**A-0611**

**Total Pages : 3** **Roll No. .......................**

# MAT-508

## M.Sc. MATH (MSCMT)

### (Advanced Differential Equation-II)

2nd Semester Examination, Session December 2024

Time : 2:00 Hrs. Max. Marks : 70

***Note* :–** This paper is of Seventy (70) marks divided into Two (02) Sections 'A' and 'B'. Attempt the questions contained in these Sections according to the detailed instructions given therein. ***Candidates should limit their answers to the questions on the given answer sheet. No additional (B) answer sheet will be issued.***

## Section–A

**(Long Answer Type Questions)** 2×19=38

***Note* :–** Section 'A' contains Five (05) Long-answer type questions of Nineteen (19) marks each. Learners are required to answer any *two* (02) questions only.

1. Show that the equations $xp = yq$ and $z(xp + yq) = 2xy$ are compatible and find their solution.

2. Reduce :

$$\frac{\partial^2 z}{\partial x^2} = x^2 \left( \frac{\partial^2 z}{\partial y^2} \right)$$

to canonical form.

3. Solve $(r - t)xy - s(x^2 - y^2) = (qx - py)$ by Monge's method.

4. Solve two dimensional Laplace's equation in cylindrical coordinates $(r, \theta, z)$.

5. Solve the Poisson's equation :

$$\frac{\partial^2 \psi}{\partial x^2} + \frac{\partial^2 \psi}{\partial y^2} = 2, \qquad 0 \le x \le 1, 0 \le y \le 1$$

With the boundary condition $\psi = 0$ on sides $x = 0, 1$, $y = 0, 1$.

## Section–B

**(Short Answer Type Questions)** 4×8=32

***Note* :–** Section 'B' contains Eight (08) Short-answer type questions of Eight (08) marks each. Learners are required to answer any *four* (04) questions only.

1. Solve $z = ax + by + cxy$.

2. Solve the Partial Differential Equation by eliminating arbitrary functions $f$ and $g$ from :

$$z = f(x^2 - y) + g(x^2 + y).$$

3. Solve the Partial Differential Equation $zp + x = 0$ by Lagrange's methods.

4. Find the complete integral of $z = px + qy + q^2 + p^2$.

5. Find the characteristic of $x^2r + 2xys + y^2t = 0$.

6. Solve $(q + 1)s = (p + 1)t$.

7. Discuss the Green's function in Three dimension

8. Discuss the exterior Dirichlet problem for a circle.

**************