SCHEME FOR EXAMINATION
B.TECH (FOUR YEAR) DEGREE COURSE
COMPUTER SCIENCE AND ENGINEERING
SCHOOL OF STUDIES IN ENGINEERING & TECHNOLOGY
GURU GHASIDAS VISHWAVIDYALAYA
SECOND YEAR, SEMESTER - III & IV
W.E.F. SESSION 2023-24(NEP)

Branch:- Computer Science & Engg. **Year: II** **Sem:- III**

S.No	Code no.	Subject	Periods			Evaluation Scheme			Credits
			L	T	P	IA	ESE	Total	
THEORY									
1.	CSUCTT1	Internet Of Things	3	0	0	40	60	100	3
2.	CSUCTT2	IT workshop	3	0	0	40	60	100	3
3.	CSUCTT3	Digital logic & Design	3	0	0	40	60	100	3
4.	CSUCTE1	Mathematics III (Numerical Methods)	3	0	0	40	60	100	3
5.	CSUCTKX	----------	3	0	0	40	60	100	3
6.	Institute Core	----------	3	0	0	40	60	100	3
PRACTICAL									
1	CSUCLT1	IT workshop Lab	0	0	3	25	25	50	1.5
2.	CSUCLT2	Internet Of Things Lab	0	0	3	25	25	50	1.5
Total						290	410	700	21

IA- INTERNAL ASSESSMENT, ESE-END SEMESTER EXAMINATION, L-LECTURE, T-TUTORIAL, P-PRACTICAL

DEPARTMENTAL ELECTIVE-I

S.No.	Course Code	Subject Name	Credits
1.	CSUCTK1	System Software	3
2.	CSUCTK2	Management Information System	3
3.	CSUCTK3	Introduction to Web Technology	3

INSTITUTE CORE-I

S.No.	Course Code	Subject Name	Credits
1.	ITUCTO1	COMPUTER ORGANIZATION & ARCHITECTURE (Not for IT)	3
2.	CSUCTO1	DATA STRUCTURE WITH C++	3
3.	ECUCTO1	DATA COMMUNICATION	3
4.	CEUCTO1	GREEN BUILDINGS	3
5.	CHUCTO1	ENGINEERING MATERIALS	3
6.	MEUCTO1	INTRODUCTION TO THERMODYNAMICS	3

7.	IPUCTO1	I.C. ENGINE	3

Branch:- Computer Science & Engg. **Year: II** **Sem:- IV**

S.No	Code no.	Subject	Periods			Evaluation Scheme			Credits
			L	T	P	IA	ESE	Total	
1.	CSUDTT1	Discrete Mathematics	3	1	0	40	60	100	3
2.	CSUDTT2	Operating System	3	0	0	40	60	100	3
3.	CSUDTT3	Data Structure & Algorithms	3	0	0	40	60	100	3
4.	CSUDTKX	----------	3	0	0	40	60	100	3
5.	CSUDTT1	----------	3	0	0	40	60	100	3
	PRACTICAL								
1.	CSUDLT1	Operating System Lab	0	0	3	25	25	50	1.5
2.	CSUDLT2	Data Structure & Algorithms Lab	0	0	3	25	25	50	1.5
3.	CSUDPV1	Mini Project	0	0	4	50	50	100	2
		Total				**300**	**400**	**700**	**20**

IA- INTERNAL ASSESSMENT, ESE-END SEMESTER EXAMINATION, L-LECTURE, T-TUTORIAL, P-PRACTICAL

Departmental Electives

S.No.	Course Code	Subject Name	Credits
1.	CSUDTK1	Electronic Device & Circuits	3
2.	CSUDTK2	Computational science	3
3.	CSUDTK3	Information Theory and Coding	3

Institutional Electives

S.No.	Course Code	Subject Name	Credits
1	ITUDTO1	Computer Network (Not For IT)	3
2	ITUDTO2	Fundamentals Of Python Programming (Not For IT)	3
3	CSUDTO1	Introduction to Information Science	3
4	ECUDTO1	Electronics Devices And Circuits	3
5	CEUDTO1	Remote Sensing & GIS	3
6	CHUDTO1	Fluidization Engineering	3

7	ESUDTO1	Effective Technical Communication	3

Subject Title: INTERNET OF THINGS		
Subject Code: CSUCTT1	**No. of Credits : 3 = 3:0:0 (L-T-P)**	**No. of Lecture Hours/Week : 03**
Exam Duration : 3:00 Hours	**IA + ESE = 40+60**	**Total No. of Contact Hours : 42**

Course Objectives:

1. Learn about Architecture of IoT.
2. To get basic knowledge of RFID Technology, Sensor Technology in IoT.
3. Learn different Application protocols for IoT.
4. To get security issues in IoT.
5. To learn different application area of IoT.

UNIT	TOPIC	CONTACT HOURS
1	**Introduction to Internet of Things:** Definition, Conceptual Framework, Architectural View, Technology Behind IoT, Sources of the IoT, M2M Communication, IoT Examples. Design Principles for Connected Devices: IoT/M2M Systems Layers and Design Standardization, Communication Technologies, Data Enrichment and Consolidation, Ease of Designing and Affordability.	**8**
2	**Principle of Web Connectivity and Internet Connectivity:** Introduction, Web Communication Protocols for Connected Devices, Message Communication Protocol for Connected Devices, Internet Connectivity, Internet Based Communication, IP Addressing for IoT, Application Layer Protocol: HTTP, HTTPS, FTP and Others.	**10**
3	**Sensors, RFID and Wireless Sensor Networks:** Introduction, Sensor Technology, Participatory Sensing Technology Principle of RFID, Components of an RFID system, Wireless Sensor Networks: Introduction, WSN Architecture, Connecting nodes, Networking Nodes, Securing Communication.	**8**
4	**Internet of Things Privacy, Security and Vulnerabilities Solutions:** Vulnerabilities of IoT, Security Requirements, Threat Analysis, Use Cases and Misuse Cases, IoT Security Tomography and Layered Attacker Model, Identity Establishment, Access Control, Message Integrity, Non-Repudiation and Availability, Security Model for IoT.	**8**
5	**IoT Applications:** Home Automation- Smart Appliances , Smoke/ Gas Detection, Cities- Smart Parking ,Smart Lighting , Smart Road , Health and Lifestyle- Health and Fitness Monitoring, Retail-Smart Payments. Case Studies: Smart City Streetlights: Control and Monitoring.	**8**

Course Outcomes:

After successful completion of this course, student will be able to

1. Understand general concepts of Internet of Things.
2. Analyze various M2M and IoT architectures.
3. Recognize various devices, sensors and applications.
4. Understand the security issues and applications of IoT.
5. Understand the application of IoT.

Text Books:

1. **Internet of Things** by Raj Kamal McGraw-Hill.
2. **IoT Fundamentals: Networking Technologies, Protocols, and Use Cases for the Internet of Things** by David Hanes, Gonzalo Salgueiro, Patrick Grossetet, Robert Barton, Jerome Henry, Cisco Press.

Reference Books:

1. **Internet of Things** by Srinivasa K.G. , Siddesh G.M. , Hanumantha Raju R.CENGAGE Leaning India.
2. **Internet of Things (A Hands-on-Approach)** by Vijay Madisetti and Arshdeep Bahga, 1st Edition, VPT.

Sub Title: IT WORKSHOP		
Sub Code : CSUCTT2	**No. of Credits : 3=3: 0: 0(L-T-P)**	**No of lecture hours/week :03**
Exam Duration : 3 hours	**IA+ESE=40+60**	**Total no of contact hours:23**

COURSE OBJECTIVE:

To know different programming paradigms.

1. To study and understand the object oriented programming concepts and methodology.To implement object oriented programming concepts in C++.
2. To direct and handling file streaming
3. To learn introductory Python environment and program structure

UNIT No	Syllabus Content	No of Hours
1	**Abstract Data Types And Programming Environment:** TC++ Environment variables, Compilation and Linking steps, functions and parameters Object identity concept of Classes. arrays, control statements. C++ in different plate forms DOSBOX etc.	10
2	**Object-Oriented Programming:** Programming using class and objects, functions, return types, pointer, concepts of encapsulation, default, parametric ,hybrid and copy constructors, destructors, memory management operators	10
3	**Advance Concepts of Object-Oriented Programming:** Polymorphism operator and function overloading, Inheritance in object oriented design, Brief concepts of Aggregation, Generalization, Specification. Design concepts Flowchart , Decision table, virtual class and virtual functions	10
4	**File Handling:** Input &output Streams and object handling in file, Ios family class, text& binary files ,Basic character operations, file opening modes ios flags , ,seekg(),tell(),seekp(),tellp(),command line arguments Streaming and File input and output handling	8
5	**Introduction to Python:** Introduction of Python Programming: python programming environment, research areas and applications of python, Data representation, introductory level programming in python.	7

COURSE OUTCOMES: The students would have learnt

CO1: Programming environment and basic elements
CO2: Key features of the object-oriented programming language.
CO3: Advance concepts of object-orientedconcepts.
CO4: Streaming concepts for file handling
CO5: Introduction of Python programming environment

Text Books:

1. Object Oriented Programming with C++ by E Balaguruswami, TMH 2019
2. Object Oriented Programming with C++ by Robert Lafore, Waite Group 2016
3. Machine Learning Tom M. Michell,Mc Graw Hill ,Indian addition
4. Applied Machine Learning by M. Gopal ,McGraw Hill Education

Reference Books:

1. Introduction to python by Bill Luboveni by O'Relly
2. Object Oriented Programming with C++ by M P Bhave S,A. Patekar, Pearson Education
3. The Complete reference by Herbit Schildt,Mc Graw Hill
4. C++ premier by F.B. Lippman, Addition Wesley
5. The C++ Programming Language,Bajanstroustrup ,Addition Wesley

Sub Title: DIGITAL LOGIC & DESIGN		
Sub Code: CSUCTT3	**No. of Credits : 3=3: 0: 0(L-T-P)**	**No of lecture hours/week :03**
Exam Duration : 3 hours	**IA+ESE=40+60**	**Total no of contact hours:23**

COURSE OBJECTIVE:

1. The concept of various components.
2. The concepts that underpin the disciplines of analog and digital electronic logic circuits.
3. Various Number system and Boolean algebra.
4. Design and implementation of combinational circuits.
5. Design and implementation of Sequential circuits.

UNIT No	Syllabus Content	No of Hours
1	**Binary System:** Binary Number , Number Base conversion , Octal and Hexadecimal Numbers Complements, Binary Codes Binary Storage andRegisters , Binary Logic , Integrated Circuits. **Boolean Algebra and Logic Gates:** Basic Definitions Axiomatic Definition of Boolean algebra .Basic Theorems and Properties of Boolean algebra Boolean Functions Canonical and Standard Forms .Other Logic Operations Digital Logic Gates . IC Digital Logic Families. NAND, NOR, EOR gates.	**10**
2	**Boolean Functions Combination Logic:** The map method Two and Three Variable Maps, Four Variable Map Product of sums Simplification, NAND and NOR implementation, Don't Care Conditions, The Tabulation Method **Combinational Logic:** Introduction, Design procedure Adders, Sub tractors .Code Conversion, Analysis Equivalence Functions	**10**
3	**Combinational Logic with MSI and LSI:** Introduction Binary Parallel Adder Decimal, Adder, Magnitude Comparator, Decoders, Multiplexers, Read – Only Memory (ROM), Programmable Logic Array (PLA) Concluding Remarks	**10**
4	**SEQUENTIAL LOGIC:** Introduction, Flip –Flops, triggering of Flips –Flops Analysis of Clocked Sequential Circuits, State Reduction and Assignment. Flip –Flop Excitation Tables Design Procedure. Design of Counters, Design with State Equations.	**8**
5	**Registers, Counters, Memory Unit & FPGA Programing:** Introduction Registers, shift Registers .Ripple Counters, Synchronous Counters. Timing Sequences, The Memory Unit Examples of Random Access Memories, FPGA: Introduction, FPGA Programming	**7**

COURSE OUTCOMES: The students would have learnt

CO1: Understand the concepts of various components to design stable analog circuits.
CO2: Represent numbers and perform arithmetic operations.
CO3: Minimize the Boolean expression using Boolean algebra and design it using logic gates.
CO4: Analyze and design combinational circuit.
CO5: Design and develop sequential circuits.
CO6: Translate real world problems into digital logic formulations using VHDL.

Text Books:

1. Digital Logic & Computer Design PH1 M Mano
2. Switching Circuit & Finite automata –ZVI Kohavi (TMH)
3. Fletcher W.I.: An engineering approach to Digital design PH1

Reference Books:

1. Switching and Finite Automata Theory by Zvi. Kohavi, Tata McGrawHill.
2. Switching and Logic Design, C.V.S. Rao, Pearson Education
3. Digital Principles and Design – Donald D.Givone, Tata McGraw Hill, Edition.
4. Fundamentals of Digital Logic & Micro Computer Design, 5TH Edition, M. Rafiquzzaman John Wiley.

Sub Title: MATHEMATICS III (Numerical Methods)		
Sub Code: CSUCTE1	**No. of Credits : 4=4: 0: 0(L-T-P)**	**No of lecture hours/week :04**
Exam Duration : 3 hours	**IA+ESE=40+60**	**Total no of contact hours:23**

COURSE OBJECTIVE:

1. To provide suitable and effective methods called Numerical Methods, for obtaining approximate representative numerical results of the problems.
2. To solve problems in the field of Applied Mathematics, Theoretical Physics and Engineering which requires computing of numerical results using certain raw data.
3. To solve complex mathematical problems using only simple arithmetic operations. The approach involves formulation of mathematical models of physical situations that can be solved with arithmetic operations.
4. To deal with various topics like finding roots of equations, solving systems of linear algebraic equations, interpolation and regression analysis, numerical integration & differentiation, solution of differential equation, boundary value problems,solution of matrix problems.
5. To facilitate numerical computing.

UNIT No	Syllabus Content	No of Hours
1	Introduction of Errors and their Analysis, types of errors, numerical problems on error analysis, curve fitting: method of least squares, fitting of exponential curves , fitting of the curve , fitting of the curve .Method of moments	10
2	**Numerical Solution of Algebraic and Transcendental Equations:** Graphical method bisection Method, Secant Method, Regula-falsi Method, Newton Raphson Method, Solution of a system of simultaneous linear algebraic Equations Direct methods: Gauss elimination Method, Gauss Jordan method, Iterative methods .Jacobi Iterative Method, Gauss Seidel Iterative method.	10
3	**The Calculus of Finite Differences:** Finite differences, Difference formula operators and relation between operators. Inverse Operator, Interpolation with equal intervals: - Newton's forward and backward interpolation formula Interpolation with Unequal intervals: - Lagrange's interpolation Newton's difference formula, inverse interpolation.	10

4	**Numerical Differentiation and Integration:** Numerical DifferentiationNewton's forward and Backward difference interpolation formula. Maxima and Minima of aTabulated function, Numerical Integration :-Trapezoidol rule simpson's (1/3) rd and (3/8) th rule, Boole's rule, weddle rule. Difference Equations: Definition ,order and degree of a difference equation Linear difference equations, Difference equations reducible to Linear form, simultaneous difference equations with constant coefficients	**8**
5	**Numerical solution of ordinary differential equation:** Taylor series method Euler's method, Modified Euler method Runge's method Runge-Kutta method, numerical method for solution of partial differential equations. General linear partial differential equation.Laplace equation and Poisson equation.	**7**

COURSE OUTCOMES: The students would have learnt

CO1: Apply Numerical analysis, which has enormous application in the field of Science and some fields of Engineering.
CO2: Familiar with finite precision computation.
CO3: Familiar with numerical solutions of nonlinear equations in a single variable.
CO4: Familiar with numerical integration and differentiation, numerical solution of ordinary differential equations.
CO5: Familiar with calculation and interpretation of errors in numerical method.

Text Books:

1. Jain & Iyngar Numerical Methods for Scientific and Engineering Computations.
2. Rao G.S. Numerical Anlysis.
3. Grewal B S Numerical Methods In Engineering and Science.
4. Das K K Advance Engineering Methods.
5. Rajaraman V Computer Oriented Numerical Methods
6. P. Kandasamy K. Thilagavathy, K. Gunavathi, Numerical Methods, S. Chand & Company,2nd Edition, Reprint 2012.
7. S. S. Sastry, Introduction methods of Numerical Analysis, PHI, 4th Edition, 2005.

Reference Books:

1. Erwin Kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons,2006.
2. Computer Networks by S. Tanenbaum – Pearson Education/PHIPublication.

Sub Title: SYSTEM SOFTWARE & APPLICATIONS		
Subject Code: CSUCTK1	**No. of Credits : 3 = 3:0:0 (L-T-P)**	**No. of Lecture Hours/Week : 03**
Exam Duration : 3:00 Hours	**IA + ESE = 40+60**	**Total No. of Contact Hours : 42**

COURSE OBJECTIVE:

1. To introduce students the fundamental model of the processing of high-level language programs for execution on computer system.
2. To explain the basic operations that are performed from the time a computer is turned on until a user is able to execute programs.
3. To understand and implement Assembler, Loader, Linkers, Macros and Compilers.
4. To introduce students the process management and information management via different software tools.

UNIT No	Syllabus Content	No of Hours
1	**Introduction:** System Software, Types of System Software, Machine architecture, CPU Machine Architecture, Simplified Instruction Computer(SIC), SIC/XE, Traditional CISC Machines, VAX Architecture, Pentium Pro Machine Architecture, RISC Architecture, instruction set, addressing modes, Type of addressing modes with example Programming review of syntax of C with emphasis on features like pointers, bit operations.	8
2	**Disk Operating System:** Introduction to interrupts, software interrupts, Hardware interrupt, internal structure of DOS, COM & EXE program's BIOS memory resident programs, Running batch files.	7
3	**Assemblers:** Types of Assembler, PASS-I Assembler, PASS-II Assembler, Cross assemblers, two assembler design data structure and algorithms, Applications of Assembler.	7
4	**Macro processors:** Definitions, nested macro definitions, macro expansion and conditional macro expansion, Applications of Macro Processors.	7
5	**Linker & Loader:** Introduction of Linker &Loader, Types of Loader, loading and relocation, static and dynamic linking, Editors, Types of Editors, Debuggers, Programming environments, Applications of Linker & Loader.	7

COURSE OUTCOMES: The students would have learnt

CO1: To understand different concept of machine architecture and system software.

CO2: To understand different concept of disk operating system.

CO3: To understand different components and applications of assembler.

CO4: To understand different components and applications of Macro Processors.

CO5: To understand different components and applications of Linker.

Text Books:

1. System Software: An Introduction to Systems Programming, Leland L. Beck, Pearson Education, 3 edition.
2. System Programming, Donovan J. J., TMH
3. Introduction to system software's, Dhamdhare D.M., TMH 1986
4. System Programming And Operating System, Dhamdhare ,TMH

Reference Books:

1. PC System Programming, Michael Tischer Abacus.
2. The Sprit of C, An Introduction to modern programming, Cooper Mullish, Jaico publication New Delhi 1987.
3. Programming with C, Schaum Series, Gottfried, TMGH.

Sub Title: MANAGEMENT INFORMATION SYSTEM		
Sub Code: CSUCTK2	**No. of Credits : 3=3: 0: 0 (L-T-P)**	**No of lecture hours/week :03**
Exam Duration : 3 hours	**IA+ESE=40+60**	**Total no of contact hours:36**

COURSE OBJECTIVE:

1. To describe the role of information technology and decision support systems in business and record the current issues with those of the firm to solve business problems.
2. To introduce the fundamental principles of computer-based information systems analysis and design and develop an understanding of the principles and techniques used.
3. To enable students understand the various knowledge representation methods and different expert system structures as strategic weapons to counter the threats to business and make business more competitive.
4. To enable the students to use information to assess the impact of the Internet and Internet technology on electronic commerce and electronic business and understand the specific threats and vulnerabilities of computer systems.
5. To provide the theoretical models used in database management systems to answer business questions.

UNIT No	Syllabus Content	No of Hours
1	**Information System:** Introduction of Information System, Fundamentals of Information System, Strategic Role of Information in Organization and Management, Three dimensions of Information System, Information System and Organization, Business Process Re-Engineering, Traditional and Computer based information system.	**8**
2	**Decision Support System:** Integration of Information, Types of Decision making in Organization, Decision Making Process, Models and Decision Support, Decision in business Areas, Strategic Analysis	**7**
3	**Information System Planning**: Types of Controlling Information System, Development of MIS Methodology and Tools/Techniques for Systematic Identification, Evaluation, Modification of MIS, Information System Success and Failure Implementation	**7**
4	**Information System for Business Operations:** Cross Functional Information System, A study of major Financial, Production, Human Resource Information System and Marketing Information System.	**7**

5	**Security and Auditing of Information System:** Management of Information System and End-User Computing, Security and Ethical issues of Information System, Major issues in Information System, Auditing of Information System.	**7**

COURSE OUTCOMES: The students would have learnt

CO1: Relate the basic concepts and technologies used in the field of management information systems;

CO2: To understand the basic concept of Decision Support System.

CO3: Compare the processes of developing and implementing information systems.

CO4: Translate the role of information systems in organizations, the strategic management processes, with the implications for the management.

CO5: Outline the role of the ethical, social, and security issues of information systems.

Text Books:

1. Management Information System: A Contemporary Perspective, Kenneth C. Laudon and Jane Price Loudon, Maxwell Macmillan International Editions.

Reference Books:

1. Management Information System: Solving Business Problems with Information Technology, Gerald V, Post and David L. Anderson, Tata McGraw – Hill Edition

2. Management Information System: Managing Information Technology in the Internet worked Enterprise, James A. O'Brien Tata McGraw –Hill Edition, Fourth Edition.

Sub Title: INTRODUCTION TO WEB TECHNOLOGY		
Sub Code: CSUCTK3	**No. of Credits : 3=3: 0: 0(L-T-P)**	**No of lecture hours/week :03**
Exam Duration : 3 hours	**IA+ESE=40+60**	**Total no of contact hours:40**

COURSE OBJECTIVE:

CO-[1]. To give introduction of the Hyper Text Markup Language.
CO-[2]. To give foundation of HTML formatting and Phrase Tags in HTML
CO-[3]. To give concepts of HTML Meta Tags and HTML comments.
CO-[4]. To give knowledge of HTML Images, Tables and Lists.
CO-[5]. To demonstrate HTML Text Links and HTML Frames.

UNIT No	Syllabus Content	No of Hours
1	HTML Overview (Basic HTML Document, HTML Tags, HTML Document Structure), HTML Basic Tags (Heading Tags, Paragraph Tags, Line Break Tag, Centering Content, Horizontal Lines, Preserve formatting, Non-breaking Spaces), HTML Elements (HTML Tag vs Element, Nested HTML Elements), HTML Attributes (Core Attribute, Id Attribute, The Class Attribute, The dir Attributes, Generic Attributes).	**10**
2	HTML formatting (Bold Text, Italic Text, Underlined Text, Strike Text, Mono spaced Font, Superscript Text, Subscript Text, Inserted Text, Deleted Text, Larger Text, Smaller Text, Grouping Content), HTML Phrase Tags (Emphasized Text, Marked Text, Strong Text, Text Abbreviation, Acronym Element, Text Direction, Special Terms, Quoting Text, Short Quotations, Text Citations, Computer Code, Keyboard Text, Programming Variables, Program Output, Address Text).	**8**
3	HTML Meta Tags (Adding Meta Tags to Your Documents, Specifying Keywords, Document Description, Document Revision Date, Document Refreshing, Page Redirection, Setting Cookies, Setting Author Name, Specify Character Set), HTML Comments (Valid vs Invalid Comments, Conditional Comments, Using Comment Tag).	**6**
4	HTML Images (Insert Image, Set Image Location, Set Image Width/Height, Set Image Border, Set Image Alignment), HTML Tables (Table Heading, Cell padding and cell spacing attributes, Colspan and Rowspan Attributes, Tables Backgrounds, Table Height and Width, Table Caption, Table Header, Body and Footer, Nested Tables), HTML Lists (HTML Unordered Lists, The type Attribute, HTML ordered Lists, The Start Attribute, HTML Definition Lists)	**8**
5	HTML Text Links (Linking Documents, The target attribute, Use of Base path, Linking to a Page Section, Setting Link Colors, Download Links, File Download Dialog Box), HTML Frames (Disadvantages of Frames, Creating Frames, The <frameset> Tag Attribute, The <frame> Tag Attribute.	**8**

COURSE OUTCOMES: The Students would have Learnt:

CO-[1]. Explain the basic features of the HTML Language.
CO-[2]. Design Web Pages using HTML formatting and Phrase Tags.
CO-[3]. Create Web Pages using HTML Meta Tags and HTML Comments.
CO-[4]. Enforce HTML Images, Tables and Lists in the Web Pages.
CO-[5]. Make Web Page having HTML Links and HTML Frames.

References:

1. A.S. Godbole and A. Khute, “Web Technology,” TMH.
2. V.K. Singh, “Internet and Web Technology”, Shubh Shree Publisher

Sub Title: IT WORKSHOP LAB	
Sub Code: CSUCLT1	**No. of Credits : 1.5=0: 0:1.5(L-T-P)**
Exam Duration : 2 hours	**IA+ESE =25+25**

Lab OBJECTIVE:

1. To discuss Turbo C++ environment
2. To discuss the various basic object oriented programming constructs like functions, properties and application.
3. To discuss advanced programming concepts and program designing.
4. Discussion Programming on file input output handling
5. To discuss basic environment of python programming

Unit No.	Content	Teaching Hours
I, II, III, IV and V	• To implement various datatypes and their memory requirement in TC++ programming • To implement various in classes and membersfunctions. • To show matrix operation • To implement functions function and argument passingmethods • To implement different function return types. • To implement concept of polymorphism. • To implement concept of virtual function and virtual class. • To implement the concept file handling. • To implement the concept of file importing in python environment. • To implement the concept of coding and execution of introductory program.	18

LAB OUTCOMES: The students would have learnt

CO1: TC++ programming Environment and programming IDE
CO2: Implementation of basic object oriented operations
CO3: Implementation of advanced programming concepts.
CO4: Implementation of file input output streams and file handling operations.
CO5: Implementation of introductory python programming language

Text Books:

1. Object Oriented Programming with C++ by E Balaguruswami, TMH
2. Object Oriented Programming with C++ by Robert Lafore, WaiteGroup
3. Introduction to python by Bill Luboveni by O'Relly

Reference Books:

1. Object Oriented Programming with C++ by M P Bhave S,A. Patekar, Pearson Education
2. The Complete reference by Herbit Schildt,Mc Graw Hill
3. The C++ Programming Language, Bajanstroustrup ,Addition Wesley
4. Machine Learning Tom M. Michell,Mc Graw Hill ,Indian addition
5. Applied Machine Learning by M. Gopal ,McGraw Hill Education

Sub Title: COMPUTER ORGANIZATION & ARCHITECTURE		
Sub Code: ITUCTO1	**No. of Credits : 3=3: 0: 0(L-T-P)**	**No of lecture hours/week :03**
Exam Duration : 3 hours	**IA+ESE=40+60**	**Total no of contact hours:23**

COURSE OBJECTIVE:

1. Conceptualize the basics of organizational and architectural issues of a digital computer.
2. Analyze processor performance improvement using instruction level parallelism.
3. Learn the function of each element of a memory hierarchy.
4. Study various data transfer techniques in digital computer.
5. Articulate design issues in the development of processor or other components that satisfy design requirements and objectives.

UNIT No	Syllabus Content	No of Hours
1	**Basic of Computer Organization & Architecture:** Introduction, Computer Organization vs. Computer architecture, Von Neumann Architecture vs. Harvard Architecture. **Input & Out1put Organization:** Introduction, Simple Bus Architecture, Types of Buses, I/O Communication Methodologies: Programmed I/O (Polling), Interrupt-driven I/O & Direct Memory Access (DMA), I/O channel & I/O Processor, Accessing I/O device: Memory Mapped I/O, Isolated or I/O Mapped.	**10**
2	**Computer Arithmetic:** Introduction, Addition & Subtraction: Addition & Subtraction with Signed-Magnitude Data, Hardware Implementation & Algorithm, Addition & Subtraction with Signed-2's Complement Data, Multiplication Algorithm: Hardware Implementation for Signed-Magnitude Data, Hardware Algorithm, Booth Multiplication Algorithm, Array Multiplier, Division Algorithms: Hardware Implementation for Signed-Magnitude Data & Algorithm , Carry Look Ahead Adder.	**10**
3	**Memory Organization:** Introduction, Types of Memory, Memory Hierarchy, Main Memory, Cache Memory, Virtual Memory, Associative Memory. Processor Organization: Introduction, Control Unit: Hardwired Control Unit, Micro programmed Control Unit, Instruction Set Computer: Reduced Instruction Set Computer (RISC) vs. Complex Instruction Set Computer(CISC).	**10**

4	**Pipelining:** Introduction, Concept of Instruction Pipeline, Design Problems with Pipeline: Structural Hazard, Data Hazard & Control Hazard, Extension in Pipeline Designed: Super Pipelining, Superscalar Processor, Very Long Instruction Width (VLIW) Architecture.	**8**
5	**Multiprocessor System:** Introduction, Shared Memory Multiprocessor, Distributed Memory Multiprocessor, Flynn's Classification: Single Instruction Single Data (SISD), Single Instruction Multiple Data (SIMD), Multiple Instruction Single Data (MISD), Multiple Instruction Multiple Data (MIMD), Cache Coherence, Message Passing Model, Cluster Computing, Distributed Computing.	**7**

COURSE OUTCOMES: The students would have learnt

CO1: Understand the computer architecture concepts.
CO2: Understand and apply different number systems and codes.
CO3: Understand memory hierarchy and its impact on computer cost/performance.
CO4: Design a pipeline for consistent execution of instructions with minimum hazards.
CO5: Understand the concepts of multiprocessor.

Text Books:

1. Computer System Architecture, M. Morris Mano, Pearson Education India.
2. Computer Organization & Architecture, W. Stalling, Pearson Education India.

Reference Books:

1. Computer Architecture & Organization, J. P. Hayes, McGraw-Hill India.
2. Computer System Organization, Naresh Jotwani, Mc Graw Hill, India.
3. Computer System Architecture, P. V. S. Rao, PHIIndia.
4. Advanced Computer Architecture, Rajiv Chopra, S. Chand India.
5. Computer Organization & Architecture, Lalit K. Arora, Anjali Arora, S. K. Kataria & Sons, India.
6. Computer Fundamentals Architecture & Organization, B Ram, Sanjay Kumar, New Age International, India.

CHUCTO1	Engineering Materials	[L:3, T:0, P:0]

Objectives

1. To provide the understanding of material selections for construction to execute a task for a particular application, its properties and behaviour at different circumstances.
2. Properties, behaviour and maintenance of various engineering materials.

Contents:

Unit-I: Crystalline and Non-Crystalline Materials: Crystalline state, Atomic bonding, Bravias lattices, Miller indices, Structure of some common inorganic compounds, Structural imperfections. Economic, environmental and social issues of material usage.

Unit-II: Mechanical properties of materials and their variation with temperature, importance and limitations of these properties on material selection for a particular application. Failure of materials: Failure of materials under service conditions.

Unit-III: Corrosion: Mechanism of corrosion, Types of corrosion, Factors influencing corrosion, Methods of corrosion control, Inhibition and other precautionary measures.

Unit-IV: Non-Ferrous Metals: Copper, Brasses, Bronze, Aluminium, their mechanical properties, Workability and applications, Corrosion resistance. Non-metallic materials of construction.

Unit-V: Phase diagram: Phase rules, Equilibrium phase diagram, cooling curves and their relations to properties of metals and alloys, Iron-carbon equilibrium diagram. Response of materials to chemical environment.

Suggested Text Books :

1. Introduction to Materials Science for Engineers by James F. Shackelford, Pearson.
2. Elements of Materials Science and Engineering by L.H.Van Vlack, Pearson.
3. Materials Science and Engineering by V. Raghavan, PHI Learning Private Limited.
4. Materials Science for Engineers by L. H. VanVlack, Addison-Wesley Publishing Co.
5. Chemistry of Engineering Materials by A. M. Sikkander and T. N. Balu, Raj Publications.
6. Corrosion, Prevention and Control by K.S. Rajagopalan, Scientific Surveys Limited.
7. Corrosion Engineering by M. G. Fontana, McGraw Hill Education.

Reference Book:

1. Perry's Chemical Engineers' Handbook by D. W. Green and R. H. Perry, McGraw Hill Publication.

Course Outcome:

Students would be able to

1. Explain different types of materials and their mechanical properties and limitations.
2. Explain types of corrosion and various methods to control them.
3. Describe phase diagram and its significance.

SYLLABUS	(SEMESTER III)	Periods/Week			Evaluation Scheme				Credits
Subject Code:	CEUCTO1	L	T	P	TA	IA	ESE	Total	3
Subject:	Green Buildings	3	0	0	10	30	60	100	

Course Learning Objectives:

- To understand the basics of Green Buildings.
- To learn the concept of site selection and water conservation.
- To study the use of efficient energies.
- To learn about maintenance of Indoor environmental quality.
- To study various green building rating systems including their mandatory requirements and credit points.

Course Content:

UNIT-I

Green Buildings: Introduction, history and evolution, objectives, benefits, typical features of green buildings, sustainability and green buildings, global trends in green buildings, Examples of green buildings in India and the world (case studies to be presented by students).

UNIT-II

Site selection and building planning: Criteria for site selection, preservation of landscape, soil erosion control, understanding and minimizing urban heat island effect. Water conservation and efficiency: Rainwater harvesting methods for roof & non-roof, water demand, water efficient plumbing systems, water metering, waste water disposal, recycle and reuse systems.

UNIT-III

Energy Efficiency: Concepts of embodied energy, operational energy, demolition energy and life cycle energy. Methods to reduce operational energy: Energy efficient building envelopes, efficient lighting technologies, energy efficient appliances for heating and air conditioning systems in buildings, wind and solar energy harvesting, energy metering and monitoring, concept of net zero buildings.

UNIT-IV

Indoor Environmental Quality for Occupant Comfort: Daylighting, air ventilation, exhaust systems, materials & adhesives, building acoustics. Environment Quality and Occupational Health: Air conditioning, air quality, Sick building syndrome, minimum fresh air requirement, improved fresh air ventilation, Measure of Indoor air quality (IAQ), Reasons for poor IAQ, Measures to achieve Acceptable IAQ levels.

UNIT- V

Green Building Rating Systems: Introduction to various rating systems (LEED, GRIHA, IGBC etc.), mandatory requirements and credit points of various rating systems, study of green building rating criteria of IGBC, Understanding the green building measures in the areas of site preservation, energy efficiency, materials, water conservation and indoor air quality.

Text Books

1. IGBC Green Homes Rating System, Version 2.0., Abridged reference guide, 2013, Indian GreenBuilding Council Publishers.

2. GRIHA version 2015, GRIHA rating system, Green Rating for Integrated Habitat Assessment.
3. Alternative building materials and technologies by K.S. Jagadish, B.V. Venkatarama Reddy and K.S. Nanjunda Rao.
4. Non-Conventional Energy Resources by G. D. Rai, Khanna Publishers.
5. Sustainable Building Design Manual, Vol.1 and 2, TERI, New Delhi 2004.
6. Mike Montoya, Green Building Fundamentals, Pearson, USA, 2010.
7. Charles J. Kibert, Sustainable Construction Green Building Design and Delivery, John Wiley & Sons, New York, 2008.
8. Regina Leffers, Sustainable Construction and Design, Pearson / Prentice Hall, USA, 2009.

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

CO1: Apply the concept and knowledge of Green Building in handling any physical projects.

CO2: Conduct a site selection process and apply water conservation techniques for green buildings.

CO3: Make use of technologies with efficient energies.

CO4: Apply the knowledge in maintaining the indoor environmental quality.

CO5: Revise essential parameters of green building rating system.

Subject: DATA STRUCTURE WITH C++

SUB CODE	L	T	P	DURATION	IA	ESE	CREDITS
CSUCTO1	3	0	0	3 HOURS	40	60	3

COURSE OBJECTIVE:

1. Introduce the concept of data structures through Array, Stack, and Queues.
2. To design and implement various data structure algorithms.
3. To introduce various techniques for representation of the data in the real world.
4. To develop application using data structure algorithms.

UNIT-I: INTRODUCTION: Functions and parameter, Dynamic memory allocation, Recursion.
LINEAR LISTS: Data objects and structures, Linear list data structures, Array Representation, Vector Representation, Singly Linked lists and chains. L1, L2
UNIT-II: ARRAYS AND MATRICS: Arrays, Matrices, Special matrices, Sparse matrices.
STACKS: The abstract data types, Array Representation, Linked Representation, Applications-Parenthesis Matching & Towers of Hanoi. L1, L2, L3

UNIT-III: QUEUES: The abstract data types, Array Representation, Linked Representation, Applications-Railroad car arrangement.

HASHING: Dictionaries, Linear representation, Hash table representation. L1, L2, L3
UNIT-IV: BINARY AND OTHER TREES: Trees, Binary trees, Properties and representation of binary trees, Common binary tree operations, Binary tree traversal the ADT binary tree, ADT binary tree and the class linked binary tree. L1, L2, L3
UNIT-V: PRIORITY QUEUES: Linear lists, Heaps, Applications-Heap Sorting.
SEARCH TREES: Binary search trees operations and implementation, Binary Search trees with duplicates. L1, L2, L3

Text Books:
1. Data structures, Algorithms, and applications in C++, Sartaj Sahni, Universities Press, 2nd Edition, 2005.

Semester	Course No.	Subject	Teaching Hours/ Week/ Periods			Evaluation Scheme						Credits
			Theory Lectures	Tutorials	Practical	Continuous Internal Assessment				Semester Examination Assessment	Total Marks	
						CIA						
			L	T	P	CT–1	CT–2	Assignments, surprise test, quiz test etc	Attendance	SEA		
B. Tech III Sem.	IPUCTO1	Automobile Engineering	3	-	-	15	15	5	5	60	100	3

COURSE OBJECTIVES:

1. To provide the knowledge of basic structure of an automobile.
2. To provide the knowledge of transmission system and its various elements.
3. To provide the knowledge of clutches and suspension system
4. To provide the knowledge of braking system.
5. To provide the knowledge of steering system and engine emissions.

COURSE CONTENT:

Module - I

Introduction of an automobile: Component and basis structure of automobile, classification, difference between automobile and automotive, the chassis construction & classification, defect in frames, frameless construction & specifications. Wheel and tyres: Types of wheel, wheel dimension, desirable tyres properties, types of tyres, tyre material, tyre dimension, factors affecting tyre life.

Module - II

Transmission system: Function of transmission types, sliding mesh gear box, constant mesh gear box, synchro mesh gear box, torque converter, propeller shaft, universal joint, hook joint, final drive, differential, performance of gear box.

Module - III

Clutches: Requirement, function & type of clutch, dry friction clutch, wet friction clutch, clutch plate, single plate & multiple plate clutch, centrifugal clutch and fluid fly wheel.

Suspension system function and requirement, leaf spring, torsion bar, telescopic shock absorber.

Module - IV

Brakes: Function and requirement, brake efficiency, wheel skidding, types of brake, electrical, mechanical and hydraulic & pneumatic brakes, master cylinder, wheel cylinder, self-actualizing brakes, brake drum, brake liners, brake shoe, trouble shooting.

Module - V

Front axle and suspension wheel alignment purpose: Factor of front wheel alignment, steering geometry, correct steering angle, steering mechanism, under steer and over steer, steering gear, power steering, reversibility of steering gears, steering gear ratio, calculation of turning radius.

Engine emission: Emission standard of vehicle in India, Euro norms, emission, testing. Principle of multipoint fuel injection (MPFI), component of MPFI, different sensors of MPFI system, vehicle air conditioning.

TEXT & REFERENCE BOOKS:

1. Automobile Engineering - Kripal Singh Vol. I, II.
2. Automobile Mechanics - Joseph Heitner.
3. Automobile Engineering - N.K Giri
4. Automobile Engineering - Shrinivasan T.M.H.
5. Automobile Engineering - K.K. Jain, R.B. Asthana T.M.H.
6. Automobile Engineering - R.B. Gupta Tech India Publication Series.

COURSE OUTCOMES:

After completion of the course, the students will be able to

CO1: Graduates will gain a strong foundation in core automobile engineering, both in theoretical and applied concepts.

CO2: Acquire knowledge and hands-on competence in the design and development of automobile.

CO3: Graduates will develop an ability to identify and solve automobile engineering maintenance problems.

Sub Title: DISCRETE MATHEMATICS		
Sub Code: CSUDTT1	**No. of Credits : 3=3: 0: 0(L-T-P)**	**No of lecture hours/week :04**
Exam Duration : 3 hours	**IA+ESE=40+60**	**Total no of contact hours:45**

COURSE OBJECTIVE:

1. Simplify and evaluate basic logic statements including compound statements, implications, inverses, converses, and contrapositives using truth tables and the properties of logic.
2. Express a logic sentence in terms of predicates, quantifiers, and logical connectives
3. Apply the operations of sets and use Venn diagrams to solve applied problems; solve problems using the principle of inclusion-exclusion.
4. Determine the domain and range of a discrete or non-discrete function, graph functions, identify one-to-one functions, perform the composition of functions, find and/or graph the inverse of a function, and apply the properties of functions to application problems.
5. Describe binary relations between two sets; determine if a binary relation is reflexive, symmetric, or transitive or is an equivalence relation; combine relations using set operations and composition.

UNIT No	Syllabus Content	No of Hours
1	**Sets, Relation and Function:** Operations and Laws of Sets, Cartesian Products Binary Relation, Partial Ordering Relation, Equivalence Relation, Image of a Set Bijective functions, Inverse and Composite Function, Size of a Set, Finite and infinite Sets, Countable and uncountable Sets, Cantor's diagonal argument and The Power Set theorem, Schroeder-Bernstein theorem.	10
2	Basic counting techniques-inclusion and exclusion, pigeon-hole principle, permutation and combination. Principle of Mathematical Induction, The Well-Ordering Principle, Recursive definition, The Division algorithm: Prime Numbers, The Greatest Common Divisor, Euclidean Algorithm, TheFundamental Theorem of Arithmetic.	10
3	**Propositional Logic:** Basic Connectives and Truth Tables, Logical Equivalence, The Laws of Logic, Logical Implication, Rules of Inference, The use of Quantifiers **Proof Techniques:** Some Terminology, Proof Methods and Strategies, Forward Proof, Proof by Contradiction, Proof by Contraposition, Proof of Necessity and Sufficiency.	10

	Algebraic Structures and Morphism: Algebraic Structures with one Binary Operation, Semi Groups, Monoids, Groups, Congruence Relation and Quotient Structures, Free and Cyclic Monoids and Groups, Permutation Groups Substructures, Normal Subgroups, Algebraic Structures with two Binary Operation, Rings, Integral Domain and Fields. Boolean Algebra and Boolean Ring, Identities of Boolean Algebra, Duality, Representation of Boolean Function, Disjunctive and Conjunctive Normal Form	**8**
5	Graphs and Trees: Graphs and their properties, Degree, Connectivity, Path Cycle, Sub Graph, Isomorphism, Eulerian and Hamiltonian Walks, Graph Colouring, Colouring maps and Planar Graphs, Four colour conjecture, trees and rooted trees, binary trees.	**7**

COURSE OUTCOMES: The students would have learnt

CO1: Students completing this course will be able to express a logic sentence in terms of predicates, quantifiers, and logical connectives.

CO2: Students completing this course will be able to applythe rules of inference and methods of proof including direct and indirect proof forms, proof by contradiction, and mathematical induction.

CO3: Students completing this course will be able to use tree and graph algorithms to solve problems.

CO4: Students completing this course will be able to evaluate Boolean functions and simplify expressions using the properties of Boolean algebra

Text Books:

1. Kenneth H. Rosen, Discrete Mathematics and its Applications, Tata McGraw– Hill
2. Susanna S. Epp, Discrete Mathematics with Applications,4th edition, Wadsworth Publishing Co. Inc.
3. C L Liu and D P Mohapatra, Elements of Discrete Mathematics A Computer Oriented Approach, 3rd Edition by, Tata McGraw – Hill.

Reference Books:

1. Erwin Kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.
2. J.P. Tremblay and R. Manohar, Discrete Mathematical Structure and It's Application to Computer Science", TMG Edition, TataMcgraw-Hill
3. Norman L. Biggs, Discrete Mathematics, 2nd Edition, Oxford University Press. Schaum's Outlines Series, Seymour Lipschutz, Marc Lipson,
4. Discrete Mathematics, Tata McGraw - Hill

Sub Title: OPERATING SYSTEM		
Sub Code: CSUDTT2	**No. of Credits : 3=3: 0: 0(L-T-P)**	**No of lecture hours/week :03**
Exam Duration : 3 hours	**IA+ESE=40+60**	**Total no of contact hours:36**

COURSE OBJECTIVE:

1. To understand the main components of an OS & their functions.
2. To study the process management and scheduling.
3. To understand various issues in Inter Process Communication (IPC) and the role of OS in IPC.
4. To understand the concepts and implementation Memory management policies and virtual memory.
5. To understand the working of an OS as a resource manager, file system manager, process manager, memory manager and I/O manager and methods used to implement the different parts of OS
6. To study the need for special purpose operating system with the advent of new emerging technologies

UNIT No	Syllabus Content	No of Hours
1	Introduction to Operating System objective and function. System components system services, system structure, batch interactive, time –Sharing and real time operating system, Protection. The introduction of window NT,DOS, Window 07 Unix ,Linux (Red hat)	**10**
2	**Concurrent Process:** Process concepts, principal of concurrency. The producer consumer problem, the critical section problem, semaphore, classical problem in concurrency, inter process communication, process generation, processscheduling	**10**
3	**CPU Scheduling:** Scheduling concepts, performance criteria scheduling algorithms. Algorithm evaluation, multiprocessor scheduling. I/O management and Disk scheduling I/O devices and organization of the I/O functions. I/O buffering disk I/O operating system design issues.	**10**
4	Dead Locks system models, deadlock characterization, prevention, avoidance and detection recovery from deadlock, combined approach.	**8**

5	**Memory Management:** Base machine , Residence monitor , multiprogramming with fixed partition , multiprogramming with variable partitions, multiple base register , paging , segmentation , paging segmentation, virtual memory concepts demand paging performance , page replacement algorithms , allocation of frames, thrashing , cache memory organization impact on performance .	**7**

COURSE OUTCOMES: The students would have learnt

CO1: Describe the important computer system resources and the role of operating system in their management policies and algorithms.
CO2: Understand the process management policies and scheduling of processes by CPU
CO3: Evaluate the requirement for process synchronization and coordination handled by operating system
CO4: Describe and analyze the memory management and its allocation policies.
CO5: Identify use and evaluate the storage management policies with respect to different storage management technologies.
CO6: Identify the need to create the special purpose operating

Text Books:

1. Milenkovic M. , Operating System concepts , MGH
2. Tanenbaubm A. S. Operating System design and implementation, PHI
3. Silberschartz A.and Patterson J.I. , " Operating system concepts ", Wisley.

Reference Books:

1. Stilling William, Operating System, Maxwell McMillan International Edition 1992.
2. Dectel H.N., An introduction to operating system, Addision Wisley.

Sub Title: DATA STRUCTURE & ALGORITHMS		
Sub Code: CSUDTT3	**No. of Credits : 3=3:0: 0(L-T-P)**	**No of lecture hours/week :04**
Exam Duration : 3 hours	**IA+ESE=40+60**	**Total no of contact hours:23**

COURSE OBJECTIVE:

1. Understand and remember algorithms and its analysis procedure.
2. Introduce the concept of data structures through ADT including List, Stack, Queues.
3. To design and implement various data structure algorithms.
4. To introduce various techniques for representation of the data in the real world.
5. To develop application using data structure algorithms.
6. Compute the complexity of various algorithms.

UNIT No	Syllabus Content	No of Hours
1	String algorithms, pattern search and editing, Arrays algorithms, development simple examples of algorithm development, complexity, Divided & conquer,binary search, selection sort, insertion sort, merge sort, quick sort complexity of sorting.	**10**
2	Linear list: Stacks, application of Stacks, arithmetic notations, recursion, queues and circular queues, Linked list definition, insertion and deletion of nodes circular and doubly linked list, Header nodes.	**10**
3	Trees, AVL trees, Threaded trees, Heap sort, B-tress.	**10**
4	**Graph and representation:** graph algorithms, optimization and Greedy methods, minimum spanning tree, shortest path, DFS, BFS search, examples of backtracking sets UNION and FIND operations tables and information retrievals, hashing.	**8**
5	Files: File organization, sequential file, direct file organization, index sequential file organization, Data storage and management.	**7**

COURSE OUTCOMES: The students would have learnt

CO1: Select appropriate data structures as applied to specified problem definition.
CO2: Implement operations like searching, insertion, and deletion, traversing mechanism etc. on various data structures.
CO3: Students will be able to implement Linear and Non-Linear data structures.
CO4: Implement appropriate sorting/searching technique for given problem.
CO5: Design advance data structure using Non- Linear data structure.
CO6: Determine and analyze the complexity of given Algorithms.

Text Books:

1. Data Structures and Algorithm Analysis in C++, 2/e by Mark Allen Weiss, Pearson Education Wirth Niclaus , Algorithm Data Structure Programs PHI
2. Horwitz E. and Sahani S. Fundamentals and Data Structure , Computer Science Press.
3. Knuth D. Threat of Computer Programming ", Vol 1-2 Addision -Wesley
4. Aho A.V.Hopcraft and Ullman J.E. "Data Structure and Algorithms, addsion Wesley.

Reference Books:

1. Tanonbaum , A. M. and Augenstein , M.J. "Data Structure with Pascal" PHI.
2. Trambley and Sorenson "Data Structure using Pascal, MGH.
3. Stubbs D. Data Structure with Abstract Data Type and Modula 2, Brooks & Cole Publication Comp.

Sub Title: ELECTRONIC DEVICE & CIRCUITS		
Sub Code: ECUDTO1	**No. of Credits : 3=3: 0: 0(L-T-P)**	**No of lecture hours/week :03**
Exam Duration : 3 hours	**IA+ESE=40+60**	**Total no of contact hours:36**

COURSE OBJECTIVE:

1. To understand practical applications of PN junction diode.
2. To study basic principle of BJT, JFET and MOSFET their characteristics and amplifiers.
3. To understand working of BJTs at low and high frequencies.
4. To understand the working of different types of feedback amplifiers.
5. To understand the working of different types of oscillators.

UNIT No	Syllabus Content	No of Hours
1	**Junction Diode And Its Application:** Properties of P-N Junction, Open Circuited P-N Junction, Current component of PN Diode, V-I Characteristics Temperature dependence of V-I Characteristics, Diode resistance, Diode as a rectifier-Half wave & Full wave rectifier, Clipper, Clamper.	8
2	**Bipolar Junction Transistor and FET:** Introduction to Bipolar Junction Transistor, Transistor current components. Transistor as an amplifier, Transistor construction, Transistor Circuit Configuration (Common Base , Common Emitter Common Collector) and Characteristics CE current gain, Analytical expression for transistor characteristics. Introduction to JFET, MOSFET, V-I and Transfer characteristics of JFET.	7
3	**Low Frequency Transistor Amplifier**: Graphical Analysis of CE amplifier, h-parameter Models, Transistor hybrid model, Analysis of Transistor amplifier using H-Parameter for CB, CE, CC configurations, Comparison of Transistor Amplifier Configuration, Darlington Pair. **High Frequency:** CE hybrid-pi model: Validity and parameter Variation, Current Gain with Resistive load, frequency response of a single stage CE Amplifier Gain-Bandwidth product.	7
4	**Feedback Amplifier**: Classification of feedback amplifier, Feedback concept, Properties of feedback amplifier, Effect of feedback on gain and impedance, Emitter and Source follower. **Oscillator:** Barkhausen criteria, Wien bridge, Tuned, Hartley, Colpitt and RC Phase shift oscillators.	7

5	**Operational Amplifiers:** OPAMP Symbol and terminal characteristics, Block Schematic of OPAMP, Ideal OPAMP Characteristics, Practical OPAMP Characteristics, Inverting Amplifier, Non-Inverting Amplifier, Voltage Follower Adder, Substractor, Comparator, Integrator, Differentiator, IC Timer-555, Introduction to Multivibrators, Monostable, Bistable, Astable Multivibrator.	**7**

COURSE OUTCOMES: The students would have learnt

CO1: Learn the design practical circuit using diodes.
CO2: Learn the Characteristics of BJT, FET and MOSFET
CO3: Evaluate frequency response to understand behavior of Electronics circuits.
CO4: Analyze important types of integrated circuits and demonstrate the ability to design practical circuits that perform the desired operations.
CO5: Learn the Designing of different oscillator circuits for various frequencies.
CO6: Gain knowledge about Differential amplifier and operational amplifier and Designing circuits for op-amp applications.

Text Books:

1. Electronic Devices and Circuit Theory, Robert L. Boylestad & L. Nashelsky, K. L. Kishore, 9thEdition, PHI
2. Integrated Electronics: Analog & Digital Circuit Systems, Jacob Millman & Halkias, TataMcGraw Hill.
3. Microelectronics, Millman and Grabel, Tata McGraw Hill.
4. Integrated Circuits by K. R. Botkar, 9th Ed., KhannaPublications

Reference Books:

1. Electronic Devices & Circuits, Allen Mottershead, PHI.
2. Microelectronic Circuits, Sedra and Smith, 5th Edition, Oxford UniversityPress.
3. Operational Amplifiers by R. Gayekwad, 4th Ed., Pearson Education

Sub Title: INFORMATION THEORY AND CODING		
Sub Code: CSUDTK3	**No. of Credits : 3=3: 0: 0(L-T-P)**	**No of lecture hours/week :03**
Exam Duration : 3 hours	**IA+ESE=40+60**	**Total no of contact hours:36**

COURSE OBJECTIVE:

1. Introduce the principles and applications of information theory.
2. To teach study how information is measured in terms of probability and entropy, and the relationships among conditional and joint entropies.
3. To teach coding schemes, including error correcting codes.
4. Explain how this quantitative measure of information may be used in order to build efficient solutions to multitudinous engineering problem

UNIT No	Syllabus Content	No of Hours
1	**Introduction:** Uncertainty, properties of information, Measures of information, Entropy: properties of entropy, information rate, conditional Entropy, Mutual Information.	8
2	**Channel Capacity:** Introduction, Shannon's Theorem, Continuous Channel, Capacity of Gaussian Channel: Shannon Hartley Theorem Bandwidth and S/N Trade-off.	7
3	**Channel Coding:** Introduction, Shannon-Fano Coding, Huffman Coding, Block Codes, Tree Codes, Cyclic Code, Hamming Codes, Convolutional Code.	7
4	**Compression:** Introduction, Types of Compression, Lossless and Lossy Compression, Binary Image Compression Schemes: Runlength Encoding, CCITT Groups, Video Compression.	7
5	**Cryptography:**Introduction, Types of Cryptosystem: Secret-key cryptosystem, Public-key cryptosystem, Encryption, Decryption, Ciphers and Secret Message, Cryptanalysis.	7

COURSE OUTCOMES: The students would have learnt

CO1: Apply information theory in source coding and channel coding
CO2: Understand how error control coding techniques are applied in communication systems.
CO3: Understand linear block codes for error detection and correction
CO4: Understand various error control encoding and decoding techniques
CO5: Students will understand the basic concepts of cryptography.

Text Books:

1. Information Theory, Coding and Cryptography by Ranjan Bose, Tata McGraw-HillEducation.
2. Communication System by R. P. Singh, S. D. Sapre, Tata McGraw-Hill.
3. Information Theory and Coding Techniques by J.S. Chitode and P.G. Chilveri, TechnicalPublication.

Reference Books:

1. Elements of Information Theory" byT. M. Cover and J. A. Thomas, John Wiley & Sons,New York.

Information Theory, Coding and

Sub Title: COMPUTATIONAL SCIENCE		
Sub Code: CSUDTK2	**No. of Credits :3**	**No of lecture hours/week :3**
Exam Duration : 3 Hours	**IA+ESE= 40+60**	**Total no of contact hours:36**

Course Objectives:

1. To define fundamental design concepts, flowchart
2. Explain idea of programming language, processors & data types
3. To develop basic concepts of functional programming languages
4. To familiarize with neuron and neural networks
5. To study basics fuzzy logic & genetic algorithms

UNIT No	Syllabus Content	No of Hours
1	**Program Design:** Introduction- fundamental design concepts - Modules and modularization criteria - Design notation: Procedure template, Pseudo code - Structured flow chart decision. Tables - Design techniques: Stepwise refinement, Levels of abstraction, Top down- Test Plans-Design guidelines. Characteristics of programming languages, Factors influencing the evolution of programming language, Development in programming methodologies, desirable features, and design issues.	8
2	**Programming language processors**: Structure and operations of translators, software simulated computer, syntax, semantics, structure, virtual computers, binding, and binding time. **Data types:** Properties of types and objects – elementary data types – structured data types. **Abstraction:** Abstract data types – encapsulation by subprograms – type definition – storage Management.	7
3	**Functional programming languages**: Introduction, fundamentals of FPL, LISP, ML, Haskell, application of Functional programming languages and comparison of functional and imperative languages	7
4	**Neural Networks (Introduction & Architecture):** Neuron, Nerve structure and synapse, Artificial neuron and its model, activation functions, Neural network architecture: single layer and multilayer feed forward networks, recurrent networks. Various learning techniques; perception and convergence rule, Auto-associative and hetro- associative memory.	7

5	**Fuzzy Logic (Introduction):** Basic concepts of fuzzy logic, fuzzy sets and crisp sets, fuzzy set theory and operations, Properties of fuzzy sets, fuzzy and crisp relations, fuzzy to crisp conversion. Genetic Algorithm (Introduction): Basic concepts, working principle, procedures of GA, flow chart of GA, Genetic representations (encoding), Initialization and selection, Genetic operators, Mutation, Generational Cycle, applications.	**7**

Course Outcomes:

1. Students will be able to demonstrate a broad understanding of the role of computer science and computational methods
2. Students will be able to demonstrate understanding of the theoretical basis of computer science
3. Students will be able to demonstrate knowledge of computational problem-solving strategies
4. Students will be able to design and implement substantial pieces of software
5. Students will be able to demonstrate understanding of the importance of theoretical scientific underpinnings for practical work and methodology

Text Books:

1. " Software Engineering Concepts" by Richard Fairley, Tata Macgraw Hill,
2. "Programming Languages, Design and implementation" by Terrance W. Pratt, and Marvin V. Zelkowitz, Prentice-Hall ofIndia, Fourth edition, 2002

Reference Books:

1. "Programming Languages – Concepts and Constructs" by Ravi Sethi, Addison-Wesley, 2nd Ed. 1996.
2. "Programming Languages: Principles and Paradigms" by Allen B. Tucker, Robert Noonan, TMH, 2006.
3. "Fundamentals of Programming Languages" by E. Horowitz, Galgotia Publishers, 1984.
4. "Programming Languages" by A.B. Tucker, Robert, Noonan, McGraw-Hill, 2002.
5. "Concepts of Programming Languages" by Robert W. Sebesta, Addison Wesley, Sixth edition, 2003.
6. "Computer Concepts and C Programming " byVikas Gupta, Wiley India.

Sub Title: OPERATING SYSTEM LAB	
Sub Code: CSUDLT1	**No. of Credits : 1.5=0: 0:1.5(L-T-P)**
Exam Duration : 2 hours	**IA+ESE =25+25**

Lab OBJECTIVE:

1. To learn Unix commands and shell programming
2. To implement various CPU Scheduling Algorithms
3. To implement Process Creation and Inter Process Communication.
4. To implement Deadlock Avoidance and Deadlock Detection Algorithms
5. To implement Page Replacement Algorithms
6. To implement File Organization and File Allocation Strategies.

Unit No.	Content	Teaching Hours
I, II, III, IV and V	• Basics of UNIX commands • Write programs using the following system calls of UNIX operating system fork, exec, getpid, exit, wait, close, stat, opendir, readdir • Write C programs to simulate UNIX commands like cp, ls, grep, etc. • Shell Programming • Write C programs to implement the various CPU Scheduling Algorithms • Implementation of Semaphores • Implementation of Shared memory and IPC • Bankers Algorithm for Deadlock Avoidance • Implementation of Deadlock Detection Algorithm • Write C program to implement Threading and Synchronization Applications	18

LAB OUTCOMES: The students would have learnt

CO1: Compare the performance of various CPU Scheduling Algorithms
CO2: Implement Deadlock avoidance and Detection Algorithms
CO3: Implement Semaphores
CO4: Create processes and implement IPC
CO5: Analyze the performance of the various Page Replacement Algorithms
CO6: Implement File Organization and File Allocation Strategies

Text Books:

1. Operating System concepts, Milenkovic M., MGH
2. Operating System design and implementation, Tanenbaubm A. S., PHI
3. Operating system concepts, Silberschartz A.and Patterson J.I. ,Wisley.

Reference Books:

1. Operating System, Stilling William, Maxwell McMillan International Edition 1992.
2. An introduction to operating system, Dectel H.N., , Addision Wisley.

Sub Title: DATA STRUCTURE & ALGORITHMS LAB	
Sub Code: CSUDLT2	**No. of Credits : 1.5=0: 0:1.5(L-T-P)**
Exam Duration : 2 hours	**IA+ESE =25+25**

Lab OBJECTIVE:

1. Understand and remember algorithms and its analysis procedure.
2. Introduce the concept of data structures through ADT including List, Stack, Queues.
3. To design and implement various data structure algorithms.
4. To introduce various techniques for representation of the data in the real world.
5. To develop application using data structure algorithms.
6. Compute the complexity of various algorithms.

Unit No.	Content	Teaching Hours
I, II, III, IV and V	• To implement the CPP program for Insert the valuesin Array. • To implement the CPP program for Delete the values in Array. • To implement the CPP program for Update the values in Array. • To implement the CPP program for Addition, Subtraction and Multiplications of the integer values in Array. • To implement the CPP program for Stringalgorithms. • To implement the CPP program for pattern matching instrings. • To implement the CPP program for insertion, deletion in one way LINK LIST. • To implement the CPP program for insertion, deletion in two way LINK LIST. • To implement the CPP program for insertion, deletion in circular LINK LIST. • To implement the CPP program for insertion, deletion in doubly LINK LIST. • To implement the CPP program for insertion, deletion in header LINK LIST. • To implement the CPP program for insertion, deletion in header doubly LINK LIST. • To implement the CPP program for TREE structure. • To implement the CPP program for pre-order, in-order, post-order of any Binary TREE. • To implement the CPP program for Binary search. • To implement the CPP program for Quick short. • To implement the CPP program for insertion sort. • To implement the CPP program for Bubble short etc	18

LAB OUTCOMES: The students would have learnt

CO1: Select appropriate data structures as applied to specified problem definition.
CO2: Implement operations like searching, insertion, and deletion, traversing mechanism etc. on various data structures.
CO3: Students will be able to implement Linear and Non-Linear data structures.
CO4: Implement appropriate sorting/searching technique for given problem.
CO5: Design advance data structure using Non- Linear data structure.
CO6: Determine and analyze the complexity of given Algorithms.

Text Books:

1. Data Structures and Algorithm Analysis in C++, 2/e by Mark Allen Weiss, Pearson Education Wirth Niclaus , Algorithm + Data Structure Programs, PHI
2. Fundamentals and Data Structure, by Horwitz E. and Sahani S., Computer Science Press.
3. Threat of Computer Programming, by Knuth D., Vol 1-2 Addision - Wesley
4. Data Structure and Algorithms, by Aho A.V.Hopcraft and Ullman J.E., addsion Wesley.

Reference Books:

1. Data Structure with Pascal, Tanonbaum , A. M. and Augenstein , M.J.PHI.
2. Data Structure using Pascal, by Trambley and SorensonMGH.
3. Data Structure with Abstract Data Type and Modula by Stubbs D. 2", Brooks & Cole Publication Comp.

Reference Books:

1. Electronic Devices & Circuits, Allen Mottershead, PHI.
2. Microelectronic Circuits, Sedra and Smith, 5th Edition, Oxford UniversityPress.
3. Operational Amplifiers by R. Gayekwad, 4th Ed., Pearson Education

SUB CODE	L	T	P	DURATION	IA	ESE	CREDITS
CSUDTO1	3	0	0	3 HOURS	40	60	3

INTRODUCTION TO INFORMATION SCIENCE

Course Objective

1. To understand basic concepts about Coding Theorem.
2. To understand basic concepts about error detection and correction methods.
3. To understand basic concepts about compression techniques.
4. To understand basic concepts about video image compression techniques.
5. To understand basic concepts about cryptography.

UNIT-I

Uncertainty, Information and Entropy Information Measures: Characteristics on information measure, Shannon's concept of information, Shannon's measure of information, Model for source coding theorem, Communication system, Source coding and line/channel coding, channel models, channel mutual information capacity (Bandwidth).

UNIT-II

Channel coding, Theorem for discrete memory less channel, Information capacity theorem, Error detecting and error correcting codes, Types of codes, Block codes, Tree codes, Hamming codes, Description of linear block codes by matrices, Description of linear tree code by matrices, Parity check codes, Parity check polynomials.

UNIT-III

Compression: Lossless and lossy, Huffman codes, Binary Image compression schemes, Runlength Encoding, CCITT group-3 1D compression, CCITT group-3 2D compression, CCITT group-42D compression.

UNIT-IV

Video Image Compression: Requirement of full motion video compression, CCITT H 261video coding algorithm, MPEG compression methodology: MPEG-2 compression, Audio (Speech)compression.

UNIT-V

Cryptography: Encryption, Decryption, Cryptogram (cipher text), Concept of cipher, Cryptanalysis, Keys: Single key (Secret key), Cryptography, two-key (Public key) cryptography, Single key cryptography, Ciphers, Block Cipher code, Stream ciphers, Requirements for secrecy, The data Encryption Standard, Public Key Cryptography, Diffie-Hellmann public key distribution, The Rivest-Shamin Adelman (R-S-A) system for public key cryptography, Digital Signature.

Text Books:

1. Digital Communication by Das, Mullick & Chatterjee, New Age Pub.
2. Digital Communication by Proakis, TMH.
3. Digital Image Processing by Gonzales & Woods, Pearson.
4. Local Area Network by G. Keiser, TMH.

Course Outcomes

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

1. Student will be able to know about Coding Theorems.
2. Student will be able to know about error detection and correction methods.
3. Student will be able to know about compression techniques.
4. Student will be able to know about video image compression techniques.
5. Student will be able to know about cryptography.

CHUDTO1 Fluidization Engineering [L:3, T:0, P:0]

Objectives To impart the fundamental knowledge of Fluidization and understand the different aspects of fluidized bed systems applied in various industries.

Contents:

Unit-I: Phenomenon of Fluidization, Advantages and disadvantages of fluidization compared to conventional processes, Classification of various industrial beds, Industrial applications of fluidized beds in mineral processing, coal and biomass gasification & combustion FCC petroleum refining, pharmaceuticals, cement and other solid handling systems, Fluidized Bed Drying.

Unit-II: Gross behavior of fluidized beds-Minimum fluidizing velocity and pressure drops; Voidage, Design of distributors, Effect of temperature and pressure on fluidized bed, Elutriation and entrainment Transport disengaging height.

Unit-III: Bubbles in dense beds-Davidson Model, stream of bubbles, Bubbling bed models, Geldart classification, Different regimes of Fluidization, Davidson's model, Variation of Bubbling bed and Circulating Fluidized beds.

Unit-IV: Emulsion phase, Turn-over rate of solids, Residence Time Distribution of Solids, Diffusion model of solids movement, Interchange coefficient of solid into and out of wake.

Unit-V: Flow Pattern of Gas through fluidized beds, diffusion model for gas flow; two region models, evaluation of interchange coefficients, Heat and Mass transfer in Fluidized Beds.

Suggested Text Books :

1. Fluidization Engineering by D. Kunii and O. Levenpiel, Butterworth-Heinemann, Elsevier. **Reference Book:**
1. Fluidization by J. F. Davidson and D. Harrison, Academic Press.
2. Fluidization and Fluid Particles Systems by F.A. Zenz and D. F. Othmer, Reinhold Publishing.
3. Handbook of Fluidization and Fluid-Particle Systems, by W. C. Yang, CRC Press. Course **Outcome:** Students would be able to

1. Describe fluidization and its recommendation in various industries exploiting its various advantages evaluating the heat and mass transfer aspects.
2. Apply model equations for fluidized beds for application in various industries.
3. Able to understand various fluidization characteristics like minimum fluidization velocity, complete fluidization velocity and transport disengage height.

CO-PO Mapping

CO	**PO**												**PSO**		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	3	3	--	--	--	--	--	--	--	3	3	--
CO2	3	3	3	3	3	--	--	--	--	--	--	--	3	3	--
CO3	3	3	3	3	3	--	--	--	--	--	--	--	3	3	--
Weightage: weak-01, moderate-02, strong-03															

SYLLABUS	**(SEMESTER-IV)**	Periods/ Week			Internal Assessment (IA)			ESE	Grand Total	Credits
Subject Code:	ESUDTO1	L	T	P	TA	IA	Total	60	100	3
Subject:	Effective Technical Communication	3	0	0	10	30	40			

Course Objectives:

Effective Technical communication is critical in today's world. Most problems in an organization arise as a result of poor communication. Effective communication ensures a smooth flow of ideas, facts, decisions, and advice. This way, employees eliminate hindrances in achieving the organization's target.

Course Content:

Unit-1 Fundamentals of Communication Technical Communication: features: Distinction between General and Technical communication; Language as a tool of communication; Levels of communication: Interpersonal, Organizational, Mass communications; the flow of Communication: Downward, Upward, Lateral of Horizontal (Peer group): Importance of technical communication; Barriers to Communication.

Unit-2 Constituents of Technical Written Communication Words and Phrases: Word formation. Synonyms and Antonyms; Homophones; Select vocabulary of about 500-1000 New words; Correct Usage: all Parts of Speech; Modals; Concord; Articles; Infinitives; Requisites of Sentence Construction: Paragraph Development: Techniques and Methods- Inductive, Deductive, Spatial, Linear, Chronological etc; The Art of Condensation-various steps.

Unit-3 Business Communication Principles, Sales & Credit letters; Claim and Adjustment Letters; Job application and Resumes. Reports: Types; Significance; Structure, Style & Writing of Reports. Technical Proposal; Parts; Types; Writing of Proposal; Significance. Negotiation & Business Presentation skills.

Unit-4 Presentation Strategies and Listening Skills. Defining Purpose; Audience & Local; Organizing Contents; Preparing Outline; Audio-visual Aids; Nuances of Delivery; Body Language; Dimensions ofSpeech: Syllable; Accent; Pitch; Rhythm; Intonation; Paralinguistic features of voice; Listening Skills:Active Listening, Passive Listening. methods for improving Listening Skills.

Unit-5 Value-Based Text Readings Following essays form the suggested text book with emphasis on Mechanics of writing. (i) Humanistic and Scientific Approaches to Human Activity by Moody E. Prior
(ii) The Language of Literature and Science by A. Huxley (iii) Man and Nature by J.Bronowski (iv) The Social Function of Literature by Ian Watt (v) Science and Survival by Barry Commoner (vi) The Mother of the Sciences by A.J.Bahm (vii) The Effect of Scientific Temper on Man by BertrandRussell.

Text Book :

1. Improve Your Writing ed. V.N.Arora and Laxmi Chandra, Oxford Univ. Press, 2001, New Delhi..
2. Technical Communication: A Practical Approach: Madhu Rani and Seema Verma- Acme Learning, NewDelhi-2011
3. Technical Communication- Principles and Practices by Meenakshi Raman & Sangeeta Sharma, Oxford Univ. Press,2007, New Delhi.

Reference Books:

1. Communication Skills for Engineers and Scientists, Sangeeta Sharma et.al. PHI Learning Pvt.Ltd,2011, New Delhi.

2. Business Correspondence and Report Writing by Prof. R.C.Sharma& Krishna Mohan, Tata McGraw Hill &Co.Ltd.,2001, New Delhi.
3. Word Power Made Easy by Norman Lewis, W.R.Goyal Pub. &Distributors, 2009,Delhi.
4. Developing Communication Skills by Krishna Mohan, Mecra Bannerji- Macmillan India Ltd. 1990, Delhi.
5. Manual of Practical Communication by L.U.B.Pandey: A.I.T.B.S. Publications India Ltd.; Krishan Nagar,2013, Delhi.
6. English Grammar and Usage by R.P.Sinha,

Course Outcomes:

CO1 At the end of the semester, employability skills of the students will develop.

CO2 Students will improve their Vocabulary and their Accent.

CO3 Enable students with the confidence to use written communication in professional and personal work.

CO4 Students will use correct and appropriate language in oral and written communication

Course Outcomes and their mapping with Programme Outcomes: Effective Technical Communication(CE23IC401)

COs	POs												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	2	2	1	2	3	1	2	3	2	2	2	2	1
CO2	2	3	2	2	1	3	2	1	2	3	2	2	2	2	2
CO3	3	3	2	2	2	2	2	2	2	3	2	2	2	1	2
CO4	3	3	2	2	2	3	3	2	1	3	2	2	2	2	2

Weightage: 1-Sightly; 2-Moderately; 3-Strongly

Sub Title: COMPUTER NETWORK		
Sub Code: ITUDTO1	**No. of Credits : 3=3:0: 0(L-T-P)**	**No of lecture hours/week :04**
Exam Duration : 3 hours	**IA+ESE=40+60**	**Total no of contact hours:45**

COURSE OBJECTIVE:

1. Discuss the basic taxonomy and terminology of the computer networking.
2. Discuss the functionality of different layers of OSI Model.
3. Discuss different protocols of TCP/IP protocol suite.
4. Discuss the process of IP addressing and working of routing protocols.
5. Discuss the different challenges of Internetworking, Congestion control and Quality of services.

UNIT No	Syllabus Content	No of Hours
1	**Introduction:** **Data communications:** Components, Data representation, Direction of data flow(simplex, half duplex, full duplex) **Networks:** Distributed processing, Network criteria, Physical structure (type of connection, topology), categories of network (LAN, MAN,WAN);Internet: brief history, internet today, Protocols and standard **Reference models:** OSI reference model, TCP/IP reference model, their comparative study. **Physical Layer:** Transmission technology.	10
2	**Data Link Layer:** Types of errors, Error detection & correction methods, Framing(character and bit stuffing), Flow control, Protocols: Stop & wait ARQ Go-Back- N ARQ, Selective repeat ARQ **Medium access sub layer:** Point to point protocol, Multiple Access Protocols: Pure ALOHA, Slotted ALOHA, CSMA, CSMA/CD, Token ring, Reservation, Polling, FDMA, TDMA, CDMA.	10

3	**Network Layer:** **Internetworking devices**: Repeaters, Hubs, Bridges, Switches, Router, Gateway **Addressing**: IP addressing, classful addressing, subnetting. **Routing**: Techniques, Static vs. Dynamic routing, Routing table for classful address, Flooding, Shortest path algorithm, Distance vector routing, Link state routing. **Protocols:** ARP, RARP, IP, ICMP, IPV6.	**10**

4	**Transport Layer:** Process to process delivery, UDP: Services and applications. TCP: Stream Oriented Service, Segment, Timers, Congestion control techniques: Avoidance and Detection.	**8**
5	**Application Layer:** DNS, SMTP, FTP, HTTP & WWW, **Security:** Cryptography, User authentication, Security protocols in internet, Firewalls. Recent research topic on networking.	**7**

COURSE OUTCOMES: The students would have learnt

CO1: Understand the working of different internetworking devices.
CO2: Understand the working of Internet.
CO3: Understand the difference between OSI and TCP/IP.
CO4: Understand the security mechanism in Networking.
CO5: Understand core concept of IP addressing and routing.

Text Books:

1. Data Communications and Networking by B. A. Forouzan – TMH Publication.
2. Computer Networks by S. Tanenbaum – Pearson Education/PHI

Publication. Reference Books:

1. Internetworking with TCP/IP by Comer – Pearson Education/PHI by Publication.
2. Data and Computer Communications by W. Stallings – PHI Publication.