SCHEME OF COURSE WORK

Department of Information Technology

Course Details:

COURSE TITLE	DATA STRUCTURES		
COURSE CODE	13CT1106	L T P C	4 0 0 3
PROGRAM	B.TECH		
SPECIALIZATION	CSE, IT		
SEMESTER	III		
PRE REQUISITES	COMPUTER PROGRAMMING THROUGH C		
COURSES TO WHICH IT IS A PRE REQUISITE	N/A		

Course Outcomes (COs):

1	Analyse complexity of algorithms
2	Apply concepts of linked lists, stacks and queues
3	Develop programs for searching and sorting
4	Develop programs using concepts of trees
5	Apply concepts of graphs

Course Outcome versus Program Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	S	M	S	S	S							M
CO2	S	M	S	S	S							M
CO3	S	M	S	S	S							M
CO4	S	M	S	S	S							M
CO5	S	M	S	S	S							M

S - Strongly correlated, *M - Moderately* correlated, *Blank - No correlation*

Assessment Methods	Assignment / Quiz / Mid-Test

Teaching- Learning & Evaluation

Week	Topic/ Contents	Course Outcomes	Sample questions	Teaching learning strategy	Assessment method & schedule
1	Analysis of Algorithms: Apriori analysis, Asymptotic Notations, Time complexity of algorithm using O notation.	CO1	1.Write in brief various Asymptotic notations.	Lecture	Assignment-1, Test- 1 Quiz-1
2	Polynomial Vs exponential algorithms, Examples, Best and worst case complexities, Analyzing recursive programs, Examples	CO1	1.Analyse the Best, Average and Worst case complexities for the following: Quick sort, Merge sort.	Lecture	Assignment-1, Test- 1 Quiz-1
3	Stacks: Introduction, Stack Operations, Applications of stacks, Examples	CO2	1. Suppose a Stack implementation supports, in addition to PUSH and POP, an operation REVERSE, which reverses the order of the elements on the stack. To implement a queue using the above stack implementation, show how to implement ENQUEUE (insertion) using a single operation and DEQUEUE (deletion) using a sequence of 3 operations. Write functions for ENQUEUE and DEQUEUE.	Lecture Programming	Assignment-1, Test- 1 Quiz-1
4	Queues: Introduction, Operations on queues, Circular Queues, Other types of queues, Applications of queues	CO2	1.Explain the operation of DEQUEUE with suitable example.	Lecture Programming	Assignment-1, Test- 1 Quiz-1
5	LINKED LISTS: Introduction, Singly linked lists, circularly linked lists, doubly linked lists,	CO2	1.Perform insertion and deletion operations on doubly linked lists.	Lecture Programming	Assignment-1, Test- 1 Quiz-1
6	Multiple linked lists, applications. LINKED STACKS AND LINKED QUEUES: Introduction,	CO2	1. Implement stacks using linked list in C and explain with suitable example.	Lecture Programming	Assignment-1, Test- 1 Quiz-1
7	Operations on linked stacks and linked queue Dynamic memory	CO2	1.Write a procedure to insert an element into stack using linked list.	Lecture Programming	Assignment-1, Test- 1 Quiz-1

			2. Differentiate malloc() and calloc() functions.		
8	Implementation of linked representations, applications SEARCHING: Introduction, linear search, transpose sequential search	CO2, CO3	1.Write a recursive procedure to implement binary search.	Lecture Programming	Assignment-1, Test- 1 Quiz-1
9	Test-1				
10	Interpolation search, binary search, Fibonacci search. INTERNAL SORTING: Introduction, bubble sort, insertion sort,	CO3	1.With a suitable example, explain Fibonacci search. 2.Explain the procedure for sorting a list using Bubble sort	Lecture Programming	Assignment-2, Test- 2 Quiz-2
11	Selection sort, merge sort, quick sort TREES AND BINARY TREES: Introduction, Trees: definition and basic terminologies, representation of trees	CO3, CO4	1.Explain selection sort with suitable example and discuss the time and space complexity for selection sort. 2.Explain about binary tree traversals.	Lecture Programming	Assignment-2, Test- 2 Quiz-2
12	Binary trees: basic terminologies and types, representation of binary trees, binary tree traversals	CO4	1.Write a routine to list out the nodes of a binary tree in level order. List the root, then nodes at depth 1, followed by nodes at depth 2, and so on. You must do this in linear time.	Lecture Programming	Assignment-2, Test- 2 Quiz-2
13	Threaded binary trees, Applications. BINARY SEARCH TREES AND AVL TREES: Introduction, binary search trees: definition and operation, Example programs	CO4	1. Explain Binary Search trees, write the algorithms and C++ implementation for insertion, deletion, and search operations.	Lecture Programming	Assignment-2, Test- 2 Quiz-2
14	AVL Trees: definition and operations, applications, Example programs	CO4	1. Show the result of inserting elements 2,1,4,5,9,3,6 and 7 into an initially empty AVL-tree.	Lecture Programming	Assignment-2, Test- 2 Quiz-2

15	GRAPHS: Introduction, definitions and basic terminologies	CO5	1.Explain different graph representations with neat diagrams.	Lecture Programming	Assignment-2, Test- 2 Quiz-2
16	Representations of graphs, Depth first traversal, Example. Breadth first traversal, Example	CO5	1.Define an algorithm for DFS and verify with an example	Lecture Programming	Assignment-2, Test- 2 Quiz-2
17	Prims Algorithm, Krushkals Algorithm, Shortest Path Algorithm(Dijkstra's)	CO5	1.Explain Krushkals algorithm with suitable example and write the C++ functions to implement Krushkals algorithm.	Lecture Programming	Assignment-2, Test- 2 Quiz-2
18	Test-2				