[This question paper contains 4 printed pages.]

436 *Your Roll No.* ....

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

DISCIPLINE CENTRED CONCURRENT COURSE

Maths other than Economics

(Algebra and Calculus

(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* **eight** *marks. Attempt* **Six** *more questions from the remaining Question Nos.* **2** *to* **10,** *selecting* **two** *questions each from Section* **I, II** *and* **III.** *Each question carries* **Five** *marks.*

1. (i) Is the set $\{(1,1,0), (0,1,0), (0,1,1)\}$ linearly independent ? Justify. (2)

P.T.O.

(ii) Find the sum of the geometric series

$$3+\frac{3}{4}+\frac{3}{4^2}+\frac{3}{4^3}+\ldots+\frac{3}{4^k}+\ldots \qquad (2)$$

(iii) Is the function defined as

$$f(x)=\begin{cases}\dfrac{x^2-9}{x-3}, & x\neq 3\\ 5\quad, & x=3\end{cases}$$ is continuous at $x=3$

(2)

(iv) Evaluate $\int \log x \, dx$ (2)

SECTION – I

2. Discuss the consistency of the following system of equations

$$2x + 3y + 4z = 11$$

$$x + 5y + 7z = 15$$

$$3x + 11y + 13z = 25$$

If found consistent, solve it. (5)

3. Find the vertex, focus and directrix of the parabola

$$x^2 = 6y \qquad (5)$$

4. Solve by cramer's rule

$$2x - y = 17$$

$$3x + 5y = 6 \qquad (5)$$

SECTION – II

5. Find all the points of local maxima and minima of the function

$f(x) = x^3 - 6x^2 + 9x - 8$ (5)

6. Verify Lagrange's mean value theorem for the function

$f(x) = (x - 3)(x - 6)(x - 9)$ on the interval $[3,5]$ (5)

7. Give the Maclaurin series for the function :

$$f(x) = e^{2x}, \ -\infty < x < +\infty$$

Find the sum of the series at $x = \frac{1}{2}$. (5)

SECTION – III

8. Evaluate $\int \frac{dx}{x^2 + a^2}$. (5)

9. Find the arc length of the curve $y = 3x^{\frac{3}{2}} - 1$ from $x = 0$ to $x = 1$. (5)

10. Find the general solution of the differential equation

$$\frac{dy}{dx} = \frac{x+1}{2-y},\ y \neq 2$$ (5)