

Name: .....

M. 10215

Reg. No. ....

**FOURTH SEMESTER M.Sc. DEGREE EXAMINATIONS, APRIL 2005**

**STATISTICS**

**PAPER - XVII (ELECTIVE I) - ADVANCED OPERATIONS RESEARCH AND RELIABILITY**

Time : 3 Hours

Max. Marks : 70

Answer any FIVE questions, without omitting any unit

All questions carry EQUAL marks.

**Unit I**

1. a) Define Unimodal function. Explain it graphically. Distinguish between unrestricted search and exhaustive search methods.  
b) Explain dichotomous search method. Find the maximum of  $f(x) = x(1.5-x)$  in the interval (0.0, 1.00) to within 10% of the exact value. **(7+8=15 marks)**
2. a) Explain the procedure used to find minimum of a function of one variable using Fibonacci method.  
b) Describe one random search method. Find the minimum of  $f(x_1, x_2) = x_1 - x_2 + 2x_1^2 + 2x_1x_2 + x_2^2$  using random jumping method. Assume the bounds on  $x_1$  and  $x_2$  as  $-10 \leq x_i \leq 10$ ;  $i = 1, 2$  **(6+9=15 marks)**

**Unit II**

3. a) Define stochastic programming problem. Discuss the impact of uncertainty on an optimization problem.  
b) Describe the chance constrained programming technique for solving a stochastic programming problem. **(7+8=15 marks)**
4. a) Solve the following integer programming problem  
Maximize  $z = 2x_1 + 3x_2$  subject to  
 $-3x_1 + 7x_2 \leq 14$ ,  $7x_1 - 3x_2 \leq 14$ ,  $x_1, x_2 \geq 0$  and are integers.  
b) Explain the general method for solving a geometric programming problem. **(9+6=15 marks)**

**Unit III**

5. a) Distinguish between Deterministic and Probabilistic inventory models.  
b) Formulate and solve an inventory model for goods with demand probabilistic and shortages are allowed. **(6+9=15 marks)**
6. a) Distinguish between fixed lead time models and random lead time models.  
b) Stating the assumptions, formulate a lot size reorder point model. Derive its optimal solution. **(5+10=15 marks)**

Turn Over

**Unit IV**

7. a) Define (i) Survivor function, (ii) hazard rate, and (iii) mean residual life function. Obtain the relationship among them.
- b) Show that for the Weibull model, the hazard function is monotonic for specific values of the shape parameter. **(9+6=15 marks)**
8. a) Define product limit estimator. Derive the Greenwoods formula for the variance of the estimates of the survival function. Describe the use of Greenwoods formula.
- b) Explain the use of least square estimation in survival analysis. **(10+5=15 marks)**

**Unit V**

9. a) Derive the m.l.e's of the parameters in a two parameter Gamma distribution with complete sample.
- b) Derive the likelihood ratio test for testing the equality of  $m$  exponential means, using Type I censored data. **(7+8=15 marks)**
10. a) Derive the m.l.e's of the parameters of the Weibull distribution based on type II data.
- b) Describe the m.l.e procedure to estimate the parameter of an exponential distribution for type I censored data. **(8+7=15 marks)**