TEC 312
Digital Electronics

Unit-I
Review of number systems: Binary, Octal, Hexadecimal, Complements, Signed binary numbers, arithmetic operation, Binary codes. Error detection and correction.

Unit-II
Boolean algebra and gate level minimization: Basic definition, Boolean logic, postulates, theorems and properties. Digital Logic gates, K-Map method for minimization upto six variables, Quine-Mcclusky method for minimization, NAND and NOR implementation.

Unit-III

Unit-IV

Unit-V

References:
2. Malvino Leach, Saha,'Digital Principles and applications’, TMH
7. Taum & Shcilings, Digital Electronics, TMH
8. TTL handbook.
UNIT - I

UNIT - II
QUEUES: Array and linked representation and implementation of queues, Operations on Queue: Create, Add, Delete, Full and Empty. Circular queue, Dequeue, and Priority Queue.
LINKED LIST: Representation and Implementation of Singly Linked Lists, Two-way Header List, Traversing and Searching of Linked List, Overflow and Underflow, Insertion and deletion to/from Linked Lists, Insertion and deletion Algorithms, Doubly linked list, Linked List in Array, Polynomial representation and addition, Generalized linked list.

UNIT - III
SEARCHING AND HASHING: Sequential search, binary search, comparison and analysis, Hash Table, Hash Functions, Collision Resolution Strategies, Hash Table Implementation.

UNIT - IV
SORTING: Insertion Sort, Bubble Sorting, Quick Sort, Two Way Merge Sort, Heap Sort, Sorting on Different Keys, Practical consideration for Internal Sorting.
BINARY SEARCH TREES: Binary Search Tree (BST), Insertion and Deletion in BST, Complexity of Search Algorithm, Path Length, AVL Trees.

UNIT - V
FILE STRUCTURES: Physical Storage Media File Organization, Organization of records into Blocks, Sequential Files, Indexing and Hashing, Primary indices, Secondary indices, B+ Tree index Files, B Tree index Files, Indexing and Hashing Comparisons, Graph, Traversal(DFS,BFS), Minimum spanning tree.

References:
UNIT-I
FLOATING POINT ARITHMETIC: Representation of floating point numbers, Operations, Normalization, Pitfalls of floating point representation, Errors in numerical computation

UNIT-II
SIMULTANEOUS LINEAR EQUATIONS: Solutions of system of Linear equations, Gauss Elimination direct method and pivoting, Ill Conditioned system of equations, Refinement of solution. Gauss Seidal iterative method, Rate of Convergence.
INTERPOLATION AND APPROXIMATION: Finite Differences, Difference tables Polynomial Interpolation: Newton’s forward and backward formula Central Difference Formulæ: Gauss forward and backward formula, Stirling’s, Bessel’s, Everett’s formula. Interpolation with unequal intervals: LANGRANGE’S INTERPOLATION, NEWTON DIVIDED DIFFERENCE FORMULA, Approximation of function by Taylor’s series.

UNIT-III

UNIT-V
CURVE FITTING, CUBIC SPLINE AND APPROXIMATION: Method of least squares, fitting of straight lines, polynomials, exponential curves etc Cubic Spline Approximation.
REGRESSION ANALYSIS: Linear and Non-linear regression, multiple regression.

UNIT-V
TIME SERIES AND FORECASTING: Moving averages, smoothening of curves, forecasting models and methods. Statistical Quality Controls methods

Text Book:

References:
UNIT-I

UNIT-II

UNIT-IV
MICRO PROGRAMMED CONTROL: Control memory, Address sequencing, microprogram example, design of control unit Hard wired control. Microprogrammed control.

THE MEMORY SYSTEM: Basic concepts semiconductor RAM memories. Read-only memories Cache memories performance considerations, Virtual memories secondary storage. Introduction to RAID.


UNIT-V
PIPELINE AND VECTOR PROCESSING: Parallel Processing, Pipelining, Arithmetic Pipeline, Instruction Pipeline, RISC Pipeline Vector Processing, Array Processors.

Text Books:

References:
UNIT-I
PRINCIPLES OF OBJECT-ORIENTED PROGRAMMING:-Object-Oriented Programming Paradigm, Basic Concepts of Object-Oriented Programming, Benefits of OOPs, Object-Oriented Languages, Applications of OOP, C++ Statements, Class, Structure of C++ Program, structure versus objects oriented. Tokens, expressions and control structures:-Introduction, Tokens, Keywords, Identifiers Basic Data types, User Defined Data Types, Derived Data Types, Symbolic Constants, Type Compatibility, Declaration of Variables, Dynamic Initialization of Variables, Reference Variables, Operators in C++, Scope Resolution Operator, Member Dereferencing Operators, Manipulators, Type Cast Operator, Expressions and Implicit Conversions, Operator Precedence, Control Structures.

UNIT-II
CLASSES AND OBJECTS:-Specifying a Class, Defining Member Functions, Making an Outside Function Inline, Nesting of Member Functions, Private Member Function, Arrays within a Class, Memory Allocation for Objects, Static Data Member, Static Member Functions, Arrays of Objects, Object as Function Arguments. Constructors and destructors:-Introduction, Constructors, Parameterized Constructors, Multiple Constructors with Default Arguments, Dynamic Initialization of Objects, Copy Constructors, Dynamic Constructors, Destructor.

UNIT-III

UNIT - IV

UNIT-V
Managing Console & I/O operations and stream computations, working with files, Generic programming with templates, Exception Handling & manipulating strings.

Text Book:

Reference:
1. Write a program to add of two polynomials of degree n, using linked list
   
   For example  \( p1 = a_n x^n + a_{n-1} x^{n-1} + a_{n-2} x^{n-2} + \ldots \ldots + a_0 x^0 \)
   
   \( p2 = b_n x^n + b_{n-1} x^{n-1} + b_{n-2} x^{n-2} + \ldots \ldots + b_0 x^0 \)
   
   \( p1 = \text{first polynomial}, p2 = \text{second polynomial}, \) Find out \( p3 = p1 + p2 \)

2. W.A.P. for Conversion of infix expression to postfix expression using stack

3. W.A.P. to evaluate any given postfix expression. For example \((3,4,5,*,+)\) : Answer = 23

4. Write a program to sort an array using Quick sort technique.

5. Write a program to sort an array using Bubble sort

6. Write a program to sort an array using Insertion sort

7. Write a program to sort an array using Merge sort technique Write a program to sort an array using Selection sort technique.

8. W.A.P to implement doubly circular link list and perform following operations.
   
   i) Inserting an element.
      
      A) Beginning
      B) At a particular location
      C) In the last.
   
   ii) Deletion of an item.
      
      A) Beginning
      B) At a particular location
      C) In the last.
   
   iii) Displaying the element.

   iv) Exit
CBNST LAB(PIT303)
LIST OF SAMPLE PROGRAMS

1) Define error in terms of computer and explain different types of error with example.
2) Write a Program in C to find the absolute errors, relative errors and error in percentage.
3) Write a Program in C to round-off the number 3.1418235416 after truncating to 3 places.

Practical to find the Root of transcendental Equation:

4) Write a Program in C to find the root of equation $Ax^2 + Bx + c=0$ (Sridharacharya).
5) Write a Program in C to find the root of an equation using Bisection method.
6) Write a Program in C to find the root of an equation using Regular falsi method.
7) Write a Program in C to find the root of an equation using Newton Raphson method.
8) Write a Program in C to find the root of an equation using fixed point iteration method.
1. Practicals based on implementation of classes & objects, array of objects, I/O manipulators etc.
2. Practicals based on implementation of object passed as an argument to function & the function returning object.
3. Practicals based on implementation of constructor, overloading constructors including default constructor, parametric constructor & copy constructor & destructor.
4. Practicals based on implementation of function overloading.
5. Practicals based on implementation of this pointer.
6. Practicals based on implementation of operator overloading using member function.
7. Practicals based on implementation of operator overloading using friend function.
8. Practicals based on implementation of various types of inheritance.