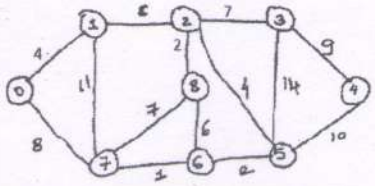
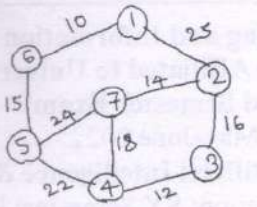
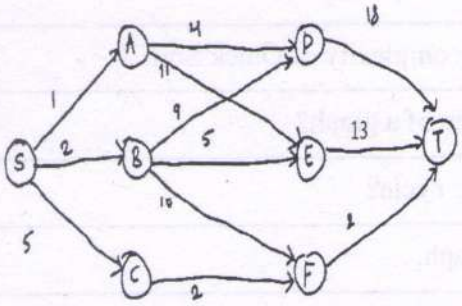
Date : 26-05-22

K. J. Somaiya Institute of Engineering and Information Technology, Sion, Mumbai-22
(Autonomous College Affiliated to University of Mumbai)
End Semester Exam
May-June 2022
B.Tech Program: **Artificial Intelligence & Data Science**
Examination: SY Semester: IV
Course Code: **1UAIC402** Course Name: **Analysis of Algorithm**
Duration: 03 Hours Max. Marks: 60

Instructions:
(1) All questions are compulsory.
(2) Draw neat diagrams wherever applicable.
(3) Assume suitable data, if necessary.

		Max. Marks	CO	BT level
Q 1	**Solve any six questions out of eight.**	**12**		
i)	Define time complexity and space complexity.	**2**	CO1	U AP
ii)	Give the best case and worst-case complexity of Quick Sort.	**2**	CO2	U, RE
iii)	What do you mean by spanning tree of a graph?	**2**	CO3	U, AP
iv)	What do you mean by Hamiltonian cycle?	**2**	CO4	U, AP
v)	Define Chromatic Number of a graph.	**2**	CO5	AP
vi)	What are spurious hits in Rabin Karp Algorithm?	**2**	CO6	U, RE
vii)	Express the complexity of the following algorithm using recurrence relation: Algo (int n) { if (n>0) { for(i=0; i<n; i=i*2) print(i); Algo(n-1); } }	**2**	CO1	AN, AP
viii)	Write a recursive backtracking algorithm for the sum of subsets problem.	**2**	CO5	U,RE
Q.2	**Solve any four questions out of six.**	**16**		
i)	Find the complexity of the recurrence relation i) $T(n)=4T(n/2)+n^2$ ii) $T(n)=2T(n/2)+n^3$	**4**	CO1	U, AP
ii)	Apply Bellman Ford's algorithm on the following graph. Consider vertex 0 as source. 	**4**	CO4	AP, AN, EV

iii)	Find the cost of the minimum spanning tree of the given graph by using Prims's algorithm. Show the intermediate steps. 	4	CO3	AP
iv)	Write a short note on 15 Puzzle Problem.	4	CO5	AN, AP
v)	Find Longest common subsequence for the following string. X = ababcde Y = bacadb	4	CO4	U, AP
vi)	Explain Rabin Karp String matching algorithm with example.	4	CO6	U, AP
Q.3	**Solve any two questions out of three.**	**16**		
i)	Explain O, Ω, and Θ notations with the help of graph.	8	CO1	RE, AP
ii)	Find the shortest path from vertex S to T for the following multistage graph. 	8	CO4	U, AP
iii)	Write an algorithm to solve the N Queens Problem. Show its working for N=4.	8	CO5	AP
Q.4	**Solve any two questions out of three.**	**16**		
i)	Write an algorithm for Binary Search and analyse its Time Complexity.	8	CO2	AN, AP
ii)	Obtain the solution for following knapsack problem using Greedy Approach n=7, M=15 (w1,w2,w3,w4,w5,w6,w7) = (2,3,5,7,1,3,1) (p1,p2,p3,p4,p5,p6,p7) = (10,15,12,7,18,18,13)	8	CO3	AP
iii)	Write an algorithm for KMP string matching methods. Explain it with a suitable example.	8	CO6	AP