



VIT

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

REG.NO.: 24BHT0014

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

SLOT: A1+TA1+TAA1

Programme Name & Branch : B.Tech.
Course Code and Course Name : BMAT102L- Differential Equations and Transforms
Class Number(s) : Common question paper for this slot
Date of Examination : 16-03-2025
Exam Duration : 90 minutes

Maximum Marks: 50

Answer All Questions

Q. No	Question	M	CO	BL
1.	Using Laplace transform, evaluate $\int_0^{\infty} e^{-2t} \left(\frac{\sin^2 t}{t} \right) dt.$	10	2	2
2.	Find the inverse Laplace transform of $\frac{s}{s^4 + s^2 + 1}$ using Partial fractions method.	10	2	2
3.	An electrical circuit consists of an inductance 1 henry, a resistance of 3 ohms and a condenser of capacitance 0.5 farads. Find the charge q at any time t , given that $q(0) = 0$ and $q'(0) = 3$ using Laplace transform.	10	4	3
4.	Obtain the solution of $u_x + u_t = 0$ with $u(0, t) = 0$ ($t > 0$) and $u(x, 0) = 1 + x$ ($x > 0$). using Laplace transform	10	4	3
5.	Obtain the Fourier series expansion of $f(x) = \begin{cases} \frac{1}{2} + x & \text{for } -1 \leq x \leq 0 \\ \frac{1}{2} - x & \text{for } 0 \leq x \leq 1 \end{cases}$ and hence find the value of $\frac{1}{1^2} + \frac{1}{3^2} + \frac{1}{5^2} + \dots$	10	3	2