B.Sc.- I (CBCS Pattern) Semester-II

USMT-04 - Mathematics Paper-II - Partial Differential Equations

P. Pages : 2 **GUG/S/25/11587**

Time : Three Hours * 1 5 3 7 * Max. Marks : 60

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

UNIT-I

1. a) Form the partial differential equation by eliminating the arbitrary function from the equation $f\left(x^2+y^2+z^2, z^2-2xy\right)=0$ **6**

b) Solve $\dfrac{dx}{x\left(y^2-z^2\right)}=\dfrac{dy}{-y\left(z^2+x^2\right)}=\dfrac{dz}{z\left(x^2+y^2\right)}$. **6**

OR

c) Find the general solution of PDE **6**
$x^2p+y^2q=(x+y)z$

d) Find the general integral of $(mz-ny)p+(nx-\ell z)q+mx-\ell y=0$. **6**

UNIT – II

2. a) Show that the equation xp – yq = x and $x^2p+q=xz$ are compatible and final their solutions. **6**

b) Solve the PDE **6**
$(y-x)(qy-px)=(p-q)^2$

OR

c) Solve the PDE **6**
$p^2+q^2=x^2+y^2$

d) Solve the PDE **6**
$z^2=pqxy$
by Charpit's method.

UNIT – III

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

b) Solve the equation **6**
$$\frac{\partial^2 z}{\partial x^2}-\frac{\partial^2 z}{\partial x\cdot\partial y}=\cos x\cdot\cos 2y$$

OR

c) Prove that **6**
$$\frac{1}{D-mD'}f(x,y)=\int f(x,c-mx)\,dx,\ c=y+mx$$

d) Solve the equation **6**

$xpq + yq^2 = 1$

by Jacobi's method

UNIT – IV

4. a) Prove that the solution of non-homogenous equation $(bD' + c)z = 0$ is **6**

$e^{-cy/b}F(bx), b \neq 0$

b) Solve the D. E. **6**

$D(D - 2D' - 3)z = e^{x+2y}$

OR

c) Solve the equation **6**

$$x^2 \cdot \frac{\partial^2 z}{\partial x^2} - y^2 \frac{\partial^2 z}{\partial y^2} - y\frac{\partial z}{\partial y} + x \cdot \frac{\partial z}{\partial x} = 0$$

d) Reduce the equation **6**

$$y^2 r - 2x\, y5 + x^2 t = \frac{y^2}{x} p + \frac{x^2}{y} q$$

to canonical form and hence solve it.

5. Solve **any six**.

a) Form a PDE from the equation. **2**

$x^2 + y^2 + (z - c)^2 = r^2$

b) Write the Condition of integrability of Pdx + Qdy + Rdz = 0. **2**

c) Show that the equation $f(x, y, p, q) = 0$ and $g(x, y, p, q) = 0$ are compatible if **2**

$J_{xp} + J_{yq} = 0$

d) Obtain the complete integral of the equation. **2**

pq = 1

e) Solve the equation **2**

$(D^3 - 6D^2D' + 11DD'^2 - 6D'^3)z = 0$

f) Find P.I. of **2**

$$\frac{1}{2D - 3D'} e^{x-y}$$

g) Find P.I. of **2**

$(D^2 - D')z = e^{x+y}$

h) Find Particular Integral of equation $(D - D' - 2)z = e^{2x-y}$. **2**

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