

M.Sc.(AI)I/02.22.003 Reg. No.

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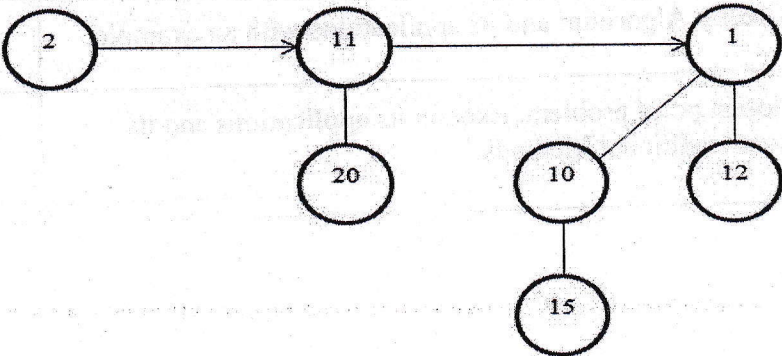
**COCHIN UNIVERSITY OF SCIENCE AND TECHNOLOGY**  
**M.Sc. COMPUTER SCIENCE WITH SPECIALISATION IN ARTIFICIAL INTELLIGENCE**  
**FIRST SEMESTER EXAMINATION, FEBRUARY 2022**  
**21-344-0103 ADVANCED DATA STRUCTURES AND ALGORITHMS**

**Time: 3 Hrs.**

**Maximum Marks: 50**

**Answer any five questions**

**Each question carries 10 Marks**

QUESTIONS			MARKS
I	a)	Write a short note on asymptotic notations and their properties?	6
	b)	What is a recurrence relation? Discuss any two methods to solve a recurrence relation. Apply the same methods for solving $T(n) = 2T(n/2)+n$ .	4
II	a)	Why LR and RL are called complex rotations, explain with an example for each?	3
	b)	Create a Red-Black tree by inserting the following sequence of numbers 8, 18, 5, 15, 17, 25, 40 and 80 with the explanation of each step.	7
III	Starting from an empty binomial min heap, perform the following operations.		4
	a)	Insert 4, 12, 8, 24, 6, 18 and 16 in this order.	
	b)	Explain various cases in union of two binomial heaps. Perform union operation on the resultant heap with the heap given below, 	6

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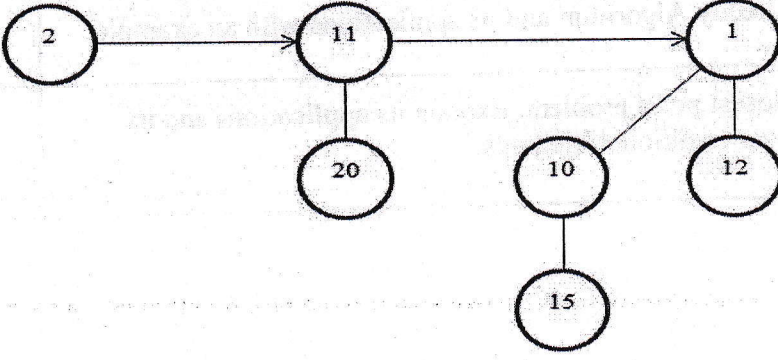
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IV	a) Describe and analyze the Edmonds Karp algorithm for finding the maximum flow in a network.	5
	b) Show the execution of Edmonds Karp algorithm on the following network from S to T. <div data-bbox="448 443 1161 922" data-label="Diagram"> <pre> graph LR     S((S)) -- 7 --&gt; X((X))     S -- 4 --&gt; W((W))     S -- 10 --&gt; Z((Z))     X -- 2 --&gt; W     X -- 10 --&gt; Y((Y))     X -- 2 --&gt; Z     W -- 2 --&gt; Y     W -- 10 --&gt; T((T))     Y -- 7 --&gt; T     Z -- 6 --&gt; T           </pre> </div>	5
V	a) Write a short note on line segment properties.	3
	b) State maximum bipartite matching problem and its applications. Explain how Ford Fulkerson method can be applied to find the maximum bipartite matching, along with an example.	7
VI	a) Explain the various Algorithm Design Techniques.	5
	b) Explain Huffman Coding with an Example.	5
VII	a) Explain Greedy Algorithm and its applications with an example.	5
	b) Define Closest point problem. Explain its applications and its benefits over traditional Methods.	5