PVP 20

Code: 20ES1305

II B.Tech - I Semester – Regular/Supplementary Examinations
DECEMBER 2023

DATA STRUCTURES
(Common for CSE, IT)

Duration: 3 hours Max. Marks: 70

Note: 1. This paper contains questions from 5 units of Syllabus. Each unit carries 14 marks and have an internal choice of Questions.
2. All parts of Question must be answered in one place.

BL – Blooms Level CO – Course Outcome

			BL	CO	Max. Marks
		UNIT-I			
1	a)	Show the outcome of different passes for sorting the following sequence of data using Quicksort algorithm. 8, 11, 3, 15, 6, 9, 12, 39 Assume the first element of the list as pivot.	L3	CO2	7 M
	b)	Compare Big-oh (O), Big-Omega (Ω) and Theta (Ɵ) notations and illustrate with an example.	L2	CO1	7 M
		OR			
2	a)	Write a recursive algorithm to compute n^{th} Fibonacci number for a given n. Write recurrence relation for this algorithm and also compute running time of the same.	L2	CO1	7 M

	b)	Find Big-oh (O) representation of given function f(n) = $n^3 2^n + 6n^2 3^n$. Justify your answer.	L2	CO1	7 M
UNIT-II					
3	a)	Write an algorithm or pseudo code to count the total number of nodes in a Singly Linked List.	L3	CO4	7 M
	b)	Write an algorithm to insert and delete an element in a Circular Doubly linked list representation at a position 'X' from the head node.	L4	CO4	7 M
OR					
4	a)	Write algorithms to perform the following operations on a doubly linked list. i) Insert a node with data 'y' after a node whose data is 'x'. ii) Delete a node whose data is 's' .	L3	CO3	7 M
	b)	Consider two singly linked lists L1 and L2 of sizes m and n respectively. Let X and Y are two nodes in the list L1. Write an algorithm to remove the nodes X and Y from the List L1 and insert the node X before the first node in L2 and insert Y node after the last node in L2.	L3	CO4	7 M

UNIT-III					
5	a)	Illustrate the step by step procedure to convert the given Infix expression into Postfix expression Infix Expression: ((A-(B+C))*D) $ (E+F) Here $ is used to represent exponential operator.	L2	CO3	7 M
	b)	Compare and contrast Queue with circular Queue. Illustrate the operations, advantages & disadvantages of Queue and Circular queue with example.	L2	CO3	7 M
OR					
6	a)	Write a procedure to implement queue using stacks i.e., implement insert and delete operation of queue using push and pop operations.	L4	CO4	7 M
	b)	Write a procedure for PUSH and POP operations of stack using singly linked list data structure.	L2	CO3	7 M
UNIT-IV					
7	a)	Write an algorithm to identify the deepest node of a given binary tree.	L3	CO3	7 M
	b)	Compare and contrast tree, binary tree and binary search tree with an example.	L3	CO3	7 M
OR					
8	a)	Write the algorithms for in-order, pre-order and post-order traversal of a binary tree. And also illustrate the same with an example	L3	CO3	7 M

	b)	Write a short note on binary tree? Construct a binary tree for a given the pre-order traversal and inorder traversals as follows: Pre-Order Traversal: G B Q A C K F P D E R H In-Order Traversal: Q B K C F A G P E D H R	L3	CO3	7 M
UNIT-V					
9	a)	Illustrate the Prim's algorithm with suitable example.	L2	CO3	7 M
	b)	Write an algorithm to find whether there exists a path of length "k" for a given two nodes in a graph G. The length of the path can be defined as the total number of edges on the corresponding path.	L4	CO4	7 M
OR					
10	a)	Outline the distinguishing features of Depth First Search (DFS) and Breath First Search (BFS) for a given Graph G. List the applications where each of it is used.	L2	CO3	7 M
	b)	Illustrate the different approaches to represent the graphs.	L2	CO3	7 M