

**VIT**Vellore Institute of Technology
(Approved by the University Grants Commission, UGC, Act 1956)

REG.NO.:25B1T0258

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

SLOT: D2+TD2

Programme Name & Branch : B.Tech.,
 Course Code : BAMAT101
 Course Name : Multivariable Calculus and Differential Equations
 Faculty Name(s) : Common Question paper for D2 slot
 Date of Examination : 08-10-2025 (FN)
 Exam Duration : 90 minutes Maximum Marks: 50

Answer All Questions

S.No.	Questions	Marks	CO	BL
1.	Find the volume under the paraboloid $z = x^2 + y^2$ above the region D in the xy -plane, where D is the part of the upper half-plane ($y \geq 0$) lying between the circles $x^2 + y^2 = 1$ and $x^2 + y^2 = 4$. Use polar coordinates.	10	2	3
2.	Think of a circular wall of unit radius, capped by a parabolic dome defined by $z = -x^2 - y^2 + 9$. Practically, this models the volume of material under a curved roof mound confined within a circular wall boundary of radius 1. Calculate the volume of material under the paraboloid over that circular plan area.	10	2	3
3.	The flow of a fluid in a two-dimensional plane with the velocity of the fluid at any point (x, y) is given by $\vec{F} = (3x^2 - 3y^2)\vec{i} - 6xy\vec{j}$. (i) Check whether the fluid compressing or expanding at a point $P(1,2)$. (ii) Is there any rotation in the fluid at point $P(1,2)$. (iii) If it is a conservation field, then find its pressure ϕ .	10	3	3
4.	Using the Green's theorem, show that the flux around the boundary and the source inside the area are same, for a vector force $\vec{F} = (6y + x)\vec{i} + (y + 2x)\vec{j}$ that passes over a circular field of radius 2 units which is centred at $(2,3)$.	10	3	3
5.	Find the steady state current assuming the flow of current in an RLC circuit with resistance 24Ω , inductance $1.2H$ and capacitance $\frac{1}{90}F$. Also, charge $Q = 0.05$; current $I = 0$ when time $t = 0$.	10	4	3