M 15844

Reg. No. : .....

Name : .....

IV Semester M.Sc. Degree Examination, May 2009
STATISTICS
Paper – 4.1 : Advanced Operations Research

Time: 3 Hours Max. Marks: 70

Instructions : 1) Answer any five questions, choosing one from each Unit.
2) All questions carry equal marks.

Unit – I

1. a) Find the maximum of the function

$$f(x)\Big\} = \begin{cases} x/2 & \text{for } x \le 2 \\ -x+3 & \text{for } x > 2 \end{cases}$$

using the unrestricted search method with the initial guess point $x_1 = -1.0$ and step size $s = 0.4$.

b) Explain the dichotomous search method. Using this method determine the number of experiments to be conducted to obtain a value of 0.001 for the ratio of final to initial intervals of uncertainty with $\delta = 10^{-4}$.

OR

2. a) Describe Fibonacci search technique in one-dimensional minimisation methods.

b) Is the study of unconstrained optimisation techniques in non-linear programming problems important ? Why ? What are direct search methods and descent methods ?

Unit – II

3. a) Give a comparative study between chance-constrained approach and two-stage approaches in stochastic programming models.

b) What is integer programming ? Stating the importance of integer programming models, explain some of its practical applications.

OR

P.T.O.

4. a) Solve the following LPP :

Maximise $Z = x_1 + 4x_2$ subjcct to the constraints

$$2x_1 + 4x_2 \leq 7;\ 5x_1 + 3x_2 \leq 15;$$

$$x_1, x_2 \geq 0 \text{ and integers}$$

b) Explain Geometric programming and point out how it differs from other optimisation techniques.

Unit – III

5. a) An item costing Rs. 10 is sold for Rs. 25. Unsold items can be sold for Rs. 4 each. It is assumed that there is no shortage penalty cost besides the lost revenue. The demand is known to be any value between 600 and 1000 items. Determine the optimal number of units of the item to be stocked.

b) What are the different costs associated with inventory ? Also explain the terms : Leadtime, Re-order point.

OR

6. a) Discuss the case of single period stochastic inventory problem with instantaneous demand.

b) Define (i) Re-order point (ii) Back order (iii) Random leadtime in inventory theory.

Unit – IV

7. a) For a two-parameter Weibull distribution determine the reliability function and failure rate. Examine the monotone behaviours of this distribution. When does this distribution reduces to (i) an exponential distribution (ii) Rayleigh distribution.

b) In classifying the life distribution, when does a distribution possess the following properties ?

(i) IFR (ii) IFRA (iii) New better than used (iv) DFR

OR

8. a) Consider an experiment where a group of n units is observed from time 0; observation stops at the time of r th failure or at time C, whichever occur first. What type of censoring is this ? Also determine the likelihood function.

   b) Define the product-limit estimate of the survivor function and list its properties.

Unit – V

9. a) Let $t_{(1)}, t_{(2)}, \ldots\ldots\ldots, t_{(r)}$ be the first r ordered observations of a random sample of size n from an exponential distribution with parameter θ. Determine the joint distribution of $t_{(1)},\ldots\ldots\ldots,t_{(r)}$. Obtain an expression for the 'total time on test' statistic T. What is the distribution followed by T ?

   b) Obtain the confidence intervals for θ_1/θ_2 where θ_1 and θ_2 represent the mean of two exponential distributions.

OR

10. a) Obtain the likelihood ratio statistic for testing $H_0: \theta : \theta_0$ Vs $H_1 : \theta \neq \theta_0$ for a Type 1 censored one parameter exponential model.

    b) Write a note on the inference procedure for estimating the parameters of a gamma distribution with Type 1 censoring.
