Total Page No. : 4]   **[Roll No. ....**

MCS–507

MCA/MSCIT II/IV Semester Examination Dec., 2023

DESIGN AND ANALYSIS OF ALGORITHM

Time : 2 Hours]   [**Max. Marks :** 70

Note **:–** This paper is of Seventy (70) marks divided into two (02) Sections 'A' and 'B'. Attempt the questions contained in these Sections according to the detailed instructions given there in. ***Candidates should limit their answers to the questions on the given answer sheet. No additional (B) answer sheet will be issued.***

Section–A

(Long Answer Type Questions)   2×19=38

Note **:–** Section 'A' contains Five (05) Long-answer type questions of Nineteen (19) marks each. Learners are required to answer any *two* (02) questions only.

1. What is divide and conquer design technique ? What are the components of divide and conquer strategy ? What are the advantages and disadvantages of divide and conquer paradigm ?

2. (a) Describe Dijkastra' s algorithm to solve single-source shortest path problem. What is its time complexity ?

   (b) Find the shortest path in the below graph from the source vertex 1 to all other vertices by using Dijkstra's algorithm.
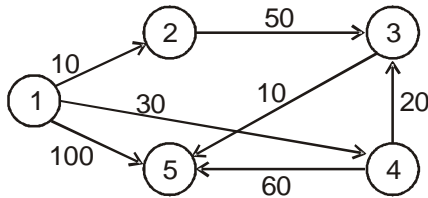
3. What is Minimum Cost Spanning Tree ? Explain Kruskal's Algorithm and Find MST of the Graph. Also write its Time-Complexity.
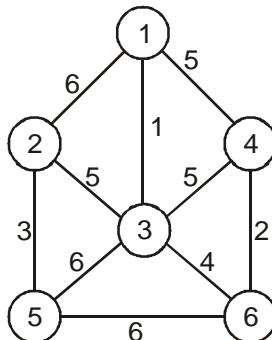
4. What is Merge sort ? Is insertion sort better than the merge sort? Discuss. Sort the following sequence (23, 11, 5, 15, 68,31, 4, 17) using merge sort.

5. Explain "greedy algorithm". Write its pseudo code to prove that fractional Knapsack problem has a greedy-choice property.

Section–B

(Short Answer Type Questions)   4×8=32

Note :– Section 'B' contains Eight (08) Short-answer type questions of Eight (08) marks each. Learners are required to answer any *four* (04) questions only.

1. Define Algorithm. What are the characteristics of the algorithm ?

2. Explain Single source shortest path.

3. Write Huffman code algorithm and derive its complexity.

4. What are six steps processes in algorithmic problem solving ?

5. Write the formulation to solve travelling sales person problem with dynamic programming?

6. Define warshall's algorithm.

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7. Discuss the problem classes P, NP and NP-complete with class relationship.

8. Write a short note on the following :

   (a) Linear Programming

   (b) Randomization

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