

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

April – May 2024	B. Tech Program: Artificial Intelligence & Data Science	Scheme-II B
	Examination: SY Semester: IV	
Date of Exam: 16/05/2024	Course Code: AIC402 and Course Name: Analysis of Algorithm	Max. Marks: 60
	Duration: 2.5 Hours	

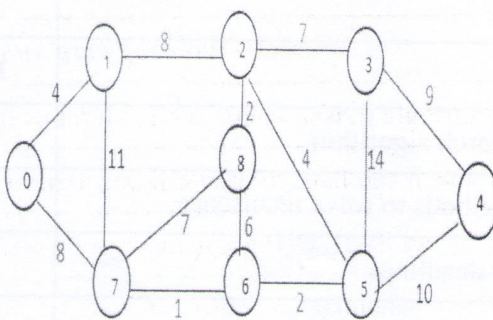
Instructions:

- (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)	Compute the average case time complexity of quick sort.	2	CO1	3
ii)	Solve following recurrence relation by using masters theorem $T(n) = T(n-1) + n^2$	2	CO2	3
iii)	Define class P and class NP.	2	CO2	1
iv)	How does Dijkstra's Algorithm handle negative edge weights? Can you suggest a modification to handle negative edge weights?	2	CO3	2
v)	Write pseudocode for All pair shortest path algorithm.	2	CO4	6
vi)	Differentiate between Backtracking and Branch & Bound Algorithm.	2	CO5	4
vii)	Define a dead node and live node.	2	CO5	1
viii)	Apply Naïve String matching algorithm on following string String = companion Pattern = pani	2	CO6	3
Q.2	Solve any four questions out of six.	16		
i)	Discuss with example about binary search algorithm	4	CO1	6
ii)	Explain recurrence and its various methods to solve recurrence.	4	CO2	1
iii)	Discuss in detail Job sequencing with deadline.	4	CO3	1
iv)	Determine the LCS of the following sequence: $X = \{A, B, C, B, D, A, B\}$ $Y = \{B, D, C, A, B, A\}$	4	CO4	5
v)	Solve the sum of subset problem for the following $n=4, m=15, w = \{3, 5, 6, 7\}$	4	CO5	3

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vi)	Discuss about Merge sort algorithm with example.	4	CO6	1																									
Q.3	Solve any two questions out of three.	16																											
i)	Sort the list of elements 10, 5, 7, 6, 1, 4, 8, 2, 3, 9 using merge sort and show its computing time is $O(n \log n)$	8	CO1	3																									
ii)	Write algorithm for 0/1 knapsack problem using dynamic algorithm. Also solve the following example: $N=4, M=21$ $\{P1, P2, P3, P4\} = \{2, 5, 8, 1\}, \{W1, W2, W3, W4\} = \{10, 15, 6, 9\}$	8	CO4	6																									
iii)	Solve the following Travelling Salesperson Problem using branch and bound method Cost matrix = <table border="1" style="margin-left: auto; margin-right: auto; border-collapse: collapse;"> <tr><td>∞</td><td>20</td><td>30</td><td>10</td><td>11</td></tr> <tr><td>15</td><td>∞</td><td>16</td><td>4</td><td>2</td></tr> <tr><td>3</td><td>5</td><td>∞</td><td>2</td><td>4</td></tr> <tr><td>19</td><td>6</td><td>18</td><td>∞</td><td>3</td></tr> <tr><td>16</td><td>4</td><td>7</td><td>16</td><td>∞</td></tr> </table>	∞	20	30	10	11	15	∞	16	4	2	3	5	∞	2	4	19	6	18	∞	3	16	4	7	16	∞	8	CO5	3
∞	20	30	10	11																									
15	∞	16	4	2																									
3	5	∞	2	4																									
19	6	18	∞	3																									
16	4	7	16	∞																									
Q.4	Solve any two questions out of three.	16																											
i)	Prove that vertex cover problem is NP complete.	8	CO2	3																									
ii)	Apply Dijkstra's algorithm on the following graph Consider vertex 0 as source 	8	CO3	3																									
iii)	Rewrite and compare Rabin Karp and Knutt Morris Pratt algorithm. Give pseudo code for KMP string matching algorithm.	8	CO6	6																									