

Reg.No. :

M 11876

Name :

Fourth Semester M.Sc. Degree Examination, May 2006

STATISTICS

Paper 4.1 : Advanced Operations Research

(2004 Admn.)

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) Define unimodal function. Prove that a convex function is unimodal. Describe the unrestricted search method to find the optimum value of a non-linear programming problem.

b) Explain the exhaustive search method. Find the minimum of the function $f = \lambda^5 - 5\lambda^3 - 20\lambda + 5$ by the exhaustive search method in the interval (0, 5).

OR

2. a) Compare the ratios of intervals of uncertainty (Ln/Lo) obtainable in the Dichotomous search with $\delta = 10^{-4}$ and Fibonacci method.

b) Find the minimum of $f(x_1, x_2) = 4x_1^2 + 3x_2^2 - 5x_1x_2 - 8x_1$ by random jumping method.

UNIT – II

3. a) Define a stochastic linear programming problem. Explain the two-stage programming technique to solve a stochastic linear programming problem.

b) Distinguish between pure and mixed integer programming problems. Describe Gomory's method of solving an all-integer linear programming problem.

OR

P.T.O.

4. a) Solve the following integer programming problem.

$$\text{Maximize } f = 3x_1 + 5x_2 + x_3$$

Subject to :

$$3x_1 + 2x_2 \leq 10$$

$$x_1 + 4x_2 \leq 11$$

$$3x_1 + 3x_2 + x_3 \leq 13$$

$$x_1, x_2, x_3 \geq 0, \text{ integers}$$

- b) What is geometric programming ? Explain geometric programming and point out how it differs from other optimization techniques.

UNIT - III

5. a) Name the different types of models of inventory system and explain them in detail. Distinguish between periodic review system (P-system) and fixed order quantity system (Q-system) of inventory.

- b) The probability distribution of monthly sales of a certain item is as follows:

Monthly sales :	0	1	2	3	4	5	6
Probability :	0.02	0.05	0.30	0.27	0.20	0.10	0.06

The cost of carrying inventory is Rs. 10 per unit per month. The current policy is to maintain a stock of four items at the beginning of each month. Assuming that the cost of shortage is proportional to both time and quantity short, obtain the imputed cost of a shortage of one item for one unit of time.

OR

6. a) Derive the continuous case of a probabilistic inventory model with instantaneous demand and no set up cost.

- b) A newspaper boy buys papers for Rs. 1.40 and sells them for Rs. 2.45 each. He cannot return unsold newspapers. Daily demand has the following distribution :

Customers :	25	26	27	28	29	30	31	32	33	34	35	36
Probability :	0.03	0.05	0.05	0.10	1.15	0.15	0.12	0.10	0.10	0.07	0.06	0.02

If each day's demand is independent of the previous day's, how many papers he should order each day ?

UNIT – IV

7. a) Define failure rate and Mean Residual Life Function (MRLF). Show that both failure rate and determine the distribution function uniquely . Also obtain the inter relationship between the failure rate and MRLF.
- b) Discuss the role of Weibull distribution in survival analysis. Define IFR and DFR and examine this ageing behaviour for the Weibull model .

OR

8. a) Distinguish between censoring and truncation. Explain various types of censoring.
- b) Derive the Kaplan-Meir estimator for the survival function and obtain its variance.

UNIT – V

9. a) Obtain the maximum likelihood estimate for the one parameter exponential distribution under type I censored data. Also obtain the likelihood tests statistic for the hypothesis $H_0 : \theta = \theta_0$.
- b) Obtain the maximum likelihood estimates for the two parameter weibull distribution under type II censored data.

OR

10. a) Obtain the maximum likelihood estimates for the two parameter Weibull model under Type I censored data. Also derive the likelihood ratio statistic for testing $H_0 : \beta = \beta_0$ against $H_1 : \beta \neq \beta_0$.
- b) Discuss the role of gamma model in survival analysis. Obtain the maximum likelihood estimates for the gamma model under both censored and uncensored data.