Reg. No.:

Name :

VIT

Vellore Institute of Technology

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

Continuous Assessment Test I – March 2023

Programme	:	B.Tech.	Semester	:	WIN SEM 2022-23
Course Title	:	Differential Equations and Transforms	Code	:	BMAT102L
			Slot	:	C1+TC1+TCC1
Faculty(s)	:	Dr. Saroj Kumar Dash; Dr. Srutha Keerthi B; Dr. Somnath Bera; Dr. Ashish Bera; Dr. Kriti Arya	Class Nos.		CH2022232300616; CH2022232300617; CH2022232300673; CH2022232300618; CH2022232300682
Time	:	90 Minutes	Max. Marks	:	50

Answer ALL the Questions

Q.No.	Question Description	Marks
1.	Solve the following differential equation $\frac{d^2y}{dx^2} - 3\frac{dy}{dx} = x + e^x \sin x$ by the method of undetermined coefficients.	10
2.	A mass weighing 32 Pounds attached to a vertically hanged spring, by which the spring elongated 3.2 Feet below its original length. Suppose the spring-mass system is inside a damping medium with the damping constant one 5^{th} of the spring constant. Find the displacement $x(t)$, if the mass is released 3 Feet below the equilibrium position with an upward velocity of 5 Feet/Sec. [**Note:** $g = 32$ units (in FPS system).]	10
3.	(a) Form the partial differential equation by eliminating the arbitrary functions $f(x,y)$ and $\phi(x,y)$ from $z = f(x^3 + 2y) + g(x^3 - 2y)$. (b) Find the singular solution for the partial differential equation $z = px + qy + 3p^{\frac{1}{3}}q^{\frac{1}{3}}$.	5+5
4.	Solve the following PDE: $x(y^2 + z)p - y(x^2 + z)q = z(x^2 - y^2)$.	10
5.	(a) Find the particular solution of the ordinary differential equation: $2x^2y'' + 5xy' + y = \left(\frac{1}{2}\right)\left(1 - \frac{1}{x}\right)$, if the complementary solution/homogeneous solution is: $y_h(x) = y_c(x) = c_1x^{-1/2} + c_2x^{-1}$ by using a method except using the Operator method. (b) Using standard formulae, derive the Laplace transform of the following function $\sin^2 t \cos t$.	5+5

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