



Sardar Patel Institute of Technology

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

End Semester Examination

May 2018

Max. Marks: 100

Class: S.Y.

Course Code: MCA43

Name of the Course: Design and Analysis of Algorithms

Duration: 3 Hrs.

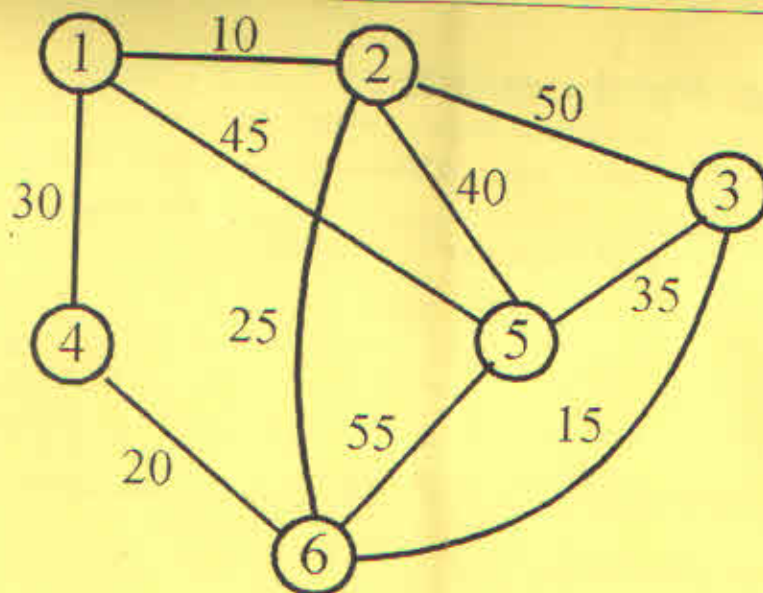
Semester: IV

Branch: M.C.A.

Instruction:

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

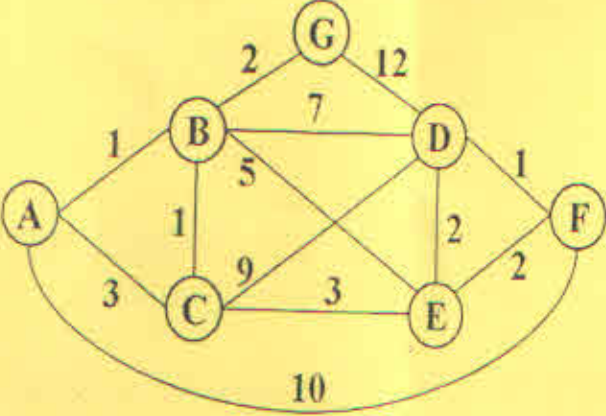
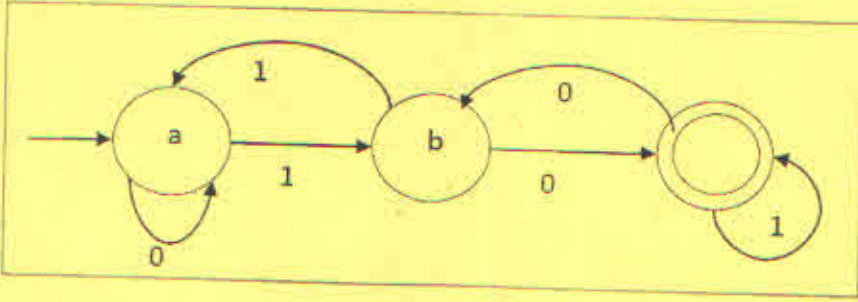
Q. No.		Max. Marks	CO
Q.1		5	CO1
a)	Discuss the Role of Algorithms in Computing.		
b)	What is the time complexity of following function fun ()? Explain <pre>int fun(int n) { for (int i = 1; i <= n; i++) { for (int j = 1; j < n; j += i) { Sum = Sum + i*j; } } return(Sum); }</pre>	7	CO1
c)	Draw the recurrence tree for $T(n) = T(n/3) + T(2n/3) + n$ up to first 3 levels. OR Compare P, NP, NP-complete problems.	8	CO1
Q. 2		6	CO2
a)	Find the LCS of string 1: BACBAD string2: ABAZDC		
b)	Find minimum Spanning Tree for following graph using Kauskal's algorithm.	8	CO2



OR

Given a chain of four matrices A_1, A_2, A_3, A_4 (5,4,6,2,7). Find the cost of matrix multiplication.

c)	Describe the Dynamic 0/1 Knapsack Problem. Find an optimal solution for the dynamic programming 0/1 knapsack instance for $n=3$, $m=6$, profits are $(p_1, p_2, p_3) = (1, 2, 5)$, weights are $(w_1, w_2, w_3) = (2, 3, 4)$.	6	CO2
Q. 3 a)	Discuss the 8-Queen Problem. What technique is used to solve the problem? Write the algorithm to solve above problem. OR "Least cost Branch and Bound reduces the state space search" comment	7	CO3
b)	Discuss the Hamiltonian Cycles Problem. What technique is used to solve the problem? Write the algorithm to solve above problem.	7	CO3
c)	Find the time complexity of "the subset sum problem" OR Define the 15-puzzle problem. Suggest the technique to solve the problem. According to you does it give the optimal solution? Justify	6	CO3

<p>Q. 4</p> <p>a)</p>	<p>Find the single-source shortest paths from A to every other vertex using Dijkstra's algorithm.</p> 	7	CO4
b)	Write Floyd Warshalls algorithm for all pair shortest path	6	CO4
c)	<p>Derive the complexity of Knuth Morris Pratt string matching algorithm.</p> <p>OR</p> <p>Derive the complexity of Rabin Carp string matching algorithm.</p>	7	CO4
<p>Q. 5</p> <p>a)</p>	<p>Derive the Best, Worst and Average time complexities of Quick sorting technique.</p> <p>OR</p> <p>Consider "Vertex cover Problem". According to you what type of problem it is P or NP or NP-complete. Justify.</p>	5	CO1
b)	<p>Apply Dynamic programming method to generate Optimal Binary Search Tree for the following values:</p> <p>Index: 0 1 2 3</p> <p>Key : 10 12 16 21</p> <p>Frequency: 4 2 6 3</p>	5	CO2
c)	Compare Backtracking and Branch and Bound techniques (Definition, Working, Performance, Analysis, Example)	5	CO3
d)	<p>For following deterministic finite automaton obtain 5 -tuple DFA</p> <p>Generate 3 strings which are accepted by this DFA</p> 	5	CO4