



K24P 0323

Reg. No. :

Name :

IV Semester M.Sc. Degree (C.B.S.S. – Reg./Supple.-(One Time Mercy
Chance)/Imp.) Examination, April 2024
(2017 Admission Onwards)

MATHEMATICS
MAT 4E03 : 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. Explain the term expected mutual information.
2. Explain the characteristics of Markov Process.
3. Describe the Hurwicz criterion for decisions under uncertainty.
4. What you meant by life testing ?
5. What are the various costs associated with inventories ?
6. What are axioms concerning the amount of information conveyed by a message stating that an event E with probability p has occurred ?

PART - B

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

Unit - I

7. Customers arrive at a milk booth for the required service. Assume that inter-arrival and service times are constant and given by 1.8 and 4 time units, respectively. Simulate the system by hand computations for 14 time units. What is the average waiting time per customer ? What is the percentage idle time of the facility ? (Assume that the system starts at $t = 0$).

P.T.O.



8. Suppose there are two market products of brands A and B respectively. Let each of these two brands have exactly 50% of the total market in same period and let the market be of a fixed size. The transition matrix is given below :

From	To	
	A	B
A	0.9	0.1
B	0.5	0.5

If the initial market share breakdown is 50% for each brand, then determine their market shares in the steady-state.

9. a) Describe the term Decision Tree.
 b) A manager has a choice between (i) A risky contract promising Rs. 7 lakhs with probability 0.6 and Rs. 4 lakhs with probability 0.4 and (ii) A diversified portfolio consisting of two contracts with independent outcomes each promising Rs. 3.5 lakhs with probability 0.6 and Rs. 2 lakhs with probability 0.4. Construct a decision-tree for using EMV criteria. Can you arrive at the decision using EMV criteria ?

Unit – II

10. 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 types of items. The relevant data for the three items is given below :

Item	I	II	III
Demand rate (unit/month)	600	1200	1500
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 item. If stock-outs are not allowed, determine the optimum lot size for each item.
11. Explain the fundamental problem of EOQ.



12. 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 orders according to EOQ. It has been offered a quantity discount of one percent 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?

13. Describe Joint and Conditional Entropies with examples.
14. State and prove any two properties of Entropy function.
15. There are twelve coins, all of equal weight except one which may be lighter or heavier. Using concepts of information theory, show that it is possible to determine which coin is the odd one and indicate whether it is lighter or heavier.

