REG.NO.:

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

SCHOOL OF ADVANCED SCIENCES
CONTINUOUS ASSESSMENT TEST - II
FALL SEMESTER 2025-2026

SLOT:A2+TA2+TAA2

Programme Name & Branch	: B.Tech & Biotechnology
Course Code and Course Name	: BMAT203L & Linear Algebra and Differential Equations
Faculty Name(s)	: Dr. A. G. Vijaya Kumar, Dr. K. Raghavendar
Class Number(s)	: VL2025260100709, VL2025260100703
Date of Examination	: 05-10-2025
Exam Duration	: 90 minutes

Maximum Marks: 50

General instruction(s):

- Answer All Questions
- M - Max mark; CO – Course Outcome; BL – Blooms Taxonomy Level (1 – Remember, 2 – Understand, 3 – Apply, 4 – Analyse, 5 – Evaluate, 6 – Create)
- CO2- Apply concepts of sequences and series to model real life problems.
- CO3- Understand the concept of ordinary differential equations of first and second order linear differential equations.
- CO4- Apply the techniques of differential equations to model dynamic problems.

Q. No	Question	M	CO	BL
1.	Find the radius and interval of convergence of the power series $\sum_{n=3}^{\infty}\frac{(x-2)^{n+1}}{n\ ln\,(n)}$.	10	2	3
2.	Express $\int \cos\sqrt{x}\ dx$ as an infinite series. Evaluate $\int_0^1 \cos\sqrt{x}\ dx$ to within an error of 0.01.	10	2	3
3.	a) Find the general solution of $cosec^3 x\frac{dy}{dx} = \cos^2 y$.	5	3	
	b) Solve the differential equation $\cos x\frac{dy}{dx} + y\sin x = \frac{1}{2}\sin 2x$.	5		2
4.	Consider a microprocessor that operates in an environment where the room temperature is constant at 35°C. After a long period of operation, the microprocessor's temperature is at 85°C. Once the device is turned off, the microprocessor begins to cool down to room temperature. Suppose the characteristic cooling constant k for this scenario, which depends on the heat transfer properties of the microprocessor and its cooling system, is 0.08/min. **a)** Find the equation of the microprocessor's temperature. **b)** What will be the temperature of the microprocessor 8 minutes after the device is turned off? **c)** How long will it take for the microprocessor to cool down to 45 °C?	10	4	3
5.	a) Draw the phase line and identify the source, sink and nodes for the autonomous differential equation $\frac{dy}{dx} = (y^3 - 3y^2 - 6y + 8)$. And also, discuss the stability of the equilibrium points.	5	3	3
	b) Solve the partial decoupled system of ordinary differential equations $\frac{dx}{dt} = x, \frac{dy}{dt} = x^2e^{-t} + y$.	5		

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