

Enrollment No./ Seat No.:

GUJARAT TECHNOLOGICAL UNIVERSITY

MASTER OF ENGINEERING - SEMESTER - 2 EXAMINATION – SUMMER 2026

Subject Code: 3720216

Date: 10-06-2026

Subject Name: Advance Algorithms

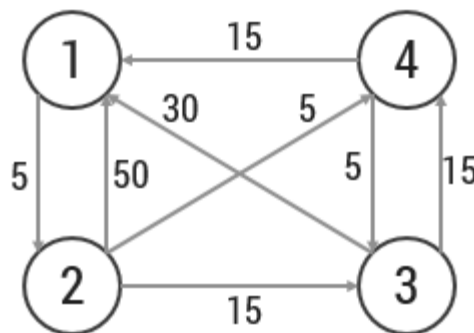
Time: 10:30 AM TO 01:00 PM

Total Marks: 70

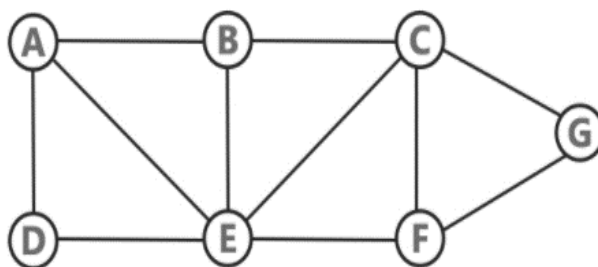
Instructions:

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.

- Q.1** (a) What is “Divide and Conquer” approach? Explain with a sorting algorithm and analyze it. **07**
- (b) What is amortized analysis? How it differs from conventional analysis? Explain using Stack operations. **07**
- Q.2** (a) What is Topological Sorting? Write an algorithm to find topological sorting of a graph. Describe with example. **07**
- (b) Explain Shortest path by BFS. Give correctness proof of the algorithm. **07**
- OR**
- (b) Prove the theorem: “If G is a graph, then M is maximum matching iff (G, M) has no augmenting path” **07**
- Q.3** (a) Find shortest path between all pairs of following graph using Floyd-Warshall algorithm. **07**



- (b) Describe Edmond's Blossom algorithm to compute augmenting path. **07**
- OR**
- Q.3** (a) Traverse the following graph using Breadth First Search Technique. Consider vertex A as the starting vertex **07**



- (b) Solve the following linear program using SIMPLEX **07**
- Maximize: $18x_1 + 12.5x_2$
- Subject To: $x_1 + x_2 \leq 20$
- $x_1 \leq 12$
- $x_2 \leq 16$

$$x_1, x_2 \geq 0$$

- Q.4 (a)** Explain DFT and FFT. Prove that FFT is useful in reducing the multiplying time of two polynomials. **07**
- (b)** Define P, NP, NP-Complete and NP-Hard problems. Show using intersection diagram about their relationship with each other. **07**

OR

- Q.4 (a)** Explain Chinese remainder theorem. **07**
- (b)** Define Matroid with all conditions. How it is useful in solving the problem of minimum spanning tree? **07**

- Q.5 (a)** Explain the terms with respect to a Graph: Matching, Perfect Matching, Maximal Matching. Give an example of graph that explains all these terms. **07**
- (b)** Demonstrate with example the process of LU decomposition of a given matrix **07**

OR

- Q.5 (a)** Specify vertex cover and set cover problems. Explain with example how vertex cover problem can be reduced to set cover problem. **07**
- (b)** Write and explain Strassen's Algorithm. **07**
