1/3 MCA First Semester

CA1T3 PROGRAMMING IN C & DATA STRUCTURES Credits : 4

Lecture Hours : 4 periods / week Internal assessment : 30 Marks

Semester and Examination: 70 Marks

Course Description:

C with Data Structures is one of the leading languages frequently used. It generally supports both system software and application software. Here Students are able to learn how arrays, pointers, structures and Different types of ADTs are used in different applications.

Course Objectives:

- Get a solid understanding of C functions
- Learn to create and use Structures and Unions
- Become familiar with the basic concepts of Pointers
- Understand of Sorting and Searching Techniques
- Become familiar with Data Structures like Stacks, Queues, Linked List & Tress
- Understanding and Usage of the Data Structures in various applications

UNIT-I:

Introduction & Control Statements: History of C – Structured Programming Language – The C Character Set – Identifiers – Keywords – Data Types & its sizes – Access Modifiers - Escape Sequences – DataType Conversions – Operators – Statements – Library Functions – Header Files – The main() function – Conditional Statements: Loop and Non Loop Statements – Unconditional Statements: break, continue.

UNIT-II:

Arrays – Types of Arrays– Declaring Arrays – Initializing Arrays – Accessing Array Elements – Strings – String Library Functions – Functions – Function Prototyping – return statement – nested functions – Function arguments – Actual Vs Formal Parameters – Recursion.

UNIT-III:

Pointers – Pointer Variables – Initialization of Pointers – Pointer Arithmetic

– Pointers and Arrays – Pointers, Concepts in Functions – Call by value – Call by reference –Pointers to Pointers – Arrays as Function Arguments - Multiple Indirection.

UNIT-IV:

Structures – Declaration – Definition – Initialization – Array of Structures

– Pointers to Structures – Nested Structures – Unions – Declaration – Definition – Initialization, Applications.

UNIT-V:

Introduction to ADTs & Sortings: Abstract Data Types, Sorting Techniques: Bubble Sort, Insertion Sort, Shell Sort, Selection Sort, Quick Sort, Merge Sort, Heap Sort, Searching Techniques: Linear Search, Binary Search.

UNIT-VI:

Data Structures: Stack, Queue, Circular Queue, Applications, Expression Evaluation – Infix to Prefix, Postfix and vice-versa.

UNIT-VII:

List: Linked List, Circular List, Multi List Operations, Applications.

UNIT VIII:

Trees: Introduction, Binary Trees, Binary tree representations, Binary Tree Traversals, Applications of Trees, Binary Search Trees.

Learning Resources :

Text Books:

1. Computer Programming and Data Structures, Pradip Dey, Manas Ghosh, Oxford Higher Education,2/e, 2011.
2. Data Structures, Algorithms and Applications in C/C++, S. Sahani, University Press (India), Orient Longmann Pvt. Ltd, 2/e, 2005

Reference Books:

1. Programming in C, Stephen G. Kochan, Pearson Education, 3/e, 2007.
2. C Programming with Problem Solving, J. A. Jones and K. Harrow, DreamTech Press, 5/e, 2009.
3. Data Structures and Algorithm Analysis in C/C++, Mark Allen Weiss, Pearson Education, 2/e, 1997.
4. Data Structures and Program Design in C, R. Kruse, C. L. Tondo, BP Leung, Shashi M, Pearson Education, 2/e, 2006.