No. of Printed Pages : 4 **MMPO–001**

# MANAGEMENT PROGRAMME

## (MP)

## Term-End Examination

## December, 2025

### MMPO-001 : OPERATIONS RESEARCH

*Time : 3 Hours* *Maximum Marks : 100*

*Weightage : 70%*

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***Note :*** *(i) Attempt any* ***five*** *questions.*

*(ii) All questions carry equal marks.*

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1. Define operations research. Discuss the history and applications of operations research in business and management.

2. Describe the rationale behind Cutting Plane and Branch & Bound methods used for solving integer programming models.

3. A petroleum company is considering expansion of its one unloading facility at its refinery. Due to random variations in weather, loading delays and other factors, ships arriving at the refinery to unload crude oil arrive at a rate of 5 ships per week. The service rate is 10 ships per week. Assume arrivals follow a Poisson process and the service time is exponential.

   (a) Find the average time a ship must wait before beginning to deliver its cargo to the refinery.

   (b) If a second berth is rented, what will be the average number of ships waiting before being unloaded ?

(c) What would be the average time a ship would wait before being unloaded with two berths ?

(d) What is the average number of idle berths at any specified time ?

4. What is dynamic programming ? Discuss the applications of dynamic programming in decision-making. How is this different from linear programming ?

5. What is Goal Programming (GP) ? Discuss various steps of Goal Programming (GP) formulation. How does GP help in decision-making ?

6. Explain Saddle point, pure and mixed strategy and theory of dominance in game theory.

7. Write short notes on any *four* of the following :

(i) An Unbounded Solution of a Linear Programming Problem

(ii) Formulation of a Dual Linear Programming Problem

(iii) M/M/C Queueing Model

(iv) Travelling Salesman Problem

(v) Assignment Problem

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