

MANAGEMENT PROGRAMME
Term-End Examination
February, 2021

MS-051 : OPERATIONS RESEARCH

Time : 3 hours

Maximum Marks : 100

(Weightage : 70%)

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

(ii) All questions carry equal marks.

1. (a) What are the main characteristics of Operations Research ? Explain with suitable examples. Discuss its scope and limitations.
(b) What is buffer stock ? List the reasons for keeping a buffer stock. Suppose the lead time for procurement of a product gets doubled, will you recommend doubling its buffer stock ? Justify your answer.
2. (a) Briefly discuss the application of Quadratic programming in Portfolio selection.
(b) “Goal programming appears to be the most appropriate, flexible and powerful technique for complex decision problems involving multiple conflicting objectives” — Discuss with suitable examples.

3. (a) Briefly describe the Cutting Plane Method for solving an Integer Programming Problem.
- (b) Explain the concept of Dominance in the context of Game Theory.
4. (a) What are the advantages and disadvantages of Monte Carlo simulation as a problem solving technique ?
- (b) Workers come to the tool store room to receive a special tool (required by them) for accomplishing a particular project assigned to them. The average time between two arrivals is 60 seconds and the arrivals are assumed to be in Poisson distribution. The average service time (of the tool room attended) is 40 seconds.

Determine :

- (i) Average queue length,
- (ii) Average number of workers in the system, including the worker being attended,
- (iii) Mean waiting time of an arrival, and
- (iv) Average waiting time of an arrival (worker) who waits.

5. (a) Solve the following Linear Programming Problem by Graphical method.

$$\text{Min } z = 20x_1 + 10x_2$$

subject to

$$x_1 + 2x_2 \leq 40$$

$$3x_1 + x_2 \geq 30$$

$$4x_1 + 3x_2 \geq 60$$

and $x_1, x_2 \geq 0$

- (b) A company has manufacturing plants at places A, B and C with daily production of 250, 300 and 400 units respectively. At points D_1, D_2, D_3 and D_4 , it has four warehouses with daily demands 200, 225, 275 and 250 respectively. Per unit shipping costs are given in the following table. If the firm wants to minimize its total transportation cost, how should it route its products ? Use Vogel's approximation method to find an initial basic feasible solution.

		Warehouse			
		D_1	D_2	D_3	D_4
Plants	A	11	13	17	14
	B	16	18	14	10
	C	21	24	13	10

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

- (a) Saddle points
 - (b) ABC Analysis
 - (c) Periodic review system in inventory system
 - (d) Travelling Salesman problem
 - (e) Bellman's Principle of Optimality
 - (f) Impact of Web on OR
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