VIT

Vellore Institute of Technology

REG.NO.: 25BMV0022

SCHOOL OF ADVANCED SCIENCES

CONTINUOUS ASSESSMENT TEST - I

FALL SEMESTER 2025-2026

SLOT: D1+TD1

Programme Name & Branch	: B.Tech. (IT)
Course Code and Course Name	: BAMAT101 – Multivariable Calculus and Differential Equations
Faculty Name	: Dr. K. Palanivel
Class Number(s)	: Common to D1 slot
Date of Exam	: 20/08/2025
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 – Analyze, 5 – Evaluate, 6 – Create)
  - Course Outcomes (1. Evaluate partial derivatives and solve optimization problems involving several variables with or without constraints, 2. Solve multiple integrals in cartesian, polar, cylindrical and spherical coordinates.)

Q. No	Questions	M	CO	BL
1.	If $u = x + y + z, v = x^2 + y^2 + z^2$ and $w = x^3 + y^3 + z^3 - 3xyz$, whether they are functionally related. If so, find the relation between u, v and w.	10	1	1
2.	Expand the following function as far as terms of third-degree using Taylor series expansion: $f(x, y) = e^x \cos y$ at $(1, \pi/4)$.	10	1	2
3.	A rectangular box, which is open at the top, has a capacity of 256 cubic feet. Determine the dimensions of the box such that the least material is required for the construction of the box. Use the method of the Lagrange's multipliers to find the solution.	10	1	3
4.	(a) Evaluate $\iint_R xy\, dxdy$, where R is the quadrant of the circle $x^2 + y^2 = a^2$, where $x \geq 0$ and $y \geq 0$. (b) Find the area between the parabolas $y^2 = 4ax$ and $x^2 = 4ay$.	10	2	3
5.	Evaluate the integral $\int_0^1 \int_x^{2-x} \frac{x}{y}\, dy\, dx$ by change the order of integration and also sketch the graph.	10	2	3

****