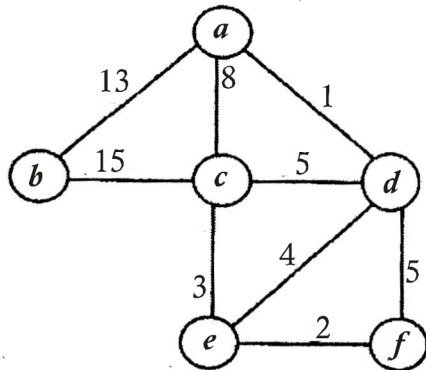


10. What is graph colouring problem ? What is the bounding condition for graph colouring problem ?
11. State and prove Cook's theorem.
12. What sub-problems are for compute 3^9 using divide and conquer method ? Also find out how the sub-problems are combined.
13. What is Minimum Spanning Tree (MST) ? Find the minimum spanning tree for the following graph using Prim's algorithm :



MCA-12

December – Examination 2022

MCA Examination

Design and Analysis of Algorithms

Paper : MCA-12

Time : 3 Hours]

[Maximum Marks : 80

Note :- The question paper is divided into three Sections A, B and C. Write answers as per the given instructions.

Section-A

8×2=16

(Very Short Answer Type Questions)

Note :- Answer all questions. As per the nature of the question delimit your answer in one word, one sentence or maximum up to **30** words. Each question carries 2 marks.

1. (i) Define Time complexity.
- (ii) Give examples of internal and external sorting.

- (iii) What is Greedy Strategy ?
- (iv) What is backtracking method ?
- (v) Name the approach used for combinational and discrete global optimizations of problems.
- (vi) What is decision and optimization problem ?
- (vii) What is the size of a clique ?
- (viii) What is average case time complexity of insertion sort ?

Section-B **4×8=32**

(Short Answer Type Questions)

Note :- Answer any *four* questions. Each answer should not exceed **200** words. Each question carries 8 marks.

- 2. Write an algorithm to sort elements by bubble sort algorithm. What are the time and space complexities ?
- 3. Prove $3n^5 - 7n + 4 = O(n^5)$.
- 4. Sort the following elements by using counting sort algorithm :

7, 9, 9, 6, 4, 2, 8, 6, 4, 3, 7, 2, 1

- 5. How does merge sort follow the divide and conquer strategy ? Give one example.
- 6. In the following elements, search the key element 12 using binary search, using divide and conquer method.

3, 4, 6, 7, 9, 10, 12, 13, 14, 18.

- 7. "A globally optimal solution can be arrived at by making a locally optimal choice." Explain briefly.
- 8. Consider the following job sequencing problem. Find the feasible solution set.

Job <1, 2, 3, 4 >

Profit <10, 20, 15, 5>

Deadline <2, 3, 3, 2>

- 9. Describe the method of solving travelling salesman problem using dynamic programming.

Section-C **2×16=32**

(Long Answer Type Questions)

Note :- Answer any *two* questions. You have to delimit your each answer maximum up to **500** words. Each question carries 16 marks.