Reg. Number:

VIT
Vellore Institute of Technology
CHENNAI

Continuous Assessment Test II (CAT II) – March 2025

Programme	:	B.Tech.	**Semester**	:	WINSEM 2024-25
Course Code & Course Title	:	BMAT102L and Differential Equations and Transforms	**Slot**	:	C1+TC1+TCC1
Faculty	:	Dr.Sethukumarasamy K, Dr.Manimaran J, Dr.Mohana N, Dr.Mohit Kumar, 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 Number**	:	CH2024250500780, 781, 783, 784, 785, 787, 789, 790, 791, 793, 794, 797, 798, 799, 800,802,803,805
Duration	:	90 Minutes	**Max. Mark**		50

General Instructions:

Write only your registration number on the question paper in the box provided and do not write other information.

Only non-programmable calculators are permitted

Answer all questions

No	Sub Sec.	Description	MO	CO/BT	Marks
1.	a	Find the Laplace transform of the function $f(t) = e^{-3t}\int_0^t \tau \cos 5\tau \, d\tau$	3	CO2/3	4
	b	Find the Laplace transform of the following function: $f(t) = \begin{cases} \sin t, & 0 \le t \le \frac{\pi}{2} \\ \frac{\pi}{2} - t, & \frac{\pi}{2} < t \le \pi \end{cases}$, where $f(t+\pi) = f(t)$.	3	CO2/3	6
2.		Find the inverse Laplace Transform of $F(s)$ where $e^{F(s)} = \frac{s^3+1}{s^3-1}$.	3	CO2/3	10
3.		Solve the following IVP by using Laplace transform, $2y'' + 10y = 3u(t-12) - 5\delta(t-4)$; given that $y(0) = -1$; $y'(0) = -2$. where the functions $u(t)$ and $\delta(t)$ are the Heaviside and Dirac delta functions respectively.	4	CO4/3	10

4.		By using Laplace Transform solve $\frac{\partial u}{\partial x}+\frac{\partial u}{\partial t}=xt,\ x>0$ and $t>0$ with $u(x,0)=u(0,t)=0$.	4	CO4/4	10
5		Expand $f(x)=\begin{cases}2-x & 0<x<4\\ x-6 & 4<x<8\end{cases}$ as a Fourier series in a period of 8. Hence find the value of $1+\frac{1}{3^2}+\frac{1}{5^2}+\ldots$	5	CO3/5	10

BL-Bloom's Taxonomy Levels - (1. Remembering, 2. Understanding, 3. Applying, 4. Analysing, 5. Evaluating, 6. Creating)

************All the best **************