Regulation R18 *Subject code:* **2P5ED/2P5FD**

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

(Autonomous, Accredited by NAAC with 'A+' Grade)

B.Tech V Semester Supplementary Examinations, February 2024

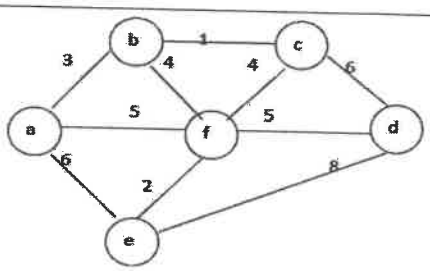
Design and Analysis of Algorithms

(Common to CSE & IT)

Maximum Marks: 70 Date: 22.02.2024 Duration: 3 hours

Note: **1. Question paper contains two parts A and B.**
2. Answer all questions in Part A, Each question carries 1 mark.
3. Answer 5 questions in Part B out of 10 questions. Each question carries 12 marks.

	Part-A		
Answer all the following questions	(10X2M=20 Marks)	CO	Bloom Tx
1	What are the characteristics of an algorithm?	CO1	L1
2	Write the Control abstraction for Divide-and conquer	CO1	L1
3	What is spanning tree?	CO2	L1
4	What is articulation point?	CO2	L1
5	What is Knapsack problem?	CO3	L1
6	Define job sequencing with dead lines problem	CO3	L1
7	What is Floyd-warshall algorithm?	CO4	L1
8	What is optimal binary search tree?	CO4	L1
9	Write the non deterministic sorting algorithm.	CO5	L1
10	Define Bounding function? Give the statement of 0/1 Knapsack FIFO BB.	CO5	L1
	Part-B		
Answer all the questions.	**(5X10M=50Marks)**		
11	Write an algorithm for merge sort using recursive method and sort the following elements? Write the recurrence relation for merge sort? Calculate the time complexity? [10M] 9, 3, 7, 5, 6, 4, 8, 2.	CO1	L3
	OR		
12	A) Define an algorithm? Explain the characteristics of an algorithm? [5M] B) Analyse the recurrence relation and tree for the following: [5M] $T(n) = \begin{cases} 1, & n = 0 \\ T(n-1) + \log n, & n > 0 \end{cases}$	CO1	L4
13	Construct connected and Bi-connected components with suitable example [10M]	CO2	L3
	OR		
14	Write an algorithm of DFS. Make use of DFS for a suitable example. [10M]	CO2	L3
15	Write an algorithm of kruskal's minimum cost spanning tree and construct minimum cost spanning tree for the graph. [10M]	CO3	L3

			
	OR		
16	Explain knapsack problem with an algorithm. Consider the following instance of knapsack problem n=7, m=15, profits $(p_1,p_2,p_3,p_4,p_5,p_6,p_7)$=(10,15,12,4,6,16,8) and weights $(w_1,w_2,w_3,w_4,w_5,w_6,w_7)$=(2,4,5,4,2,3,3). Obtain the optimal solution by applying greedy approach. [10M]	CO3	L3
17	A) Explain the methodology of Dynamic programming. List the applications of Dynamic programming. [5M] B) Explain Reliability design problem. [5M]	CO4	L4
	OR		
18	Describe the dynamic 0/1 knapsack problem. Build an optimal solution for the dynamic programming 0/1 knapsack instance for n=4, m=8, profits are(p1,p2,p3,p4)=(1,2,5,6), weights are(w1,w2,w3,w4)=(2,3,4,5). [10M]	CO4	L3
19	Construct the portion of state space tree generated by LCBB for the 0/1 knapsack instance n=5 (p1,p2,…p5)=(10,15,6,8,4), (w1,w2,w3….w5)=(4,6,3,4,2) and m=12. And also find an optimal solution of the same. [10M]	CO5	L3
	OR		
20	A) Discuss about cook's theorem. [5M] B) Differentiate between NP-hard and NP-complete. [5M]	CO5	L4