



VIT
Vellore Institute of Technology
(Approved to be a University under section 3 of UGE Act, 1956)

REG.NO.:

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

SLOT: F2+TF2

Programme Name & Branch : M.Tech. (Integrated)
Course Code and Course Name : IAMAT101 - Multivariable Calculus and Differential Equations
Faculty Name(s) : Common Question Paper
Class Number(s) : Common for all
Date of Examination : 10/10/2025
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)
2. Solve multiple integrals in Cartesian, polar, cylindrical and spherical coordinates.
3. Understand gradient, directional derivatives, divergence, curl, Green's, Stokes and Gauss Divergence theorems.

Q. No	Question	M	CO	BL
1.	Evaluate $\int_0^2 \int_0^{\sqrt{2y-y^2}} 2(x^2 + y^2) dx dy$ by using polar coordinates.	10	2	3
2.	Convert $\int_0^3 \int_0^{\sqrt{9-y^2}} \int_{\sqrt{x^2+y^2}}^{\sqrt{9-x^2-y^2}} (x^2 + y^2 + z^2) dz dx dy$ into spherical coordinates and evaluate it.	10	2	3
3.	(a) Find the directional derivatives of $f(x, y) = \sin(yz) + \log(x^2)$ at $(1, 1, \pi)$ in the direction of $v = i + j - k$. [6M] (b) Find curl F if $F = xyz i + 3x^2y j + (xz^2 - y^2z) k$ at $(1, -1, 1)$. [4M]	10	3	2
4.	Use Green's theorem to calculate line integral $\int_C (y^2 + x^2) dx + (3x^2 - y) dy$, where C is a right triangle with vertices $(-1, 2)$, $(4, 2)$ and $(4, 5)$ oriented counterclockwise.	10	3	3
5.	Use Stokes theorem to evaluate $\int_C F \cdot dr$, if $F = 2yz i + xz j + 3xy k$ and C is boundary of the portion of the plane $3x + y + 2z = 3$ in the first octant traversed counter clockwise direction.	10	3	3
