

Roll No.

Total No. of Pages : 02

Total No. of Questions : 07

M.Sc. (Mathematics) (Sem.-2)  
**PARTIAL DIFFERENTIAL EQUATIONS**

Subject Code : MSM-204-18

M.Code : 75965

Date of Examination : 12-07-22

Time : 3 Hrs.

Max. Marks : 70

**INSTRUCTIONS TO CANDIDATES :**

1. SECTION-A is COMPULSORY consisting of FIVE questions carrying TWO marks each.
2. SECTION - B & C have THREE questions each.
3. Attempt any FOUR questions from SECTION B & C carrying FIFTEEN marks each.
4. Select atleast TWO questions from SECTION - B & C each.

**SECTION-A**

1. Answer the following :

a) Solve  $\frac{\partial^2 z}{\partial x \partial y} = 2x + 2y$

b) Find the differential equation of  $z = ax^2 + by^2 + ab$ .

c) Solve by the method of separation of variables :  $\frac{\partial u}{\partial x} = 2 \frac{\partial u}{\partial t} + u$  where  $u(x, 0) = 6e^{-3x}$ .

d) Find the singular integral of  $z = px + qy + c\sqrt{1 + p^2 + q^2}$ .

e) Find the deflection  $u(x, y, t)$  of the square membrane with  $a = b = 1$  and  $c = 1$ , if the initial velocity is zero and the initial deflection is  $f(x, y) = A \sin \pi x \sin 2\pi y$ .

**SECTION-B**

2. Solve  $r = a^2 t$  using Monge's method.

3. Solve by Charpit's Methods  $z^2 = pqxy$ .

4. Solve  $p^2 - q^2 = \frac{x-y}{z}$ .

### SECTION-C

5. A tightly stretched string with fixed end points  $x = 0$  and  $x = l$  is initially in a position given by  $y = y_0 \sin^3 (\pi x/l)$ . If it is released from rest from this position, find the displacement  $y(x, t)$ .
6. Find the deflection  $u(r, t)$  of the circular membrane of unit radius if  $c = 1$  the initial velocity is zero and the initial deflection is  $0.25(1 - r^2)$ .
7. An infinitely long plane uniform plate is bounded by two parallel edges and an end at right angles to them. The breadth is  $\pi$ ; this end is maintained at a temperature  $u_0$  at all points and other edges are at zero temperature. Determine the temperature at any point of the plate in the steady-state.

**NOTE : Disclosure of Identity by writing Mobile No. or Making of passing request on any page of Answer Sheet will lead to UMC against the Student.**