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

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

SLOT: A2+TA2+TAA2

Programme Name & Branch : B.Tech. Common
Course Code and Course Name : BMAT102L & Differential Equations and Transforms
Faculty Name(s) : Common question paper for A2+TA2+TAA2 slot
Class Number(s) : Common question paper for A2+TA2+TAA2 slot
Date of Examination : 16/03/2025
Exam Duration : 90 minutes **Maximum Marks: 50**

General instruction(s): Answer All Questions

Q.No.	Question	M	CO	BL
1.	Find the Laplace transform of the following functions: a) $f(t)=\begin{cases} 3; & 0\le t\le 2 \\ 2t; & 2<t<\infty \end{cases}$ b) $g(t)=e^{t}\cos(2t)+t^{2}\sin(t)$	5+5	2	2
2.	Apply Convolution theorem to evaluate the inverse Laplace transform of $F(s)=\dfrac{s}{(s^2+9)(s^2+25)}$.	10	2	2
3.	Solve the given initial value problem (IVP) using Laplace transform: $y''+7y'+6y=H\left(t-\dfrac{\pi}{2}\right)$; where, $y=0=y'$ at $t=0$.	10	4	3
4.	Solve the given PDE by the method of Laplace transform: $\dfrac{\partial y}{\partial t}=3\dfrac{\partial y}{\partial x}-5e^{-2t}$ with initial condition $y(x,0)=2x$ under the assumption that $y(x,t)$ is bounded for all $x\in(0,2)$ and $t>0$.	10	4	3
5.	Find the Fourier series of the function $f(x)=(2-x)^2$; $0<x<4$. Hence, deduce that $\dfrac{1}{1^2}+\dfrac{1}{2^2}+\dfrac{1}{3^2}+\ldots\ldots\ldots=\dfrac{\pi^2}{6}$.	10	3	2

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