

MA 8353 Transforms and Partial Differential Equations

Important 13mark questions

Unit I

1. Solve $\frac{\partial^2 z}{\partial x^2} - 2 \frac{\partial^2 z}{\partial x^2 \partial y} = 2e^{2x} + 3x^2y$.
2. Find the general solution of $(D^2 + 2DD' + D^2)z = x^2y + e^{x-y}$.

Unit II

1. Find the Fourier series expansion of $f(x) = \sqrt{1 - \cos x}$, $0 \leq x \leq 2\pi$ and hence evaluate the value of the series $\frac{1}{1.3} + \frac{1}{3.5} + \frac{1}{5.7} - \dots$.
2. Find the Fourier series of period 2π for the function $f(x) = x \cos x$ in $0 < x < 2\pi$.

Unit III

1. Solve using by the method of separation of variables $\frac{\partial^2 z}{\partial x^2} - 2 \frac{\partial z}{\partial x} + \frac{\partial z}{\partial y} = 0$.
2. A string is stretched and fastened to two points $x = 0$ and $x = l$ apart. Motion is started by displacing the string into the form $y = k(lx - x^2)$ from which it is released at time $t = 0$. Find the displacement of any point on the string at a distance of x from one end at time t .

Unit IV

1. Find the Fourier transform of $e^{-a^2x^2}$, $a > 0$. By using the properties, find the Fourier transform of $e^{-2(x-3)^2}$.
2. Evaluate $\int_0^\infty \frac{dx}{(x^2+1)(x^2+4)}$ using Fourier transforms.

Unit V

1. Find Z-transform of $\frac{2n+3}{(n+1)(n+2)}$.
2. Find the inverse Z-transform of $\frac{8z^2}{(2z-1)(4z+1)}$ using convolution theorem for Z-transform.