

Seat No./Enrollment No.: \_\_\_\_\_

**GUJARAT TECHNOLOGICAL UNIVERSITY**  
**BACHELOR OF ENGINEERING – SEMESTER 5 – EXAMINATION – SUMMER 2026**

Subject Code: 3152008

Date: 25/05/2026

Subject Name: Production Optimization Techniques

Time: 02:30 PM TO 05:00 PM

Total Marks: 70

**Instructions:**

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.
4. Simple and non-programmable scientific calculators are allowed.

**Q.1** (a) Enlist the different optimization techniques. **03**

(b) Discuss the role of any one scientific tool/model in Decision-making with suitable example. **04**

(c) Identify and develop model for following case to maximize the profit. **07**

A factory manufactures two products P and Q on three machines X, Y, and Z. Product P requires 11 hours of machine X and 7 hours of machine Y a 2 hour of machine Z. The requirement of product Q is 6 hours, 10 hours and 2 hours of machine X, Y and Z respectively. The profit contribution of products P and Q are Rs. 32/- per unit and Rs. 23 /- per unit respectively. In the coming planning period the available capacity of machines X, Y and Z are 2600 hours, 2000 hours and 400 hours respectively.

**Q.2** (a) Explain the “degeneracy” in context of linear programming problem. **03**

(b) Demonstrate the “Unbounded solution” and “No feasible solution” case through sketch for graphical method. **04**

(c) Suggest most appropriate optimization technique for logistics to minimize the cost with suitable example. **07**

OR

**Q.2** (c) Write the steps followed to solve the jobs allocation to operators by Hungarian technique. **07**

**Q.3** (a) Explain with suitable example “Unbalanced” transportation problem. **03**

(b) Distinguish between transportation problem and assignment problem **04**

(c) **07**

| From    To ⇒ | X  | Y  | Z  | Available |
|--------------|----|----|----|-----------|
| ⇓            |    |    |    |           |
| A            | 9  | 20 | 10 | 7         |
| B            | 16 | 19 | 12 | 13        |
| C            | 20 | 12 | 10 | 4         |
| Requirements | 8  | 10 | 6  | 24        |

Find IBFS by NWCM and optimal solution by stepping stone method of above transportation problem.

OR

**Q.3** (a) Define the Non-Square matrix in assignment problem. **03**

- (b) There are jobs A, B, C and three machines X, Y, Z. All the jobs can be processed on all machines. The time (in hrs.) required for processing job on a machine is given below in the form of matrix. Make allocation to minimize the total processing time by enumeration. 04

| Jobs | X  | Y  | Z  |
|------|----|----|----|
| A    | 11 | 16 | 21 |
| B    | 20 | 13 | 17 |
| C    | 13 | 15 | 12 |

- (c) Why VAM method give more near to optimal solution compared to North-west corner method ? write the steps to find optimal solution by MODI method in case of transportation problem. 07

- Q.4** (a) Explain the concept of float in context of network analysis. 03

- (b) Describe the terms with example for CPM: (1)EST (2) LFT 04

- (c) In a factory there are 6 jobs to perform each of which should go through to machines A and B in the order A, B. The processing timing (in hours) for the job are given below. Determine the sequence for performing the jobs that would minimise the total elapsed time and find the value of elapsed time. 07

| Job       | J1 | J2 | J3 | J4 | J5 | J6 |
|-----------|----|----|----|----|----|----|
| Machine A | 1  | 3  | 8  | 5  | 6  | 3  |
| Machine B | 5  | 6  | 3  | 2  | 2  | 10 |

OR

- Q.4** (a) Write the assumption made in solving sequencing problem. 03

- (b) Enlist the various examples of sequencing problem from your daily life. 04

- (c) A project consist following activates. Draw the network and find critical path. 07

| Activity               | A | B | C | D   | E | F |
|------------------------|---|---|---|-----|---|---|
| Immediate predecessors | - | A | A | B,C | - | E |
| Duration (days)        | 2 | 3 | 4 | 6   | 2 | 8 |

- Q.5** (a) Write any two real life applications of CPM. 03

- (b) Explain the Johnson's Rule and its logic, 04

- (c) Discuss the the case of decision making under certainty. 07

OR

- Q.5** (a) Enlist any two real life problem that can be solve by decision theory. 03

- (b) Explain following terms in context of sequencing with example : 1) Processing order  
2) Idle time 04

- (c) Discuss the the case of decision making under risk. 07

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