Graphic Era HILL UNIVERSITY
Established by an Act of the State Legislature of Uttarakhand (Adhiniyam Sankhya 12 of 2011)
University under section 2(f) of UGC Act, 1956

## End Term (Odd) Semester Examination NOV 2025

Roll no.....

Name of the Program and semester: MCA -III
Name of the Course: ***Design and Analysis of Algorithm***
*Course Code: TMC 301 and TMD 311*
Time: 3-hour Maximum Marks: 100

**Note:**

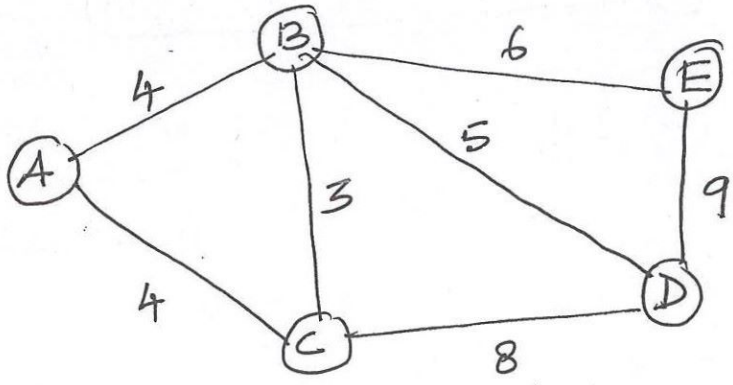
*(i)* All the questions are compulsory.
*(ii)* Answer any two sub questions from a, b and c in each main question.
*(iii)* Total marks for each question are 20 (twenty).
*(iv)* Each sub-question carries 10 marks.

**Q1.** (10X 2 = 20 Marks)

a): What is time complexity and space complexity of an algorithm? Explain big O and notation with example. [C.O-1]

b): Give Quick Sort algorithm; Discuss its time complexity in its worst case. [C.O-2]

c): Use Give Kruskal's algorithm to find minimal spanning tree of the given graph. [C.O-2]




**Q2.** (10X 2 = 20 Marks)

a): which function is fastest growing function out of these nlog n, n and $5^n$ [C.O-1]

b): Solve the recurrence relation T (n) =3T (n/4) + $cn^2$, T (1) =A with help of recursion tree. [C.O-1]

c). Write a short note on Branch and Bound technique. [C.O-3]

**Q3.** (10X 2 = 20 Marks)

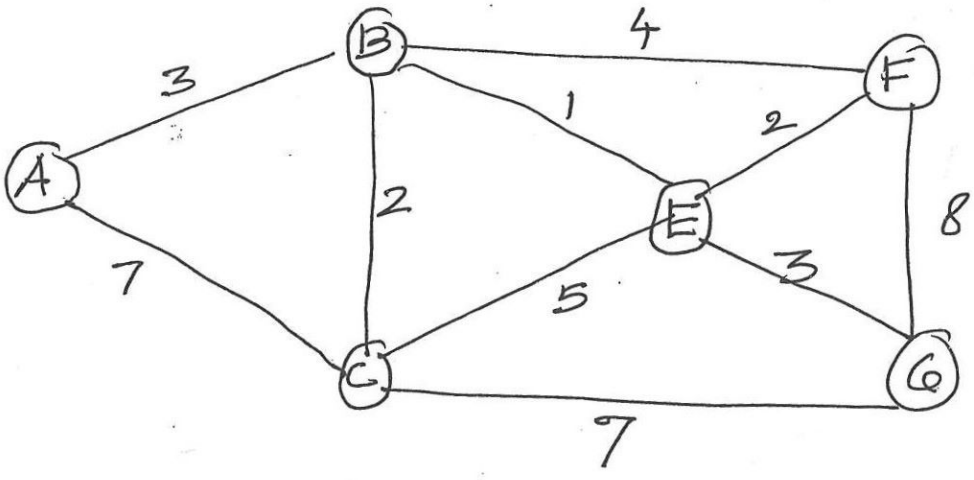
Graphic Era HILL UNIVERSITY
Established by an Act of the State Legislature of Uttarakhand (Adhiniyam Sankhya 12 of 2011)
University under section 2(f) of UGC Act, 1956

## End Term (Odd) Semester Examination Dec 2025

a). Discuss Back tracking approach. Explain how it can be used to find a Hamiltonian cycle in a given graph with help of a suitable example.

b): How 0/1 knapsack problem can be solved by using Dynamic Programming approach? Explain.

c). Apply Dijkastra's algorithm to solved given single source shortest path problem, node A is the source node. Show all steps of calculations




**Q4.** (10X 2 = 20 Marks)

a): Give the algorithm to solve Tower of Hanoi problem and discuss its time complexity.

b): Write a short note on Job sequencing with Deadlines, how this problem can be solved with Greedy approach.

c): Give Floyd-Warshall algorithm to find solution of all pair shortest path problem for a given graph, Discuss its time complexity.

**Q5.** (10X 2 = 20 Marks)

a): Explain BFS with a suitable example, Give all steps of traversal.

b). Give a recursive algorithm to generate all permutation of a finite string.

c): Discuss the Merge Sort algorithm, set Recurrence relation for time Complexity function of Merge sort and compute its time complexity.