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

May-June 2024		
B. Tech. Computer Engineering Scheme: IIB		
Regular Examination: SY Semester: IV		
Course Code: CEC402	Course Name: Analysis of Algorithms	
Date of Exam: 16/05/2024	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)	Write time complexity of insertion sort and selection sort for all cases.	02	1	U
ii)	Write recurrence relation for binary search algorithm and derive it's time complexity.	02	2	Ap
iii)	Compare Prim's and Kruskal's Algorithm for finding the minimum spanning tree.	02	3	U
iv)	Given 2 sequences of characters, P=<MLNOM> and Q= <MNOM>.. Obtain the LCS for these given sequences	02	4	Ap
v)	What are the characteristics of Dynamic Programming?	02	4	U
vi)	Write the bounding conditions for sum of subset problem	02	5	U
vii)	Write and explain estimated cost function used in 15 Puzzle Problem.	02	5	U
viii)	Show the comparisons the naive string matcher makes for the pattern P = 0001 in the text T = 000010001010001.	02	6	Ap
Q.2	Solve any four questions out of six.	16		
i)	Explain Asymptotic notations with graph.	04	1	U
ii)	Write an Algorithm to find Min and Max value in an array using Divide and Conquer approach.	04	2	U
iii)	Solve the following job sequencing with deadlines problem. n=7, M=15, Profits= (30, 50, 200, 180, 10, 60, 300), Deadlines= (1, 3, 4, 3, 2, 1, 2).	04	3	Ap
iv)	Apply the Floyd-warshall shortest path algorithm for below mentioned all pairs.	04	4	Ap

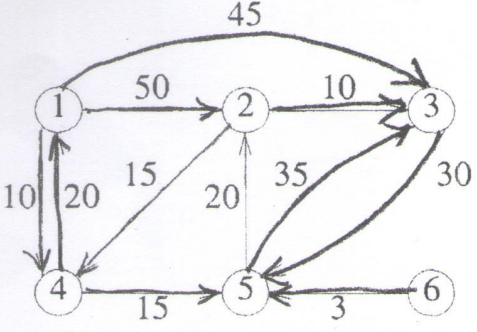
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	$\begin{bmatrix} 0 & \infty & 3 & \infty \\ 2 & 0 & \infty & \infty \\ \infty & 7 & 0 & 1 \\ 6 & \infty & \infty & 0 \end{bmatrix}$			
v)	Differentiate Backtracking and Branch and Bound Approach.	04	5	U
vi)	Compute prefix function π for the following pattern using KMP algorithm. ababbabbabbababbabb	04	6	Ap
Q.3	Solve any two questions out of three.	16		
i)	Explain recurrences. (2M) List and explain the various methods to solve recurrences giving suitable examples. (6M)	08	1	U
ii)	Prove that for the Quick Sort, (6M) i. Worst Case time complexity is $T(n) = O(n^2)$ ii. Best Case time complexity is $T(n) = O(n \lg n)$ Also give example of best case and worst case. (2M)	08	2	An
iii)	What is Travelling Salesman Problem? (2M) Find the solution of following travelling salesman problem using branch and bound method. (6M) $\begin{bmatrix} \infty & 20 & 30 & 10 & 11 \\ 15 & \infty & 16 & 4 & 2 \\ 3 & 5 & \infty & 2 & 4 \\ 19 & 6 & 18 & \infty & 3 \\ 16 & 4 & 7 & 16 & \infty \end{bmatrix}$	08	5	Ap
Q.4	Solve any two questions out of three.	16		
i)	Consider 0/1 knapsack problem number of items $N=3$, $w=(4, 6, 8)$, $p=(10,12,15)$ using dynamic programming. Determine the optimal profit for the knapsack of capacity $M=10$.	08	4	Ap
ii)	Apply Dijkstra's algorithm on the following graph. Consider vertex 1 as source	08	3	Ap

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iii)	a) Describe Rabin Karp Algorithm with an example (5M). b) Describe spurious his with an example (2M). c) Write complexity of it. (1M).	08	6	U
