M 22138

Reg. No. : ....

Name : ....

Third Semester M.A./M.Sc./M.Com. Degree (Reg./Sup./Imp.) Examination, November 2012
STATISTICS
Paper – 3.4 : Operations Research

Time : 3 Hours Max. Marks : 70

***Instruction** : Answer **any five** questions without omitting **any** Unit.*
***All** questions carry **equal** marks.*

UNIT – I

1. a) Show that a linear objective function takes its minium at an extreme point of the convex set of feasible solutions to the L.P. problem. If it assumes maximum at more than one extreme point, then it takes on the same value for every convex combination of these particular points.

   b) Explain the use of artificial variables in LP and discuss the big M method for solving an LP problem.

2. a) Describe the revised simplex technique of solving a LPP. State its advantages over simplex technique.

   b) Explain the Vogel's method of finding an initial feasible solution to a transportation problem. Explain the u-v method of improving it.

UNIT – II

3. a) What are Kuhn-Tucker conditions for general non-linear programming problem with m constraints. Use the Kuhn-Tucker conditions to solve the following non-linear programming problem.

   Minimize $Z = 2x_1^2 - 12x_1x_2 - 7x_2^2$

   Subject to $2x_1 + 5x_1 \leq 98$, $x_1, x_2 \geq 0$

   b) Define quadratic programming problem and derive the Kuhn-Tuker conditions for it.

P.T.O.

4. a) Derive the Kuhn-Tucker conditions for maximizing f(x) subject to the constraints : $g(x) \leq b$ and $x \geq 0$. Show also that these conditions are sufficient if f is concave and g is convex.

   b) State Bellman's principle of optionality. Explain how the recursive approach is preferred to the exhaustive search method for finding solutions to a finite stage problem with finite number of alternatives at each stage.

UNIT – III

5. a) What is a queue ? Give an example. Explain the important characteristics of a queueing system. Show that if interarrival times are exponentially distributed, the number of arrivals in a period of time is a Poisson process.

   b) Describe M/M/I queueing system. Obtain the steady state distribution. Also obtain the expected number of customers in the system.

6. a) Explain the role of imbedded Markovian chain in queueing system. Derive Pollaczek-Khintchime formula for M/G/I model.

   b) Obtain the steady-state solution for the M/M/C model. Obtain the mean queue length and the average waiting time in the system.

UNIT – IV

7. a) Consider the inventory situation in which stock is replenished uniformly at the rate a. Consumption occurs at the constant rate D. The setup cost is K per order, and the holding cost is h per unit per unit time. If no shortages are allowed, obtain the expression for the optimum order quantity.

   b) Discuss the EOQ problem with one price break.

8. a) For the single period model, show that for the discrete demand the optimal order quantity y* is determined from

$$P(D \leq y^* - 1) \leq \frac{P - c}{P + h} \leq P(D \leq Y^*)$$

   where D is the probabilities demand during the period ; P is the shortage cost ; C is the purchasing cost and h is the holding cost.

   b) Explain the s-S policy.

UNIT – V

9. a) Explain the theory of dominance in the solution of rectangular games. Solve the following 3×5 game using dominance properties

Player B

		1	2	3	4	5
Player A	1	2	5	10	7	2
	2	3	3	6	6	4
	3	4	4	8	12	1

b) Explain the graphical method of solving 2×4 and m×2 games.

10. a) Describe various types of replacement situations.

b) Explain various steps in PERT and CPM techniques.

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