K23P 0207

Reg. No. : .....

Name : .....

IV Semester M.Sc. Degree (CBSS – Reg./Supple./Imp.) Examination, April 2023
(2019 Admission Onwards)
MATHEMATICS
MAT4E03 : Operations Research

Time : 3 Hours Max. Marks : 80

PART – A

Answer **any four** questions from this Part. **Each** question carries 4 marks. **(4×4=16)**

1. Describe the term Encoding.
2. Explain Transition Diagram with example.
3. Explain the Laplace criterion for decisions under uncertainty.
4. Define Reliability. State its important aspects.
5. Describe different types of inventories.
6. Define entropy of the probability distribution.

PART – B

Answer **any four** questions from this Part without omitting **any** Unit. **Each** question carries **16** marks. **(4×16=64)**

UNIT – I

7. Describe MONTE-CARLO Simulation.
8. A housewife buys three kinds of cereals : A, B and C. She never buys the same cereal on successive weeks. If she buys cereal A, then the next week she buys cereal B. However, if she buys either B or C, then the next week she is three times as likely to buy A as the other brand. Obtain the transition probability matrix and determine how often she would buy each of the cereals in the long run.

P.T.O.

9. a) Describe the maximin and minimax criterion for the decision under uncertainty.

   b) A manufacturer makes a product, of which the principal ingredient is a chemical X. At the moment the manufacturer spends Rs. 1,000 per year on supply of X, but there is a possibility that the price may soon increase to four times its present figure because of a worldwide shortage of the chemical. There is another chemical Y, which the manufacturer could use in conjunction with a third chemical Z, in order to give the same effect as chemical X. Chemicals Y and Z would together cost the manufacturer Rs. 3,000 per year, but their price are unlikely to rise. What action should the manufacturer take ? Apply the maximin and minimax regret criteria for decision making and give two sets of solutions. If the coefficient of optimism is 0.4, find the courser of action that minimizes the cost.

UNIT – II

10. A machine shop produces three products 1, 2 and 3 in lots. The shop has a warehouse whose total floor area is 4000 sq. metres. The relevant data for the three items is given below

Item	1	2	3
Annual demand (units/year)	500	400	600
Cost per unit (Rs.)	30	20	70
Set-up cost per lot (Rs.)	800	600	1000
Floor area required (Sq. metres)	5	4	10

The inventory carrying charges for the shop are 20% of the average inventory valuation per annum for each item. If no stock-outs are allowed and at no time can the warehouse capacity be exceeded, determine the optimum lot size for each item.

11. Explain the problem of EOQ with Instantaneous Production and Variable Order Cycle Time.

12. Find the optimum order quantity for a product for which the price breaks are as follows :

Quantity	Purchasing cost per units (Rs.)
$0 \leq Q_1 < 100$	20
$100 \leq Q_2 < 200$	18
$200 \leq Q_3$	16

The monthly demand for the product is 400 units. The storage cost is 20% of the unit cost of the product and the cost of ordering is Rs. 25.00 per month.

UNIT – III

13. Explain different Channel Probabilities with examples.

14. State and prove Information Characterization Theorem.

15. Find the capacity of the memoryless channel specified by the channel matrix.

$$P = \begin{bmatrix} \frac{1}{2} & \frac{1}{4} & \frac{1}{4} & 0 \\ \frac{1}{4} & \frac{1}{4} & \frac{1}{4} & \frac{1}{4} \\ 0 & 0 & 1 & 0 \\ \frac{1}{2} & 0 & 0 & \frac{1}{2} \end{bmatrix}$$