

**P-819**

Total Pages : 4

Roll No. ....

## **MCA-12/MSc(IT)-12**

### **Design and Analysis of Algorithm**

(MCA/MSCIT)

3rd Semester Examination, 2023 (June)

**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 therein. Candidates should limit their answer to the questions on the given answer sheet. No additional (B) answer sheet will be issued.

### **SECTION–A**

**(Long Answer Type Questions)**

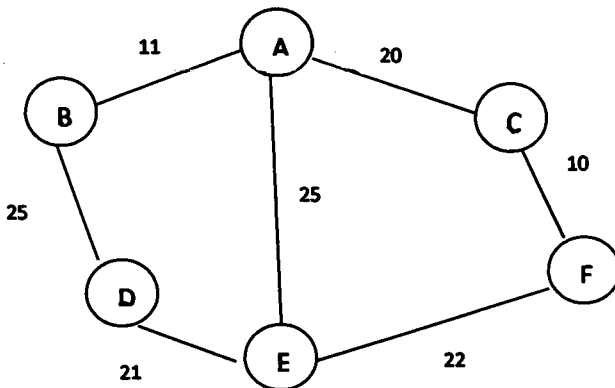
**Note :** Section 'A' contains Five (05) long answer type questions of Nineteen (19) marks each. Learners are required to answer any Two (02) questions only.

(2×19=38)

1. Explain time complexity with the help of an example. How is time complexity measured? What is the time complexity of the following code:

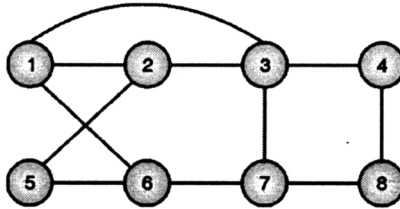
```
int a = 0;
for (i = 0; i < N; i++) {
    for (j = N; j > i; j--) {
        a = a + i + j;
    }
}
```

2. What are asymptotic notations in Complexity Analysis of Algorithms? Explain in detail.
3. Describe Kruskal's Algorithm to find the minimum spanning tree of the following graph:



Write all steps properly.

4. Explain how to find Hamiltonian Cycle by using Backtracking in a given graph:



Write all steps properly.

5. What is Non-deterministic? How a non-deterministic algorithm is specified? Explain with the help of an example.

### SECTION-B

#### (Short Answer Type Questions)

**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. (4×8=32)

1. What is disjoint set? Draw a disjoint set Venn diagram that represents the given two sets

$$X = \{a, b, c, d, f\} \text{ and } Y = \{e, g, h, i\}$$

2. Explain the important features of Binomial Heap.

3. Write a recursive and non-recursive function for binary search algorithm.
  4. Write an algorithm to sort elements by merge sort algorithm.
  5. Explain Travelling Salesman Problem with the help of an example.
  6. Explain the characteristics of a problem that can be solved efficiently using dynamic programming technique.
  7. Explain the purpose of graph colouring with the help of an example.
  8. Write short notes on :
    - (a) Cook's Theorem.
    - (b) Optimal binary Search Tree.
    - (c) NP-Hard.
    - (d) NP-Complete.
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