



Fall Semester 2019-2020

Continuous Assessment Test - II

Programme Name & Branch: B. Tech.

Course Title: Applications of Differential and Difference Equations

Exam Duration: 90 minutes

Slot: B2+TB2

Course Code: MAT2002

Maximum Marks: 50

Answer All Questions (50 marks)

S.No.	Question	Marks
1.	Find the current $I(t)$ in an RLC -circuit with $R = 15\Omega$, $L = 0.5H$, $C = 10^{-2}F$, which is connected to a source of voltage $115 \sin(377t)$. Assume that current and capacitor charge are zero when $t = 0$.	[10]
2.	Solve the differential equation by method of variation of parameters: $x^2 \frac{d^2 y}{dx^2} + 5x \frac{dy}{dx} + 4y = x \log x.$	[10]
3.	An impulse I (kg-sec) is applied to a mass m attached to a spring having a spring constant k . The system is damped with damping constant μ . Find expressions for displacement and velocity of the mass, assuming initial conditions $x(0) = x'(0) = 0$.	[10]
4.	Find the general solution of linear system of equations by matrix method: $\begin{aligned} x_1' &= 5x_1 - 7x_2 - 2e^t, \\ x_2' &= 2x_1 - 4x_2 - 4e^t. \end{aligned}$	[10]
5.	Find the first five non-vanishing terms in the series solution of initial value problem: $(1 - x^2) \frac{d^2 y}{dx^2} + 2x \frac{dy}{dx} + y = 0, y(0) = 1, y'(0) = 1.$	[10]



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$$-20 - \lambda + \lambda^2 + 14 = 0$$