

- (b) Find the general solution of the linear partial differential equation

$$(y + zx)p - (yz + x)q = x^2 - y^2 \quad (6.5)$$

- (c) Find the integral surface of the partial differential equation

$$z(x + y)p + z(x - y)q = x^2 + y^2, \quad y = 2x, \quad z = 0 \quad (6.5)$$

6. (a) Find the complete integral of the equation

$$(p + q)(px + qy) = 1 \quad (6)$$

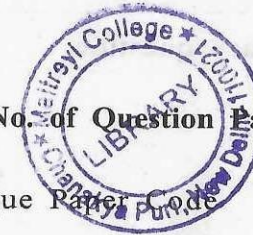
- (b) Reduce the following partial differential equation into canonical form

$$x^2 \frac{\partial^2 z}{\partial x^2} - y^2 \frac{\partial^2 z}{\partial y^2} + x \frac{\partial z}{\partial x} - y \frac{\partial z}{\partial y} = 0 \quad (6)$$

- (c) Solve

$$p \tan x + q \tan y = \tan z \quad (6)$$

[This question paper contains 4 printed pages.]



Your Roll No.....
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Sr. No. of Question Paper : 4915

Unique Paper Code : 42357501

Name of the Paper : Differential Equations

Name of the Course : B.Sc. (Prog.) - DSE

Semester : V

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 **all** question by selecting **two** parts from each question.
3. Part of the questions to be attempted together.
4. If question paper has **Part- A/B/C** (write appropriate direction).
5. Use of non-programmable Scientific Calculator allowed.

Attempt any two parts from each question.

1. (a) Solve $y - x \frac{dy}{dx} = a \left(y^2 + \frac{dy}{dx} \right)$. (6.5)

(b) Find the integrating factor and solve the differential equation

$$(x^2 + y^2 + 1)dx - 2xydy = 0 \quad (6.5)$$

(c) Solve $x \log x \frac{dy}{dx} + y = 2 \log x$. (6.5)

2. (a) Solve $(D^2 + D)y = x^2 + 2x + 4$, where $D = \frac{d}{dx}$. (6)

(b) Find a family of oblique trajectories that intersect the family of straight line $y = cx$ at an angle 45° . (6)

(c) Solve $xp^2 - 2yp + ax = 0$. (6)

3. (a) Using the method of variation of parameters, solve the differential equation

$$(x+4) \frac{dy}{dx} + 3y = 3 \quad (6.5)$$

(b) Find the general solution of

$$x^2 \frac{d^2y}{dx^2} + x \frac{dy}{dx} + 4y = 2x \log x \quad (6.5)$$

(c) Solve

$$t dx = (t - 2x) dt$$

$$t dy = (tx + ty + 2x - t) dt \quad (6.5)$$

4. (a) Solve

$$(D^3 - 3D^2 - 6D + 8)y = xe^{-3x}, \text{ where } D = \frac{d}{dx}. \quad (6)$$

(b) Solve

$$((D^2 - 1)y = x^2 \cos x \quad (6)$$

(c) Solve

$$(D^2 - 1)y = e^{-x} \sin e^{-x} + \operatorname{cose}^{-x} \quad (6)$$

5. (a) Form a partial differential equation corresponding to complete integral

$$x + y + z = f(x^2 + y^2 + z^2), \text{ where } f \text{ is an arbitrary function.} \quad (6.5)$$