GUJARAT TECHNOLOGICAL UNIVERSITY

Master of Science (Integrated-Information Technology)

Semester: II

Subject Name: Data structure

Subject Code: 1320503

Teaching and Examination Scheme:

Teaching Scheme			Credits	Examination Marks				Total Marks
L	T	P	C	Theory Marks		Practical Marks		
				ESE(E)	PA (M)	PA (V)	PA (I)	
3	0	2	4	70	30	30	20	150

Content:

Sr. No.	Content	Teaching Hours	Module Weightage (%)
1.	Introduction to Data Structure Data Structure Basic Concepts ,Types of data structures ,Primitive and non-primitive data structures ,Introduction to Algorithms Key features of an algorithm , Analysis Terms , Array ,Overview of various array operations, Searching an element into an array – i. Linear Search ii. Binary Search	**04**	**10%**
2.	Strings String representation : Reading and Writing Strings , String operations : Finding length of a string, ,Converting Characters of a string into upper case and lower case, Concatenation of two strings to form a new string, Appending, Reversing a string, Copying a string, Comparing strings, Insertion, Substring, Deletion	**04**	**10%**
3.	Stack & Queue Linear and Non-Linear Data Structures, Stack : Array representation of Stack, PUSH POP Operations on Stack, Implementation of Stack, Application of Stack, Infix, Prefix and Postfix Forms of Expressions, Recursive Functions (factorial, greatest common divisor, Fibonacci series), Queue: Array representation of Queue, Operations on Queue, Implementation of Queue, Limitation of Single Queue, Concepts of Circular Queue Application of queue , Difference circular queue and simple queue	**08**	**18%**
4.	Linked List Pointers Revision , Revision of Structure , Revision of structure using pointers, Dynamic Memory Allocation, Linked list Presentation , Types of Linked List , Basic operations on singly linked list : Insertion of a new node in the beginning of the list, at the end of the list, after a given node, before a given node, in sorted linked list Deleting the first and last node from a linked list, Searching a node in Linked List, Count the number of nodes in	**11**	**23%**

	linked list, Concepts of circular linked list , Difference between circular linked list and singly linked list , Basic operations on Doubly linked list : Insertion of a new node in the beginning of the list, at the end of the list, after a given node, before a given node.		
5.	Sorting & searching techniques, Sorting Methods a. Bubble Sort, b. Selection Sort, c. Quick Sort, d. Insertion Sort, e. Merge Sort, f. Radix Sort , Hashing Concepts CONTINUE… , Hash functions : Division Method, Middle Square Method, Folding Method ′ Collision in Hashing , Collision resolution techniques: Linear Probing	**09**	**20%**
6.	Trees Non-linear data structures, Binary trees : Complete Binary Tree, Basic Terms: level number, degree, in-degree and out-degree, leaf node, directed edge, path, depth, similar binary trees, copies of binary trees, General Tree, Conversion of General Tree to Binary Tree, Forest. Binary Search Tree : Insertion of a node in binary tree, Deletion of a node in binary tree, Searching a node in binary tree , Tree Traversal : Inorder, Preorder, Postorder, Applications of binary tree	**09**	**20%**

Reference Books:

1 Data and File Structures using C Thareja,Reema Oxford University Press New Delhi 2011
2 Data Structures using C ISRD Group McGraw Hill, New Delhi, 2013
3 Data Structures Chitra, A Rajan, P T Tata McGraw Hill, New delhi, 2009 4 Classic DataStructures Samanta, D. PHI Learning, New Delhi

Course Outcome:

1 Understand the concept of Dynamic memory management, data types, algorithms, Big O notation.
2 Understand basic data structures such as arrays, linked lists, stacks and queues.
3 Describe the hash function and concepts of collision and its resolution methods
4 Solve problem involving graphs, trees and heaps
5 Apply Algorithm for solving problems like sorting, searching, insertion and deletion of data