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 | Duration: 3.00 hrs
Class: F.Y. MCA | Semester: II
Course Code:MC507 | Branch: M.C.A.
Name of the Course: Design and Analysis of Algorithms

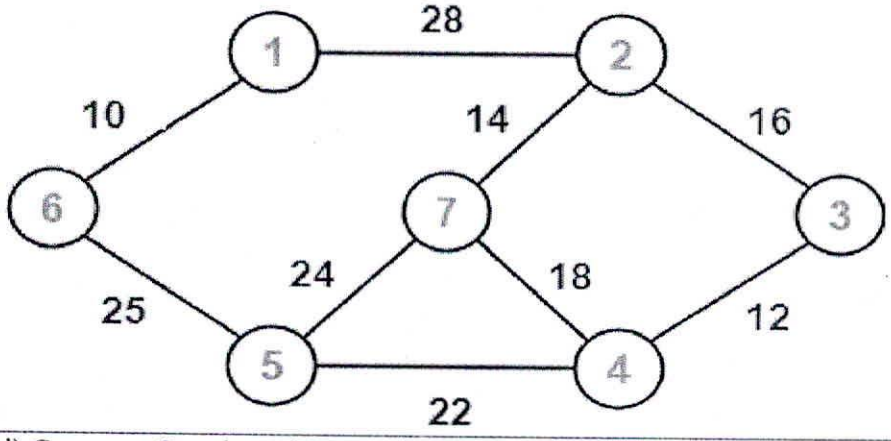
Instruction:
(1) All questions are compulsory
(2) Draw neat diagrams
(3) Assume suitable data if necessary

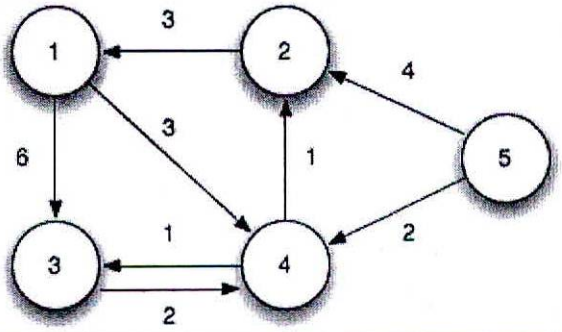
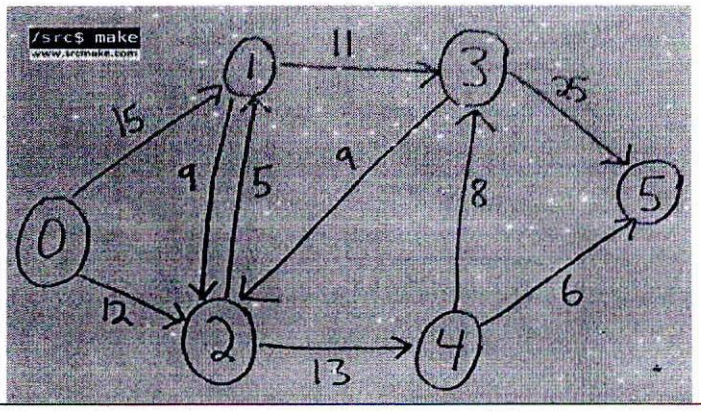
Q. No.	Questions	Max. Marks	CO-BL
Q1			
A)	Find the bounding function and complexity of following code.	16	1-3

	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++;`
	`}`
		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("*");`
		`  }`
		`}`		

	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++;`
	`}`
		4.
		`while(n>1)`
		`{`
		`  n=n/2`
		`  stmt`
		`}`		

B)	Apply merge sort algorithm on array A = (10 1 52 8 6 13 20 3 50 69) Show all the iterations. OR Write quick sort algorithm and find its complexity.	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)	Draw the portion of state space tree generated by recursive backtracking	10	3-3

	algorithm for 4-Queen problem with an example.3-		
Q3 A	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) 1 2 3 _ 4 5 6 8 7 9 10 12 11 13 15 14	**10**	**4-3**
B)	Write Kruskal's algorithm for minimum spanning tree. Analyze the algorithm. **OR** Find minimum Spanning Tree for following graph using Kruskals's algorithm.  	**10**	**4-4** **4-3**
Q 4 A	i) Compare Greedy and Dynamic programing techniques (Definition, Working, Performance, Analysis, Example) ii) Build the Finite automata for pattern matching in the document. (Pattern : SSPPIT)	**6** **4**	**3-4** **Self study**
B)	Given a chain of four matrices A1,A2,A3,A4 with P=[4 6 3 4 5] Find matrix M. Also preserve the order of multiplication.	**10**	**3-3**
Q 5 A	Find the shortest path distance between every pair of vertices using Floyd Warshall Algorithm.	**10**	**4-3**

			
B)	Find maxflow in the network. (source: S, Sink : T) 	**10**	**4-3**