



Continuous Assessment Test I - January 2025

Programme	B.Tech.	Semester	Winter 2024-2025
Course	Differential Equations and Transforms	Code	BMAT102L
Faculty	Dr. Sethukumarasamy K, Dr. Manimaran J, Dr. Mohana N, Dr. Sagithya T, Dr. Prabhakar V, Dr. Nathiya N, Dr. Somnath Bera, Dr. Durga Nagarajan, Dr. Kalyan Manna, Dr. Krishna Kumar B, Dr. Sandip Saha, Dr. Sankarsan Tarai, Dr. Sudip Debnath, Dr. Sowndarrajan P T, Dr. Tharasi Dilleswar, Dr. Ashish Kumar, Dr. Revathi G K, Dr. Sandip Dalui	Class ID	CH2024250500780, 781, 783, 784, 785, 787, 789, 790, 791, 793, 794, 797, 798, 799, 800, 802, 803, 805
		Slot	C1+TC1+TCC1
Duration	90 Mins	Max.Marks	50

Answer ALL the Questions

(Non-programmable calculators are permitted)

1. Solve the ODE

$$\frac{d^2 y}{dx^2} + 4 \frac{dy}{dx} + 4y = 6e^{-2x} \cos^2 x$$

by using the method of undetermined coefficients.

[10]

2. Solve $x^2 \frac{d^2 y}{dx^2} + 4x \frac{dy}{dx} + 2y = x^2 + \frac{1}{x^2}$ by using the method of variation of parameters.

[10]

3. (a) Find the charge $q(t)$ on the capacitor in an LRC series circuit when $L = 0.25\text{h}$, $R = 10\Omega$, $C = 0.001\text{f}$, $E(t) = 0$, $q(0) = 5$ coulombs and $i(0) = 0$ ampere.

[5]

(b) Eliminate the specific function $F(x^2 + y^2 + z^2, z^2 - 2xy) = 0$ and form the PDE.

[5]

4. Solve the PDE $(x + 2z)p + (4zx - y)q - 2x^2 - y = 0$.

[10]

5. Find the complete and the singular solution of the PDE $\sqrt{p^2 + q^2}(z - px - qy) = 1$.

[10]