



Sardar Patel Institute of Technology

Bhavan's Campus, Munshi Nagar, Andheri (West), Mumbai-400058, India
(Autonomous College Affiliated to University of Mumbai)

ESE

July- 2023

Max. Marks: 100

Class: F.Y. MCA

Course Code: MC507

Name of the Course: Design and Analysis of Algorithms

Duration: 3.00 hrs

Semester: II

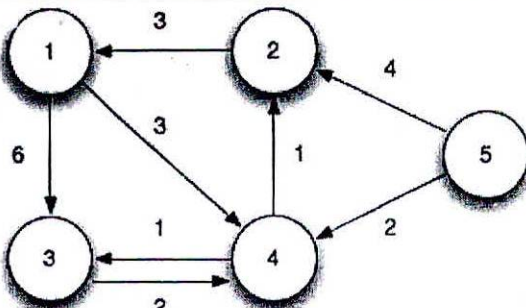
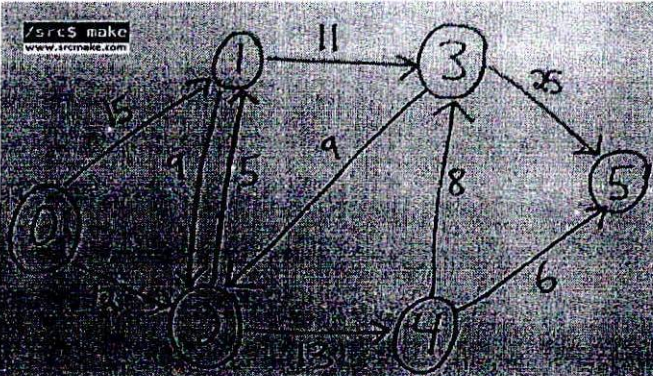
Branch: M.C.A.

Instruction:

- (1) All questions are compulsory
- (2) Draw neat diagrams
- (3) Assume suitable data if necessary

Q. No.	Questions	Max. Marks	CO-BL
Q1			
A)	Find the bounding function and complexity of following code.	16	1-3
	<div>1. void function(int n) { int count = 0; for(int i=n/4; i<=n; i++) for(int j=1; j<=n; j=3*j) for(int k=1; k<=n; k=k*3) count++; }</div> <div>2. void function(int n) { int count = 0; for(int i=0; i<n; i++) for(int j=i; j<i*i; j++) if (j%i == 0) {for(int k=0; k<j; k++) printf("*"); } }</div>		
	<div>3. void function(int n) { int count = 0; for(int i=1; i<=n; i++) for(int j=1; j<=n; j++) for(int k=i; k<=n/2; k++) count++; }</div> <div>4. while(n>1) { n=n/2 stmt }</div>		
B)	Apply quick sort algorithm on array A = (10 1 52 8 6 13 20 3 50 69) Show all the iterations. OR Derive the Best, Worst and Average time complexities of Quick sorting technique.	4	2-3
Q2 A)	Consider sum of subset problem defined on the following set A = {1,2,3,5,7,9}. Solve the problem using backtracking technique and dynamic method. Analyze and compare both the methods.	10	3-4 4-4

B)	Discuss the Graph coloring Problem. What technique is used to solve the problem? Write the algorithm to solve above problem.	10	3-3																
Q3 A	<p>Consider start state for a 15 puzzle problem as shown in table below. Show three levels of branching using branch and bound states with justification. (show the various Queues for -live node, E node, dead node)</p> <table border="1"> <tr><td>4</td><td>1</td><td>2</td><td>3</td></tr> <tr><td>7</td><td>5</td><td>6</td><td>8</td></tr> <tr><td>11</td><td>9</td><td>10</td><td>12</td></tr> <tr><td></td><td>13</td><td>15</td><td>14</td></tr> </table>	4	1	2	3	7	5	6	8	11	9	10	12		13	15	14	10	4-3
4	1	2	3																
7	5	6	8																
11	9	10	12																
	13	15	14																
B)	<p>Write Kruskal's algorithm for minimum spanning tree. Analyze the algorithm.</p> <p>OR</p> <p>Find minimum Spanning Tree for following graph using Kauskal's algorithm.</p>	10	4-4 4-3																
Q 4 A	i) Compare Greedy and Dynamic programming techniques (Definition, Working, Performance, Analysis, Example)	6	3-4																
	ii) Write the brute force string matching algorithm and find its time complexity.	4	Self-study																
B)	<p>Find the multiplication of matrices using Strassen's algorithm.</p> $A = \begin{bmatrix} 3 & 5 \\ 6 & 7 \end{bmatrix}, \quad B = \begin{bmatrix} 8 & 7 \\ 9 & 5 \end{bmatrix}$	10	3-3																
Q 5 A	Find the shortest path distance between every pair of vertices using Floyd Warshall Algorithm.	10	4-3																

			
B)	<p>Find maxflow in the network. (source: S, Sink : T)</p> 	10	4-3

