B.Sc. I (C.B.C.S. Pattern) Sem-II

USMT-04 - Mathematics Paper-II (Partial Differential Equation)

P. Pages : 2 **GUG/S/19/11587**

Time : Three Hours * 3 4 8 2 * Max. Marks : 60

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

UNIT – I

1. a) Solve $\frac{dx}{x(y-z)} = \frac{dy}{y(z-x)} = \frac{dz}{z(x-y)}$. **6**

b) Find the general integral of the PDE $z(xp - yq) = y^2 - x^2$. **6**

OR

c) Solve the D.E. **6**
$y(1+z^2)dx - x(1+z^2)dy + (x^2+y^2)dz = 0$

d) Solve the homogeneous differential equation **6**
$(y^2 + yz)dx + (z^2 + zx)dy + (y^2 - xy)dz = 0$

UNIT – II

2. a) Solve $p^2 + q^2 = k^2$. **6**

b) Find the complete integral of $z^2(p^2x^2 + q^2) = 1$. **6**

OR

c) Show that the equations $xp - yq = x$ and $x^2p + q = xz$ are compatible and find their solutions. **6**

d) Find the complete solution of $(p^2 + q^2)y = qz$ by Charpit's method. **6**

UNIT – III

3. a) Solve $\frac{\partial^2 v}{\partial x^2} + \frac{\partial^2 v}{\partial y^2} = -4\pi(x^2 + y^2)$. **6**

b) Find a particular integral of **6**
$(D^2 - D')z = 2y - x^2$

OR

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

d) Solve $xpq + yq^2 = 1$ by Jacobi's method. **6**

UNIT – IV

4. a) Show that the solution of a non – homogeneous D.E. $(aD + bD' + c)Z = 0$ is $Z = e^{-cx/a} F(ay - bx)$, $a \neq 0$. **6**

b) Solve $(D^2 + DD' + D' - 1)Z = e^{2x-y}$. **6**

OR

c) Solve $(D - D' - 1)(D - D' - 2)Z = x$. **6**

d) Solve the equation **6**

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

5. Solve **any six.**

a) Solve : $(yz + zxy)dx + (zx + xyz)dy + (xy + xyz)dz = 0$. **2**

b) Obtain PDE by Eliminating the arbitrary constants from $x^2 + y^2 + (z - c)^2 = r^2$. **2**

c) Solve $pqz = p^2(xq + p^2) + q^2(yp + q^2)$. **2**

d) Show that the equations $f(x, y, p, q) = 0$ and $g(x, y, p, q) = 0$ are compatible if $J_{xp} + J_{yq} = 0$. **2**

e) Solve $2r + 5s + 2t = 0$. **2**

f) Find the particular integral of **2**
$(D^2 - DD' - 2D'^2)Z = e^x$

g) Solve $(D + 2D' - 3)(2D - D' + 5)Z = 0$. **2**

h) Find particular integral of **2**
$(D - D' - 1)(D - D' - 2)Z = e^{2x-y}$

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