

This question paper contains 4+2 printed pages]

Your Roll No. ....

5660

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 *fourteen* 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 the Taylor approximation of degree 5 of the function

$$f(x) = \sin x \text{ around the point } x = 0.$$

3

P.T.O.

- (ii) A car hire firm has two cars which it hires out day by day. The number of demand for a car on each day is distributed as Poisson variate with mean 1.5. Calculate the proportion of days on which some demand is refused. 3
- (iii) In five tests, one student averaged 63.2 with a standard deviation of 3.3, while another student averaged 78.8 with a standard deviation of 5.3. Find which student is more consistent. 3
- (iv) How many different sample of size  $n = 3$  can be selected from a finite population of size 40 ? 2
- (v) Solve the following two-person zero-sum game : 3

**Player II**

		B <sub>1</sub>	B <sub>2</sub>	B <sub>3</sub>
<b>Player I</b>	A <sub>1</sub>	-3	-2	6
	A <sub>2</sub>	2	0	2
	A <sub>3</sub>	5	-2	-4

## Section I

2. (i) Find an approximate value of

$$\int_0^{0.3} (1 - 8x^3)^{1/2} dx$$

using Simpson's 3/8 rule.

5

- (ii) Solve the following system of equations :

$$x + y + z = 6$$

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

$$2x + y + 3z = 13$$

by using Gauss-elimination method with partial pivoting

wherever necessary.

5

3. (i) Perform four iterations of Newton-Raphson method of find

the smallest root of the equation  $x^3 - 5x + 1 = 0$ .

6

- (ii) For what value of  $x$  can we replace  $\sin x$  by  $x - \frac{x^3}{3!}$  with an error magnitude no greater than  $3 \times 10^{-4}$ . 2
- (iii) Find the linearization of

$$f(x) = \sqrt{x^2 + 9} \quad \text{at } x = -4. \quad 2$$

### Section II

4. (i) Assume the mean height of soldiers in a normal distribution to be 68.22 inches and variance 10.8 inches. How many soldiers in a regiment of 1000 soldiers would you expect to be over 6 feet tall ? It is given that area under the standard normal curve between  $z = 0$  and  $z = 1.15$  is 0.3746. 5
- (ii) A speaks truth in 75% and B in 80% of the cases. In what percentage of cases are they likely to contradict each other in stating the same fact ? 4

5. (i) A soap manufacturing company was distributing a particular brand of a soap through a large number of retail shops. Before advertisement campaign, the mean sales per week was 140 dozens. After the campaign a sample of 26 shops were taken and the mean sales was found to be 147 dozens with standard deviation 16. Can you consider the advertisement effective ? 5
- (ii) The probability that a person will die within a month after a certain cancer operation is 18%. What are the probabilities that in three such operations, one, two or all three persons will survive ? 4

## Section III

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

Maximize :  $2x + 3y$

Subject to :

$$4x + y \leq 16$$

$$x + 2y \leq 12$$

$$x, y \geq 0.$$

5

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

		<b>Player II</b>		
		1	2	3
<b>Player I</b>	1	3	-1	1
	2	2	4	3

5