[This question paper contains 4 printed pages.]

Your Roll No.....

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Sr. No. of Question Paper	:	**4960**
Unique Paper Code	:	62357604
Name of the Paper	:	Differential Equations
Name of the Course	:	**B.A. (Prog.)**
Semester	:	VI

Duration : 3 Hours

Maximum Marks : 75

Instructions for Candidates

1. Write your Roll No. on the top immediately on receipt of this question paper.
2. Attempt any two parts from each question.
3. All questions are compulsory.

Q.1

(i) Solve the differential equation

$$(x^2 - 3y^2)\,dx + 2xy\,dy = 0$$

6

(ii) Solve the differential equation

$$\frac{dy}{dx} + y = x\,y^3$$

6

(iii) Solve the following differential equation

$$e^{4x}\,(p-1) + e^{2y}\,p^2 = 0$$

by reducing it to Clairaut form using the transformation

$$e^{2x} = u \text{ and } e^{2y} = v.$$

6

P.T.O.

Q. 2

(i) Find the general solution of

$$y''' - 5y'' + 7y' - 3y = 0$$

6

(ii) Given that e^{-x}, e^{3x} and e^{4x} are all solution of

$$y''' - 6y'' + 5y' + 12y = 0$$

Show that they are linearly independent on the interval $-\infty < x < \infty$ and write the general solution.

6

(iii) Solve the equation

$$x^2 \frac{d^2y}{dx^2} - 2x \frac{dy}{dx} + 2y = 0$$

6

Q.3

(i)

Find the general solution of the given differential equation using variation of parameter method.

$$y'' + y = \tan x$$

6.5

(ii) Solve

$$\frac{dx}{dt} + 7x + y = 0$$

$$\frac{dy}{dt} + 2x + 5y = 0$$

6.5

(iii) Solve

$$\frac{dx}{y^3x - 2x^4} = \frac{dy}{2y^4 - x^3y} = \frac{dz}{9z(x^3 - y^3)}$$

6.5

Q.4

(i) Form the partial differential equation of the equation

$$\frac{x^2}{a^2} + \frac{y^2}{b^2} + \frac{z^2}{c^2} = 1$$

6

(ii) Find the general solution of the equation

$$2(xp - yq) = y^2 - x^2$$

6

(iii) Find the complete integral of $z = pq$

6

Q.5

(i) Find the partial differential equation of all spheres having their centers in the xy-plane.

6.5

(ii) Find the general solution of the equation

$$x^2p + y^2q = (x + y)z$$

6.5

(iii) Find the complete integral of $px + qy = pq$

6.5

Q.6

(i) Find the general solution of the equation

$$y^2p - xyq = x(z - 2y)$$

6.5

(ii) Find a complete integral of $p = (z + qy)^2$ 6.5

(iii) Reduce the equation $r - x^2t = 0$ to the canonical form. 6.5