M.Sc DEGREE EXAMINATION,APRIL 2019
II Year III Semester
Operations Research

Time : 3 Hours **Max.marks :75**

Section A $(10 \times 2 = 20)$ Marks

Answer any **TEN** questions

1. Define transition function.
2. Define dynamic programming.
3. Define Expected monetary value.
4. Define Expected opportunity Loss.
5. Define Holding cost.
6. Define lead time.
7. Write the Kendal's notation.
8. Define queue length.
9. Define global minimum value.
10. . Define stationary points.
11. Define regret criterion.
12. Define optimum policy.

Section B $(5 \times 5 = 25)$ Marks

Answer any **FIVE** questions

13. Divide quantity b into n parts so as to maximize their product. Let $f_n(b)$ be the maximum value. Then show that

    $f_1(b) = b$, and $f_n(b) = Max_{0 \le z \le b}\{z f_{n-1}(b-z)\}$

14. The probability of the demand for lorries for hiring on any day in a given district is as follows:

No. Of. lorries demanded :	0	1	2	3	4
Probability :	0.1	0.2	0.3	0.2	0.2

    Lorries have a fixed cost of Rs 90 each day to keep the daily hire changes (variable costs of running) Rs 200. If the lorry –hire company owns 4 lorries, what is its daily expectation? If the company is about to go into business and currently has no lorries should it buy?

15. The production department of company requires 3,600 kg of raw material for manufacturing a particular item per year. It has been estimated that the cost of placing an order is Rs 36 and the cost of carrying inventory is 25 per cent of the investment in the inventories. The price is Rs 10 per kg. Help the purchase manager to determine an ordering policy for raw material.

16. A television repairman finds that the time he spends on his jobs has an exponential distribution with a mean of 30 minutes. If he repairs the sets in the order in which they came in, and if the arrival of sets follows a Poisson distribution with an approximate average rate of 10 per 8-hour day, what is the repairman's expected idle time each day? How many jobs are ahead of average set just brought in?

17. Consider the function, $f(x) = x_1 + 2x_2 + x_1x_2 - x_1^2 - x_2^2$.

    Determine the maximum or minimum point (if any) of the function.

18. Discuss the various costs involved in an inventory model.

19. The demand pattern of the cakes made in a bakery is as follows:

No .of. cakes demanded :	0	1	2	3	4	5
Probability :	0.05	0.10	0.25	0.30	0.20	0.10

    If the preparation cost is Rs 3 per unit and selling price is Rs 4 per unit , how many cakes should the baker bake for maximizing his profit?

Section C $(3 \times 10 = 30)$ Marks

Answer any **THREE** questions

20. Consider the problem of designing electronic devices to carry five power cells, each of which must be located within three electronic systems. If one system's power fails, then it will be powered on an auxiliary basis by the cells of the remaining systems. The probability that any particular system will experience a power failure depends on the number of cells originally assigned to it. The estimated power failure probabilities for a particular system are given below

Power cells	Probability of system power failure		
	System 1	System 2	System 3
1	0.50	0.60	0.40
2	0.15	0.20	0.25
3	0.04	0.10	0.10
4	0.02	0.05	0.05
5	0.01	0.02	0.01

    Determine how many power cells should be assigned to each system in order to maximize the overall system reliability.

21. A TV dealer finds that the cost of holding a TV a stock for a week is Rs.50. customers who cannot obtained new TV sets immediately tend to go to other dealers and he estimates that for every customer who cannot get immediate delivery he losses an average of Rs.200. for one particular model of TV the probabilities of demand of 0, 1, 2, 3, 4 and 5 TV sets in a week are 0.05, 0.10, 0.20, 0.30, 0.20and 0.15 respectively.

    (a). How many Televisions per week should the dealer order? Assume that there is no time lag between ordering and delivering.

    (b). Compute EVPI.

    (C). The dealer is thinking of spending on a small market survey to obtain additional information regarding the demand levels. How much should he be willing to spend on such a survey .

22. Explain the EOQ model with constant rate of demand.
23. Explain single server Queuing model's (M/M/1): (∞/FCFS).
24. Explain Kuhn - tucker necessary conditions.