

Roll No.

Total No. of Pages : 02

Total No. of Questions : 07

M.Sc. (Mathematics) (2018 Batch) (Sem.-2)

PARTIAL DIFFERENTIAL EQUATIONS

Subject Code : MSM-204-18

M.Code : 75965

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) Form a partial differential equation by eliminating a, b from $z = (2x + a)(2y + b)$.

b) Solve $ar = xy$.

c) Classify the following equation as elliptic, parabolic or hyperbolic :

$$r = x^2t.$$

d) Find particular integral of $(D^2 - 3DD')z = 2 \sin x \cos 2y$.

e) State wave equation and laplace equation.

SECTION-B

2. a) Solve $3p^2 = q$ using Charpit method.

b) Find the equation of surfaces orthogonal to $F(z(x+y)^2, x^2 - y^2) = 0$.

3. Solve $(x_2 + x_3)(p_2 + p_3)^2 + z p_1 = 0$ by using Jacobi's Method.
4. a) Find equation of surface which cuts surfaces of the system $z(x + y) = \lambda(3z + 1)$ orthogonally and which passes through the curve $x^2 + y^2 = 1, z = 1$.
b) Find the general solution of $2r - 5s + 2t = 15 \sin(2x + y)$.

SECTION-C

5. Derive Heat Diffusion Equation and obtain the solution using method of separation of variables.
6. a) Solve wave equation.
b) Find the deflection of a vibrating string of unit length having fixed ends with initial velocity zero and initial deflection $f(x) = k(\sin x - \sin 2x)$.
7. A rod of length 1 with insulated sides, is initially at a uniform temperature u_0 . its ends are suddenly cooled to 0°C and are kept at that temperature. Find the temperature $u(x, t)$.

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.