SOMAIYA VIDYAVIHAR UNIVERSITY

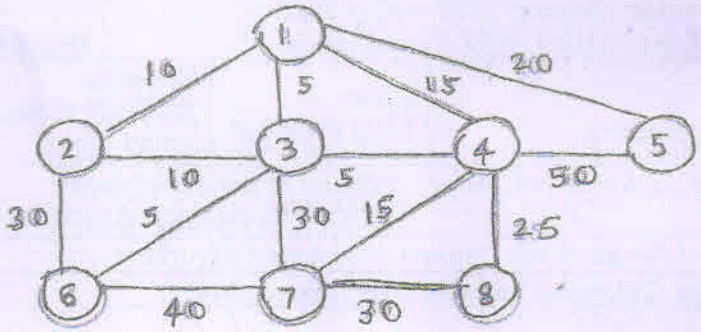
20/05/2022 (A)

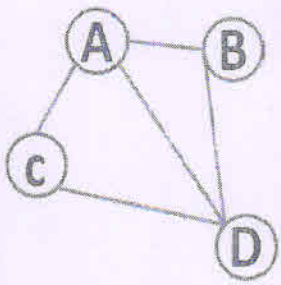
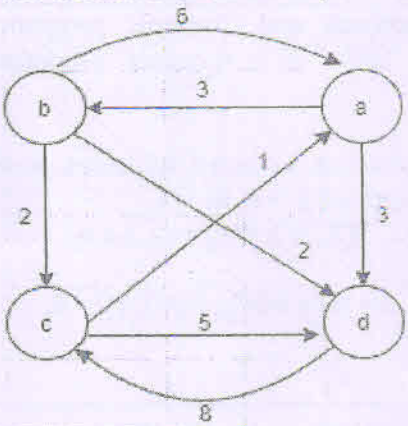
Semester: January 2022 – May 2022		
Maximum Marks: 100	**Examination: ESE Examination**	**Duration:** 3 Hrs.
Programme code: 01 **Programme:** B. Tech Computer Engineering	**Class:** ~~FY~~/SY/~~TY~~/~~LY~~	**Semester:** ~~I/II~~/III/IV/~~V/VI/VII/VIII~~ **(SVU 2020)**
Name of the Constituent College: K. J. Somaiya College of Engineering	**Name of the department:** /COMP/~~ETRX/EXTC/IT/MECH~~	
Course Code: 116U01C402	**Name of the Course:** Analysis of Algorithm	
Instructions: 1)Draw neat diagrams 2)Assume suitable data if necessary		

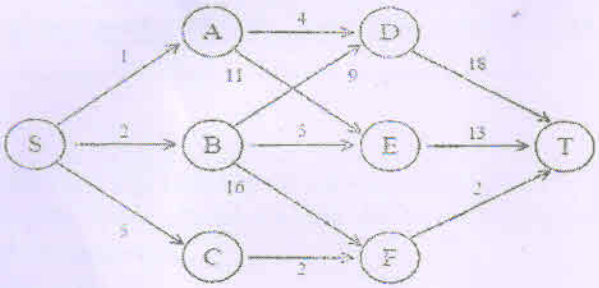
Question No.		Max. Marks

Q1 (a)	Explain the significance of Big-Oh, Big–Theta and Big-Omega notations.
	Compute Space complexity and time complexity for the following codes.
	Code segment 1:
	factorial(int n)
	{
	if (n==0 || n==1) return 1;
	else return (n*factorial(n-1));
	}
	
	Code segment 2:
	int factorial (int n)
	{ int fact=1;
	for(i=1; i<n;i++)
	fact=fact*i;
	return fact;
	}
		10 M

Q1 (b)	I. Derive Average case complexity of quick sort. II. Solve the recurrence T (n) =T (n/2) +1 using recurrence tree method.	10 M
Q2 (a)	I. Differentiate between Greedy approach and Dynamic programming strategies. Also list and explain steps in a dynamic programming solution. II. Explain Dynamic programming approach to solve knapsack problem. Find optimal solution to knapsack instance n = 4, m = 9 (P1, P2, P3,P4) = (4,5,7,10) and (W1, W2, W3,W4) = (1,3,4,6). **OR** Given a chain of four matrices A1, A2, A3, A4 with P0=5, P1=7, P2= 8, P3= 4 & P4=3 . Find m [1, 4].	10 M
Q2 (b)	Define Minimum Spanning Tree. Compute MSTs using Kruskal's and Prim's algorithm.	10 M



Q3 (a)	For the given graph, compute the minimum chromatic number to color the graph such that no two adjacent vertices have the same color. Give all possible combinations of such color assignments using backtracking. Draw state space tree, backtracking tree, solution tree.  **OR** Define N-Queens problem. Explain the need of backtracking concept by using state space tree and backtracking tree for 4-Queen's problem. Solve the 4-queen's problem to compute all possible solutions by using the principle of backtracking. Draw state space tree and backtracking tree both.	10 M
Q3 (b)	For Given graph, apply Floyd Wars hall's Algorithm to compute all pairs shortest distance. Show all steps.  	10 M

Q4 (a)	Solve Traveling Salesperson problem using dynamic programming. Find a minimum cost tour starting and ending at Vertex 1. Also write the cost of the tour. $\begin{vmatrix} 0 & 10 & 15 & 20 \\ 5 & 0 & 9 & 10 \\ 6 & 13 & 0 & 12 \\ 8 & 8 & 9 & 0 \end{vmatrix}$	10 M
Q4 (b)	Solve the given problem instance of Multistage graphs with forward or backward (either of the methods)  **OR** Solve 8 -puzzle problem for the given initial and goal state using branch and bound strategy. Initial state: 1 4 7 / 2 5 8 / 3 _ 6 Goal State: 1 4 _ / 2 5 7 / 3 6 8	10 M
Q5 (a)	Define Longest Common Subsequence Problem. Give Dynamic programming Solution. Solve given example : X – MANTRALAYA Y- MALAYALAM **OR** Explain the concept of String matching with finite automata with suitable examples. State its complexity.	10 M
Q5 (b)	Explain different complexity classes with suitable examples. Comment relationship among P, NP, NP-Hard and NP-Complete problems.	10 M