K22P 3323

Reg. No. : .....

Name : .....

IV Semester M.Sc. Degree (CBSS – Reg./Supple./Imp.) Examination, April 2022
(2018 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.

1. What are the characteristics of a Markov process ?
2. Explain the Savage criterion for decisions under uncertainty.
3. What are the costs associated with the inventory ?
4. Explain XYZ analysis.
5. Explain any two components of a communication system.
6. Define code, block code and binary code.

PART – B

Answer **any four** questions from this Part without omitting **any** Unit. **Each** question carries **16** marks.

Unit – I

7. 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.

8. The manager of a flower shop promises delivery within four hours on all flower orders. The flowers are purchased on the previous day and delivered to the manager by 8.00 A.M. the next morning. Manager's daily demand for roses is as follows :

Roses (in dozens)	7	8	9	10
Probability	0.1	0.2	0.4	0.3

The manager purchases roses for Rs. 10 per dozen and sells them for Rs. 30. All unsold roses are donated to a local hospital. How many dozens of roses should the manager order each evening to maximize its profits ? What is the optimum expected profit ?

9. Explain the steps involved in Monte-Carlo simulation.

Unit – II

10. Derive an inventory model with one price break and obtain the decision rules for finding optimal order quantity. Also, extend the decision rules for two price breaks.

11. A company uses 8000 units of a product as raw material, costing Rs. 10 per unit. The administrative cost per purchase is Rs. 40. The holding costs are 28% of the average inventory. The company is following an optimal purchase policy and places order according to EOQ. It has been offered a quantity discount of one per cent if it purchases its entire requirement only four times a year. Should the company accept the offer of quantity discount of one percent ? If not, what minimum discount should the company demand ?

12. A small shop produces three machine parts I, II and III in lots. The shop has limited storage space sufficient only for 500 units of all type of items. The relevant data for the three items is given below :

Item	I	II	III
Demand rate (unit/month)	600	1,200	1,500
Cost per unit (Rs.)	5	10	15
Set-up cost per lot (Rs.)	100	50	200

The inventory carrying charges for the shop are 20% of the average inventory valuation per month for each time. If stock-outs are not allowed, determine the optimum lot size for each item.

Unit – III

13. Define entropy function and establish its formal requirements.

14. Explain conditional entropy. In the usual notation show that
$H(X, Y) = H(X) + H(Y|X) = H(Y) + H(X|Y)$.

15. A transmitter has an alphabet consisting of five letters $[x_1, x_2, x_3, x_4, x_5]$ and the receiver has an alphabet of four letters $[y_1, y_2, y_3, y_4]$. The joint probabilities for the communication are given below :

	y_1	y_2	y_3	y_4
x_1	0.25	0.00	0.00	0.00
x_2	0.10	0.30	0.00	0.00
x_3	0.00	0.05	0.10	0.00
x_4	0.00	0.00	0.05	0.10
x_5	0.00	0.00	0.05	0.00

Determine the different entropies for this channel (assume that $0 \log 0 \equiv 0$).