



- (2) Illustrate single period inventory model with shortest cost in detail.
- (c) (1) List the five applications of Inventory model.  
 (2) The probability  $p_n$  of failure just before age  $n$  is shown below. If individual replacement costs Rs. 12.50 and group replacement costs Rs. 3.00 per item, find the optimum replacement policy.

$n$	1	2	3	4	5
$p_n$	0.1	0.2	0.25	0.3	0.15

2 Attempt any **two** of the following : **10×2=20**

- (a) (1) Enlist the algorithm of Simplex method for solving linear programming (LPP).  
 (2) Explain the Charnes' Big-M method of solving Linear Programming Problems (LPP).
- (b) List the various steps of branch and bound method for solving Integer Linear Programming Problems.
- (c) (1) What do you mean by sensitivity analysis? Discuss its significance in solving LPP.  
 (2) Illustrate the important results (at least three) in Duality.

3 Attempt any **two** of the following : **10×2=20**

- (a) Apply Dual Simplex Method to solve the LPP.

$$\text{Max } Z = -3x_1 - 2x_2$$

Subject to

$$x_1 + x_2 \geq 1$$

$$x_1 + x_2 \leq 7$$

$$x_1 + 2x_2 \geq 10$$

$$x_2 \leq 3$$

$$x_1, x_2 \geq 0$$



- (b) Find the initial solution to the following TP using Vogel's Approximation Method (VAM) and Matrix-Minima (MM) method.

Factory	Destination				Supply
	D <sub>1</sub>	D <sub>2</sub>	D <sub>3</sub>	D <sub>4</sub>	
F <sub>1</sub>	3	3	4	1	100
F <sub>2</sub>	4	2	4	2	125
F <sub>3</sub>	1	5	3	2	75
Demand	120	80	75	25	300

- (c) A company has three plants A, B and C, 3 warehouses X, Y and Z. The number of units available at the plants is 60, 70, 80 and the demand at X, Y, Z are 50, 80, 80 respectively. The unit cost of transportation is given in the following table :

	X	Y	Z
A	8	7	3
B	3	8	9
C	11	3	5

Find the allocation so that the total transportation cost is minimum.

4 Attempt any **two** of the following : 10×2=20

- (a) Describe the Hungarian Method for Assignment problem (AP).  
 (b) Illustrate Wolfe's method for quadratic programming in detail.



- (c) What do you mean by Dynamic Programming?  
Use the dynamic programming to solve the LPP.

$$\text{Max } Z = x_1 + 9x_2$$

Subject to the constraints

$$2x_1 + x_2 \leq 25$$

$$x_2 \leq 11$$

$$x_1, x_2 \geq 0$$

5 Attempt any **two** of the following : **10×2=20**

- (a) Describe Multistage decision problem and its solution in context of dynamic programming.
- (b) What do you mean by Queuing theory ? Describe basic elements of Queuing model.

In a public telephone booth the arrivals are on the average 15 per hour. A call on the average takes 3 minutes. If there is just one phone, find

- (i) the expected number of callers in the booth at any time ?
- (ii) the production of the time the booth is expected to be idle ?
- (c) Write short notes on :
- (i) Erlong Distribution and Poisson Distribution.
- (ii) Markovian process, steady and transit state.

