

(4)

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(c) Explain Bellman Ford Algorithm with proper example. (CO4)

5. (a) Compare between NP-hard and NP-complete. (CO5)

(b) Explain Robin-Karp Algorithm for Pattern Searching with the help of an example.

(CO5)

(c) Construct an optimal travelling sales person tour using Dynamic Programming.

(CO5)

$$\begin{pmatrix} 0 & 10 & 9 & 3 \\ 5 & 0 & 6 & 2 \\ 9 & 6 & 0 & 7 \\ 7 & 3 & 5 & 0 \end{pmatrix}$$

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Roll No.

TMC-301

M. C. A. (THIRD SEMESTER)

END SEMESTER

EXAMINATION, Dec., 2023

DESIGN AND ANALYSIS OF ALGORITHM

Time.: Three Hours

Maximum Marks : 100

Note : (i) All questions are compulsory.

(ii) Answer any *two* sub-questions among (a), (b) and (c)-in each main question.

(iii) Total marks in each main question are **twenty**.

(iv) Each sub-question carries 10 marks.

1. (a) Define an Algorithm. Write a recursive Algorithm to find the Factorial of a function and find its complexity. (CO1)

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(2)

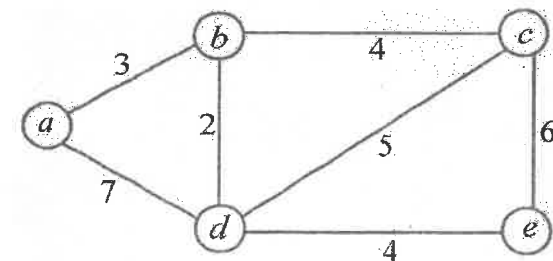
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- (b) Explain the following notation for growth rate of function : (CO1)
- (i) $O(\text{big-Oh})$
 - (ii) $\theta(\text{theta})$
 - (iii) $\Omega(\text{omega})$
- (c) Write Divide-And-Conquer recursive Quick sort algorithm and analyse the algorithm for average time complexity. (CO1)
2. (a) Discuss the various cases of insertion of key in red-black tree for given sequence of key in an empty red-black tree : (CO2)
- {15, 13, 12, 16, 19, 23, 5, 8}
- (b) Write an algorithm for In-order and Pre-order traversal. Also analyse its time and space complexity. (CO2)
- (c) Show the results of inserting the keys : (CO2)
- F, S, Q, K, C, L, H, T, V, W, M, R, N, P, A, B, X, Y, D, Z, E
- in order into an empty B-tree. Use $t = 3$, where t is the minimum degree of B-tree. (CO2)

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3. (a) Explain Backtracking Method. What is N-Queens Problem ? Give solution of 4-Queens Problem using Backtracking Method. (CO3)
- (b) Explain Matrix Chain Multiplication with an example. (CO3)
- (c) Find an optimal solution to the knapsack instance $n = 4$ objects and the capacity of knapsack $m = 15$, profits (10, 5, 7, 11) and weight are (3, 4, 3, 5). (CO3)
4. (a) Explain Breadth First Traversal Method for Graph with example. (CO4)
- (b) What is Minimum Spanning Tree (MST) ? Explain Kruskal's algorithm to create the MST for the following graph : (CO4)



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