Reg. No.:

Name :

VIT

Vellore Institute of Technology

Continuous Assessment Test I – March 2023

Programme	:	B.Tech.	Semester	:	Winter 2022-2023
Course Title	:	Differential Equations and Transforms	Code	:	BMAT 102L
			Slot	:	A2+TA2
Faculty	:	Dr. Saroj Kumar Dash, Dr. Lakshmanan Shanmugham, Dr. Abhishek Kumar Singh, Dr. Harshavarthini Shanmugam, Dr. P.T. Sowndarrajan, Dr. Soumendu Roy, Dr. Manimaran J.	Class No.	:	CH2022232300442, CH2022232300445, CH2022232300446, CH2022232300447, CH2022232300448, CH2022232300449, CH2022232300450
Time	:	90 Minutes	Max. Marks	:	50

Answer ALL the Questions (5x10 = 50)

Q.No.	Sub. Sec.	Question Description	Marks
1.		Solve the ordinary differential equation by using method of undetermined coefficients: $y'' - 4y' - 12y = 3e^{5t} + \sin 2t + te^{4t}$.	10
2.		A 2 kg mass is attached to a vertically hanged spring, which the spring elonginated 61.25 cm below its original length. Suppose the spring-mass sytem is inside a damping medium with damping constant 8 units. Find the displacement $x(t)$ at any time t, if we start the experiment by releasing the mass from the position 2 cm above its equilibrium position. [**Note:** $g = 9.8$ units (in MKS system) and 980 units (in CGS system).]	10
3.	a)	Solve the ordinary differential equation: $x^2y'' + xy' + y = \sin(\ln x^2)$.	5
	b)	Form the PDE by eliminating the arbitrary function $F(xy + z^2, x + y + z) = 0$.	5
4	a)	Solve the following PDE by the method of separation of variables. $\frac{\partial u}{\partial x} = 4\frac{\partial u}{\partial y}$, given that, $u(0, y) = 8e^{-3y}$.	5
	b)	Solve: $x^2(y^2 - z^2)p + y^2(z^2 - x^2)q = z^2(x^2 - y^2)$.	5
5.	a)	Find the complete solution/integral of: $z = px + qy + \sqrt{1 + p^2 + q^2}$. And hence find the singular solution/integral if it exists.	5
	b)	Find $L\left[t^{\frac{3}{2}} + 5t^3 + 7te^{-2t}\right]$	5

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