SETB

K. J. Somaiya Institute of Technology, Sion, Mumbai-22
(Autonomous College Affiliated to University of Mumbai)

Nov – Dec 2024
B. Tech Program: **Artificial Intelligence & Data Science** Scheme **III**
Regular Examination: **SY** Semester: **III**
Course Code: **AIC303** and Course Name: **Design and Analysis of Algorithms**
Date of Exam: ~~21/11/24~~ 29/12/24 Duration: 02.5 Hours Max. Marks: 60

Dec24

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

Q. No.	Question	Max. Marks	CO	BT level
Q 1	Solve any **two** questions out of three: (05 marks each)	10		
a)	Compare Quick Sort vs Merge Sort		CO2	Un
b)	Explain the relationship with P, NP, and NP-Hard problems.		CO1	Un
c)	Discuss about Job sequencing problem using greedy approach		CO3	Un
Q 2	Solve any **two** questions out of three: (05 marks each)	10		
a)	Distinguish between dynamic programming and divide and conquer technique.		CO4	Un
b)	Write a note on Naïve String-Matching algorithm		CO6	Un
c)	Write a recursive backtracking algorithm for the sum of subsets problem.		CO5	Un
Q.3	Solve any **two** questions out of three. (10 marks each)	20		
a)	Find the complexity of the recurrence relation using master theorem i. $T(n)=2T(n/2) + n$ ii. $(n)= 4T(n/2) + n^3$		CO1	Ap
b)	Write an algorithm for quick sort. Trace Quicksort for the data set: A= {44, 22, 33, 77, 11, 55, 66}		CO2	Ap
c)	Consider the following instance of the fractional Knapsack problem and find a feasible solution to it.		CO3	Ap

Objects	X1	X2	X3	X4	X5	X6	X7
Profit	10	5	15	7	6	18	3
Weights	2	3	5	7	1	4	1

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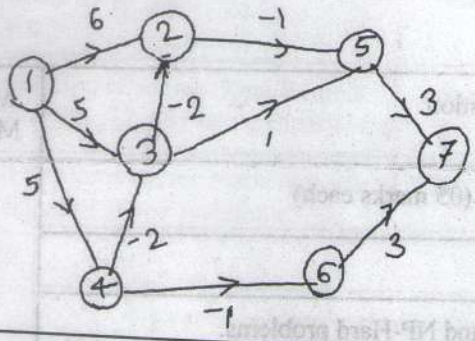
Q.4	Solve any **two** questions out of three. (10 marks each)	20		
a)	Solve the shortest path from source 1 for the following graph using dynamic programing 		CO4	Ap
b)	Discuss about the 8-Queen problem and illustrate its state space tree. Write an algorithm for the same.		CO5	Un
c)	Explain and Apply Naïve String-Matching Algorithm for the following string: String = x y z t r w q x y z f g Where Pattern = x y z		CO6	Ap

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