

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

April – May 2023		
B.Tech. Computer Engineering Scheme II		
Examination: SY	Semester: IV	
Course Code: CEC402	Course Name: Analysis of Algorithms	
Date of Exam: 16/05/2023	Duration: 2.5 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 NP-Hard & NP-Complete problems.	02	CO1	U
ii)	Explain the general procedure of divide and conquer method.	02	CO2	U
iii)	Differentiate between greedy method and dynamic programming.	02	CO4	An
iv)	Differentiate between kruskal's and prim's algorithm.	02	CO3	An
v)	Write the bounding conditions for sum of subset problem	02	CO5	U
vi)	Define space complexity & time complexity of an algorithm with the help of an example.	02	CO1	U
vii)	Explain Dynamic programming with example.	02	CO4	U
viii)	Explain the limitations of Rabin-Karp string matching algorithm?	02	CO6	U
Q.2	Solve any four questions out of six.	16		
i)	Apply the insertion sort technique on the following list of elements and show the result of each pass. <27, 91, 25, 8, 89>	04	CO1	Ap
ii)	Derive the complexity of quick sort for best case and worst case.	04	CO2	An
iii)	Apply the fractional knapsack problem for the following instance: $n=6, m=13, p=(18, 5, 9, 10, 12, 7), w=(7, 2, 3, 5, 3, 2)$.	04	CO3	Ap
iv)	Write an algorithm to find all pairs shortest path using dynamic programming.	04	CO4	U

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v)	Explain 15-puzzle problem with the help of an example.	04	CO5	U
vi)	Explain Naïve string matching algorithm with example.	04	CO6	U
Q.3	Solve any two questions out of three.	16		
i)	Explain recurrences. List and explain the various methods to solve recurrences giving suitable examples.	08	CO1	U
ii)	Write an algorithm for 0/1 knapsack problem using dynamic programming. Apply the algorithm on the following data: m = 8, p = {1, 2, 5, 6}, w = {2, 3, 4, 5}	08	CO4	Ap
iii)	Write an algorithm to solve the N-Queen problem. Show it's working for N=4.	08	CO5	Ap
Q.4	Solve any two questions out of three.	16		
i)	Write an algorithm for finding minimum and maximum using divide and conquer. Also Derive its complexity.	08	CO2	U
ii)	Apply Dijkstra's algorithm on the following graph to find the shortest path. <div style="text-align: center;"> </div>	08	CO3	Ap
iii)	Write an algorithm for Knuth-Morris-Pratt (KMP) and explain it with the help of an example.	08	CO6	
