Sr.No.14341

Exam Code:211002

Subject Code: 7740

**M.Sc.(Mathematics) - 2nd Semester (old sylb 2019-20)**

**(2721)**

**Paper: MATH-565 Differential 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 a complete integral of the equation $p^2x + qy = z$, and hence derive the equation of an integral surface of which the line $y = 1,\ x + z = 0$ is a generator.

   (b) By Charpit's method, solve the equation $z = p^2 + q^2$.

2. (a) By Jacobi's method, solve the equation $xpq + yq^2 = 1$.

   (b) Find the complete solution of the equation $r + s - 2t = e^{x+y}$.

## Section - B

3. A uniform string of line density ρ is stretched to tension $\rho c^2$ and executes a small transverse vibration in a plane through the undisturbed line of the string. The ends $x = 0,\ l$ of the string are fixed. The string is at rest, with the point $x = b$ drawn aside through a small distance ε and released at time t = 0. Find the transverse displacement $y$ at any subsequent time t using the Fourier expansion.

4. The faces $x = 0,\ x = a$ of an infinite slab are maintained at zero temperature. The initial distribution of temperature in the slab is described by the equation $\theta = f(x)$ $(0 < x < a)$. Determine the temperature at a subsequent time t.

## Section - C

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

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

## Section - D

7. Find the resolvent kernel of the Fredholm's integral equation $y(x) = 1 + \lambda\int_0^1 (x + t) y(t) dt$.

8. Solve the Fredholm's integral equation, $y(x) = f(x) + \lambda\int_0^1 e^{x-t}\, y(t)\, dt$.

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