[This question paper contains 4 printed pages.]

43|8   *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) Find an approximate value of :

$$I = \int_0^2 e^x dx$$

using Simpson's 1/3 rule.   (3)

P.T.O.

(ii) Find the probability that at most 10 defective fuses will be found in a box of 200 fuses if experience of experience show that 2% of such fuses are defective. ($e^{-4} = 0.0183$) (3)

(iii) Assume the mean height of cricket players in Indian team 68.22 inches and standard deviation 3.28 inches. How many players in the team of 25 players would be over 6 feet tall? Area under the standard normal curve between $z = 0$ and $z = 1.15$ is 0.3746. (3)

(iv) Solve the following two-person zero-sum game.

$$
\begin{array}{c}
\quad\ B_1\ B_2\ B_3 \\
\begin{array}{c} A_1 \\ A_2 \\ A_3 \end{array}
\left[\begin{array}{ccc}
1 & 2 & 1 \\
0 & -4 & -1 \\
1 & 3 & -2
\end{array}\right]
\end{array}
$$
(3)

Section I

2. (i) Perform four iterations of Newton-Raphson method to obtain the approximate value of $(17)^{1/3}$. Take the initial approximation at $x_0 = 2$. (5)

    (ii) Find the Taylor polynomial approximation of degree 9 of the function $f(x) = \sin x$ around the point $x = 0$. (5)

3. (i) Solve the following system of equations

$$x + y + z = 6$$

$$3x + 3y + 4z = 20$$

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

by using Gauss- elimination method with partial pivoting wherever necessary.   (5)

(ii) Apply Trapezoidal rule of estimate the value of

$\int_1^2 dx/x$, by dividing the interval (1, 2) into four equal intervals.   (5)

Section-II

4. (i) A problem of statistics is given to three students whose chances for solving are 1/2, 1/3, 1/4 respectively. What is the probability that the problem is solved?   (4)

(ii) The dean of a college wants to use the mean of a random sample to estimate the average amount of time students take to get from one class to the next, and she wants to be able to assert with 95 percent confidence that the error is at most 0.25 minute. If it can be presumed from experience that $\sigma = 1.50$ minutes, how large a sample will she have to take?   (7)

P.T.O.

5. (i) Two random variables have the least squares regression lines $3x + 2y = 26$ and $6x + y = 31$. Find the mean values and the coefficient of correlations. (7)

(ii) A die (unbiased) is rolled. A person gets Rs. 10 if he gets an odd number and loses Rs. 5 for an even number. What is his expectation? (4)

Section-III

6. Solve the following linear programming problem by simplex methods:

Maximize : $2x + 3y$

Subject to: $4x + y \leq 16$

$x + 2y \leq 12$

$x, y \geq 0$ (5)

7. Consider a modified form of "matching biased coins" game problem. The matching player is paid Rs. 8.00 if the two coins turn both heads and Rs. 1.00 if the coins turn both tails. The non-matching player is paid Rs. 3.00 when the two coins do not match. Given the choice of being the matching or non-matching player, which one would you choose and what would be your strategy? (5)