing, problems and solutions, achieving coherence, transition words, sequence words - essays of descriptive and argumentative - writing instructions, use of imperatives - jumbled sentences into sequential paragraph using linguistic clues - report writing - technical reports, industry visit reports, events reports - writing recommendations - letter writing - formal and informal letters, e-mail writing - job application and resume, permission for in-plant training, business correspondence letters, calling for quotation, placing order, lodging complaint, persuasive letters - assignment writing - mini-project –telephonic etiquette- transcoding - transferring of information from text to pictorial/graphical representation and vice versa.

* Exercises apart from the text book shall also be referred for classroom tasks.

TEXT BOOKS:

1. Practical English Usage. Michael Swan. OUP.1995.
2. Remedial English Grammar. F.T. Wood.Macmillan.2007
3. On Writing Well. William Zinsser. Harper Resource Book.2001

REFERENCE BOOKS:

1. Study Writing. Liz Hamp-Lyons and Ben Heasly. Cambridge University Press.2006.
2. Communication Skills. Sanjay Kumar and PushpLata. Oxford University Press.2011.
3. Exercises in Spoken English. Parts. I-III. CIEFL, Hyderabad. Oxford University Press

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(2204PC10) DIGITAL SIGNAL PROCESSING

COURSE OBJECTIVES:
This course is an essential course that provides design techniques for processing all type of signals in various fields. The main objectives are:

- To provide background and fundamental material for the analysis andprocessing of digital signals.
- To familiarize the relationships between continuous-time and discrete time signalsand systems.
- To study fundamentals of time, frequency and Z-plane analysis and to discuss theinter-relationships of these analytic method.
- To study the designs and structures of digital (IIR and FIR) filters fromanalysis to synthesis for a given specifications.
- The impetus is to introduce a few real-world signal processing applications.
- To acquaint in FFT algorithms, Multi-rate signal processing techniques and finiteword length effects.

COURSE OUTCOMES:
On completion of this subject, the student should be able to:

- Explain the fundamentals of digital signal processing, including discrete-time signals, Lnear shift-invariant systems, and Z-transform applications.
- Analyze the properties of the Discrete Fourier Transform (DFT) and implement linear convolution using DFT, Overlap-Add, and Overlap-Save mets.
- Apply Fast Fourier Transform (FFT) algorithms, including Radix-2 Decimation-in-Time and Decimation-in-Frequency techniques, for efficient computation of DFT.
- Design and implement IIR digital filters using analog filter approximations, bilinear transformation, and impulse-invariant mets
- Design FIR digital filters using Fourier mets, windowing techniques, and frequency sampling approaches, and compare their performance with IIR filters.
- Evaluate multirate digital signal processing techniques such as sampling rate conversion, down-sampling, and up-sampling, while analyzing finite word-length effects on filter performance.

UNIT – I
Introduction: Introduction to Digital Signal Processing: Discrete Time Signals & Sequences, conversion of continuous to discrete signal, Normalized Frequency, Linear Shift Invariant Systems, Stability, and Causality, linear differential equation to difference equation, Linear Constant Coefficient Difference Equations, Frequency Domain Representation of Discrete Time Signals and Systems.

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.

UNIT - II

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, and FFT with General Radix-N

UNIT - III

IIR Digital Filters: Analog filter approximations – Butterworth and Chebyshev, 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 FIRFilters: Fourier Method, Digital Filters using Window Techniques, Frequency Sampling Technique, Comparison of IIR & FIR filters.

UNIT - V

Multirate Digital Signal Processing: Introduction, Down Sampling, Decimation, Upsampling, Interpolation, Sampling Rate Conversion, Conversion of Band Pass Signals, Concept of Resampling, Applications of Multi Rate Signal Processing.

Finite Word Length Effects: Limit cycles, Overflow Oscillations, Round-off Noise in IIR Digital Filters, Computational Output Round off Noise, Methods to Prevent Overflow, Trade off between Round Off and Overflow Noise, Measurement of Coefficient Quantization Effects through Pole-Zero Movement, Dead Band Effects.

TEXT BOOKS:

1. Digital Signal Processing, Principles, Algorithms, and Applications: John G.Proakis, Dimitris G. Manolakis, Pearson Education / PHI, 2007.
2. Discrete Time Signal Processing – A. V. Oppenheim and R.W. Schaffer, PHI, 2009
3. Fundamentals of Digital Signal Processing – Loney Ludeman, John Wiley, 2009

REFERENCES:

1. Digital Signal Processing – Fundamentals and Applications – Li Tan, Elsevier, 2008
2. Fundamentals of Digital Signal Processing using MATLAB – Robert J.Schilling, Sandra L. Harris, Thomson, 2007
3. Digital Signal Processing - A Practical approach, Emmanuel C. Ifeachor andBarrie W. Jervis, 2nd Edition, Pearson Education, 2009

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(2204PC11) LINEAR & DIGITAL IC APPLICATIONS

COURSE OBJECTIVES:

The main objectives of the course are:

- To introduce the basic building blocks of linear integrated circuits.
- To teach the linear and non - linear applications of operational amplifiers.
- To introduce the theory and applications of analog multipliers and PLL.
- To teach the theory of ADC and DAC.
- To introduce the concepts of waveform generation and introduce some special function ICs.
- To understand and implement the working of basic digital circuits

COURSE OUTCOMES:

On completion of this course, the students will have

- Understand the basic concepts of integrated circuits and operational amplifiers.
- Design OP- Amp circuits for different applications.
- Design and analyze the filters and oscillators using OP- Amp
- Discuss various applications of special functions of ICs such as 555,voltage Regulators and PLL applications.
- Analyze Various types of ADC and DAC
- Choose the proper LDICs by knowing their characteristics.

UNIT - I: Operational Amplifier

Operational Amplifier: Ideal and Practical Op-Amp, Op-Amp Characteristics, DC and AC Characteristics, Features of 741 Op-Amp, Modes of Operation - Inverting, Non-Inverting, Differential, Instrumentation Amplifier, AC Amplifier, Differentiators and Integrators, Comparators, Schmitt Trigger, Introduction to Voltage Regulators, Features of 723 Regulator, Three Terminal Voltage Regulators. **Active Filters:** Analysis and Design of 1st order Low Pass and High Pass Butterworth Filters.

UNIT - II:Op-Amp, IC-555 & IC 565 Applications

Op-Amp, IC-555 & IC 565 Applications: Introduction to Active Filters, Characteristics of Band pass, Band reject and All Pass Filters, Analysis of 1st order LPF & HPF Butterworth Filters, Waveform Generators – Triangular, Saw tooth, Square Wave, IC555 Timer - Functional Diagram, Monostable, and Astable Operations, Applications, IC565 PLL - Block Schematic, Description of Individual Blocks, Applications.

UNIT - III: Data Converters

Data Converters: Introduction, Basic DAC techniques, Different types of DACs-Weighted resistor DAC, R-2R ladder DAC, Inverted R-2R DAC, Different Types of ADCs - Parallel Comparator Type ADC, Counter Type ADC, Successive Approximation ADC and Dual Slope ADC, DAC and ADC Specifications.

UNIT - IV:Digital Integrated Circuits

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, LED & LCD Decoders with Drivers, Encoders, Priority Encoders, Multiplexers, Demultiplexers, Priority Generators/Checkers, Parallel Binar Adder/Subtractor, Magnitude Comparators.

UNIT - V: Sequential Logic IC's and Memories

Sequential Logic IC's and Memories: Familiarity with commonly available 74XX & CMOS 40XX Series ICs – All Types of Flip-flops, 74LS279A-Set-Reset Latch,Synchronous Counters, Decade Counters, Shift Registers.Memories - ROM Architecture, Types of ROMS & Applications, RAM Architecture, Static & Dynamic RAMs.PLA, PAL, PGA, Sequential programmable logic devices

TEXT BOOKS:

1. Op-Amps & Linear ICs – Ramakanth A. Gayakwad, PHI, 2003.
2. Digital Fundamentals – Floyd and Jain, Pearson Education, 8th Edition, 2005.

REFERENCE BOOKS:

1. Linear Integrated Circuits –D. Roy Chowdhury, New Age International (p) Ltd, 2nd Ed., 2003.
2. Op Amps and Linear Integrated Circuits-Concepts and Applications James M. Fiore, Cengage Learning/ Jaico, 2009.
3. Operational Amplifiers with Linear Integrated Circuits by K. Lal Kishore – Pearson, 2009.
4. Linear Integrated Circuits and Applications – Salivahanan, MC GRAW HILL EDUCATION.
5. Modern Digital Electronics – RP Jain – 4/e – MC GRAW HILL EDUCATION, 2010.
6. Digital System Design Using VHDL – Charles H Roth, Jr. Thomson, 1998.

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(2204PE13)LARGE LANGUAGE MODEL

(Professional Elective – III)

Course Outcomes:

- Understand the fundamental concepts and architectures of large language models
- Develop skills in implementing and fine-tuning pre-trained language models
- Analyze and evaluate the performance of large language models on various NLP tasks
- Design and develop applications using large language models
- Apply ethical considerations and potential biases in large language models

Course Objectives:

- Understand the foundational concepts of NLP, the history, evolution, and types of large language models.
- Analyze the architecture, functionality, and variants of transformer-based language models like BERT and RoBERTa.
- Apply dataset preparation, model training techniques, and evaluation methodologies for large language models.
- Examine advanced topics such as multimodal integration, explainability, ethics, and future trends in large language models.
- Develop practical projects and explore applications in fields like computer vision, speech recognition, and industry use cases.
- Demonstrate best practices for deploying and maintaining large language models in real-world scenarios.

UNIT I: Introduction to Large Language Models- Overview of natural language processing (NLP) and language models- History and evolution of large language models- Types of language models: transformer-based, recurrent neural network (RNN), and hybrid models- Applications oflarge language models: language translation, text summarization, chatbots, and more

UNIT II: Transformer-Based Language Models- In-depth analysis of transformer architecture and its variants- BERT, RoBERTa, and other pre-trained language models- Fine-tuning and adapting transformer models for specific NLP tasks- Advantages and limitations of transformer- based models.

UNIT III: Training and Evaluation of Large Language Models- Large-scale dataset preparation and preprocessing- Model training and optimization techniques- Evaluation metrics and methodologies for language models- Common challenges and pitfalls in training large language models.

UNIT IV: Advanced Topics in Large Language Models- Multimodal language models and vision-language integration- Explainability and interpretability techniques for language models - Ethical considerations and potential biases in large language models- Future directions and research opportunities in the field.

UNIT V: Applications and Project Development- Hands-on project development using large language models- Applications in computer vision, speech recognition, and other areas- Case

studies and industry applications of large language models- Best practices for deploying and maintaining large language models in real-world scenarios

TEXTBOOKS:

1. "Hands-On Large Language Models" by O'Reilly [1]
2. "Build a Large Language Model (From Scratch)" by Manning Publications [2]
3. "Natural Language Processing with Transformers" by Lewis Tunstall and Leandro von Werra
4. "Transformers for Natural Language Processing and Computer Vision" by Denis Rothman
5. "Hands-On Large Language Models: Language Understanding and Generation" by Jay Alammar and Maarten Grootendorst [3]

REFERENCE BOOKS:

1. "Quick Start Guide to Large Language Models: Strategies and Best Practices for Using ChatGPT and Other LLMs" by Addison-Wesley Data & Analytics Series [3]
2. "Building LLM Powered Applications: Create intelligent apps and agents with large language models" by Valentina Alto [3]
3. "Demystifying the Power of Large Language Models: A deep dive into large language models" by Theophilus Siameh [3]
4. "Mastering Large Language Models with Python: Unleash the Power of Advanced Natural Language Processing for Enterprise Innovation and Efficiency" by Raj Arun R [3]
5. "Generative AI with LangChain: Build large language model (LLM) apps with Python, ChatGPT and other LLMs" by Ben Auffarth [3]

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(2204PE14)VLSI DESIGN
(Professional Elective – III)

Course Objectives: The objectives of the course are to:

- Give exposure to 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.
- Give exposure to 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 any system using gates.
- Understand basic programmable logic devices and testing of CMOS circuits.

Course Outcomes: Upon completing this course, the student will be able to

- Explain the fundamental concepts of various IC technologies,including MOS, PMOS, NMOS, CMOS, and BiCMOS, and their electrical properties.
- Apply the principles of VLSI design processes to develop MOS and CMOS transistor layouts, utilizing stick diagrams and design rules
- Analyze gate-level design, including complex gates and switch logic, to determine the impact on time delays, wiring capacitance, and load driving capacity
- Develop data path subsystems like adders, ALUs, and comparators using appropriate design metologies for optimized performance
- Design array subsystems such as SRAM, DRAM, and ROM to meet specific data storage requirements in VLSI systems
- Evaluate programmable logic devices, including PLA, PAL, FPGAs, and CPLDs, and implement CMOS testing strategies at the chip level.

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, Bi- CMOS 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 and Other complex gates, Switch logic, Alternate gate circuits, Time delays, Driving large capacitive loads, Wiring capacitance, Fan – in, Fan – out.

UNIT - IV Data Path Subsystems: Subsystem Design, Shifters, Adders, ALUs, Multipliers, Parity generators, Comparators, Zero/One Detectors, Counters. Array Subsystems: 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.

TEXT BOOKS:

1. Essentials of VLSI circuits and systems – Kamran Eshraghian, Eshraghian Dougles and A. Pucknell, PHI, 2005 Edition
2. CMOS VLSI Design – A Circuits and Systems Perspective, Neil H. E Weste, David Harris, Ayan Banerjee, 3rd Ed, Pearson, 2009.

REFERENCE BOOKS:

1. Introduction to VLSI Systems: A Logic, Circuit and System Perspective – Ming-BO Lin, CRC Press, 2011
2. CMOS logic circuit Design - John. P. Uyemura, Springer, 2007.
3. Modern VLSI Design - Wayne Wolf, Pearson Education, 3rd Edition, 1997.
4. VLSI Design- K. Lal Kishore, V. S. V. Prabhakar, I.K International, 2009

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(2204PE15)DIGITAL VIDEO SIGNAL PROCESSING

(Professional Elective – III)

Course Outcomes

- Understand the basic principles of video processing, including analog and digital video, image formation models, and video signal sampling.
- Apply video sampling, interpolation techniques, and linear filtering for image enhancement. Analyze motion detection methods and optical flow techniques.
- Develop an understanding of video enhancement and restoration techniques, including video quality assessment and super-resolution
- Analyze and implement video segmentation methods, including motion segmentation, tracking techniques, and the application of optical flow and direct methods for 2D and 3D motion tracking.
- Apply optimization techniques, including pel-recursive and Bayesian methods, for video stabilization, mosaicking, and indexing.
- Implement and evaluate video surveillance and retrieval techniques, with a focus on video summarization and browsing applications.

Unit -I : Basic Steps of Video Processing: Analog video, Digital Video, Time varying Image Formation models : 3D motion models, Geometric Image formation , Photometric Image formation, sampling of video signals, filtering operations

Unit -II : Video Sampling and Interpolation, Basic Linear Filtering with Applications to Image Enhancement, Computational Models of Early Human Vision, Motion Detection and Estimation Optical Flow Methods, Motion Compensated Filtering

Unit III : Video Enhancement and Restoration: Video Enhancement and Restoration, Video Quality Assessment, Restoration, Super Resolution

Unit –IV: Video Segmentation: Video Segmentation, Motion Segmentation, Motion Tracking in Video, 2D and 3D Motion Tracking in Digital Video, Methods using Point Correspondences, Optical Flow and Direct Methods

Unit - V Optimization: Pel-Recursive Methods, Bayesian Methods, Applications Video Stabilization and Mosaicing, A Unified Framework for Video Indexing, Summarization, Browsing and Retrieval, Video Surveillance

TEXT BOOKS:

1. The Essential Guide to Video Processing, Bovik
2. Handbook of Image and Video Processing, Bovik
3. Yao wang, Joem Ostarmann and Ya – quin Zhang, ”Video processing and communication “,1st edition , PHI.

REFERENCE BOOKS:

1. Gonzaleze and Woods ,”Digital Image Processing “, 3rd edition , Pearson
2. M. Tekalp ,”Digital video Processing”, Prentice Hall International

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(2204PE16)IoT ARCHITECTURES
(Professional Elective – III)

Course Objectives:
- To provide the basic knowledge on IoT.
- To explain the different components and Architectures from M2M to IoT.
- To provide knowledge on different protocols of IoT.
- To impart knowledge on implementations of different protocols of IoT.

Course Outcomes: After completion of this course the student will able to
- Understand IoT Concepts and Architecture
- Explore the Evolution of IoT, its Growth and Applications
- Know the components of IoT and Compare the various architectures of IoT
- Develop IoT Applications
- Acquire the knowledge on data management of IoT
- Establish the knowledge on various IoT protocols like Data link, Network, Transport, Session, Service layers

UNIT- I
IOT introduction:
Introduction and definition of IoT, Evolution of IoT, IoT growth, Application areas of IoT, Characteristics of IoT, IoT stack, Enabling technologies, IoT levels, IoT sensing and actuation, Sensing types, Actuatortypes.

UNIT - II
IOT and M2M:
M2M to IoT — A Basic Perspective– Introduction, Differences and similarities between M2M and IoT, SDN and NFV for IoT,M2M Value Chains, IoT Value Chains, An emerging industrial structure for IoT, international driven global value chain and global information monopolies.

UNIT- III

IOT Architecture:
IoT Architecture components, Comparing IoT Architectures, A simplified IoT Architecture, core IoT functional stack, IoT data management and compute stack

UNIT- IV
IOT Data link layer and Network layer protocols:

PHY/MAC Layer (3GPP MTC, IEEE 802.11, IEEE 802.15), Wireless HART, Z Wave, Bluetooth Low Energy, Zigbee Smart Energy, DASH7 - Network Layer-IPv4, IPv6, 6LoWPAN, 6TiSCH, ND, DHCP, ICMP, RPL, CORPL, CARP

UNIT- V

Transport and Session layer protocols:

Transport Layer (TCP, MPTCP, UDP, DCCP, SCTP)-(TLS, DTLS) – Session Layer HTTP, CoAP, XMPP, AMQP, MQTT

TEXT BOOKS:

1. Sudip Misra, Anandarup Mukherjee, Arijit Roy -Introduction to IOT, Cambridge University Press.
2. David Hanes, Gonzalo salgueiro, Patrick Grossetete, Rob barton, Jerome henry-IoTFundamentals Networking Technologies, Protocols and Usecases for IoT", Cisco Press.

REFERENCE BOOKS:

1. Cunopfister-Getting started with the internet of things, O Reilly Media, 2011
2. Francis daCosta,-Rethinking the Internet of Things: A Scalable Approach to ConnectingEverything", 1 st Edition, Apress Publications.
3. Arshdeep Bahga, Vijay Madisetti -Internet of Things A Hands-on approach, Universities Press
4. Shriram K Vasudevan, RMD Sundaram, Abhishek S Nagarajan-Internet of things, John Wileyand Sons.
5. Massimo Banzi, Michael Shiloh Make: Getting Started with the Arduino, ShroffPublisher/Maker Media Publishers

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(2204PE17)SATELLITE COMMUNICATIONS
(Professional Elective – III)

Course Objectives :

- To acquired foundation in orbital mechanics and launch vehicles for the satellites.
- To provide basic knowledge of link design of satellite.
- To understand multiple access systems and earth station technology
- To understand the concepts of satellite navigation and GPS.

Course Outcomes: Upon completing this course, the student will be able to

- Explore the basic concepts and frequency allocations for satellite communication, orbital mechanics and launch vehicles
- Envision the satellite sub systems and design satellite links for specified C/N
- Familiarize the various multiple access techniques for satellite communication systems and earth station technologies
- Known the concepts of LEO, GEO Stationary Satellite Systems and satellite navigation
- To introduce the basic concepts of direct broadcast satellite television and radio
- To know the concepts of global positioning system and its operation.

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), Inter modulation, 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.

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, 2nd Edition, 2003.
2. Wilbur L. Pritchard, Robert A Nelson and Henri G. Suyderhoud - Satellite Communications Engineering, 2nd Edition, Pearson Publications, 2003.

REFERENCE BOOKS:

1. M. Richharia - Satellite Communications : Design Principles, 2nd Edition, BS Publications, 2003.
2. D.C Agarwal - Satellite Communication, 5th Edition, Khanna Publications,
3. K.N. Raja Rao - Fundamentals of Satellite Communications, PHI, 2004
4. Dennis Roddy - Satellite Communications, 4th Edition, McGraw Hill, 2009

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(2204PE18)BIOMEDICAL ELECTRONICS
(Professional Elective – III)

COURSE OUTCOMES:

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

- Explain the origin of biopotentials and various electrodes for sensing and conditioning bio signals..
- Analyze the human cardio- vascular, central nervous and muscular system and explain the different measurement techniques for the signals originating from these systems
- Apply image processing principles in imaging techniques such as X-
- rays, image intensifiers, CT scanners, ultrasound scanners and MRI.
- Select suitable transducers for medical applications.
- Design Biomedical Instrumentation

Ensure Safety and Compliance in Biomedical Systems

UNIT – I:

Cell structure, basic cell functions, origin of biopotentials, electrical activity of cells, Acquisition, types of bio-signals, Study of diagnostically significant bio-signal parameters, Electrodes for bio-physiological sensing and conditioning, Electrode-electrolyte interface

UNIT-II:

Cardio-vascular system and measurements: Structure of heart, rhythmicity, pacemaker cell filters, averaging and integrator circuits, ECG signal acquisition, ECG electrodes, electrocardiograph, vector cardiograph, ECG analysis, ECG- QRS detection

UNIT - III

R amplitude, interval detection, Bio-signal amplifiers and signal processing, transient protection, isolation circuit, Phonocardiography, PCG analysis to diagnose heart valve disorder, blood pressure measurement (invasive and non-invasive), blood flow meter-magnetic and ultrasound, cardiac output measurement, Plethysmography, Short wave diathermy, microwave diathermy, ultrasound therapy unit, transcutaneous electrical nerve stimulators, radiotherapy, Pacemakersand defibrillators, heart lung machine.

UNIT - IV

Central nervous systems and muscular system: Receptors, sensory pathways and motor systems, processing sensory information, neural, neuromuscular, sensory muscular and sensory measurements, biofeedback, evoked response, Electroencephalography (EEG), EEG amplifier, separation of alpha, beta, theta and delta waves from EEG

UNIT - V

Auditory and vision system: Mechanism of hearing, sound conduction system, basic

audiometer, pure tone audiometer, Evoked response audiometer system, hearing aids.
Anatomy of eye, visual acuity, slit lamp, tonometer, ophthalmoscope, perimeter, LASER applications in ophthalmology – diabetic retinopathy, glaucoma and retinal hole and detachment treatment.

Text /Reference books:

1. Leslie Cromwell, Fred J. Weibull, Erich A. Pfeiffer, "Biomedical Instrumentation an dMeasurements", Pearson Education, 2nd edition, 1980.
2. R. S. Khandpur, "Handbook of Biomedical Instrumentation", TMH, 2nd edition, 2000
3. Vander, Shermen, "Human Physiology– The Mechanism of Body Functions", TMH, 13thedition, 2013.
4. Tompkins, "Biomedical Digital Signal Processing", PHI, 5th edition, 2010.

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(2204PC67) DIGITAL SIGNAL PROCESSING LAB

Course Objectives

The objective of the course to practical implementation of the convolution, correlation, DFT, IDFT, Convolution, Signal smoothing, filtering of long duration signals and multirate signal processing.

Course Outcomes

After studying this course the students would be able to

- Implement recursive difference equations to generate sinusoidal waveforms and signals
- Analyze the histogram of white Gaussian noise and uniformly distributed noise, and interpret the statistical properties of the signals
- Calculate the Discrete Fourier Transform (DFT) and Inverse DFT (IDFT) of given discrete-time signals, and interpret their frequency- domain characteristics
- Evaluate the frequency response of a given system using transfer function or differential equation mets, and validate the results with theoretical expectations
- Design and implement Fourier series coefficients using the formula and Fast Fourier Transform (FET) for signal analysis, and compare the results for a half-sine wave.
- Implement and analyze the performance of FIR and IIR filters for given sequences/signals, and design low-pass and high-pass filters for specific applications.

LIST OF EXPERIMENTS

1. Generation of Sinusoidal Waveform / Signal based on Recursive Difference Equations
2. Histogram of White Gaussian Noise and Uniformly Distributed Noise.
3. To find DFT / IDFT of given DT Signal
4. To find Frequency Response of a given System given in Transfer Function/Differential equation form.
5. Obtain Fourier series coefficients by formula and using FET and compare for half sine ave.
6. Implementation of FFT of given Sequence
7. Determination of Power Spectrum of a given Signal(s).
8. Implementation of LP FIR Filter for a given Sequence/Signal.
9. Implementation of HP IIR Filter for a given Sequence/Signal
10. Generation of Narrow Band Signal through Filtering
11. Generation of DTMF Signals
12. Implementation of Decimation Process
13. Implementation of Interpolation Process
14. Implementation of I/D Sampling Rate Converters
15. Impulse Response of First order and Second Order Systems.

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(2204PC68) LINEAR & DIGITAL IC APPLICATIONS LAB

Course Objectives:
The main objectives of this course are to

- To understand the linear and non-linear applications of operational amplifiers (741).
- To get familiarity with theory and applications of 555 timers.
- To understand the design the different types of counter designing
- To understand the design various applications using 7 segment display

Course Outcomes:
Upon completion of the course, student should possess the following :

- Design different applications using IC 741
- Analyze different 3 terminal voltage regulators and design voltage regulators using IC 723
- Design Multivibrator using IC 555
- Design PLL circuits using IC 565
- Design different applications using digital ICs
- Design & Implement ADC and DAC Circuits

LIST OF EXPERIMENTS

1. Inverting and Non-inverting Amplifiers using Op Amps.
2. Adder and Subtractor using Op Amp.
3. Integrator and Differentiator circuits using Op Amp.
4. Active Filter Applications – LPF, HPF (first order)
5. Design of Schmitt trigger using IC 741 Op Amp.
6. Mono-stable Multivibrator using IC 555.
7. Astable Multivibrator using IC 555.
8. IC 565 – PLL Applications.
9. Voltage Regulator using IC 723.
10. Plot the transform Characteristics of 74H, LS, HS series IC's.
11. Design a model to 53 counter using two decade counters.
12. Design a two Digit 7 segment display unit using this display the Mod counter output ofexperiment 11
13. Design a 4 bit pseudo random sequence generator using 4 – bit ring counter.
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.
16. Design a 4 digit hex counter using Asynchronous one digit hex counters.

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(2200MC05) INDIAN TRADITIONAL KNOWLEDGE
(Mandatory Course)

Course Objectives: To facilitate the students with the concepts of Indian traditional knowledge and to make them understand the Importance of roots of knowledge system.

Course Outcomes:
After completion of the course, students will be able to:

- Upon completion of the course, the students will understand values,ethics
- Understand the concept of Traditional knowledge and its importance
- Know the need and importance of protecting traditional knowledge.
- Know the various enactments related to the protection of traditional knowledge.
- Understand the concepts of Intellectual property
- Understand the need to protect the traditional knowledge.

UNIT I:
Introduction to traditional knowledge: Define traditional knowledge, nature and characteristics, scope and importance, kinds of traditional knowledge, the physical and social contexts in which traditional knowledge develop, the historical impact of social change on traditional knowledge systems. Indigenous Knowledge (IK), characteristics, traditional knowledge vis-à-vis indigenous knowledge, traditional knowledge Vs western knowledge traditional knowledge vis-à-vis formal knowledge

UNIT II:
Protection of traditional knowledge: the need for protecting traditional knowledge Significance of TK Protection, value of TK in global economy, Role of Government to harness TK.

UNIT III: Legal frame work and TK:
A: The Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006, Plant Varieties Protection and Farmer's Rights Act, 2001 (PPVFR Act);
B: The Biological Diversity Act 2002 and Rules 2004, the protection of traditional knowledge bill, 2016. Geographical indicators act 2003.

UNIT IV:
Traditional knowledge and intellectual property: Systems of traditional knowledge protection, Legal concepts for the protection of traditional knowledge, Certain non IPR mechanisms of traditional knowledge protection, Patents and traditional knowledge, Strategies to increase protection of traditional knowledge, global legal FORA for increasing protection of Indian Traditional Knowledge.

UNIT V:

Traditional knowledge in different sectors: Traditional knowledge and engineering, traditional medicine system, TK and biotechnology, TK in agriculture, Traditional societies depend on it for their food and healthcare needs, Importance of conservation and sustainable development of environment, Management of biodiversity, Food security of the country and protection of TK 139

TEXT BOOKS:

1. Traditional Knowledge System in India, by Amit Jha, 2009.
2. Traditional Knowledge System and Technology in India by Basanta Kumar Mohanta andVipin Kumar Singh, Pratibha Prakashan 2012.

REFERENCE BOOKS:

1. Traditional Knowledge System in India by Amit Jha Atlantic publishers, 2002
2. "Knowledge Traditions and Practices of India" Kapil Kapoor1, Michel Danino2

IV B. TECH SYLLABUS (ECE)

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IV Year B.Tech ECE-I Sem **L /T / P/ C**
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(2200HS04) FUNDAMENTALS OF MANAGEMENT AND ENTREPRENEURSHIP

COURSE OBJECTIVES

- To provide engineering and science students with an accelerated introduction to the basics of management.
- The course provides a framework that will enhance a person's effectiveness in the business world and make familiarize management language.
- To understand the management concepts and applications of concepts in practical aspects of business and development of managerial skills.
- To provide the student with a clear understanding of Entrepreneurship.
- To give hands on experience on how to generate ideas, evaluate business model.

COURSE OUTCOMES

- The students understand the significance of Management in their Profession.
- The various Management Functions like Planning, Organizing, Staffing, Leading, Motivation and Control aspects are learnt in this course.
- The students can explore the Management Practices in their domain area and understand, adopt motivational theories and leadership styles and apply controlling techniques at right time for better decision making.
- The student will be exposed to the basic concepts of entrepreneurship and its development process.
- The student will be able to evaluate business ideas and attain hands on experience in designing value proposition and he will acquire the ability of developing a business plan / model.
- Apply Management and Entrepreneurial Concepts in Real-world Scenarios

UNIT–I INTRODUCTION TO MANAGEMENT

Definition, Nature and Scope, Functions, Managerial Roles, Levels of Management, Managerial Skills; Evolution of Management Thought- Classical Approach- Scientific and Administrative Management; The Behavioral approach; The Systems Approach; Contingency Approach.

UNIT– II PLANNING AND ORGANIZING

Planning – Planning Process, Types of Plans, Decision making and Steps in Decision Making; Principles of Organization: Span of control, organizational Design & Organizational Structures; Departmentalization, Delegation; Centralization, Decentralization.

UNIT–III LEADING, MOTIVATION AND CONTROLLING

Leadership, Power and Authority, Leadership Styles; Behavioral Leadership, Situational Leadership, Leadership Skills. Motivation – Types; Motivational Theories – Needs Hierarchy Theory, Two Factor Theory, Theory X and Theory Y. Controlling– basic control process – control techniques

UNIT–IV NATURE OF ENTREPRENEURSHIP

Characteristics and skills of an entrepreneur, Entrepreneur scenario in India and abroad. Types of entrepreneur, types of ownership, Small business in Indian economy. Risk Reduction strategies. Strategies for growth. Financial aspects: sources of rising capital, schemes of Department of Industries (DIC), KVIC, SIDBI, NABARD, NSIC, IFCI and IDBI.

UNIT–V CREATING AND STARTING THE VENTURE

Creativity and the business idea (Self-discovery, Opportunity discovery); Developing the business plan (Business model – Lean canvas by Alexander Osterwalder); Marketing plan (Customer & Solution- Value proposition, Marketing & Sales); Financial plan (Validation, money), Human Resource Plan (Team).

TEXT BOOKS

1. Management Fundamentals, Robert N Lussier, 5e, Cengage Learning, 2013.
2. Fundamentals of Management, Stephen P. Robbins, Pearson Education, 2009.
3. Principles and Practice of Management, L. M. Prasad, Sultan Chand & Sons, 2012
4. Entrepreneurship- Robert D Hisrich, Michael P Peters, Dean A Shepherd, TMH.2009

REFERENCES

1. Essentials of Management, Koontz Kleihrich, Tata Mc – Graw Hill.
2. Management Essentials, Andrew DuBrin, 9e, Cengage Learning, 2012.
3. Entrepreneurship- Rajeev Roy, Oxford, 2011
4. Intellectual Property- Deborah E.Bouchoux, Cengage, 2012

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(2204PC12) COMPUTER NETWORKS

Course Objectives:
To introduce the fundamental various types of computer networks.

- To demonstrate the TCP/IP and OSI models with merits and demerits.
  To explore the various layers of OSI Model.
- To introduce UDP and TCP Models.
- To have the concept of different routing techniques for data communications.

Course Outcomes:

- Understand the OSI and TCP/IP models, including their layers, protocols, and addressing schemes
- Describe data link layer concepts such as error control, flow control, framing techniques, and IEEE standards, with examples of protocols and technologies like Ethernet and wireless LANs.
- Apply routing and forwarding protocols, including RIP, OSPF, and BGP, for effective data transmission at the network layer
- Analyze transport layer protocols, specifically TCP, UDP, and SCTP, and assess their roles in ensuring reliable data delivery and congestion control
- Examine various application layer protocols, such as DNS, FTP, and HTTP, and demonstrate their usage in network communication
- Discuss network security mechanisms, including IPSec, SSL, VPNs, and firewall configurations, and describe emerging networking technologies like IPv6, Bluetooth, and Zigbee.

UNIT - I

Introduction to Networks: Internet, Protocols and Standards, the OSI Model, Layers in OSI Model, TCP/IP Suite, Addressing.

Physical Layer: Multiplexing, Transmission Media, Circuit Switched Networks, Datagram Networks, and Virtual Circuit Networks.

UNIT - II

Data Link Layer: Introduction, Checksum, Framing, Flow and Error Control, Noiseless Channels, Noisy Channels, Random Access Controlled Access, Channelization, IEEE Standards, Ethernet, Giga-Bit Ethernet, Wireless LANs, SONET-SDH, Frame Relay and ATM.

UNIT - III

Network Layer: Logical Addressing, Internetworking, Tunneling, Address Mapping, ICMP, IGMP, Forwarding, Routing-Flooding, Bellman& Ford, Disjkstra's routing protocols, RIP, OSPF, BGP,- and Multicast Routing Protocols. Connecting Devices-Passive Hubs, Repeaters,

Active Hubs, Bridges, Routers.

UNIT - IV

Transport Layer: Process to Process Delivery, UDP, TCP and SCTP Protocols, Congestion, Congestion Control, Quality of Service.

Application Layer: Domain Name Space, DNS in Internet, Electronic Mail, File Transfer Protocol, WWW, HTTP, SNMP, Multi-Media.

UNIT - V

Network Security: Security services, mechanisms and attacks, IPSec, SSL, VPN, Firewall. Bluetooth, Zigbee, IPv4, IPv6.

TEXT BOOKS:

1. Data Communications and Networking – Behrouz A. Forouzan, 4th Edition Mc Graw Hill Education, 2006.
2. Computer Networks -- Andrew S Tanenbaum, 4th Edition, Pearson Education.
3. Computer Networking: A Top-Down Approach Featuring the Internet, James F. Kurose, K. W. Ross, 3rd Edition, Pearson Education.

REFERENCES:

1. Data communications and Networks by William Stallings, Pearson Edu. 10th Edition.
2. Data communication and Networks - Bhusan Trivedi, Oxford University Press 2016.
3. An Engineering Approach to Computer Networks-S.Keshav, 2nd Edition, Pearson Education.
4. Understanding Communications and Networks, 3rd Edition, W.A.Shay, Cengage Learning.

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(2204PC13) MICROPROCESSORS & MICROCONTROLLERS

Course Objectives:

- To develop an understanding of the operations of microprocessors and micro controllers; machine language programming and interfacing techniques.

Course Outcomes:

- Understand the internal architecture, registerorganization, addressing modes and instruction set of 8086.
- Understand the internal architecture, register organization, addressing modes and instruction set of 8086.
- Implement LCD, RAM, ROM, ADC and DAC interfaces with the 8051 microcontroller and also assess the impact of different external communication interfaces, like RS232 and USB, on system performance and usability in embedded system applications.
- Understand the internal architecture, registerorganization, addressing modes and instruction set of ARM Processor.
- Understand the internal architecture and applications of CORTEX and OMAP Processors.
- Able to do the real time projects based on advanced processors in embedded systems.

UNIT - I

8086 Architecture: 8086 Architecture-Functional diagram, Register Organization, Memory Segmentation, Programming Model, Memory addresses, Physical Memory Organization, Architecture of 8086, Signal descriptions of 8086, interrupts of 8086.

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.

UNIT - II

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 – III

I/O And Memory Interface: LCD, Keyboard, External Memory RAM, ROM Interface, ADC, DAC Interface to 8051.

Serial Communication and Bus Interface: Serial Co mmunication Standards, Serial Data Transfer Scheme, On board Communication Interfaces-I2C Bus, SPI Bus, UART; External Communication Interfaces-RS232,USB.

UNIT – IV

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.

UNIT – V

Advanced ARM Processors: Introduction to CORTEX Processor and its architecture, OMAP Processor and its Architecture.

TEXT BOOKS:

1. Advanced Microprocessors and Peripherals – A. K. Ray and K.M. Bhurchandani, MHE, 2nd Edition 2006.
2. The 8051 Microcontroller, Kenneth. J. Ayala, Cengage Learning, 3rd Ed.
3. ARM System Developers guide, Andrew N SLOSS, Dominic SYMES, Chris WRIGHT, Elsevier, 2012

REFERENCE BOOKS:

1. Microprocessors and Interfacing, D. V. Hall, MGH, 2nd Edition 2006.
2. Introduction to Embedded Systems, Shibu K.V, MHE, 2009
3. The 8051Microcontrollers, Architecture and Programming and Applications - K.Uma Rao, Andhe Pallavi, Pearson, 2009.

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(2204PE19) NATURAL LANGUAGE PROCESSING
(Professional Elective – IV)

COURSE OBJECTIVES:

- Introduction to some of the problems and solutions of NLP and their relation to linguistics and statistics.

Course Outcomes:

- Show sensitivity to linguistic phenomena and an ability to model them with formal grammars
- Understand and carry out proper experimental methodology for training and evaluating empirical NLP systems
- Able to manipulate probabilities, construct statistical models ove strings and trees, and estimate parameters using supervised and unsupervised training methods
- Able to design, implement, and analyze NLP algorithms; and design different language modeling Techniques.
- Develop Real-world NLP Applications
- Explore Advanced NLP Techniques.

UNIT - I

Finding the Structure of Words: Words and Their Components, Issues and Challenges, Morphological Models

Finding the Structure of Documents: Introduction, Methods, Complexity of the Approaches, Performances of the Approaches, Features

UNIT - II

Syntax I: Parsing Natural Language, Treebanks: A Data-Driven Approach to Syntax, Representation of Syntactic Structure, Parsing Algorithms

UNIT – III

Syntax II: Models for Ambiguity Resolution in Parsing, Multilingual Issues

Semantic Parsing I: Introduction, Semantic Interpretation, System Paradigms, Word Sense

UNIT - IV

Semantic Parsing II: Predicate-Argument Structure, Meaning Representation Systems

UNIT - V

Language Modeling: Introduction, N-Gram Models, Language Model Evaluation, Bayesian parameter estimation, Language Model Adaptation, Language Models- class based, variable

length, Bayesian topic based, Multilingual and Cross Lingual Language Modeling

TEXT BOOKS:

1. Multilingual natural Language Processing Applications: From Theory to Practice – Daniel M.Bikel and Imed Zitouni, Pearson Publication

REFERENCE BOOK:

1. Speech and Natural Language Processing - Daniel Jurafsky& James H Martin, PearsonPublications.
2. Natural Language Processing and Information Retrieval: Tanvier Siddiqui, U.S. Tiwary

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(2204PE20)CMOS MIXED SIGNAL DESIGN

(Professional Elective – IV)

Course Objectives: The objectives of this course are to

- Introduce circuit design concepts for basic building blocks used in mixed-signal integratedcircuit designs.
- Provide students with the skills to design mixed-signal integrated circuits with these buildingblocks.
- Understand design and operation of basic analog circuits.
- Know mixed signal circuits like DAC, ADC, PLL etc.
- Design and analysis of switched capacitor circuits
- Analysis basic data conversion algorithms and circuits.

Course Outcomes: At the completion of this course, each student will have demonstrated proficiencyin:

- CMOS analog circuits to achieve performance specifications.
- Analyzing CMOS based switched capacitor circuits
- Designing data converters and know how to use these in specific applications
- Design a mixed-signal circuits with understanding design flow.
- Apply techniques for low-power design in mixed-signal circuits
- Analyze and model the performance of mixed-signal circuits

UNIT - I
Switched Capacitor Circuits
Introduction to Switched Capacitor circuits- basic building blocks, Operation and Analysis, Non-ideal effects in switched capacitor circuits, Switched capacitor integrators first order filters, Switch sharing, biquad filters.

UNIT - II
Phased Lock Loop (PLL)
Basic PLL topology, Dynamics of simple PLL, Charge pump PLLs-Lock acquisition, Phase/Frequency detector and charge pump, Basic charge pump PLL, Non-ideal effects in PLLs-PFD/CP non-idealities,Jitter in PLLs, Delay locked loops, applications

UNIT - III
Data Converter Fundamentals
DC and dynamic specifications, Quantization noise, Nyquist rate D/A converters- Decoder based converters, Binary-Scaled converters, Thermometer-code converters, Hybrid converters.

UNIT - IV

Nyquist Rate A/D Converters

Successive approximation converters, Flash converter, Two-step A/D converters, Interpolating A/D converters, Folding A/D converters, Pipelined A/D converters, Time-interleaved converters.

UNIT - V

Oversampling Converters

Noise shaping modulators, Decimating filters and interpolating filters, Higher order modulators, Delta sigma modulators with multibit quantizers, Delta sigma D/A.

TEXT BOOKS:

1. Design of Analog CMOS Integrated Circuits- Behzad Razavi, TMH Edition, 2002.
2. CMOS Analog Circuit Design - Philip E. Allen and Douglas R. Holberg, Oxford UniversityPress, International Second Edition/Indian Edition, 2010.
3. Analog Integrated Circuit Design- David A. Johns,Ken Martin, Wiley Student Edition, 2013.

REFERENCE BOOKS:

1. CMOS Integrated Analog-to- Digital and Digital-to-Analog converters-Rudy Van DePlassche, Kluwer Academic Publishers, 2003
2. Understanding Delta-Sigma Data converters-Richard Schreier, Wiley Interscience, 2005.
3. CMOS Mixed-Signal Circuit Design - R. Jacob Baker, Wiley Interscience, 2009.

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(2204PE21)PATTERN RECOGNITION

(Professional Elective – IV)

Course Objectives

- This course introduces fundamental concepts, theories, and algorithms for pattern recognition and machine learning.
- Topics include: Pattern Representation, Nearest Neighbor Based Classifier, Bayes Classifier, Hidden Markov Models, Decision Trees, Support Vector Machines, Clustering, and an application of hand-written digit recognition.
- **Course Outcomes**
  - Understand the theory, benefits, inadequacies and possible applications of various machine learning and pattern recognition algorithms
  - Identify and employ suitable machine learning techniques in classification, pattern recognition, clustering and decision problems
  - Apply Machine Learning Algorithms for Pattern Recognition
  - Explore Feature Extraction and Dimensionality Reduction
  - Evaluate the Performance of Pattern Recognition Systems
  - Design and Develop Real-world Pattern Recognition Applications

UNIT - I: Introduction: What is Pattern Recognition, Data Sets for Pattern Recognition, Different Paradigms for Pattern Recognition. Representation: Data Structures for Pattern Representation, Representation of Clusters, Proximity Measures, Size of Patterns, Abstractions of the Data Set, Feature Extraction, Feature Selection, Evaluation of Classifier, Evaluation of Clustering.

UNIT - II: Nearest Neighbor Based Classifier: Nearest Neighbor Algorithm, Variants of the NN Algorithm use of the Nearest Neighbor Algorithm for Transaction Databases, Efficient Algorithms, Data Reduction, Prototype Selection. Bayes Classifier: Bayes Theorem, Minimum Error Rate Classifier, Estimation of Probabilities, Comparison with the NNC, Naïve Bayes Classifier, Bayesian Belief Network.

UNIT - III: Hidden Markov Models: Markov Models for Classification, Hidden Morkov Models, Classification using HMMs. Decision Trees: Introduction, Decision Tree for Pattern Classification, Construction of Decision Trees, Splitting at the Nodes, Overfitting and Pruning, Examples of Decision Tree Induction.

UNIT - IV: Support Vector Machines: Introduction, Learning the Linear Discriminant Functions, Neural Networks, SVM for Classification. Combination of Classifiers: Introduction,

Methods for Constructing Ensembles of Classifiers, Methods for Combining Classifiers.

UNIT - V: Clustering: Why is Clustering Important, Hierarchical Algorithms, Partitional Clustering, Clustering Large Data Sets. An Application-Hand Written Digit Recognition: Description of the Digit Data, Preprocessing of Data, Classification Algorithms, Selection of Representative Patterns, Results.

EXT BOOK:

1. Pattern Recognition: An Algorithmic Approach: Murty, M. Narasimha, Devi, V. Susheela, Spinger Pub,1st Ed.

REFERENCE BOOKS:

1. Machine Learning - Mc Graw Hill, Tom M. Mitchell.
2. Fundamentals Of Speech Recognition: Lawrence Rabiner and Biing- Hwang Juang. PrenticeHall Pub

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(2204PE22)ANTENNAS AND WAVE PROPAGATION
(Professional Elective – IV)

COURSE OBJECTIVES:

The main objectives are:

- Understand basic terminology and concepts of Antennas.
- To attain knowledge on the basic parameters those are considered in the antenna design process and the analysis while designing that.
- Analyze the electric and magnetic field emission from various basic antennas and mathematical formulation of the analysis.
- To have knowledge on antenna operation and types as well as their usage in real time field.
- Aware of the wave spectrum and respective band antenna usage and also to know the propagation of the waves at different frequencies through different layers in the existing layered free space environment structure.

COURSE OUTCOMES:

Student will be:

- Explain the radiation through antenna and identify different types of antennas.
- Identify and measure the basic antenna parameters.
- Design and analyze Very high frequency AND Ultra high frequency Antennas.
- Design and analyze antenna arrays.
- Design the bench setup for antenna parameters measurement.
- Identify the characteristics of radio-wave propagation.

UNIT- I:Antenna Basics &Thin Linear Wire Antennas

Antenna Basics: Introduction, Basic Antenna Parameters - Patterns, Beam Area, Radiation Intensity, Beam Efficiency, Directivty- Gain- Resolution, Antenna Apertures, Effective Height. Related Problems.

Thin Linear Wire Antennas: Radiation from Small Electric Dipole, Quarter wave Mono pole and Half wave Dipole – Current Distributions, Field Components, Radiated Power, Radiation Resistance, Beam widths, Directivity, Effective Area and Effective Height. Natural current distributions, fields and patterns of Thin Linear Center-fed Antennas of Different Lengths, Illustrative Problems. Loop Antennas - Introduction, Small Loop, Comparison of Far Fields of Small Loop and Short Dipole, Radiation Resistances and Directivities of Small and Large Loops (Qualitative Treatment).

UNIT - II: VHF, UHF AND Microwave Antennas - I

VHF, UHF AND Microwave Antennas - I: Arrays with Parasitic Elements, Yagi - Uda Arrays, Folded Dipoles & their characteristics, Helical Antennas - Helical geometry, Helix Modes, Practical Design Considerations for Monofilar Helical Antenna in Axial and Normal Modes.

Horn Antennas - Types, Fermat's Principle, Optimum Horns, Design Considerations of Pyramidal Horns, Illustrative Problems.

UNIT - III:VHF, UHF ,Microwave Antennas & Lens Antennas- II

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. Impact of Different Parameters on Characteristics, Reflector Antennas - Introduction, FlatSheet and Corner Reflectors, Paraboloidal Reflectors - Geometry, Pattern Characteristics, Feed Methods, Reflector Types - Related Features, Illustrative Problems. **Lens Antennas** - Introduction, Geometry of Non-metallic Dielectric Lenses, Zoning, Tolerances, Applications.

UNIT - IV:Antenna Arrays &Antenna Measurements

Antenna Arrays: Point Sources - Definition, Pattern, arrays of 2 Isotropic Sources - Different Cases, Principle of Pattern Multiplication, Uniform Linear Arrays - Broadside Arrays, End fire Arrays, EFA with Increased Directivity, Derivation of their Characteristics and Comparison, BSAs with Non-unitform Amplitude Distributions - General Considerations and Binomial Arrays, Illustrative Problems.

Antenna Measurements: Introduction, Concepts - Reciprocity, Near and Far Fields, Coordinate System, Sources of Errors. Patterns to be Measured, Pattern Measurement Arrangement, Directivity Measurement, Gain Measurements (by Comparison, Absolute and 3-Antenna Methods)

UNIT - V: Wave Propagation - I & Wave Propagation - II

Wave Propagation - I: Introduction, Definitions, Categorizations and General Classifications, Different Modes of Wave Propagation, Ray/Mode Concepts, Ground Wave Propagation (Quantitative Treatment) - Introduction, Plane Earth Reflections, Space and Surface Waves, Wave Tilt, Curved Earth Reflections, Space Wave Propagation - Introduction, Field Strength Variation with Distance and Height, Effect of Earth's Curvature, Absorption, Super retraction, M-Curves and Duct Propagation, Scattering Phenomena, Tropospheric Propagation.

Wave Propagation - II: Sky Wave Propagation - Introduction, Structure of Ionosphere, Refraction and Reflection of Sky Waves by Ionosphere, Ray Path, Critical Frequency, MUF, LUF, OF, Virtual Height and Skip Distance, Relation between MUF and skip Distance, Multi-hop Propagation.

TEXT BOOKS:

1. Antennas for All Applications – John D. Kraus and R. J. Marhefka, and Ahmad S. Khan TMH, New Delhi, 4th ed., (Special Indian Edition) 2010.
2. Electromagnetic Waves and Radiating Systems – E.C. Jordan and K.G. Balmain, PHI, 2nd ed., 2000.

REFERENCE BOOKS:

1. Antenna Theory - C.A. Balanis, John Wiley & Sons, 3rd ed., 2005.
2. Antennas and Wave Propagation – K.D. Prasad, Satya Prakashan, Tech India Publications, New Delhi, 2001.
3. Transmission and Propagation – E.V.D. Glazier and H.R.L. Lamont, The Services Text Book of Radio, vol. 5, Standard Publishers Distributors, Delhi.
4. Electronic and Radio Engineering – F.E. Terman, McGraw-Hill, 4th edition, 1955.
5. Antennas – John D. Kraus, McGraw-Hill (International Edition), 2nd Ed. 1988.

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(2204PE23) HARDWARE AND SOFTWARE CO-DESIGN

(Professional Elective – IV)

Course Objectives:

- To know the Co-design Issues, prototype and emulation techniques
- To learn Architecture specific techniques
- To know the different tool for design

Course Outcomes: Students will be able to:

- Acquire the knowledge on various models of Co-design
- Explore the interrelationship between Hardware and software in a embedded system
- Acquire the knowledge of firmware development process and tools during Co-design
- Implement validation methods and adaptability
- Optimize Co-design for Performance and Power
- Implement Communication Interfaces in Co-design

UNIT - I

Co-Design Issues: Co- Design Models, Architectures, Languages, A Generic Co-design Methodology. **Co-Synthesis Algorithms:** Hardware software synthesis algorithms: hardware – software partitioningdistributed system co-synthesis.

UNIT- II

Prototyping and Emulation: Prototyping and emulation techniques, prototyping and emulation environments, future developments in emulation and prototyping architecture specialization techniques, system communication infrastructure.

Target Architectures: Architecture Specialization techniques, System Communication infrastructure, Target Architecture and Application System classes, Architecture for control dominated systems (8051- Architectures for High performance control), Architecture for Data dominated systems (ADSP21060, TMS320C60), Mixed Systems.

UNIT - III

Compilation Techniques and Tools for Embedded Processor Architectures: Modern embedded architectures, embedded software development needs, compilation technologies, practical consideration in a compiler development environment.

UNIT - IV

Design Specification and Verification: Design, co-design, the co-design computational model, concurrency coordinating concurrent computations, interfacing components, design verification, implementation verification, verification tools, interface verification.

UNIT - V

Languages for System – Level Specification and Design-I: System – level specification,

design representation for system level synthesis, system level specification languages, **Languages for System – Level Specification and Design-II:** Heterogeneous specifications and multi- language co-simulation, the cosyma system and lycos system.

TEXT BOOKS:

1. Hardware / Software Co- Design Principles and Practice – Jorgen Staunstrup, Wayne Wolf –Springer, 2009.
2. Hardware / Software Co- Design - Giovanni De Micheli, Mariagiovanna Sami, Kluwer Academic Publishers, 2002.

REFERENCE BOOKS:

1. A Practical Introduction to Hardware/Software Co-design -Patrick R. Schaumont, Springer, 2010

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(2204PE24) HIGH SPEED ELECTRONICS
(Professional Elective – IV)

COURSE OUTCOMES:
At the end of this course students will demonstrate the ability to

- Understand the concepts of high speed data communication.
- Understand the methodologies for design of high speed buses.
- Analyze the effect of noise on the performance of the high speed circuits.
- Design of printed circuit board which can handle high speed power transfer.

Unit – I Transmission line theory (basics) crosstalk and non ideal effects; signal integrity: impact of packages, vias, traces, connectors; non-ideal return current paths, high frequency power delivery, methodologies for design of high speed buses; radiated emissions and minimizing system noise;

Unit – II Noise Analysis: Sources, Noise Figure, Gain compression, Harmonic distortion, Inter modulation, Cross-modulation, Dynamic range
Devices: Passive and active, Lumped passive devices(models), Active(models, low vs high frequency)

UNIT – III RF Amplifier Design, Stability, Low Noise Amplifiers, Broadband Amplifiers (and Distributed) Power Amplifiers, Class A, B, AB and C, D E Integrated circuit realizations, Cross-over distortion Efficiency RF power output stages

UNIT-IV Mixers –Up conversion Down conversion, Conversion gain and spurious response. OscillatorsPrinciples.PLL Transceiver architectures

UNIT-V Printed Circuit Board Anatomy, CAD tools for PCB design, Standard fabrication, Microvia Boards. Board Assembly: Surface Mount Technology, Through Hole Technology, Process Control and Design challenges.

Text/Reference Books:

1. Stephen H. Hall, Garrett W. Hall, James A. McCall “High-Speed Digital System Design: A Handbook of Interconnect Theory and Design Practices”, August 2000, Wiley-IEEE Press
2. Thomas H. Lee, “The Design of CMOS Radio-Frequency Integrated Circuits”, Cambridge University Press, 2004, ISBN 0521835399.
3. Behzad Razavi, “RF Microelectronics”, Prentice-Hall 1998, ISBN 0-13-887571-5.
4. Guillermo Gonzalez, “Microwave Transistor Amplifiers”, 2nd Edition, Prentice Hall.
5. Kai Chang,“RF and Microwave Wireless systems”, Wiley.
6. R.G. Kaduskar and V.B.Baru, Electronic Product design, Wiley India, 2011

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(2204PC69) COMPUTER NETWORKS LAB

Course Objectives:

- To Understand the functionalities of various layers of OSI model
- To understand the operating System functionalities

Course Outcomes:

- Implement data link layer framing techniques such as character stuffing, bit stuffing, and character stuffing to ensure data integrity
- Apply CRC polynomial algorithms (CRC-12, CRC-16, and CRC- CCIP) for error detection in data transmission and demonstrate their effectiveness
- Implement Dijkstra's algorithm to compute the shortest path in a graph, and analyze its efficiency for routing in computer networks
- Design and implement a distance vector routing algorithm and calculate routing tables based on delay weights in a subnet graph
- Design and implement encryption and decryption algorithms such as DES and RSA to secure communication over networks.
- Develop client-server applications using TCP and UDP protocols for file transfer and sentence reversal tasks

System/ Software Requirement

1. Intel based desktop PCs LAN CONNECTED with minimum of 166 MHZ or faster processor with at least 64 MB RAM and 100 MB free disk space

LIST OF EXPERIMENTS

1. Implement the data link layer framing methods such as character, character stuffing, and bit stuffing.
2. Implement on a data set of characters the three CRC polynomials – CRC 12, CRC 16 and CRC CCIP.
3. Implement Dijkstra‘s algorithm to compute the Shortest path thru a graph.
4. Take an example subnet graph with weights indicating delay between nodes. Now obtain Routing table art each node using distance vector routing algorithm
5. Take an example subnet of hosts. Obtain broadcast tree for it.
6. Take a 64 bit playing text and encrypt the same using DES algorithm.
7. Write a program to break the above DES coding
8. Using RSA algorithm encrypts a text data and Decrypt the same.
9. C Program to implement Link state routing.
10. Design TCP iterative Client and Server application to reverse the given input sentence.
11. TCP Client and Server application to transfer file.
12. UDP Client and Server application to transfer a file.

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(2204PC70) MICROPROCESSORS & MICROCONTROLLERS LAB

COURSE OBJECTIVES:

The Primary objective of this course is:

- To enable the students to identify the programming model of microprocessor /microcontroller
- To enable the students to use the instruction set architecture to perform various operations.
- To enable the students to write the programs in assembly language to perform a particular task.
- To enable the students to use basic interfacing techniques to connect the microprocessor to outside world.

COURSE OUTCOMES:

- Able to demonstrate programming proficiency using the various addressing modes and data transfer instructions of the target microprocessor.
- Able to program using the capabilities of the stack, the program counter, and the status register and show how these are used to execute a machine code program.
- Able to apply knowledge of the microprocessor's internal registers and operations by use of a PC based microprocessor simulator.
- Able to write assembly language programs and download the machine code that will provide solutions real-world control problems.
- Implement the programs to interface LCD, Keyboard and multiprocessors using 8051 microcontroller.

LIST OF EXPERIMENTS:

1. Programs for 16 bit arithmetic operations 8086(using various addressing modes)
2. Programs for sorting an array for 8086.
3. Programs for searching for a number of characters in a string for 8086.
4. Programs for string manipulation for 8086.
5. Programs for digital clock design using 8086.
6. Interfacing ADC and DAC to 8086.
7. Parallel communication between two microprocessor kits using 8255.
8. Serial communication between two microprocessor kits using 8251.
9. Interfacing to 8086 and programming to control stepper motor.
10. Programming using arithmetic, logical and bit manipulation instructions of 8051.
11. Program and verify Timer/Counter in 8051.
12. Program and verify interrupt handling in 8051.
13. UART operation in 8051.
14. Communication between 8051 kit and PC
15. Interfacing LCD to 8051
16. Interfacing Matrix/Keyboard to 8051

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(2204PE25) QUANTUM COMPUTING
(Professional Elective – V)

Course Objectives:

- A basic introduction to quantum mechanics, linear algebra and familiarity with the Dirac notation is provided first to get one's quantum moorings right .
- This is then followed byan introductory treatment of quantum computation and quantum information covering aspects of quantum entanglement, quantum algorithms, quantum channels.
- Rudimentary quantum computing is introduced using the IBM quantum computer and associated simulators

Course Outcomes:

- Understand the fundamentals of quantum mechanics and linear algebra for quantum computing
- Explore quantum states, Hilbert space, Bloch sphere, and density operators
- Analyze and apply the no-cloning theorem and generalized measurements
- Analyze quantum correlations, Bell inequalities, and entanglement
- Apply Schmidt decomposition, super dense coding,and teleportation protocols
- Design quantum algorithms using universal gates, quantum circuits, and key algorithms

Unit - I Introduction: Elementary quantum mechanics:, linear algebra for quantum mechanics, Quantum states in Hilbert space, The Bloch sphere, Density operators, generalized measurements, no-cloning theorem.

Unit II Quantum correlations: Bell inequalities and entanglement, Schmidt decomposition, super dense coding, teleportation.

Unit III Quantum cryptography: quantum key distribution

Unit IV Quantum gates and algorithms: Universal set of gates, quantum circuits, Solovay-Kitaev theorem, Deutsch-Jozsa algorithm, factoring

Unit V Programming a quantum computer: The IBMQ, coding a quantum computer using a simulator to carry out basic quantum measurement and state analysis

Text-books

(1) Phillip Kaye, Raymond Laflamme et. al., An introduction to Quantum Computing, Oxford University press, 2007.
(1) Chris Bernhardt, Quantum Computing for Everyone, The MIT Press,Cambridge, 2020

(2)David McMahon-Quantum Computing Explained-Wiley-Interscience , IEEE Computer Society (2008)

References

(1) Quantum Computation and Quantum Information, M. A. Nielsen &I.Chuang, Cambridge University Press (2013).
(2) Quantum Computing, A Gentle Introduction , Eleanor G. Rieffel and Wolfgang H. Polak MIT press (2014)

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(2204PE26)LOW POWER VLSI DESIGN
(Professional Elective – V)

Course Objectives:

- Known the low power low voltage VLSI design
- Understand the impact of power on system performances.
- Known about different Design approaches.
- Identify suitable techniques to reduce power dissipation in combinational and sequential• circuits.

Course Outcomes: Upon completing this course, the student will be able to

- Understand the need of Low power circuit design.
- Analyze the impact of short-channel effects and other phenomena on power dissipation
- Apply low-power design techniques using voltage scaling and various CMOS technologies
- Design low-power circuits at the architectural level using pipelining and parallel processing
- Design and optimize low-voltage low-power adder circuits
- Evaluate the impact of low-power design techniques on the overall system performance

UNIT - I: Fundamentals:

Need for Low Power Circuit Design, Sources of Power Dissipation – Switching Power Dissipation, Short Circuit Power Dissipation, Leakage Power Dissipation, Glitching Power Dissipation, Short Channel Effects –Drain Induced Barrier Lowering and Punch Through, Surface Scattering, Velocity Saturation, Impact Ionization, Hot Electron Effect.

UNIT - II: Low-Power Design Approaches:

Low-Power Design through Voltage Scaling – VTCMOS circuits, MTCMOS circuits, Architectural Level Approach –Pipelining and Parallel Processing Approaches. Switched Capacitance Minimization Approaches: System Level Measures, Circuit Level Measures, and Mask level Measures.

UNIT - III: Low-Voltage Low-Power Adders:

Introduction, Standard Adder Cells, CMOS Adder's Architectures – Ripple Carry Adders**,** Carry Look- Ahead Adders, Carry Select Adders, Carry Save Adders, LowVoltage Low-Power Design Techniques –Trends of Technology and Power Supply Voltage, LowVoltage Low-Power Logic Styles. UNIT - IV: Low-Voltage Low-Power Multipliers: Introduction, Overview of Multiplication, Types of Multiplier Architectures, Braun Multiplier, Baugh- Wooley Multiplier, Booth Multiplier, Introduction to Wallace Tree Multiplier.

UNIT - V: Low-Voltage Low-Power Memories:

Basics of ROM, Low-Power ROM Technology, Future Trend and Development of ROMs, Basics of SRAM, Memory Cell, Precharge and Equalization Circuit, Low-Power SRAM

Technologies, Basics of DRAM, Self-Refresh Circuit, Future Trend and Development of DRAM.

TEXT BOOKS:

1. CMOS Digital Integrated Circuits – Analysis and Design – Sung-Mo Kang, Yusuf Leblebici, TMH, 2011.

2. Low-Voltage, Low-Power VLSI Subsystems – Kiat-Seng Yeo, Kaushik Roy, TMH Professional Engineering.

REFERENCE BOOKS:

1. Introduction to VLSI Systems: A Logic, Circuit and System Perspective – Ming-BO Lin, CRC Press, 2011

2. Low Power CMOS VLSI Circuit Design – Kaushik Roy, Sharat C. Prasad, John Wiley & Sons, 2000.

3. Practical Low Power Digital VLSI Design – Gary K. Yeap, Kluwer Academic Press, 2002.

4. Leakage in Nanometer CMOS Technologies – Siva G. Narendran, Anatha Chandrakasan, Springer, 2005.

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(2204PE27) COMPUTER VISION
(Professional Elective – V)

Course Objectives:

- To review image processing techniques for computer vision.
- To understand shape and region analysis.
- To understand Hough Transform and its applications to detect lines, circles, ellipses.
- To understand three-dimensional image analysis techniques
- To understand motion analysis.
- To study some applications of computer vision algorithms.

Course Outcomes: Upon completion of this course, the students should be able to

- Implement fundamental image processing techniques required for computer vision.
- Perform shape analysis.
- Implement boundary tracking techniques.
- Apply chain codes and other region descriptors.
- Apply Hough Transform for line, circle, and ellipse detections.
- Apply 3D vision techniques and Develop applications using computer vision techniques

UNIT - I Image Processing Foundations:

Review of image processing techniques – classical filtering operations – thresholding techniques – edge detection techniques – corner and interest point detection – mathematical morphology – texture.

UNIT - II Shapes and Regions:

Binary shape analysis – connectedness – object labeling and counting – size filtering – distance functions – skeletons and thinning – deformable shape analysis – boundary tracking procedures – active contours – shape models and shape recognition – centroidal profiles – handling occlusion –boundary length measures – boundary descriptors – chain codes – Fourier descriptors – region descriptors – moments.

UNIT - III Hough Transform:

Line detection – Hough Transform (HT) for line detection – foot-of normal method – line localization – line fitting – RANSAC for straight line detection – HT based circular object detection– accurate center location – speed problem – ellipse detection – Case study: Human Iris location– hole detection – generalized Hough Transform (GHT) – spatial matched filtering – GHT for ellipse detection – object location – GHT for feature collation

UNIT - IV 3D Vision and Motion:

Methods for 3D vision – projection schemes – shape from shading – photometric stereo

– shape from texture – shape from focus – active range finding – surface representations – point-based representation – volumetric representations – 3D object recognition – 3D reconstruction – introduction to motion – triangulation – bundle adjustment – translational alignment – parametric motion – spline-based motion – optical flow – layered motion.

UNIT - V Applications: Application: Photo album – Face detection – Face recognition – Eigen faces – Active appearance and 3D shape models of faces Application: Surveillance – foreground background separation – particle filters – Chamfer matching, tracking, and occlusion – combining views from multiple cameras – human gait analysis Application: In-vehicle vision system: locating roadway – road markings – identifying road signs – locating pedestrians.

TEXT BOOKS:

1. Simon J. D. Prince, ―Computer Vision: Models, Learning, and Inference‖, Cambridge University Press, 2012.

2. Mark Nixon and Alberto S. Aquado, ―Feature Extraction & Image Processing for Computer Vision‖, Third Edition, Academic Press, 2012.

3. E. R. Davies, ―Computer & Machine Vision, Fourth Edition, Academic Press, 2012.

REFERENCES:

1. D. L. Baggio et al., ―Mastering OpenCV with Practical Computer Vision Projects‖, Packt Publishing, 2012.

2. Jan Erik Solem, ―Programming Computer Vision with Python: Tools and algorithms for analyzing images, O'Reilly Media, 2012.

3. R. Szeliski, ―Computer Vision: Algorithms and Applications‖, Springer 2011.

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(2204PE28) 5G COMMUNICATIONS
(Professional Elective – V)

Course Objectives

- To provide the student with an understanding of the Cellular concept, Frequency reuse, Co-channel interference.
- To give the student an understanding of handoff and dropped calls and multiple access techniques.
- To learn 5G technology basic requirements and advances.
- To learn about Device to Device Communication.

Course Outcomes

By the end of the course, the student will be able to analyze and design wireless and mobile cellular systems.

- Explain the evolution from 1G to 4G technologies, and identify key requirements and regulations for 5G communications.
- Describe the unique challenges and requirements of 5G propagation channels, including channel modeling for mm wave techniques in 5G, such as modulation and multiple access techniques including OFDM, GFDM, and NOMA.
- Analyze D2D and M2M communication extensions from 4G to 5G, focusing on radio resource management and multi hop operations.
- Evaluate spectrum regulations and physical layer techniques for millimeter-wave communications, including beam forming and interference management.
- Demonstrate the concepts of Massive MIMO, channel estimation,
- and techniques to address challenges like pilot contamination and spatial modulation in 5G.

UNIT I

Overview of 5G Broadband Wireless Communications: Evaluation of mobile technologies 1G to 4G (LTE, LTEA, LTEA Pro) , An Overview of 5G requirements, Regulations for 5G,Spectrum Analysis and Sharing for 5G.

UNIT II

The 5G wireless Propagation Channels: Channel modeling requirements, propagation scenarios and challenges in the 5G modeling, Channel Models for mm Wave MIMO Systems.

UNIT III

Transmission and Design Techniques for 5G: Basic requirements of transmission over 5G, Modulation Techniques – Orthogonal frequency division multiplexing (OFDM), generalized frequency division multiplexing (GFDM), filter bank multi-carriers (FBMC) and universal filtered multi-carrier (UFMC), Multiple Accesses Techniques – orthogonal frequency division multiple accesses (OFDMA), generalized frequency division multiple accesses (GFDMA), non-orthogonal multiple accesses (NOMA).

UNIT IV

Device-to-device (D2D) and machine-to-machine (M2M) type communications – Extension of 4G D2D standardization to 5G, radio resource management for mobile broadband D2D, multi-hop and multi-operator D2D communications.

UNIT V

Millimeter-wave Communications – spectrum regulations, deployment scenarios, beam forming, physical layer techniques, interference and mobility management, Massive MIMO propagation channel models, Channel Estimation in Massive MIMO, Massive MIMO with Imperfect CSI, Multi-Cell Massive MIMO, Pilot Contamination, Spatial Modulation (SM),

Textbooks:

1. Martin Sauter "From GSM From GSM to LTE–Advanced Pro and 5G: An Introduction to Mobile Networks and Mobile Broadband", Wiley-Blackwell.
2. Afif Osseiran, Jose.F.Monserrat, Patrick Marsch, "Fundamentals of 5G Mobile Networks" , Cambridge University Press.
3. Athanasios G.Kanatos, Konstantina S.Nikita, Panagiotis Mathiopoulos, "New Directions in Wireless Communication Systems from Mobile to 5G", CRC Press.
4. Theodore S.Rappaport, Robert W.Heath, Robert C.Danials, James N.Murdock "Millimeter Wave Wireless Communications", Prentice Hall Communications.

References

1. Jonathan Rodriguez, "Fundamentals of 5G Mobile Networks", John Wiley & Sons.
2. Amitabha Ghosh and Rapeepat Ratasuk "Essentials of LTE and LTE-A", Cambridge University Press.

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(2204PE29) EMBEDDED SYSTEM DESIGN

(Professional Elective – V)

Course Objectives:

- To provide an overview of Design Principles of Embedded System.
- To provide clear understanding about the role of firmware.
- To understand the necessity of operating systems in correlation with hardware systems.
- To learn the methods of interfacing and synchronization for tasking.

Course Outcomes: Upon completing this course, the student will be able to

- To understand the selection procedure of Processors in the embedded domain.
- Design Procedure for Embedded Firmware.
- To visualize the role of Real time Operating Systems in Embedded Systems
- To evaluate the Correlation between task synchronization and latency issues
- Design embedded systems with basic firmware using appropriate development languages and approaches
- Develop device drivers for embedded systems and understand their role

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: 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, Methods to Choose an RTOS.

TEXT BOOK:

1. Introduction to Embedded Systems - Shibu K.V, Mc Graw Hill.

REFERENCE BOOKS:

1. Embedded Systems - Raj Kamal, TMH.
2. Embedded System Design - Frank Vahid, Tony Givargis, John Wiley.
3. Embedded Systems – Lyla, Pearson, 2013 5. An Embedded Software Primer - David E. Simon, Pearson Education.

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(2204PE30) AUTOMATIVE ELECTRONICS

(Professional Elective – V)

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(2204PE31) COGNITIVE COMPUTING
(Professional Elective – VI)

Course Objectives:

- To provide an understanding of the central challenges in realizing aspects of human cognition.
- To provide a basic exposition to the goals and methods of human cognition.
- To develop algorithms that use AI and machine learning along with human interaction and feedback to help humans make choices/decisions.
- To support human reasoning by evaluating data in context and presenting relevant findings along with the evidence that justifies the answers.

Course Outcomes:

- Understand what cognitive computing is, and how it differs from traditional approaches
- Plan and use the primary tools associated with cognitive computing
- Plan and execute a project that leverages cognitive computing.
- Understand and develop the business implications of cognitive computing.
- Understand and apply formal models of inductive generalization, causality, categorization, and problem solving
- Explore cognitive development and child concept acquisition through cognitive models

UNIT - I

Introduction to Cognitive Science: Understanding Cognition, IBM's Watson, Design for Human Cognition, Augmented Intelligence, Cognition Modeling Paradigms: Declarative/ logic-based computational cognitive modeling, connectionist models of cognition, Bayesian models of cognition, a dynamical systems approach to cognition.

UNIT – II

Cognitive Models of memory and language, computational models of episodic and semantic memory, modeling psycholinguistics.

UNIT - III

Cognitive Modeling: modeling the interaction of language, memory and learning, Modeling select aspects of cognition classical models of rationality, symbolic reasoning and decision making.

UNIT - IV

Formal models of inductive generalization, causality, categorization and similarity, the role of analogy in problem solving, Cognitive Development Child concept acquisition. Cognition and Artificial cognitive architectures such as ACT-R, SOAR, OpenCog, CopyCat, Memory Networks.

UNIT - V

DeepQA Architecture, Unstructured Information Management Architecture (UIMA), Structured Knowledge, Business Implications, Building Cognitive Applications, Application of Cognitive Computing and Systems.

TEXT BOOKS:

1. The Cambridge Handbook of Computational Psychology by Ron Sun (ed.), Cambridge University Press.
2. Formal Approaches in Categorization by Emmanuel M. Pothos, Andy J. Wills, Cambridge University Press.

REFERENCE BOOKS:

1. Judith S. Hurwitz, Marcia Kaufman, Adrian Bowles Cognitive Computing and Big Data Analytics, Wiley
2. Vijay V Raghavan, Venkat N. Gudivada, Venu Govindaraju, Cognitive Computing: Theory and Applications: Volume 35 (Handbook of Statistics), North Holland.

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(2204PE32)ASIC Design
(Professional Elective – VI)

Course Objectives:

- To prepare the student to be an entry-level industrial standard ASIC or FPGA designer.
- To give the student an understanding of issues and tools related to ASIC/FPGA design and implementation.
- To give the student an understanding of basics of System on Chip and platform based design.

Course Outcomes: Upon successful completion of this course student should be able to:

- Demonstrate VLSI tool-flow and appreciate FPGA architecture.
- Understand the issues involved in ASIC design, including technology choice, design management,tool-flow,verification,debugandtest,aswellastheimpactoftechnology scaling on ASIC design.
- Understand the algorithms used for ASIC construction.
- Understand the basics of System on Chip, on chip communication architectures like AMBA, AXI and utilizing Platform baseddesign.
- Appreciate high performance algorithms available for ASICsIC. Engage in multidisciplinary teamwork for designing and developing ASICs and SoCs

UNIT - I Types of ASICs, VLSI Design flow, Programmable ASICs - Antifuse, SRAM, EPROM, EEPROM based ASICs. Programmable ASIC logic cells and I/O cells. Programmable interconnects. Latest Version - FPGAs and CPLDs and Soft-core processors.

UNIT - II Trade off issues at System Level: Optimization with regard to speed, area and power, asynchronous and low power system design. ASIC physical design issues, System Partitioning, Power Dissipation, Partitioning Methods.

UNIT - III ASIC floor planning, Placement and Routing.

UNIT - IV System-On-Chip Design - SoC Design Flow, Platform-based and IP based SoC Designs, Basic Concepts of Bus-Based Communication Architectures, On-Chip Communication Architecture Standards, Low-Power SoC Design.

UNIT - V High performance algorithms for ASICS/ SoCs as case studies – Canonic Signed Digit Arithmetic, KCM, Distributed Arithmetic, High performance digital filters for sigma-delta ADC, USB controllers, OMAP

TEXT BOOKS

1. M.J.S. Smith,"ApplicationSpecific Integrated Circuits", Pearson, 2003

2.H.Gerez, "Algorithms for VLSI Design Automation", John Wiley,1999.

REFERENCE BOOKS

1. J..M.Rabaey, A. Chandrakasan, and B.Nikolic, "Digital Integrated Circuit Design Perspective (2/e)", PHI2003.

2. D.A.Hodges,"AnalysisandDesignofDigitalIntegratedCircuits(3/e)",MGH2004.

3. Hoi-Jun Yoo, KangminLeeandJun Kyong Kim, "Low-Power NoC for High-Performance SoC Design", CRC Press,2008.

4. S. Pasricha and N. Dutt," OnChipCommunication Architectures System on Chip Interconnect, Elsveir",2008

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(2204PE33)DSP PROCESSORS AND ARCHITECTURES
(Professional Elective – VI)

Course Objectives: The main objectives of the course are:

- To provide a comprehensive understanding of various programs of Digital Signal Processors.
- To distinguish between the architectural differences of ARM and DSPs along with floating point capabilities.
- To explore architecture and functionality of various DSP Processors and can able to write programs.
- To known about the connectivity of interfacing devices with processors.

Course Outcomes: Upon completing this course, the student will be able to:

- Understand the various processing operations on Digital signals.
- Know the architecture of DSP Processors TMS320C54XX, ADSP 2100, 2181 and Blackfin Processor.
- Run the programs on DSP Processors.
- Interface Memory and I/O devices with DSP Processors.
- Develop programming skills in DSP devices, including using the TMS320C54XX processor's instruction set, on-chip peripherals, and pipeline operations
- Apply knowledge of DSP architectures to implement practical DSP applications using programmable DSP devices and processors.

UNIT –I Fundamentals of Digital Signal Processing: Digital signal-processing system, Sampling process, Discrete time sequences, Discrete Fourier Transform (DFT) and Fast Fourier Transform (FFT), Linear time-invariant systems, Digital filters, Decimation and Interpolation, Computational Accuracy in DSP Implementations- Number formats for signals and coefficients in DSP systems, Dynamic Range and Precision, Sources of error in DSP implementations, A/D Conversion errors, DSP Computational errors, D/A Conversion Errors, Compensating filter.

UNIT –II Architectures for Programmable DSP Devices: Basic Architectural features, DSP Computational Building Blocks, Bus Architecture and Memory, Data Addressing Capabilities, Address Generation UNIT, Programmability and Program Execution, Speed Issues, Features for External interfacing.

UNIT -III Programmable Digital Signal Processors: Commercial Digital Signal-Processing Devices, Data Addressing modes of TMS320C54XX DSPs, Data Addressing modes of TMS320C54XX Processors, Memory space of TMS320C54XX Processors, Program Control, TMS320C54XX instructions and Programming, On-Chip Peripherals, Interrupts of TMS320C54XX processors, Pipeline operation of TMS320C54XX Processors.

UNIT –IV Analog Devices Family of DSP Devices: Analog Devices Family of DSP Devices – ALU and MAC block diagram, Shifter Instruction, Base Architecture of ADSP 2100, ADSP-2181 high performance Processor. Introduction to Blackfin Processor - The Blackfin Processor, Introduction to Micro Signal Architecture, Overview of Hardware Processing Units and Register files, Address Arithmetic Unit, Control Unit, Bus Architecture and Memory, Basic Peripherals

UNIT –V Interfacing Memory and I/O Peripherals to Programmable DSP Devices: Memory space organization, External bus interfacing signals, Memory interface, Parallel I/O interface, Programmed I/O, Interrupts and I/O, Direct memory access (DMA).

TEXT BOOKS:

1. Digital Signal Processing: Principles, Algorithms & Applications – J.G. Proakis & D.G. Manolakis, 4th Ed., PHI,2006.

2. Digital Signal Processing – Avtar Singh and S. Srinivasan, Thomson Publications, 2004.

REFERENCES:

1. A Practical Approach to Digital Signal Processing - K Padmanabhan, R. Vijayarajeswaran, Ananthi. S, New Age International, 2009.

2. Digital Signal Processors, Architecture, Programming and Applications – B. Venkataramani and M. Bhaskar, TMH, 2002.

3. DSP Processor Fundamentals, Architectures & Features – Lapsley et al., S. Chand & Co. 2000

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IV Year B.Tech ECE-II Sem **L /T / P/ C**
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(2204PE34)WIRELESS SENSOR NETWORKS
(Professional Elective – VI)

Course Objectives:

- To acquire the knowledge about various architectures and applications of Sensor Networks
- To understand issues, challenges and emerging technologies for wireless sensor networks
- To learn about various routing protocols and MAC Protocols
- To understand various data gathering and data dissemination methods
- To Study about design principals, node architectures, hardware and software required for implementation of wireless sensor networks.

Course Outcomes: Upon completion of the course, the student will be able to:

- Analyze and compare various architectures of Wireless Sensor Networks
- Understand Design issues and challenges in wireless sensor networks
- Analyze and compare various data gathering and data dissemination methods.
- Design, Simulate and Compare the performance of various routing and MAC protocol
- Understand the design principles, gateway concepts, and operating systems used in sensor networks.
- Gain proficiency in TinyOS and nesC programming for sensor networks.

UNIT - I:

Introduction to Sensor Networks, unique constraints and challenges, Advantage of Sensor Networks, Applications of Sensor Networks, Types of wireless sensor networks

UNIT - II:

Mobile Ad-hoc Networks (MANETs) and Wireless Sensor Networks, Enabling technologies for Wireless Sensor Networks. Issues and challenges in wireless sensor networks

UNIT – III:

Routing protocols, MAC protocols: Classification of MAC Protocols, S-MAC Protocol, B-MAC protocol, IEEE 802.15.4 standard and ZigBee

UNIT - IV:

Dissemination protocol for large sensor network. Data dissemination, data gathering, and data fusion; Quality of a sensor network; Real-time traffic support and security protocols

UNIT - V:

Design Principles for WSNs, Gateway Concepts Need for gateway, WSN to Internet Communication, and Internet to WSN Communication. Single-node architecture, Hardware components & design constraints, Operating systems and execution environments, introduction to TinyOS and nesC

TEXT BOOKS:

1. Ad-Hoc Wireless Sensor Networks- C. Siva Ram Murthy,B. S. Manoj, Pearson
2. Principles of Wireless Networks – Kaveh Pah Laven and P. Krishna Murthy, 2002, PE

REFERENCE BOOKS:

1. Wireless Digital Communications – Kamilo Feher, 1999, PHI.
2. Wireless Communications-Andrea Goldsmith, 2005 Cambridge University Press.
3. Mobile Cellular Communication – Gottapu Sasibhushana Rao, Pearson Education, 2012.
4. Wireless Communication and Networking – William Stallings, 2003, PHI

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(2204PE35)CRYPTOGRAPHY AND NETWORK SECURITY
(Professional Elective – VI)

Course Objectives:
- Understand the basic concept of Cryptography and Network Security, their mathematical models
- To understand the necessity of network security, threats/vulnerabilities to networks and counter measures
- To understand Authentication functions with Message Authentication Codes and Hash Functions.
- To provide familiarity in Intrusion detection and Firewall Design Principles

Course Outcomes: Upon completing this course, the student will be able to
- Describe network security fundamental concepts and principles
- Encrypt and decrypt messages using block ciphers and network security technology and protocols
- Analyze key agreement algorithms to identify their weaknesses
- Identify and assess different types of threats, malware, spyware, viruses, vulnerabilities
- Develop a strong foundation in applying cryptography for secure communication in real-world systems and applications
- Analyze cryptographic algorithms in terms of security strength, such as the strength of DES and RSA

UNIT - I
Security Services, Mechanisms and Attacks, A Model for Internetwork security, Classical Techniques: Conventional Encryption model, Steganography, Classical Encryption Techniques.

Modern Techniques: Simplified DES, Block Cipher Principles, Data Encryption standard, Strength of DES, Block Cipher Design Principles.

UNIT - II
Encryption: Triple DES, International Data Encryption algorithm, Blowfish, RC5, Characteristics of Advanced Symmetric block Ciphers. Placement of Encryption function, Traffic confidentiality, Key distribution, Random Number Generation.

UNIT – III
Public Key Cryptography: Principles, RSA Algorithm, Key Management, Diffie-Hellman Key exchange, Elliptic Curve Cryptograpy. Number Theory: Prime and Relatively prime numbers, Modular arithmetic, Fermat's and Euler's theorems, Testing for primality, Euclid's Algorithm, the Chinese remainder theorem, Discrete logarithm

UNIT - IV
Message Authentication and Hash Functions: Authentication requirements and functions, Message Authentication, Hash functions, Security of Hash functions and MACs. Hash and Mac

Algorithms: MD-5, Message digest Algorithm, Secure Hash Algorithm. Digital signatures and Authentication protocols: Digital signatures, Authentication Protocols, Digital signature standards. Authentication Applications: Kerberos, Electronic Mail Security: Pretty Good Privacy, SIME/MIME.

UNIT – V

IP Security: Overview, Architecture, Authentication, Encapsulating Security Payload, Key Management. Web Security: Web Security requirements, Secure sockets layer and Transport layer security, Secure Electronic Transaction. Intruders, Viruses and Worms: Intruders, Viruses and Related threats. Fire Walls: Fire wall Design Principles, Trusted systems.

TEXT BOOKS:

1. Cryptography and Network Security: Principles and Practice - William Stallings, Pearson Education.
2. Network Security: The complete reference, Robert Bragg, Mark Rhodes, TMH,2004.

REFERENCE BOOKS:

1. Network Security Essentials (Applications and Standards) by William Stallings Pearson Education.
2. Fundamentals of Network Security by Eric Maiwald (Dreamtech press)
3. Principles of Information Security, Whitman, Thomson.
4. Introduction to Cryptography, Buchmann, Springer

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IV Year B.Tech ECE-II Sem **L /T / P/ C**
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(2204PE36)NANO ELECTRONICS
(Professional Elective – VI)

Course Objectives:

- Know the types of nanotechnology, atomic structure, molecular technology, and preparation of nano materials.
- Understand the fundamentals of nano electronics and its properties.
- Know the Silicon MOSFET's, and carbon nano tubes.
- Know the Quantum Transport Devices (QTD).
- Understand the fundamentals of molecular electronics.

Course Outcomes:

At the end of this course students will demonstrate the ability to

- To get introduced to Nano electronics and nanotechnology.
- Understand working of Nano scale devices such as transistors.
- Applying quantum mechanics to analyze nano electronic systems
- Design of Carbon based Nano electronics devices
- Understand modeling aspects of Nano scale devices from the perspective of circuit applications.
- Understanding molecular material and their electronic properties.

UNIT I INTRODUCTION TO NANOTECHNOLOGY Introduction: Discussion of the International Technology Roadmap characteristics: Need for new concepts in electronics from microelectronics towards biomolecule electronics Background to nanotechnology: Types of nanotechnology and nanomachines, periodic table, atomic structure, molecules, and phases – energy – molecular and atomic size, surface and dimensional space – top down and bottom up.

UNIT II FUNDAMENTALS OF NANOELECTRONICS Fundamentals of logic devices: Requirements, dynamic properties – threshold gates; physical limits to computations. concepts of logic devices: - classifications- two terminal devices – field effect devices – coulomb blockade devices – spintronics – quantum cellular automata.

UNIT III SILICON MOSFETs & QUANTUM TRANSPORT DEVICES Silicon MOSFETS - Novel materials and alternate concepts, fundamentals of MOSFET Devicesscaling rules, silicon-dioxide based gate dielectrics, metal gates, junctions & contacts, advanced MOSFET concepts. Quantum transport devices based on resonant tunneling: Electron tunneling, resonant tunneling diodes

UNIT IV CARBON NANOTUBES Carbon Nanotube: Fullerenes - types of nanotubes – formation of nanotubes – assemblies – purification of carbon nanotubes – electronic properties – synthesis of carbon nanotubes – carbon nanotube interconnects – carbon nanotube FETs – Nanotube for memory applications

UNIT V MOLECULAR ELECTRONICS Electrodes & contacts – functions – molecular electronic devices – first test systems – simulation and circuit design – fabrication. Future applications: MEMS – robots – random access memory – mass storage devices.

TEXT BOOKS

1. Michael Wilson, Kamali Kannangara, Geoff Smith, Michelle Simmons and Burkhard
2. Raguse, Nanotechnology: Basic Science and Emerging Technologies, Chapman & Hall / CRC, 2002.
3. Rainer Waser (Ed.), Nanoelectronics and Information Technology: Advanced Electronic Materials and Novel Devices, Wiley-VCH, 2003.
4. T. Pradeep, NANO: The Essentials – Understanding Nanoscience and Nanotechnology, TMH, 2007.

REFERENCE

1. M.Ziese and M.J Thornton(Eds.)"Spin Electronics ", Springer-verlag 2001.
2. M.Dutta and M.A Stroscio Edited by "Quantum Based Electronic Devices and systems", world Scientific, 2000.

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Technical Seminar(2204PR08)

IV Year B.Tech ECE-II Sem **L / T / P/ C**
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Innovation- Start-Up & Entrepreneurship(2204PR09)

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Research Project – II(2204PR10)

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IV Year B.Tech ECE-II Sem **L /T / P/ C**
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(2200MC08) GENDER SENSITIZATION

COURSE DESCRIPTION

This course offers an introduction to Gender Studies, an interdisciplinary field that asks critical questions about the meanings of sex and gender in society. The primary goal of this course is to familiarize students with key issues, questions and debates in Gender Studies, both historical and contemporary. It draws on multiple disciplines – such as literature, history, economics, psychology, sociology, philosophy, political science, anthropology and media studies – to examine cultural assumptions about sex, gender, and sexuality.

This course integrates analysis of current events through student presentations, aiming to increase awareness of contemporary and historical experiences of women, and of the multiple ways that sex and gender interact with race, class, caste, nationality and other social identities. This course also seeks to build an understanding and initiate and strengthen programmes combating gender based violence and discrimination. The course also features several exercises and reflective activities designed to examine the concepts of gender, gender-based violence, sexuality, and rights. It will further explore the impact of gender-based violence on education, health and development.

Objectives of the Course:

- 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.

Learning Outcomes:

- Students will have developed a better understanding of important issues related to gender in contemporary India.
- Students will be sensitized to basic dimensions of the biological, sociological, psychological and legal aspects of gender. This will be achieved through discussion of materials derived from research, facts, everyday life, literature and film.
- Students will attain a finer grasp of how gender discrimination works in our society and how to counter it.
- Students will acquire insight into the gendered division of labour and its relation to politics and economics.
- Men and women students and professionals will be better equipped to work and live together as equals.
- Students will develop a sense of appreciation of women in all walks of life.
- Through providing accounts of studies and movements as well as the new laws that provide protection and relief to women, the textbook will empower students to understand and respond to gender violence.

UNIT - I: UNDERSTANDING GENDER Introduction: Definition of Gender-Basic Gender Concepts and Terminology-Exploring Attitudes towards Gender-Construction of Gender-Socialization: Making Women, Making Men - Preparing for Womanhood. Growing up Male. First lessons in Caste.

UNIT – II: GENDER ROLES AND RELATIONS Two or Many? -Struggles with Discrimination-Gender Roles and Relations-Types of Gender RolesGender Roles and Relationships Matrix-Missing Women-Sex Selection and Its ConsequencesDeclining Sex Ratio. Demographic Consequences-Gender Spectrum: Beyond the Binary

UNIT – III: GENDER AND LABOUR Division and Valuation of Labour-Housework: The Invisible Labor- "My Mother doesn't Work." "Share the Load."-Work: Its Politics and Economics -Fact and Fiction. Unrecognized and Unaccounted work. -Gender Development Issues-Gender, Governance and Sustainable Development-Gender and Human Rights-Gender and Mainstreaming

UNIT – IV: GENDER - BASED VIOLENCE The Concept of Violence- Types of Gender-based Violence-Gender-based Violence from a Human Rights Perspective-Sexual Harassment: Say No! -Sexual Harassment, not Eve-teasing- Coping with Everyday Harassment- Further Reading: "Chupulu". Domestic Violence: Speaking OutIs Home a Safe Place? -When Women Unite [Film]. Rebuilding Lives. Thinking about Sexual Violence Blaming the Victim-"I Fought for my Life…."

UNIT – V: GENDER AND CULTURE Gender and Film-Gender and Electronic Media-Gender and Advertisement-Gender and Popular Literature- Gender Development Issues-Gender Issues-Gender Sensitive Language-Gender and Popular Literature - Just Relationships: Being Together as Equals Mary Kom and Onler. Love and Acid just do not Mix. Love Letters. Mothers and Fathers. Rosa ParksThe Brave Heart.

Note: Since it is Interdisciplinary Course, Resource Persons can be drawn from the fields of English Literature or Sociology or Political Science or any other qualified faculty who has expertise in this field from engineering departments.

Classes will consist of a combination of activities: dialogue-based lectures, discussions, collaborative learning activities, group work and in-class assignments. Apart from the above prescribed book, Teachers can make use of any authentic materials related to the topics given in the syllabus on "Gender". X

ESSENTIAL READING: The Textbook, "Towards a World of Equals: A Bilingual Textbook on Gender" written by A.Suneetha, Uma Bhrugubanda, DuggiralaVasanta, Rama Melkote, Vasudha Nagaraj, Asma Rasheed, Gogu Shyamala, Deepa Sreenivas and Susie Tharu published by Telugu Akademi, Telangana Government in 2015