List of Experiments:

This is a sample list of Experiments, **minimum 12 experiments** are to be performed covering the entire syllabus. At least two experiments should be beyond syllabi based on learning of syllabi (Apply)

1. Introduction to PHP and configure it to work with Apache Web Server.
2. Design web pages for your college containing a description of the courses, departments, faculties, library etc, use href, list tags.
3. Create your class timetable using table tag.
4. Create user Student feedback form (use textbox, text area , checkbox, radio button, select box etc.)
5. Create your resume using HTML tags also experiment with colors, text , link , size and also other tags you studied.
6. Design a web page of your home town with an attractive background color, text color, an Image, font etc. (use internal CSS).
7. Develop a JavaScript to display today's date.
8. Write a JavaScript to design a simple calculator to perform the following operations: sum, product, difference and quotient.
9. Write an HTML page that contains a selection box with a list of 5 countries. When the user selects a country, its capital should be printed next to the list. Add CSS to customize the properties of the font of the capital (color, bold and font size).
10. Write a PHP program to keep track of the number of visitors visiting the web page and to display this count of visitors, with proper headings.
11. Write a PHP program to display a digital clock which displays the current time of the server.
12. Write the PHP programs to do the following: a. Implement simple calculator operations. b. Find the transpose of a matrix.
13. Write a PHP program to sort the student records which are stored in the database using selection sort.
14. Study and Install IDE of Arduino and different types of Arduino.
15. Write program using Arduino IDE for Blink LED.
16. Write Program for RGB LED using Arduino.
17. Study the Temperature sensor and write a Program for monitor temperature using Arduino.
18. Study and Implement RFID, NFC using Arduino. • Study and implement MQTT protocol using Arduino.
19. Study and Configure Raspberry Pi.
20. WAP for LED blink using Raspberry Pi.
21. Study and Implement Zigbee Protocol using Arduino / Raspberry Pi.
22. Create Smart Plugs with Arduino and Raspberry Pi.
23. Interfacing digital sensors with raspberry pi.
24. Creating a webpage to control I-O devices, Reading data from sensor and passing to web page.
25. Implement a program to access Analog sensor via wifi with HTML Web server.

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SYLLABUS OF B.E. SEM. III & IV (I.T.) [C.B.C.S.]

Semester-III

3IT01/3KS01/3KE01 ENGINEERING MATHEMATICS-III

Course Objectives:-

- Find general solutions of linear differential equations with constant coefficients using the roots of the auxiliary equation.
- Calculate the Laplace Transform of basic functions using the definition.
- Apply Laplace transform to find solution of linear differential equations. And solve problems related to Fourier Transform
- Compute and interpret the correlation coefficient.
- Compute the Analytic function and Complex Analysis.
- Perform vector differentiation and integration to analyze the vector fields and apply to compute line, surface and volume integrals.

Course Outcomes:

After successfully completing the course, the students will be able to:

1. Demonstrate the knowledge of differential equations and linear differential equations .
2. Apply Laplace transform to solve differential equations.
3. Demonstrate the use of Fourier Transform to connect the time domain and frequency domain.
4. Demonstrate the basic concepts of probability and statistics.
5. Apply the knowledge of Complex Analysis.
6. Apply the knowledge of vector calculus to solve physical problems.

SECTION-A

UNIT-I: **Ordinary differential equations**:- Complete solution, Operator D, Rules for finding commplementary function, the inverse operator, Rules for finding the particular integral, Method of variation of parameters, Cauchy's and Legendre's linear differential equations. (7)

UNIT-II: **Laplace Transform:-** Definition, standard forms, properties of Laplace transform, inverse Laplace transform, Initial and final value theorem, Convolution theorem, Laplace transform of impulse function, Unit step function, Laplace transforms of periodic function . (7)

UNIT-III: **a) Applications of Laplace Transform:-** Solution of Linear differential equations, Simultaneous differential equation by Laplace transform method

b) Fourier Transform:- Definition, standard forms, Fourier transforms, properties of Fourier transforms, Convolution theorem, Fourier sine and Fourier cosine transforms and integrals, inverse Fourier transforms.(7)

SECTION-B

UNIT-IV: **a) Partial differential equation** of first order of following form:- (i)f (p,q) = 0; (ii) f (p,q,z) = 0; (iii) f (x, p) = g (y,q); (iv) P p + Qq = R (Lagranges Form); (v) z = px + qy + f(p,q) (Clairauts form)

b) Statistics Curve fitting: Least Square Method, Coefficient of Correlations, Lines of Regression. (7)

UNIT-V: **Complex Analysis: -** Functions of complex variables, Analytic function, Cauchy- conditions, Harmonic function, Harmonic conjugate functions, Milne's Method, conformal mappings (translation, rotation, magnification and bilinear transformation), Expansion of function in Taylor's and Laurent's series. (7)

UNIT–VI: **Vector calculus**:- Scalar and vector point functions, Differentiation of vectors, Curves in space, Gradient of a scalar point function, Directional derivatives, Divergence and curl of a vector point function and their physical meaning, expansion Formulae (without proof), line, surface, volume integrals, irrotational Solenoidal Vector fields. (7)

Text Books:

1. Elements of Applied Mathematics Vol. II by P. N. Wartikar and J.N. Wartikar,
2. Higher Engg. Mathematics by B.S. Grewal.

Reference Books:

1. Advancing Engg. Mathematics by E.K.Kreyzig.
2. A text book of Differential Calculus by Gorakh Prasad.
3. A Text Book of Applied Mathematics by P.N.Wartikar and J.N.Wartikar.
4. Engineering Mathematics by Ravish R Singh, Mukul Bhatt.

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3IT02 Discrete Structure & Graph Theory

Course Objectives:

- Increase Critical thinking and analytical problem-solving skills and awareness of computer related ethics to discrete Mathematical Logic.
- Apply appropriate discrete mathematical concepts and operations to interpret data and to solve problems.
- Identify problem and analyze it in terms of its significant parts and the information needed to solve problems based on sets, relation, function and recursion.
- Formulate and evaluate possible solutions to problem and select the chosen solution based on Boolean algebra.
- Construct graphs and trees, interpret them, and draw appropriate conclusion.

Course Outcomes:

After successfully completing the course, the students will be able to:

- Identify basic terminology of Mathematical Logic, Theory of inference & Predicate calculus.
- Identify, illustrate, and solve engineering problems on the basis of set theory.
- Identify and Design an Algebraic Structures and groups
- Examine and formulate the concept of Lattices & Boolean Algebra to solve engineering problems.
- Design and interpret data using graphs, trees and related algorithms.

UNIT I : Mathematical Logic : Statements & Notation , Connectives , Normal forms , The Theory of Inference for the Statement Calculus , Predicate Calculus , The Inference Theory of the Predicate Calculus.

UNIT II: Set Theory : Basic concepts of Set Theory , Representation of Discrete Structure, Relation and ordering, Functions , Recursion.

UNIT III : Algebraic Structures : Algebraic Systems , Semi groups and Monoids , Grammars and Languages, Polish expression & their compilation , Groups , Semi groups, Application of Residue Arithmetic to Computers.

UNIT IV: Lattice & Boolean Algebra: Lattices as Partially Ordered Sets, Boolean Algebra, Boolean Functions, Representation of Boolean Functions , Minimization of Boolean Functions.

UNIT V: Graph Theory: Basic concepts of Graph Theory , Paths, Reachability & Connectedness, Matrix representation of graphs , Storage Representation and Manipulation of Graphs, Coloring Graphs.

UNIT VI: Trees, Tree Searching, Minimal spanning trees, Simple Precedence Grammars, , rooted tree, expression tree, B tree, Distance between spanning trees of a graph. PERT and Related Techniques.

Text Book : J.P.Trembley, R.Manohar :"Discrete Mathematical Structures with Application to Computer Science" 1988 (Tata McGraw Hill)

REFERENCE BOOKS:

1 G Shankar Rao, "Discrete Mathematical Structures", New Age International, 2002 ISBN:81-224-1424-9.
2 Kenneth H. Rosen, " Discrete Mathematics and its Applications", 7th Edition, McGraw Hill Edition.
3. S.K. Chakraborty & B.K.Sarkar ;"Discrete Mathematics" OXFORD.
4. Bernard Kolman,Robert C.Busby, Sharon Ross: "Discrete Mathematical Structures" Third Edition PHI.

3IT03 OBJECT ORIENTED PROGRAMMING

Course Objectives:

- Study of the basic concepts of Java such as operators, classes, objects, inheritance, packages and exception handling.
- Study of concepts like enumerations, generics, logging, API, assertions, Applets, AWT.
- Preparing the students to learn Object Oriented Programming Methodology.

Course Outcomes:

- Apply Object Oriented approach to design software.
- Implement programs using classes and objects.
- Specify the forms of inheritance and use them in programs.
- Analyze polymorphic behavior of objects.
- Design and develop GUI programs.
- Develop Applets for web applications

Unit I: Introduction to Object Oriented Programming: Introduction, Need of OOP, Principles of Object-Oriented Languages, Procedural Language Vs OOP, Application of OOP, Java Virtual Machine, Java features, Program Structures. **Java Programming Constructs:** Variables, Primitive data types, Identifier, Literals, Operators, Expressions, Precedence Rules and Associativity, Primitive Type Conversion and Casting, Flow of Control.

Unit II: Classes and Objects: Classes, Objects, Creating Objects, Methods, Constructors, Cleaning up Unused Objects, Class Variable and Methods, this keyword, Arrays, Command Line Arguments.

Unit III: Inheritance: Inheritance vs. Aggregation, Polymorphism, Method Overloading Method Overriding, super keyword, final keyword, Abstract class. **Interfaces, Packages and Enumeration:** Interface, Packages, java.lang package, Enum type.

Unit IV: Exception: Introduction, Exception handling Techniques, User-defined exception, Exception Encapsulation and Enrichment. **Input/ Output:** The java.io.file Class, Reading and Writing data, Randomly Accessing a file, Reading and Writing Files using I/O Package.

Unit V: Applets: Introduction, Applet Class, Applet structure, Applet Life cycle, Common Methods used in displaying the output, paint (), update () and repaint (), More about applet tag, get Document Base () and get Code Base() methods.

Unit VI: Event Handling: Introduction, Event delegation Model, java.awt.event Description, Sources of events, Event Listeners, Adapter classes, Inner Classes. **Abstract Window Toolkit:** Introduction, Components and Containers, Button, Label, Checkbox, Radio Buttons, List Boxes, Choice Boxes, Text field and Textarea, Container Class, Layouts, Menu, Scrollbar.

Text Book: Sachin Malhotra and Saurabh Choudhary: Programming in Java, Oxford University Press 2010.

Reference Books:

1. Herbert Schildt: Java Complete References (McGraw Hill)
2. E. Balagurusamy: Programming with Java (McGraw Hill)
3. Khalid Mughal: A Programmer's Guide to Java Certification, 3rd Edition (Pearson)
4. Liang: A text Book of Java Programming, (PHI).

3IT04 ASSEMBLY LANGUAGE PROGRAMMING

Course Objectives :

1. Able to understand the architecture and organization of microprocessor 8086/8088 .
2. Able to understand different addressing modes & instruction format of 8086 & apply in 8086 programming.
3. Able to understand instruction set, control flow instruction and apply the fundamentals of assembly level programming of microprocessor through use of any Open Source Software.(TASM,NASM etc.)
4. Able to understand stack, subroutine. Recursion & apply in 8086 programming.

Course Outcomes ;

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

1. To draw and explain internal architecture of 8086 with its register organization.
2. Able apply instruction format 7 addressing modes in 8086 programming.
3. Able to apply control flow instruction in 8086 programming through use of any Open Source Software.(TASM,NASM etc.)
4. Able to apply stack & subroutine concept in 8086 programming.

Unit I: Microprocessor 8086 architecture-BIU and EU, pin configuration, Software model of 8086 microprocessor. Memory addresses space and data organization. Data types. Segment registers, memory segmentation. IP & Data registers, Pointer, Index registers. Memory addresses generation.

Unit II: 8086 Instruction set overview, addressing modes. 8086 instruction formats. 8086 programming: Integer instructions and computations: Data transfer instructions, Arithmetic instructions and their use in 8086 programming.

Unit III: 8086 instructions: logical instructions, Shift and rotate instructions 8086 programming: 8086 flag register and Flag control instructions control flow and jump instructions, Loops & loop handling instructions. 8086 programming using these instructions.

Unit IV: Stack and Subroutines,8086 stack segment and stack related instructions. 8086 I/O Address space, Subroutines and related instructions, parameter passing, Concept of Macros, Status saving on stack. Concept of recursion at assembly Program level. 8086 programming using subroutines, recursion and macros.

Unit V: 8086 I/O: Types of input output, isolated I/O interface, input output data transfers, I/O instructions and bus cycles. Programmable Peripheral Interface 8255 PPI: pin diagram, internal organization, modes of operation.

Unit VI: 8086 Interrupt Mechanism, types and priority , Interrupt vector table, Interrupt Instructions, External hardware-interrupt interface signals & interrupts sequence. Programmable Interrupt Controller 8259: Block & pin diagram, internal architecture, Software interrupts, Nonmaskable interrupt, Internal Interrupt functions.

Text Book: Avtar Singh & Walter A. Triebel: The 8088 and 8086 Microprocessors, Programming, Interfacing, Software, Hardware, and Applications, PHI, 2003.

References:

1. Barry B. Brey : The Intel Microprocessor Architecture, Programming & Interfacing (6/e)(PHI)
2. John P Uffenbeck, "8086/8088 Families: Designing, Programming and Interfacing". Prentice Hall
3. D. V. Hall: Microprocessors and Interfacing, TMH.

3IT05 ANALOG AND DIGITAL ELECTRONICS

Course Objectives :

- To understand the basic operation and applications of analog devices such as BJT and JFET
- To introduce analog ICs like Op-Amp and Timer
- To study and develop skills to design basic combinational and Sequential logic circuits
- To lay foundation for understanding computer architecture and organization

Course Outcomes :

On completion of the course learner will be able to-

- Understand the basic applications of BJT.
- Get acquainted with analog ICs like Op-Amp IC-741 and Timer IC-555
- Discriminate the working of sinusoidal and non-sinusoidal waveform generators.
- Apply the concept of K-map to simplify logic expressions.
- Design and implement Combinational circuits
- Explore the applications of Sequential circuits

UNIT I:

Introduction to Analog Circuits: Transistor as an amplifier. Need of biasing, Potential divider bias circuit, Faithful amplification of CE amplifier, Transistor as an electronic switch, Construction and working of JFET.

UNIT II:

Operational Amplifier: Block diagram of Op-Amp, ideal Op-Amp parameters. Applications of op-amp: Inverting & Non-Inverting Amplifier, Voltage follower, Summing Amplifier, Subtractor, Comparator.

UNIT III:

Wave Generators:

Transistorized Oscillators: Barkhausen Criterion, R-C Phase Shift Oscillator, Transistor crystal oscillator Timer IC 555: Block diagram**,** working, Astable multivibrator, Monostable multivibrator.

UNIT IV: Introduction to Digital Circuits: Logic gates, Standard logic expression forms, SOP, POS, Logic expression realization & minimization using K-map (upto 4 variables only). Half Adder, Full Adder, Half subtractor, Full subtractor.

UNIT V: Logic Circuits: Difference between Combinational and Sequential circuits, Code convertors (BCD, Excess-3 and Gray), Multiplexers, De-multiplexers and Decoders.

Flip Flops: SR flip-flop, JK flip-flop, D flip-flop and T flip-flop.

UNIT VI: Sequential Circuits: Difference between Asynchronous & Synchronous sequential circuits, Asynchronous counters, Mod counter, Up-Counter, Down-Counter. Working of shift Registers, SISO, SIPO, PISO and PIPO. Application of Shift Register as a Ring Counter.

Text Books:

1. V.K.Mehta, Rohit Mehta: Principles of Electronics (S.CHAND)
2. Gayakwad R.A.: Op-Amps & Linear Integrated circuits (PHI)
3. Jain R.P. Modern Digital Electronics (TMH)

Reference Books:

1. N.N.Bhargava, D.C.Kulshreshtha, S.C.Gupta: Basic Electronics & Linear circuits, (TTTI)
2. S. Salivahanan: Electronics Devices & circuits, Third Edition
3. John P. Hayes: Introduction to Digital Logic Design{Pearson)
4. Anand Kumar: Fundamentals of Digital Circuits (PHI)

3IT06 OBJECT ORIENTED PROGRAMMING - LAB

Practical based on the syllabus of Object Oriented Programming (3IT03)

Following list is an indicative list and the subject teacher is free to design his/her own list of experiments based on the syllabus of Object Oriented Programming (3IT03)

1. Write a program to demonstrate various data-types used in java and also perform the type casting.
2. Demonstrate the use of this keyword in java.

3. Write a program in java to demonstrate various OOP'S (Inheritance, Polymorphism, and Abstraction) concepts in java.
4. Create User defined Packages in Java
5. Write a program in java to set the priority of thread in order.
6. Demonstrate the strings are immutable in java and create mutable strings in java.
7. Write a program in java which demonstrates the exception caught because of invalid input.
8. Write java program to create a registration form using AWT.
9. Write a Java program to demonstrate the use of AWT components namely buttons, labels, text boxes, menus with event handling.
10. Write a program in java to copy certain text of one file to another newly created file in java using java I/O operations.
11. Write a program in java to connect java to oracle or MySql Database using JDBC drivers
12. Demonstrate the various List interfaces in java.
13. Write a program in java to show use of generic classes and methods

Students are advised to explore the Virtual Labs Developed by Ministry of Human Resource Development Government of India available at http://www.vlab.co.in/broad-area-computer-science-and-engineering

3IT07 ASSEMBLY LANGUAGE PROGRAMMING - LAB

Practical based on the syllabus of Assembly Language Programming (3IT04)

Following list is an indicative list and the subject teacher is free to design his/her own list of experiments based on the syllabus of Assembly Language Programming (3IT04). Study experiments are highly discouraged.

1. Executing various debugging commands.
2. Write a program to manipulate the two given operands with general arithmetic operators +, -, *, /
3. Write a program in TASM to store given a number XY i.e. 0X in BX register and 0Y in CX register
4. Program for block transfer from one segment to another segment
5. Write a program in TASM to find out no. of positive and negative numbers from a given series of a signed no.
6. Program to sort the given array in ascending and descending order.
7. Program for Addition/Subtraction of 2 numbers using FAR/NEAR procedure
8. Program to find out Factorial of any given number using recursive procedure.
9. Program to add two BCD numbers.
10. Program for BCD to HEX conversion.
11. Program for HEX to BCD conversion.
12. Program to display System Date/Time.
13. Program to find whether no. is Prime or not.
14. Execute various commands on 8086 Microprocessor Trainer kit.

Students are advised to explore the Virtual Labs Developed by Ministry of Human Resource Development Government of India available at http://www.vlab.co.in/broad-area-computer-science-and-engineering

3IT08 ANALOG & DIGITAL ELECTRONICS - LAB

Practical based on the syllabus of Analog & Digital Electronics (3IT05)

Following list is an indicative list and the subject teacher is free to design his/her own list of experiments based on the syllabus of Analog & Digital Circuits (3IT05)

1) To study the input and output characteristics of transistor connected in Common Emitter (CE) configuration.
2) Implementation of Op-amp as an inverting amplifier.
3) Implementation of Op-amp as a non-inverting amplifier.
4) Study of Astable Multivibrator using IC 555 and find the frequency of output square wave.
5) To study and verify the Truth Table of different Logic gates using TTL ICs (7400, 7402, 7404, 7408, 7427, 7432, 7486 etc.).
6) Study and verify the truth table of Half adder and Full adder using logic gates.
7) Study and verify the truth table of Half Subtractor and Full Subtractor using logic gates
8) Implementation of 4bit parallel adder using IC-7483 .

9) Study the working of Multiplexer using one of the ICs like 74151A, 74152, 74153, 74157.
10) Study the working of De-Multiplexer and Decoder using one of the ICs like74138,74154,74156
11) Study the working and Verification of truth table of SR, JK, T and D Flip Flops.
12) Implementation of 3 bit asynchronous counter using JK Flip Flop.
13) Implementation of 3 bit Shift Register using D Flip Flop.

Students are advised to explore the Virtual Labs Developed by Ministry of Human Resource Development Government of India available at http://www.vlab.co.in/broad-area-computer-science-and-engineering

3IT09 COMPUTER SKILL LAB - I

This practical lab must cover the following aspects for Python:

1. Basics for python programming that consists of the study of various data types in Python, implementation of control structures and loops, functions (pre-defined and user defined), file handling commands and functions.
2. The lab must also cover the concepts related to networking using python.
3. OOP concepts study and its programming using python libraries.
4. The lab must cover the part of UI deigning using python (Django, Flask, etc.).
5. The plotting of graphs using various libraries such as (matplotlib, seaborn, etc.).
6. The lab must also give a brief introduction regarding the a concept of machine learning or a learning algorithm implementation.
7. An introduction to the data science track can be given by conducting and including an experiment on data manipulation using (Numpy, Pandas, etc.)

The following list is an indicative list and the subject teacher is free to design his/her own list of experiments based on Python, R etc.

1. To study the various data types in Python.
2. To study dictionaries, data frames and tuples in Python
3. To study the control structures and loops in Python.
4. To study the various Functions (pre-defined and User Defined) in Python.
5. To study the various File handling and i/o in Python.
6. To study the concepts related to Networking in Python.
7. To study various OOP concepts using Python.
8. To study UI design using various libraries in Python.
9. To Study Plotting of Graphs using the various libraries in Python.
10. To study basic data manipulation using Python Libraries.
11. To study a learning algorithm using Python.
12. Mini Project (based on all the above mentioned concepts)

Students are advised to explore the Virtual Labs Developed by Ministry of Human Resource Development Government of India available at http://www.vlab.co.in/broad-area-computer-science-and-engineering

SEMESTER - IV

4IT01 COMPUTER ORGANIZATION & ARCHITECTURE

Course Objectives :

- How Computer Systems work & the basic principles.
- Instruction Level Architecture and Instruction Execution.
- The current state of art in memory system design.
- How I/O devices are accessed and its principles.
- To provide the knowledge on Instruction Level Parallelism.
- To impart the knowledge on micro programming.
- Concepts of advanced pipelining techniques.

Course outcomes :

- Ability to understand the basic structure of computer including functional units, addressing modes, stacks, queues, subroutines, etc.
- Ability to understand the basic processing unit of computer, execution of a complete instruction.
- Ability to understand about input/output organization of computer including interrupt, DMA, buses, interfaces, etc.
- Ability to understand the concepts of RAM, ROM, cache memory, virtual memory.
- Ability to understand number representation, Booth's algorithm, different peripheral devices.

Unit-I Basic structure of computer: hardware & software, program sequencing. concept of memory locations & address. Main memory operation. instructions & instruction sequencing. Addressing modes. basic I/O operations. Stacks. queues & subroutines.

Unit-II Processing Unit: fundamental concepts. execution of a complete instruction. hardwired control, performance consideration. Micro-programmed control; microinstructions.

Unit-III I/O organization: accessing I/O devices, interrupts, direct memory access, bus arbitration: centralized and distributed. I/O hardware: processor bus (Synchronous & Asynchronous).

Unit-IV Memory Unit: basic concepts, semiconductor RAM memories, internal organization, static & dynamic RAMs, ROMs. speed, size & cost considerations.

Unit-V Cache memories: performance considerations. Virtual memories, address translation. Multiprocessor: The Use of Multiprocessors, Symmetric Multiprocessor and Clusters.

Unit-VI Arithmetic; number representation. Design of fast adders, signed addition and subtraction. Multiplication of positive numbers, sequential multiplication, fast multiplication, Booths' algorithm for multiplication, integer division, restoring and non-restoring division.

Text-Books:

1. "Computer Organization" 5th Edition by V.Carl Hamacher & S.Zaky, McGraw-Hill (ISE).
2. "Computer Organization and Architecture: Designing for Performance", 10th Edition by William Stallings, Pearson Education.

References:

1. "Computer Organization and Design: The Hardware/Software Interface", 5th Edition by David A. Patterson and John L. Hennessy, Elsevier.
2. "Computer Architecture and Organization", 3rd Edition by John P. Hayes, WCB/McGraw-Hill.
3. Design and Architecture", 2nd Edition by Vincent P. Heuring and Harry F. Jordan, Pearson Education.
4. "Structured Computer Organization", 5th Edition by Tenanbaum A.S., Pearson Education.

4IT02 DATA COMMUNICATION & NETWORKING

Course Objectives :

- To understand the fundamental concepts of computer networking.
- To familiarize the students with basic taxonomy and terminology of data communication.
- To introduce the students to advanced networking concept and network reference models.
- To lay foundation for understanding the students to network design, simulation, modeling and analysis.

Course Outcomes :

- On completion of the course learner will be able to-
- Understand the principles and fundamental concept of computer networks.
- Understand and explain data communication system with its techniques and applications.
- Identify various error detection and correction techniques in data transmission.
- Evaluating the network addresses and learning routing mechanism protocols.
- Design TCP connection and analyze upper OSI layer functions and services.
- Explore the network design and its applications to digital world.

UNIT-I: Introduction (Hours: 06)

Types of Network; Network Topologies; OSI Vs TCP\IP Model; Network Devices: Bridge, Switch, Router; Transmission Medium: Guided media, Unguided media; Time and Frequency Domain, Types of Signals: Analog, Digital, Composite, Periodic, Aperiodic Signal.

UNIT-II: Data Encoding and Multiplexing (Hours: 06)

Data conversions: Digital-to-Digital, Analog-to-Digital, Digital-to-Analog; Configuring DTE-DCE Interface, Manchester and Differential Manchester encoding; Shannon Capacity; Multiplexing: FDM, WDM, TDM; Multiplexing Application: Mobile Telephone System.

UNIT-III: Data Link Layer (Hours: 06)

Design Issues: Services to Network Layer, Framing, Flow control; Error Control: Parity Bits, Hamming Code, Cyclic Redundancy Check (CRC); Data Link Protocols: Synchronous and Asynchronous Protocols, CSMA/CD, WAN Connectivity Protocols: PPP and HDLC.

UNIT-IV: Addressing and Routing (Hours: 06)

Switching Techniques, IPv4 Addressing Scheme, IPv6 addressing Overview, Subnetting, Evaluating Network Address by router, Routing Protocols: Distance Vector, Link State; Ethernet Networks: Token Ring, FDDI.

UNIT-V: Networking and Services (Hours: 06)

Transport Layer Services, TCP/UDP Protocols, TCP Segment, TCP Connection, Upper OSI Layers: Session Layer, Presentation Layer, Application Layer functions and services.

UNIT-VI: Network Design and Applications (Hours: 06)

Network Layout, Network Design Metrics, Network design traceability, WWW, DNS, Voice over IP; Introduction and Comparison of mobile network system and its applications: 2G, 3G, 4G.

Text Books:

1. Fourauzan B., "Data Communications and Networking", 5th Edition, Tata McGraw-Hill, Publications.
2. Andrew S. Tenenbaum, “Computer Networks”, PHI, ISBN 81-203-2175-8.

Reference Books:

1. William Stallings, “Data & Computer Communications”, (6/e) Pearson Education.
2. Wehrle, Klaus, Gunes, Mesut, Gross, James, "Modeling and Tools for Network Simulation", Springer, ISBN: 978-3-642-12330-6
3. J.Freey, “Computer Communication & Networks”, AEW Press.
4. Bhushan Trivedi, “Computer Networks” OXFORD.

4IT03 OPERATING SYSTEM

Course Objectives :

- To introduce basic concepts and different types of operating systems, concept of process and thread.
- To understand the scheduling of processes and concurrency control with synchronization
- To understand the concept deadlock and basic Memory Management
- To understand Virtual Memory management concepts.
- To understand the concept of File System management.
- To understand the concept of Disk Management, Scheduling and Protection and Security.

Course Outcomes :

- Fundamental understanding of the role of Operating Systems, concept of a process and thread.
- To apply the concept of process scheduling and concurrency control to different scenarios.
- To understand and apply the concept deadlock and basic Memory Management
- To realize virtual memory management schemes.
- To realize the concept of File system management.
- To understand and apply the concept of Disk Management, Scheduling and Protection and Security.

Unit I :

Introduction: Operating System (OS definition),OS Evolution, OS Services, Process Concept ,Process Scheduling ,Operations on Processes, Cooperating & Inter-process Communication, Threads: Multithreading Models, Threading Issues ,Java Threads. (6 Hrs)

Unit II : CPU Scheduling: Concepts, Scheduling Criteria, Scheduling Algorithms, Process Synch.: The Critical Section Problem ,Synchronization Hardware, Semaphores, Monitors. (6 Hrs)

Unit III : Deadlocks: Definition& Characterization. Deadlock Avoidance, Deadlock Detection, Recovery from Deadlock. Memory Management: Background, Swapping, Contiguous Memory Allocation schemes ,Paging, Segmentation. (6 Hrs)

Unit IV : Virtual Memory: Background, Demand Paging, Process Creation, Page Replacement policies, Allocation of Frames, Thrashing. (6 Hrs)

Unit V : File-System Interface: Directory Structure, File-System Mounting, File Sharing, Protection, File-System Structure, File-System Implementation, Directory Implementation, Allocation Methods Free-Space Management, File Recovery. (6 Hrs)

Unit VI: I/O Systems: Overview, I/O Hardware, Application I/O Interface , Kernel I/O Subsystem, Transforming I/O to Hardware Operations. Disk Scheduling ,Disk Management ,Swap-Space Management ,RAID Structure. (6 Hrs)

Text Book:
Avi Silberschatz, P.B.Galvin, G.Gagne: "Operating System Concepts" (6th Edn) John Wiley & Sons Publication.

Reference Books:

1. A.S Tanenbaum "Modern Operating Systems" Pearson Education.
2. William Stallings "Operating Systems" Prentice-Hall.
3. D M Dhamdhere "Operating Systems" Tata McGraw-Hill.

4IT04 DATA STRUCTURE

Course Objectives :

- To understand the role of Data Structure in memory management
- To acquire knowledge of different types of data structures like: array, types of array, linked list, stacks, queues, trees, and their memory representation
- To learn the fundamental concept of data structure and emphasize the importance of it in developing and implementing efficient algorithms
- To analyze complexity of algorithms in terms of time and memory space
- To Understand data structure, types of data structure and their common applications
- To study the use of algorithms to perform the operations on data structure such as traversing, insertion, deletion, searching, sorting and merging
- To understand importance and applications of linear and non-linear data structure
- To obtained knowledge and skill of Sorting Methods such as: Bubble Sort, Quick Sort, Merge Sort, Selection Sort and Bucket Sort
- To Learn and acquire knowledge about the use of Tree and Graph in applications

Course Outcomes :

- Define fundamental features of array, linked-list, stack, queue, tree and graph
- Write the algorithms to perform various operations such as: Search, Insertion, Deletion, Sort etc
- Implement algorithms for various operations on linear and non-linear data structure
- Classify the linear data structures such as Array, Linked-List, Stack, Queue and non-linear data Structures such as Tree and Graph with their applications
- Implement linear data structures: Array, Linked-list, Stack, Queue using suitable language C,C++
- Implement non-linear data structure: Tree, Graph using C or C++
- know different types of sorting methods and their algorithms
- Choose appropriate algorithm for Searching 9: Perform operations of traverse, insertion, deletion.

UNIT I :
Algorithms and Linear Data Structure: Array Introduction: Data, Data Structure and their types. Algorithm and their Complexity, String processing operations, Pattern matching algorithms: fast and slow. Array: Types of array, memory representation of array, Algorithm and operations on Array: traversing, searching, insertion, deletion. Applications (7 Hrs)

UNIT II:
Algorithms and Linear Data Structure: Linked List (LL) Linked List: Features, Representation of Linked List in memory using array, Types of LL, Algorithms and operations onto LL: traversing, insertion, deletion, searching & their implementation, Applications (5 Hrs)

UNIT III
Linear Data Structure: Stack and Queue Stack: Definition, Memory representation of Stacks using array and Linked List. Operations on to Stack: Push and Pop. Stack Applications: Recursion, Solve arithmetic expressions, tower of Hanoi etc. Queue: Definition, Memory representation of Queue using array and Linked List, Types of queue, Operations on queues: Traversing, Insertion, Deletion, Searching. Applications (6 Hrs)

UNIT IV
Sorting, Sorting Methods and its Algorithms Simple Sorting Algorithms, Bubble Sort, Quick Sort, Insertion Sort, Selection Sort, Heap Sort, Merge Sort, Bucket Sort and their Applications. (6 Hrs)

UNIT V :
Non-Linear Data Structure: Tree Trees: Terminology, Types, Binary trees and their representation in memory, traversing in binary trees using stacks. Binary Search Trees, searching, inserting and deleting nodes in binary trees, Heap tree, Path length & Huffman's algorithm, Spanning Trees, Basic concepts of Kruskal's and Prim's Algorithm, B+ tree. (6 Hrs)

UNIT VI :
Non-Linear Data Structure: Graph Graph: Definitions, Sequential and Linked-list representation of Graphs, Warshalls' algorithm, Bridges in graph, Johnsons algorithm. Graph Traversals: Breadth First Search, Depth First Search, Topological Sort, Shortest Path Algorithms: Unweighted Shortest Paths, Basic concepts of Dijkstra's Algorithm. (6 Hrs)

Text Books:

1. Mark Allen Weiss, 'Data Structures and Algorithm Analysis in C++', 3/e, Florida International University, ISBN 0-321-37531-9
2. Seymour Lipschutz, 'Theory & Problems of Data Structures', Schaum's Outline Series (Mc Graw-Hill) International Editions.

Reference Books:

1. John Hubbard: 'Schaum's Outline DataStructure with C++', ISBN-13: 978-0071353458
2. Jean-Paul Tremblay, Paul G. Sorenson, P. G. Sorenson, 'An Introduction to Data Structures With Applications', (McGraw-Hill Computer Science Series), ISBN-13: 978-0070651579
3. Ellis Horowitz, Sartaj Sahni, Rajasekaran , 'Computer Algorithms/C++', 2nd edition, 2019.

4 IT 05 SOCIAL SCIENCES & ENGINEERING ECONOMICS

SECTION - A

Unit I : Study of Social Science : Importance to Engineer, salient features of Indian constitution. Fundamental Rights and Duties. Directive Principles of State Policy. (8)

Unit II : Indian Parliament : Composition and powers, President of India : Election and Powers. Council of Ministers and Prime Minister (8)

Unit III : Impact of Science and Technology on culture and Civilization. Human Society: Community Groups. Marriage and Family: Functions, Types and problems. (8)

SECTION - B

Unit IV: Production : Factors of production, Laws of return, Forms of Business Organisation. (8)

Unit V : Banking : Functions of Central and Commercial Banks. Introduction to GST, Market : Forms, perfect, imperfect competition and monopoly. (8)

Unit VI: Nature and scope of Economics : Special significance of Economics to Engineers. Economics of Development : Meaning, Characteristics of under development, obstacles to Economic growth and vicious circle of poverty. (8)

Books Recommended :

1. Pylee M.V. : Constitutional Govt. in India, S.Chand and Co.
2. C N Shankar Rao: Sociology, S.Chand and Co.
3. Dewett and Varma J.D. : Elementary Economic Theory, S.Chand and Co.
4. A.N.Agrawal : Indian Economy, Problem of Development and Planning (Wiley Eastern Ltd), New Delhi.
5. S.K.Mishra : Indian Economy, Its Development Experience. Himalaya Pub.House, Bombay.
6. E.Kuper : Economics of W.R. Development, McGraw Hill Co.,
7. Brij Kishore Sharma. : The Constitution of India, PHI.
8. Mahajan : The Constitution of India, S.Chand, New Delhi.
9. Maclaver and Page : Principle of Sociology.
10. Davis K. : Human Society
11. Datt R.K. : Indian Economy, S.Chand and Comp. New Delhi P.M.Sundharam
12. Dhingra I.C. : Indian Economy
13. Jemes L.E., R.R.Lee : Economics of W.R.Planning, McGraw Hill Co.

4IT06 DATA COMMUNICATION & NETWORKING - LAB

Practical based on the syllabus of Data Communication & Networking (4IT02)

Following list is an indicative list and the subject teacher is free to design his/her own list of experiments based on the syllabus of Data Communication & Networking Lab (4IT02)

1. To study computer Networks and Its topology.
2. To study and implement digital –to- digital conversion, analog-to-digital conversion, digital to analog conversion
3. To implement and check flow control in DLL
4. To Study and Implement Asynchronous Protocols
5. To Study and Implement synchronous Protocols
6. To implement packet switching in network
7. To implement Circuit switching in network
8. To Demonstrate and study working of various networking devices like switch,router etc

Students are advised to explore the Virtual Labs Developed by Ministry of Human Resource Development Government of India available at http://www.vlab.co.in/broad-area-computer-science-and-engineering

IT07 OPERATING SYSTEM - LAB

Practical based on the syllabus of Operating System (4IT03)

Following list is an indicative list and the subject teacher is free to design his/her own list of experiments based on the syllabus of Operating System (4IT03)

Students are advised to explore the Virtual Labs Developed by Ministry of Human Resource Development Government of India available at http://www.vlab.co.in/broad-area-computer-science-and-engineering

1. To study basics of shell programming.
2. To study the creation of process using fork system call.
3. To implement FCFS scheduling algorithm.
4. To implement SJF scheduling algorithm.
5. To implement Priority scheduling algorithm.
6. To implement Round Robin scheduling algorithm.
7. To implement Best Fit algorithm of memory management.
8. To implement First Fit algorithm of memory management.
9. To implement FCFS disk scheduling algorithm.
10. To implement SCAN disk scheduling algorithm.
11. To implement the process synchronization using semaphore concept.

4IT08 DATA STRUCTURE - LAB

Practical based on the syllabus of Data Structure (4IT04)

Following list is an indicative list and the subject teacher is free to design his/her own list of experiments based on the syllabus of Data Structure (4IT04)

Students are advised to explore the Virtual Labs Developed by Ministry of Human Resource Development Government of India available at http://www.vlab.co.in/broad-area-computer-science-and-engineering

1. Program to implement Bubble Sort.
2. Program to implement Linear Search & Binary Search
3. Program to perform various operations on Linked List.
4. Program to perform various operations on Stack.
5. Program to reverse the elements in the stack using recursion.
6. Program to perform various operations on Queue.
7. Program to convert a given infix expression into its postfix Equivalent.
8. Program to create a binary search tree of characters.
9. Programs for implementing the following sorting methods to arrange a list of integers in ascending order:
    a. Insertion Sort
    b. Selection Sort
10. Program to implement graph traversal algorithms:
    a) Depth first traversal b) Breadth first traversal

4IT09 COMPUTER SKILL LAB - II

The following list is an indicative list and the subject teacher is free to design his/her own list of experiments based on Raspberry Pi with Adrino etc.

1 Familiarization with Raspberry Pi and perform necessary software installation.
2 To interface LED with Raspberry Pi and write a program to turn ON LED for 1 sec after every 2 seconds.
3 To interface Push button/Digital sensor (IR/LDR) with Raspberry Pi and write a program to turn ON LED when push button is pressed or at sensor detection.
4 To interface DHT11 sensor with Raspberry Pi and write a program to print temperature and humidity readings.
5 To interface OLED with Raspberry Pi and write a program to print temperature and humidity readings on it.
6 To interface Bluetooth with Raspberry Pi and write a program to send sensor data to smartphone using Bluetooth.
7 To interface Bluetooth with Raspberry Pi and write a program to turn LED ON/OFF when '1'/'0' is received from smartphone using Bluetooth.
8 Write a program on Raspberry Pi to upload temperature and humidity data to thingspeak cloud.
9 Write a program on Raspberry Pi to retrieve temperature and humidity data from thingspeak cloud.
10 To install MariaDB database on Raspberry Pi and perform basic SQL queries.
11 Connect to MariaDB through Python 3 program
12 Explore Scientific Python 3 ecosystem and perform image processing with NumPy and Matplotlib

Students are advised to explore the Virtual Labs Developed by Ministry of Human Resource Development Government of India available at http://www.vlab.co.in/broad-area-computer-science-and-engineering

REFERENCE BOOKS:

1) "Raspberry Pi by Example"by Ashwin Pajankar: PACKT PUBLICATIONS
2) "Raspberry Pi Amazing Projects " by Ashwin Pajankar: PACKT PUBLICATIONS
3) "20 Easy Raspberry Pi Projects: Toys, Tools, Gadgets, and More!" By : Rui Santos , Sara Santos No Starch Press
4) " IoT Fundamental" by Devid Hanes Publishers: CISCO
5) "Raspberry Pi Cookbook for Python Programmers" by Tim Cox Publishers: PACKT

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