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

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

P. Pages : 2 **GUG/W/24/11587(S)**

Time : Three Hours * 7 6 4 1 * Max. Marks : 60

Notes : 1. Solve all the questions.
2. Each question carry equal marks.

UNIT – I

1. a) Show that $(2x^2+2xy+2xz^2+1)\,dx+dy+2zdz=0$ is integrable & hence solve it. **6**

b) Solve : $\dfrac{dx}{y+z}=\dfrac{dy}{z+x}=\dfrac{dz}{x+y}$ **6**

OR

c) Form the PDE from $f(x+y+z,\ x^2+y^2+z^2)=0$. **6**

d) Solve : $x^2p+y^2q=(x+y)z$. **6**

UNIT – II

2. a) Show that $xp-yq=x$ & $x^2p+q=xz$ are compatible & find their solutions. **6**

b) Find the complete integral of $(p^2+q^2)\,y=qz$. **6**

OR

c) Solve by Charpit's method $pxy+pq+qy=yz$. **6**

d) Solve : $zpq=p+q$. **6**

UNIT – III

3. a) Solve : **6**

i) $r=a^2t$

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

b) Solve : $\left(D^3+4D^2D'-4DD'^2\right)z=\cos(2x+3y)$ **6**

OR

c) Solve : $\frac{\partial^2 z}{\partial x^2} - \frac{\partial^2 z}{\partial x \partial y} = \cos x \cos 2y$ **6**

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

UNIT – IV

4. a) Show that the solution of DE **6**
$(aD + bD' + c)z = 0$ is $z = e^{-cx/a} F(ay - bx),\ a \neq 0$
Hence solve : $(D + 2D' - 3)z = 0.$

b) Solve : $(D + 2D')(D - 2D' + 1)(D^2 + D + D')z = 0.$ **6**

OR

c) Solve : $(D^2 - D')z = xe^{x+y}$ **6**

d) Solve : $x\frac{\partial^2 z}{\partial x^2} - y^2\frac{\partial^2 z}{\partial y^2} - y\frac{\partial z}{\partial y} + x\frac{\partial z}{\partial x} = 0.$ **6**

5. Solve **any six.**

a) Reduce the equation $(x + z)^2 dy + y^2(dx + dz) = 0$ to variable separable form. **2**

b) Obtain the PDE from $x^2 + y^2 + (z - c)^2 = r^2$ **2**

c) Show that equations $f(x, y, p, q) = 0$ & $g(x, y, p, q) = 0$ are compatible if $Jxp + Jyq = 0.$ **2**

d) State the Charpit's equations. **2**

e) Write the solution of $(D - mD')z = 0.$ **2**

f) Find P.I. of $(2D - 3D')z = e^{x-y}$ **2**

g) Solve : $(D^2 - D')z = 0.$ **2**

h) Classify the equation $r = x^2 t.$ **2**

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