**SUBJECT CODE :  19MT/PE/AL15**

**M. Sc. DEGREE EXAMINATION, NOVEMBER 2022**
**BRANCH I  - MATHEMATICS**
**FIRST SEMESTER**

COURSE     :  ELECTIVE
PAPER       :  ANALYSIS OF ALGORITHMS
TIME          :  3 HOURS                                    MAX. MARKS :   100

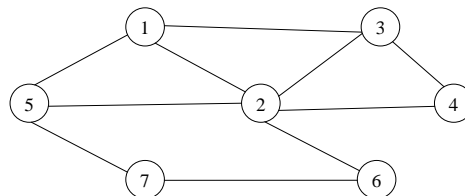**SECTION – A**

**ANSWER ALL THE QUESTIONS:**                                    ( 5 × 2 = 10)

1.  What do you mean by space complexity.

2.  Describe divide and conquer strategy.

3.  Compare Merge sort and Insertion sort and write the efficient one.

4.  Define finite automata.

5.  Define the class NP-hard.

**SECTION – B**

**ANSWER ANY FIVE QUESTIONS:**                                    ( 5 × 6 = 30)

6.  Explain recurrence relations with a suitable example.

7.  Analyse the average-case time for Algorithm SequentialSearch.

8.  Show how does heapsort process the input 71, 41, 81, 21, 11, 31, 1.

9.  Explain the working procedure of Algorithm MergeSort.

10. Formulate an algorithm for Depth first traversal and give the order that the nodes will be visited starting at the node labelled 1.



11. Present Knuth-Morris-Pratt algorithm.

12. Discuss NP-complete problems with suitable examples.

## SECTION – C

**ANSWER ANY THREE QUESTIONS:**                                      **( 3 × 20 = 60)**

13. Given an algorithm, how to find the efficiency of the algorithm. Explain using a suitable example.

14. Develop a recursive algorithm to find the $k^{th}$ largest value in a list with $n$ elements. Use the algorithm to find the $3^{rd}$ and $4^{th}$ largest value in the list [67, 10, 34, 84, 21, 71, 9, 52, 45].

15. State Algorithm Quicksort and trace the operation of Quicksort on the list [23, 42, 3, 17, 56, 47, 66, 33].

16. Write Dijkstra-Prim Algorithm and use it to find the minimum spanning tree for the following graph:
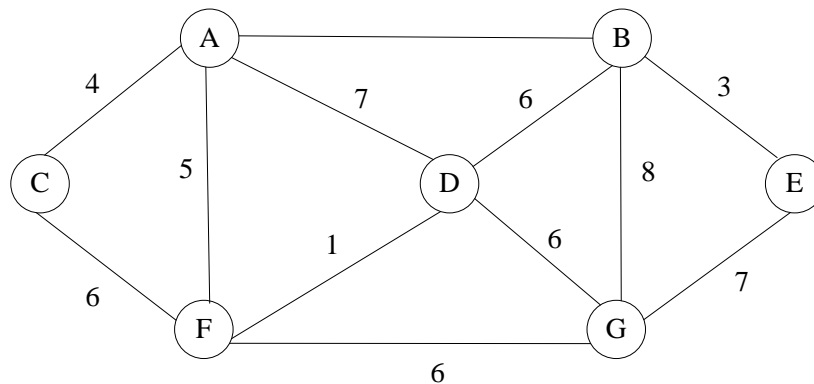


17. Explain Graph Colouring problem and devise an algorithm to find the optimal solution.

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