



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

SLOT: G2+TG2

Programme Name & Branch : B.Tech
Course Code : BAMAT101
Course Name : Multivariable Calculus and Differential Equations
Faculty Name(s) : Common question paper for G2+TG2 slot
Class Number(s) : Common to all faculties handling G2+TG2 slot
Date of Examination : 11.10.2025
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 - Analyze, 5 - Evaluate, 6 - Create)
- Course Outcomes (Type the CO statements covered in this question paper. Use the CO number as per the syllabus copy)
CO-2 Solve multiple integrals in cartesian, polar, cylindrical and spherical coordinates.
CO-3 Understand gradient, directional derivatives, divergence, curl, Green's, Stokes and Gauss Divergence theorems.
CO-4 Utilize different solution methods to obtain the solution for second-order ordinary differential equations.

Q. No	Question	M	CO	BL
1.	Apply polar coordinates to evaluate $\int_0^{\sqrt{2}} \int_y^{\sqrt{4-y^2}} \frac{dx dy}{1+x^2+y^2}$.	10	2	3
2.	Doss's ice cream cone can be visualized as a solid which is bounded above by a sphere $x^2 + y^2 + z^2 = 4$ and is bounded below by a cone $z = \sqrt{x^2 + y^2}$. Evaluate $\iiint_V \sqrt{x^2 + y^2 + z^2} dx dy dz$ over the volume of the ice cream using spherical coordinates.	10	2	3
3.	Obtain the values of a and b such that $\vec{F} = (axy + z^3)\vec{i} + (3x^2 - z)\vec{j} + (bxz^2 - y)\vec{k}$ is irrotational. Hence find its scalar potential.	10	3	2
4.	Verify the Gauss divergence theorem for $\vec{F} = y\vec{i} + x\vec{j} + z^3\vec{k}$ taken over the region bounded by $x^2 + y^2 = 4$, $z = 0$ and $z = 6$.	10	3	3
5.	An LCR circuit connected in series has $L=2$ H, $R=16 \Omega$, $C=\frac{2}{100}$ F and an applied voltage $E(t)=0$. Assuming the initial charge on the capacitor is 0.01 coulomb and no initial current at $t=0$ when the voltage is first applied, find the charge at any time 't'.	10	4	3