Printed page: 04

Subject Code: ACSE0401

Roll No: | | | | | | | | | | | |

NOIDA INSTITUTE OF ENGINEERING AND TECHNOLOGY ,GREATER NOIDA

(An Autonomous Institute Affiliated to AKTU, Lucknow)

B.Tech(Computer Science & Engineering)

(SEM:IV SESSIONAL EXAMINATION –II)(2021-2022)

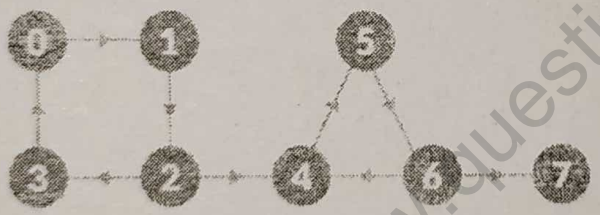
Subject Name: Design & Analysis of Algorithms

Time: 1.15Hours **Set – B** **Max. Marks:30**

General Instructions:

- All questions are compulsory. Answers should be brief and to the point.
- This Question paper consists of 04 pages & ...5.....questions.
- It comprises of three Sections, A, B, and C. You are to attempt all the sections.
- Section A -Question No- 1 is objective type questions carrying 1 mark each, Question No- 2 is very short answer type carrying 2 mark each. You are expected to answer them as directed.
- Section B - Question No-3 is Short answer type questions carrying 5 marks each. You need to attempt any two out of three questions given.
- Section C -Question No. 4 &5are Long answer type (within unit choice) questions carrying 6marks each. You need to attempt any one part a or b.
- Students are instructed to cross the blank sheets before handing over the answer sheet to the invigilator.
- No sheet should be left blank. Any written material after a blank sheet will not be evaluated/checked.

		SECTION – A	[4]	
1.	Attempt all parts		(4×1=4)	CO
	a.	Time complexity of Prim's algorithm when using Fibonacci heaps is a) O(E lg V) b)O(V + V lg E) c) O(E + V lg V) d) O(V lg E)	(1)	CO3
	b.	How many feasible solution greedy algorithms gives	(1)	CO3

		a) 1 b) 0 c) 100 d) more then 1		
	c.	Finding Strongly connected components is an important application of: a) BFS algorithm b) DFS algorithm c) Kruskal's algorithm d) Prim's algorithm	(1)	CO3
	d.	Which one is the recursive step in divide and conquer approach a) conquer b)Divide c) Combine d) None	(1)	CO3
2.	Attempt all parts		(2×2=4)	CO
	a.	Show that, with the array representation for storing an n-element heap, the leaves are the nodes indexed by $\lfloor n/2 \rfloor+1, \lfloor n/2 \rfloor+2, \ldots\ldots, n$.	(2)	CO1
	b.	Explain the concept of Strongly Connected Components. Find Strongly Connected Components in the given graph  	(2)	CO3
		SECTION – B		
3.	Answer any two of the following-		[2×5=10]	CO
	a.	Explain fractional knapsack problem. For the given items find the optimal solution: I:<I1, I2, I3, I4, I5>, W: <6, 2, 4, 3, 5>, P: <12, 10, 9, 9, 5>, capacity of knapsack = 10	(5)	CO3

	b.	Implement Merge sort algorithm also analyze it's time complexity for worst case.	(5)	CO3
	c.	Explain the Huffman code algorithm and find the Huffman code for the character of given text file Character: < a, b, c, d, e, f > Frequency: <45, 15, 20, 5, 10, 25>	(5)	CO3
		SECTION – C		
4	Answer any one of the following-(Any one can be applicative if applicable)		[2×6=12]	CO3
	a.	Write build a Min-Heap and MinHeapify procedure. Build a Min-Heap from <16, 14, 10, 9, 8, 7, 5, 3, 2, 1>. Analyze the time complexity to build Min-Heap and MinHeapify procedure.	(6)	CO3
	b.	Describe strassen's matrix multiplication and multiply following two matrices using strassen's matrix multiplication. $A = \begin{bmatrix} 1 & 3 \\ 5 & 7 \end{bmatrix} \quad B = \begin{bmatrix} 8 & 4 \\ 6 & 2 \end{bmatrix}$	(6)	CO3
5.	Answer any one of the following-			
	a.	Explain Divide-and-conquer steps of Quicksort algorithm. Implement Quicksort algorithm. Analyze it's time complexity for worst and best case.	(6)	CO3
	b.	Explain the concept of Minimum Spanning Tree. Write Kruskal's algorithm and find minimum spanning tree (MST) of following graph.	(6)	CO3