



M 20995

Reg. No. : .....

Name : .....

**IV Semester M.A./M.Sc./M.Com. Degree (Reg./Sup./Imp.)**  
**Examination, March 2012**  
**STATISTICS**  
**Paper – 4.1 : Elective – I : Advanced Operations Research**

Time: 3 Hours

Max. Marks: 70

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

**UNIT – 1**

1. a) Explain the random walk method in unconstrained optimization.
- b) Search for the maximum of the function  
 $f(x) = 3 + 6x - 4x^2$  in the interval  $0 \leq x \leq 1$  using Fibonacci search plan with smallest interval of uncertainty as 0.05. (7+7)

OR

2. a) Define a unimodal function and explain the unrestricted search methods.
- b) Find the minimum of  $f(x) = x^4 - 4x^3 - 6x^2 - 16x + 4$  by the Fibonacci method in the interval  $0 \leq x \leq 9$  using a grid of 17 equally spaced internal points. (6+8)

**UNIT – 2**

3. a) Describe Gomory's cutting plane method for solving a pure integer programming problem.
- b) What is integer linear programming problem? Explain the merits and demerits of 'rounding-off' a continuous optimal solution to linear programming problem to obtain an integer solution. (7+7)

OR

4. a) Describe a geometric programming problem and give the necessary conditions for optimality.

P.T.O.



- b) Find the solution of the following non-linear programming problem by geometric programming method.

$$\text{Minimize } f(x) = 2x_1x_2^{-3} + 4x_1^{-1}x_2^{-2} + \frac{32}{3}x_1x_2$$

$$\text{subject to } 10x_1^{-1}x_2^2 = 1 \text{ and } x_1, x_2 \geq 0.$$

(7+7)

## UNIT – 3

5. a) Explain the problem of inventory central, briefly describing the different types of costs that are generally involved in such problems.

- b) Obtain the EOQ formula for a lot-size reorder point model.

(7+7)

OR

6. a) State and solve the 'news-boy problem'.

- b) Discuss a single-inventory system with stochastic demand, given that the demand structure during the scheduling period is uniform.

(7+7)

## UNIT – 4

7. a) Describe a continuous model for lifetime, explaining the basic elements of survival function, hazard function and hazard rate. Bring out the mutual relationship between these three elements.

- b) Obtain the above elements with respect to a Weibull model.

(8+6)

OR

8. a) Explain the Kaplan-Meier product limit estimator and mention its important properties. Also obtain the variance of this estimate.

- b) Explain the log-rank test for comparing two survival functions.

(8+6)

## UNIT – 5

9. Discuss the maximum likelihood estimation in the presence of Type 1 and Type 2 censoring based on a survival model. Illustrate with a suitable example.

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OR

10. Discuss the likelihood ratio test with reference to Weibull distribution based on survival data.

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