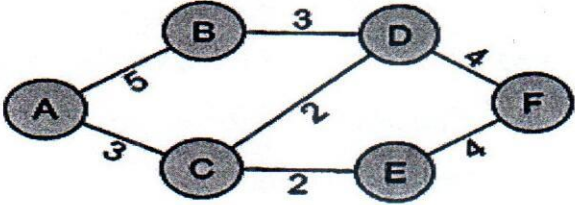


2024

DATA STRUCTURE USING C*Full Marks : 100**Time : Three hours**The figures in the margin indicate full marks for the questions.**Answer any five questions.*

1.	a)	Define the average case time complexity? Show the average case time complexity through a graph.	3+3=6
	b)	Prove that the average case time complexity of the following function $f(n)$ is of $\Theta(n^2)$ where, $f(n) = 6n^2 + 5n + 2$.	4
	c)	Define the following terms in brief:	2*5=10
	i)	In-order traversal	
	ii)	Binary search tree	
	iii)	Linear search	
	iv)	Breadth first search traversal	
	v)	Stack	
2.	a)	Why is the worst case time complexity of the selection sort algorithm for sorting an array of n elements is $O(n^2)$? Explain.	6
	b)	Write the intermediate steps using selection sort algorithm on the following data : 100 60 30 50 80 70 40 50 20	6
	c)	Perform the following operations into a circular queue of size 4. Insert: 10, 20, 30, 40, 50, delete, delete, delete, insert: 60, 70, 80, 90	8

3	<p>a) What is the minimum spanning tree? Find the minimum spanning tree for the following graph.</p> 	2+6=8
	b) Write an algorithm for binary search technique.	6
	c) Why is the worst case time complexity of binary search is $O(\log n)$?	6
4	<p>a) Write the algorithmic steps for bubble sort algorithms.</p> <p>b) Apply selection sort to the following data showing the intermediate steps only: 65 55 35 75 80 45 50 10 40</p> <p>c) Build a binary search tree from the following data: 30 70 40 25 15 75 30 35 10 20 45 Apply in-order and post order traversal to the above tree built by you.</p>	<p>6</p> <p>6</p> <p>4+2*2=8</p>
5.	<p>a) What is a B tree? Insert the following data into a Btree of order 3. 50, 60, 20, 30, 40, 70, 90, 45, 75, 55, 80, 65, 95</p> <p>b) Draw a binary tree from the following given postorder and in-order traversals: Pre Order: A, C, E, B, D, F, G, K, H, I In order: I, F, D, H, A, E, B, C, G, K</p>	<p>3+7=10</p> <p>10</p>
6.	<p>a) What is a balance factor of an AVL tree? Insert the following data into an AVL tree. 30 70 40 25 15 75 50 35 10 20 45</p> <p>b) Write an algorithm to insert an element in the last position of a singly linked list.</p> <p>c) Write an algorithm to delete an element in the first position of a singly linked list.</p>	<p>2+6=8</p> <p>6</p> <p>6</p>