

[This question paper contains 4 printed pages.]

439

Your Roll No. ....

**B.A. (Hons.)/II**

**E**

Discipline Centred Concurrent Course

**MATHEMATICS – Mathematical Methods**

(Other than Economics)

(Admission of 2005 and onwards)

*Time : 2 Hours*

*Maximum Marks : 38*

*(Write your Roll No. on the top immediately  
on receipt of this question paper.)*

*Question No. 1 is compulsory and carries  
twelve marks.*

*Attempt three more questions selecting one question  
from each of Sections I, II and III.*

*Marks are indicated against each part.*

*Use of scientific calculator is allowed.*

1. (i) Use the linear approximation  $(1 + t)^k \approx 1 + kt$  to find an approximation for the function  $f(x) = (4 + 3x)^{1/3}$  for value of  $x$  near 0. (3)

P.T.O.

- (ii) Find the mean and variance of the probability distribution of the number of heads obtained in four flips of a balanced coin. (3)
- (iii) A coin is tossed four times. Find the chances of throwing (i) four tails (ii) three heads and one tail. (3)
- (iv) Solve the following linear programming problem by Simplex method:
- Maximize :  $6x - 2y$
- Subject to :  $2x - y \leq 2$
- $x \leq 4$
- $x, y \geq 0$  (3)

### Section I

2. (i) Solve the following system of equations using Gauss-Seidal method:

$$10x + y + z = 12$$

$$2x + 10y + z = 13$$

$$2x + 2y + 10z = 14$$

Perform two iterations and take initial approximation as  $x^{(0)} = 0, y^{(0)} = 0, z^{(0)} = 0$ . (5)

- (ii) Perform three iterations of Newton-Raphson method to find a positive root of the equation:

$$x^3 - x + 4 = 0 \text{ which lies in the interval } (1, 2). \quad (5)$$

3. (i) Apply Simpson's one third rule of estimate the value of the integral  $\int_1^2 dx/x$  dividing the interval (1, 2) into four equal parts. (6)

- (ii) Find Taylor polynomial approximation of degree 5 of the function  $f(x) = \sin x$  around the point  $x = 0$ . (4)

### Section-II

4. (i) Fit a straight line to the following data taking  $y$  as the dependent variables.

x	1	2	3	4	5
y	3	5	12	16	24

(6)

- (ii) The means of two samples of 1000 and 2000 members are 67.5 inches and 68 inches respectively. Can the samples be regarded as drawn from the population of standard deviation 2.5 inches? (5)

5. (i) The height of plants of a certain species are normally distributed, the mean height being 30 cm and the standard deviation being 5 cm. What proportion of plants are greater than 40 cm in height?

It is given that area under the standard normal curve between  $z = 0$  and  $z = 2$  is 0.4772. (6)

- (ii) Find the Binomial distribution when the sum of its mean and variance for 5 trials is 4.8. (5)

### Section-III

6. Use dominance principle to solve the following game

		Player A			
		1	7	2	
Player B	6	2	7		(5)
	5	1	6		

7. Solve the following linear programming problem by graphical methods:

Maximize :  $4x + 7y$

Subject to:  $2x + y \leq 1$

$$x + 7y \leq 2$$

$$x, y \geq 0$$

(5)  
(100)