Sr.No.14340

Exam Code:211002

Subject Code: 4979

M.Sc. (Mathematics) - 2nd Semester

(2721)

Paper: MATH-565

Partial Differential Equations and Integral Equations

Time Allowed: 2 hrs.

Max. Marks: 100

Note: There are EIGHT questions of equal marks. Candidates are required to attempt any FOUR questions.

Section - A

1. (a) Find the integral surface of the linear PDE $x(y^2+z)p-y(x^2+z)q=(x^2-y^2)z$ which contains the straight line $x+y=0,\ z=1$.

   (b) Find a complete integral of $p=(z+qy)^2$, using Charpit's method.

2. (a) By Jacobi's method, solve the equation $xp+3yq=2(z-x^2q^2)$.

   (b) Find the surface which is orthogonal to the one -parameter system $z=cxy(x^2+y^2)$ and which passes through the hyperbola $x^2-y^2=a^2,\ z=0$.

Section - B

3. (a) By Monge's method, solve the PDE $3r+4s+t+(rt-s^2)=1$.

   (b) Obtain the solution, valid when $x, y>0$, $xy>1$, of the differential equation $\dfrac{\partial^2 z}{\partial x\partial y}=\dfrac{1}{x+y}$ such that $z=0$, $p=2y/(x+y)$ on the hyperbola $xy=1$.

4. Solve the wave equation $\dfrac{\partial^2 u}{\partial t^2}=\dfrac{\partial^2 u}{\partial x^2};\ 0<x<1,\ t>0$ subject to the conditions $u(0,t)=u(1,t)=0$, $u(x,0)=0$ and $\dfrac{\partial u(0,t)}{\partial t}=1$.

Section - C

5. Solve the Volterra integral equation $y(x)=\dfrac{1}{1+x^2}-\int_0^x \dfrac{t}{1+x^2}\,y(t)\,dt$.

6. Using the method of successive approximations, solve the Volterra integral equation $y(x)=1+x-\int_0^x y(t)\,dt,\ y_0(x)=1$.

Section - D

7. Solve the Fredholm's integral equation $y(x)=\cos x+\lambda\int_0^\pi \sin(x-t)\,y(t)\,dt$.

8. Solve the Fredholm's integral equation, using the method of successive approximations, $y(x)=(x+1)^2+\int_{-1}^{1}(xt+x^2t^2)\,y(t)\,dt$.

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