M 20150

Reg. No. : .....

Name : .....

Third Semester M.A./M.Sc./M.Com Degree (Reg./Sup./Imp.) Examination, November 2011

STATISTICS

Paper – 3.4 : Operations Research

Time: 3 Hours Max. Marks : 70

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

UNIT – I

1. a) Define a basic feasible solution to a LPP and prove that every basic feasible solution of an LPP is an extreme point of the convex set of feasible solutions.

   b) Describe revised simplex method. Explain how the simplex multipliers are used in revised simplex method.

2. a) What is the significance of the duality theory of linear programming ? State and prove fundamental theorem of duality.

   b) What do you mean by degeneracy in a transportation problem ? How is it resolved ?

UNIT – II

3. a) Solve the following non-linear programming problem using the method of Lagrangian multipliers.

   Minimize $f(x_1, x_2) = 3x_1^2+x_2^2+2x_1x_2 + 6xy + 2x_2$

   subject to $2x_1 - x_2 = 4$; $x_1, x_2 \geq 0$

   b) Define quadratic programming. Describe Walfe's algorithm to solve a quadratic programming problem.

4. a) Derive the Kuhn-Tucker necessary conditions for solving the following non linear programming problem

   Minimize $f(x)$, $x \in R^n$

   subject to $g_i(x) \leq b_i$, $i = 1, 2...m$

   $x \geq 0$

   b) Explain a dynamic programming problem and describe the recursive equation approach to solve dynamic programming problems.

P.T.O.

UNIT – III

5. a) Define a queue- with respect to the queue system, explain the following :
   i) queue discipline
   ii) input process
   iii) backing and jockeying
   iv) traffic intensity and
   v) steady and transient states.

   b) For a single server, poisson arrival and exponential service time queueing system, obtain the steady state equations satisfied by the probability P_n of n customers in the system. Also find the expected number of units in the system.

6. a) For a (M/M/C) : (GD/∞/∞) queueing model, derive the expressions for :
   i) Steady state equations, and
   ii) Expected number of customers and expected waiting time in the system.

   b) Making the in bedded Markov analysis derive the Pollaczek – Khistchine formula for the M/G/1 queueing system.

UNIT – IV

7. a) What are the economic parameters of inventory ? Derive the classic EOQ model. Obtain its optimum order quantity and reorder level.

   b) Consider the inventory situation in which the 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. It no shortages are allowed, obtain the optimum order quantity.

8. a) In a single period stochastic inventory problem given the initial stock k = Rs. 600, production cost c = Rs. 4, holding cost is h = Rs. 0.5 and shortage cost is Rs. 6 and the probability distribution of demand is given by

$$f(D) = \frac{1}{100} \; ; \; 0 < D < 100 .$$

   Find the optimum order quantity.

   b) Explain the single period model with set up cot (S. S. Policy).

UNIT – V

9. a) Describe a two-person zero-sum game. Show that every two-person zero-sum game with mixed strategies has a solution.

   b) Explain the method of solving a zero-sum two-person game as a linear programming problem.

10. a) What is a critical path ? Explain its importance. The following table gives the activities in a construction project and time duration.

Activity	Immediate predecessors	Duration (weeks)
A	–	2
B	A	3
C	A	4
D	B, C	6
E	–	2
F	E	8

Draw the project network and find the critical path and the corresponding project completion time. Find the total float and free float for each activity.

b) What is meant by Monte-Carlo simulation ? Discuss its applicational use. **(5×14=70)**
