



- Notes : 1. Solve all **five** questions.
2. All questions carry equal marks.

UNIT – I

1. a) Find the integral curves of the set of equations $\frac{dx}{x(y-z)} = \frac{dy}{y(z-x)} = \frac{dz}{z(x-y)}$ **6**
- b) Test the PDE $ydx + xdy + 2zdz = 0$ for integrability & find its solution. **6**

OR

- c) Find the general solution of the PDE $x^2 \frac{\partial z}{\partial x} + y^2 \frac{\partial z}{\partial y} = (x + y)z$ **6**
- d) Eliminate the arbitrary function f from $f(x^2 + y^2 + z^2, z^2 - 2xy) = 0$ and obtain the PDE. **6**

UNIT – II

2. a) Show that the equations $xp - yq = x$ and $x^2p + q = xz$ are compatible and find their solutions. **6**
- b) Find the complete integral of the equation $p^2x + q^2y = z$ by Charpit's method. **6**

OR

- c) Find the complete integral of $zpq = p + q$. **6**
- d) Show that a complete integral of $f\left(\frac{\partial u}{\partial x}, \frac{\partial u}{\partial y}, \frac{\partial u}{\partial z}\right) = 0$ is $u = ax + by + \theta(a, b)z + c$ where a, b, c are arbitrary constants, and $f(a, b, \theta) = 0$, also find a complete integral of the equation $\frac{\partial u}{\partial x} + \frac{\partial u}{\partial y} + \frac{\partial u}{\partial z} = \frac{\partial u}{\partial x} \cdot \frac{\partial u}{\partial y} \cdot \frac{\partial u}{\partial z}$. **6**

UNIT – III

3. a) Solve the following differential equation $\frac{\partial^3 z}{\partial x^3} - 3 \frac{\partial^3 z}{\partial x^2 \partial y} + 4 \frac{\partial^3 z}{\partial y^3} = e^{x+2y}$ **6**
- b) Solve $\frac{\partial^2 z}{\partial x^2} - \frac{\partial^2 z}{\partial x \partial y} = \sin x \cos 2y$ **6**

OR

c) Solve $\frac{\partial^2 U}{\partial x^2} + \frac{\partial^2 U}{\partial y^2} = -4\pi(x^2 + y^2)$ 6

d) Solve $(D^2 - 2DD' - 8D'^2)z = \sqrt{2x+3y}$ 6

UNIT – IV

4. a) Solve : $D(D-2D'-3)z = e^{x+2y}$. 6

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

OR

c) Solve $yt - q = xy$. 6

d) Solve $x^2 \frac{\partial^2 z}{\partial x^2} - 4xy \frac{\partial^2 z}{\partial x \partial y} + 4y^2 \frac{\partial^2 z}{\partial y^2} + 6y \frac{\partial z}{\partial y} = x^3 y^4$ 6

5. Solve any six.

a) Eliminate the constants a & b from $z=(x+a)(y+b)$ & obtain PDE. 2

b) Eliminate the arbitrary function f from $z=f(x-y)$ & obtain PDE. 2

c) Write the condition of compatibility for the partial differential equations $f(x, y, z, p, q) = 0$ & $g(x, y, z, p, q) = 0$. 2

d) Find the complete integral of $pq = 1$. 2

e) Solve $(D^4 - D'^4)z = 0$. 2

f) Find the Particular integral of $\frac{\partial^2 z}{\partial x^2} - \frac{\partial^2 z}{\partial x \partial y} - 2 \frac{\partial^2 z}{\partial y^2} = e^x$ 2

g) Solve $(D+2D'-3)(2D-D'+5)z = 0$ 2

h) Find P. I. of PDE $(D^2 - D^1)z = e^{x-2y}$. 2
