

**VIT**

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

SCHOOL OF ADVANCED SCIENCES**Winter Semester 2023-2024****Continuous Assessment Test –I**

Programme Name & Branch : Integrated M. Tech

Slot : C2 + TC2 + TCC2

Course Name & code : Differential Equations and Transforms - IMAT102L

Class Number (s) : VL202324050 2325/2328/2331/2333/6733

Exam Duration : 90 Min.

Maximum Marks: 50**Answer ALL Questions**

Q.No.	Question	Max Mark	CO	BL
1.	Solve the differential equation $4y'' - 4y' + y = 3 + e^{x/2}$ by the method of undetermined coefficients.	10	CO1	BL2
2.	Solve the initial value problem $2y'' + y' + 8y = \frac{x+1}{2}$, $y(0) = 1$, $y'(0) = 0$ by the method of variation of parameters.	10	CO1	BL4
3.	Find the steady state current $I(t)$ in an LCR circuit with $L = 0.5 H$, $R = 20 \Omega$, $C = 5 \times 10^{-3} F$, which is connected to a source of voltage $E(t) = 250 \cos 10t$. Assume that current and charge are zero when $t = 0$. (Hint: Solve $L Q'' + R Q' + \frac{1}{C} Q = E(t)$, $Q(0) = Q_0$, $Q'(0) = I_0$.)	10	CO1	BL3
4.	(a). Form the partial differential equation by eliminating arbitrary function f from $z = f(x^2 + y^2 + z^2)$. (b). Find the complete and singular solutions of $z = px + qy + \sqrt{1 + p^2 + q^2}.$	3+7	CO2	BL2
5.	Find the general solution of the partial differential equation: $(y + z)p + (z + x)q = x + y.$	10	CO2	BL4