

B.Sc. I (CBCS Pattern) Sem-II
USMT04 - Mathematics Paper-II : Partial Differential Equations

P. Pages : 2

Time : Three Hours



GUG/W/22/11587

Max. Marks : 60

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

UNIT – I

1. a) Find the integral curves of the differential equation **6**
- $$\frac{dx}{y+z} = \frac{dy}{z+x} = \frac{dz}{x+y}$$
- b) Obtain the partial differential equation which represents the set of all spheres whose centres lie along the z-axis. **6**

OR

- c) Solve $(x+z)^2 dy + y^2(dx+dz) = 0$. **6**
- d) Find the general integral of the PDE **6**
- $$z(xp - yq) = y^2 - x^2$$

UNIT – II

2. a) Show that the partial differential equation $z = px + qy$ is compatible with any equation $f(x, y, z, p, q) = 0$, where f is homogeneous in x, y, z . **6**
- b) Find the complete solution of $z^2 = pqxy$ by using Charpit's method. **6**

OR

- c) Find the complete integral of nonlinear partial differential equation $z = p^2x + q^2y$. **6**
- d) Find the complete integral of $p^2 - x = q^2 - y$ by using Charpit's method. **6**

UNIT – III

3. a) Solve $(D^2 + 3DD' + 2D'^2) z = x + y$. **6**
- b) Solve the equation $r - 3s + 2t = e^{2x+3y} + \sin(x-2y)$. **6**

OR

- c) Solve $(D^2 + D'^2)z = \cos Ax \cos Bx$. 6
- d) Solve the equation 6
 $4D_z^2 - 4DD'z + D'^2z = 16 \log(x + 2y)$

UNIT – IV

4. a) Solve the equation 6
 $D(D - 2D' - 3)z = e^{x+2y}$.
- b) Solve $(D^2 + DD' + D' - 1)z = e^{-x} + e^{2x-y}$. 6

OR

- c) Solve the equation 6
 $x^2 \frac{\partial^2 z}{\partial x^2} - y^2 \frac{\partial^2 z}{\partial y^2} - y \frac{\partial z}{\partial y} + x \frac{\partial z}{\partial x} = 0$
- d) Solve $(D - D' - 1)(D - D' - 2)z = e^{2x-y}$. 6

5. Solve any six.

- a) Solve the total differential equation $ydx + xdy + 2zdz = 0$. 2
- b) Eliminating arbitrary constants from the equation $z = (x - a)^2 + (y - b)^2$, obtain PDE. 2
- c) Write the condition of compatibility for the equations $f(x, y, z, p, q) = 0$ and $g(x, y, z, p, q) = 0$. 2
- d) Solve the equation $q = 3p^2$ 2
- e) Find particular integral of $(D^2 + 2DD' + D'^2)z = e^{3x+2y}$ 2
- f) Solve $r = a^2t$ 2
- g) Solve the equation $DD'(2D' - 3)z = 0$ 2
- h) Find the particular integral of $(D^2 - D')z = e^{x-2y}$ 2
