REG.NO.:

VIT®

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 2024-2025

SLOT: C1+TC1+TCC1

Programme Name & Branch	: B. Tech & BBT
Course Code and Course Name	: BMAT203L & Linear algebra and differential equations
Faculty Name(s)	: Dr K. Aruna
Class Number(s)	: VL2024250102604
Date of Examination	: 15-10-2024 (2:00pm-3:30pm)
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: Student should be able to apply concepts of sequences and series to model real life problems.
- CO3: Student should be able to understand the concept of ordinary differential equations of first and second order linear differential equations.
- CO4: Student should be able to formulate practical problems using various mathematical techniques.

Q. No	Question	M	CO	BL
1.	(a) Find the radius of convergence and interval of convergence of the series $\sum_{n=0}^{\infty} \frac{(x+1)^n}{4^n(n+3)}$. (b) Determine if the following series is absolutely convergent, conditionally convergent or divergent $\sum_{n=0}^{\infty} \frac{(-1)^{n+1}(2n+1)}{2n^3+1}$.	5+5	2	2
2.	Find the Maclaurin series of the function $f(x) = e^{2x}\sin(3x)$.	10	2	2
3.	A fluid initially at $135°C$ is placed outside on a day when the temperature is $-30°C$, and the temperature of the fluid drops $30°C$ in one minute. Let $T(t)$ denote the temperature, in Celsius, at time t, in minutes. (a) Find the temperature $T(t)$ of the fluid for $t > 0$. (b) Find the temperature of the fluid 15 minutes after it is placed outside. Round your answer to two decimal places.	10	4	3
4.	(a) Solve the initial value problem $\frac{dr}{d\theta} = \frac{2r^2}{\theta}$ subject to the initial condition $r(2) = 4$. (b) Classify the equilibrium points of the following autonomous differential equation $\frac{dy}{dt} = y^3 - 2y^2 - 5y + 6$.	5+5	3	3
5.	Consider the following initial value problem $y' + 3y = 3 - e^{-2t}, y(0) = 2$. Use Euler's method to find $y(0.4)$ by considering the step size $h = 0.1$.	10	3	2