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Your Roll No.

5661

B.A. (Hons.) – II

D

Discipline Centred Concurrent Course

MATHEMATICS —Mathematical Methods

(Other than Economics)

(Admissions 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 thirteen 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.

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P.T.O.

(ii) Using the linear approximation $(1 + t)^k = 1 + kt$ to estimate $\sqrt[5]{1.006}$. 2

(iii) Find the probability that at most 5 defective fuses will be found in a box of 200 fuses if experience shows that 2% of such fuses are defective.

$$[e^{-4} = 0.0183]. \quad 3$$

(iv) A sample of 400 female students is found to have a mean height of 67.47 inches. Can it be reasonably regarded as a sample from a large populations with mean height 67.39 inches and standard deviation 1.30 inches. 3

(v) Solve the following two-person zero-sum game :

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

Section I

2. (i) Solve the following system of equations

$$2x + 2y + z = 1$$

$$4x + 2y + 3z = 2$$

$$x + y + z = 3$$

by using Gauss-elimination method with partial pivoting

wherever necessary.

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- (ii) Perform three iterations of Newton-Raphson method to

obtain the approximate value of $1/3$. Take the initial

approximation at $x_0 = 0.3$.

5

3. (i) Solve the following system of equations using Gauss-Seidel method :

$$2x - y = 7$$

$$-x + 2y - z = 1$$

$$-y + 2z = 1$$

Perform two iterations and take the initial approximation

$$\text{as } x^{(0)} = 0, y^{(0)} = 0, z^{(0)} = 0.$$

5

- (ii) Perform four iterations of the bisection method to obtain the smallest positive root of the equation

$$f(x) = x^3 - 5x + 1 = 0.$$

4

Section II

4. (i) The means of two samples of 1000 and 2000 members are 67.5 inches and 68.0 inches, respectively. Can the samples be regarded as drawn from the population of standard deviation 2.5 inches ?

6

- (ii) The following sample data show the demand for a product (in thousands of units) and its price (in thousands of Rupees) charged in five different market areas :

Price	Demand
18	9
16	22
10	125
11	90
14	57

Fit the least square line.

5

5. (i) If 4 coins are tossed. What is the expectation of the number of heads ?

6

P.T.O.

- (ii) 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. 5

Section III

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

Maximize : $5x + 7y$

Subject to :

$$x \leq 8$$

$$y \leq 3$$

$$3x + 2y \leq 24$$

$$x, y \geq 0.$$

7. Solve the following two-person zero-sum game graphically :

		Player II		
		1	2	3
Player I	1	3	0	2
	2	1	4	2

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