END SEMESTER EXAMINATION : NOVEMBER-DECEMBER, 2023

APPLIED MATHEMATICS – III

Time : 3 Hrs. *Maximum Marks : 60*

Note: ***Attempt questions from all sections as directed.***

SECTION – A (24 Marks)

Attempt any **four** *questions out of* **five**.

Each question carries **06** *marks.*

1. Find the function if its sine transform is $\frac{e^{-s}}{s}$.

2. Solve $px + qy = pq$ by Charpit method.

3. Solve $(D^2 - DD' - 2D'^2)\, z = (y-1)\, e^x$

P.T.O.

4. Find the Fourier series of the function defined as

$$f(x)=\begin{cases} x+\pi & \text{for } 0<x<\pi \\ -x-\pi & -\pi<x<0 \end{cases} \quad \text{and } f(x+2\pi) = f(x).$$

5. (a) Find the Fourier cosine transform of $F(x) = e^{-x^2/2}$. (3)

(b) Form the partial differential equation from (3)

$$z = f(x^2 - y^2)$$

SECTION – B (20 Marks)

Attempt any **two** *questions out of* **three**.

Each question carries **10** *marks*.

6. Classify and Write down the canonical form of one-dimensional wave equation $\partial^2 z/\partial x^2 - \partial^2 z/\partial y^2 = 0$.

7. Obtain the constant terms and the coefficients of the first sine and cosine terms in the Fourier series of f(x) as given in the following table.

x	0	1	2	3	4	5
f(x)	9	18	24	28	26	20

8. (a) Solve (5)

$$p(1 + q) = qz$$

(b) Obtain a Fourier expression for (8)

$$f(x) = x^3 \quad \text{for } -\pi < x < \pi.$$

SECTION – C (16 Marks)

(Compulsory)

9. (a) A tightly stretched string with fixed end points $x = 0$ and $x = 1$ is initially in a position given by $y = y_0 \sin^3\left(\frac{\pi x}{l}\right)$. If it is released from rest from this position find the displacement $y(x,t)$. (10)

(b) Solve $(y + z)p - (x + z)q = x - y$. (6)

$xy + xz - xy - xz \neq x^2 + xy$