

CAT-1



VIT

Vellore Institute of Technology  
(Deemed to be University under section 3 of UGC Act, 1956)

REG.NO.: 24BC10075

SCHOOL OF ADVANCED SCIENCES  
CONTINUOUS ASSESSMENT TEST - I  
WINTER SEMESTER 2024-2025

SLOT: C1+TC1+TCC1

Programme Name & Branch : B. Tech  
Course Code and Course Name: BMAT 102L - Differential Equations and transforms  
Faculty Name(s) : Common  
Class Number(s) : Common slot

Date of Examination : 29-01-2025  
Exam Duration : 90 minutes  
Maximum Marks: 50

General instruction(s):

- Answer All Questions

Q.No	Question	Marks	CO	BL
1.	Using the method of undetermined coefficients, Solve $x^2 \frac{d^2 y}{dx^2} - x \frac{dy}{dx} - 3y = x^2 \log x$ .	10	CO1	BL2
2.	Using the method of variation of parameters to solve $\frac{d^2 y}{dx^2} + a^2 y = \tan ax$	10	CO1	BL2
3.	An LCR Circuit connected in a series has $R = 180$ ohms, $C = \frac{1}{180}$ farad, $L = 20$ henries and an applied voltage $E(t) = 10 \sin t$ . Assuming no initial charge on the capacitor but an initial current of 1 ampere at $t = 0$ when the voltage is first applied, find the subsequent charge on the capacitor.	10	CO1	BL3
4(a)	Form a partial differential equation by elimination of the arbitrary constants $a$ and $b$ from the equation $(x-a)^2 + (y-b)^2 = z^2 \cot^2 \alpha$ .	5	CO2	BL2
4(b)	Solve $z^2 = p^2 + q^2 + 1$ .	5		
5	Solve the partial differential equation by using Lagrange's method $(y-z) \frac{\partial z}{\partial x} - (2x+y) \frac{\partial z}{\partial y} = 2x+z$ .	10	CO2	BL2

\*\*\*\*\*