Bachelor of Science (B.Sc.) (CBCS Pattern) Second Semester CBCS USMT-04 - Mathematics Paper-II (Partial Differential Equation)

P. Pages : 2 Time : Three Hours			$\begin{array}{c} \text{GUG/W/18/115} \\ & & \\$	7 /18/11587 . Marks : 60	
	Note	es: 1. 2. 3.	Solve all five question. Question No. 1 to 4 have an alternative solve each question in full or its alternative in full. All question carry equal marks.		
			UNIT – I		
1.	a)	Find the	e integral curves of the equations $\frac{dx}{x(y-z)} = \frac{dy}{y(z-x)} = \frac{dz}{z(x-y)}$	6	
	b)	Find the	e general solution of the PDE $x^2p + y^2q = (x + y)z$.	6	
			OR		
	c)	Prove the arbitrary	hat the equation $F(u, v) = 0$ gives a PDE of the form $P_p + Q_q = R$, where F is an y function of independent functions $u = u(x, y, z)$ and $v = v(x, y, z)$.	6	
	d)	Form the equation	the partial differential equation by eliminating the arbitrary functions from the n. $z = xy + f(x^2 + y^2)$	6	
			UNIT – II		
2.	a)	Show th	hat the equation $xp - yq = x$ and $x^2p + q = xz$ are compatible and find their solution.	6	
	b)	Prove the homogen	hat PDE $z = px + qy$ is compatible with any equation $f(x, y, z, p,q) = 0$, where f is enous in x, y, z.	6	
			OR		
	c)	Find the	e complete integral of the equation $p^2x + q^2y = z$ by Charpit's method.	6	
	d)	Find the	e complete integral of $p + q = pq$.	6	
			UNIT – III		
3.	a)	Solve th	he PDE $(D^2 + 3DD' + 2D'^2)z = x + y$.	6	
	b)	Solve the solution $\frac{\partial^2}{\partial x}$	The partial differential equation $\frac{\partial^2 V}{\partial x^2} + \frac{\partial^2 V}{\partial y^2} = -4\pi (x^2 + y^2)$	6	

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c) Solve the PDE
$$(2D^2 - DD' - 3D'^2)z = 5e^{x-y}$$
 6

d) Solve the PDE
$$(D^2 - 3DD' + 2D'^2)z = e^{2x+3y} + \sin(x-2y)$$
 6

UNIT – IV

4.	a)	Prove that the solution of non-homogenous PDE $(aD+bD'+c)z=0$ is	6
		-cx	
		$z = e^{-a} F(ay - bx), a \neq 0$	

b) Solve
$$(D^2 - DD' + D' - 1) z = e^y + \cos(x + 2y)$$
.

OR

6

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

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

5. Solve any six.

a)	Form a partial differential equation by eliminating arbitrary constant from the equation $z = ax + by + a^2 + b^2$	2
b)	Solve the total differential equation $yzdx + zxdy + xydz = 0$.	2
c)	Write the condition of compatibility of two PDE.	2
d)	Find complete integral of PDE $pq = 1$.	2
e)	Find the complementary function (C.F.) of PDE $(D^3 - 4D^2D' + 4DD'^2)z = 0$	2
f)	Find the particular integral of PDE.	2

$$(D^2 - DD' - 2D'^2)z = e^x$$

g) Find solution of non-homogenous PDE
$$(2D'-3)z=0$$
.

h) Find PI of nonhomogeneous PDF
$$(D^2 - D')z = e^{x-2y}$$
