



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

SLOT: B2 + TB2

Programme Name & Branch : B.Tech & All the Branches
Course Code and Course Name : BAMAT101
Multivariable Calculus and Differential Equations
Class Number(s) : Common to B2 slot
Faculty Name(s) : Common to B2 slot
Date of Examination : 18.08.2025
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 - Analyse, 5 - Evaluate, 6 - Create)
- Course Outcomes (Type the CO statements covered in this question paper. Use the CO number as per the syllabus copy)

CO1: Evaluate partial derivatives and solve optimization problems involving several variables with or without constraints.

CO2: Solve multiple integrals in cartesian, polar, cylindrical and spherical coordinates.

Q. No	Question	M	CO	BL
1.	Find the Taylor's expansion of $\sqrt{1+x+y^2}$ in power of $(x-1)$ and $(y-0)$ upto the second-degree terms and hence compute $f(1.1, 0.9)$.	10	1	1
2.	Find the volume of the greatest rectangular parallelopiped that can be inscribed in the ellipsoid $\frac{x^2}{a^2} + \frac{y^2}{b^2} + \frac{z^2}{c^2} = 1$. (0.5x 3.5)	10	1	2
3.	a) If $u = \tan^{-1} \frac{y}{x}$; where $x = e^t - e^{-t}$ and $y = e^t + e^{-t}$, find $\frac{du}{dt}$. b) If $u = \frac{x+y}{1-xy}$ and $v = \tan^{-1} x + \tan^{-1} y$, find $\frac{\partial(u,v)}{\partial(x,y)}$. Are u and v functionally related. If so, find the relationship.	5 5	1	3
4.	a) Evaluate the integral $\int_0^1 \int_x^{\sqrt{x}} (x^2 + y^2) dy dx$. b) Evaluate $\iint_R x^2 dx dy$, where R is the two-dimensional region bounded by the curves $y = x$ and $y = x^2$.	5 5	2	3
5.	Change the order of integration and hence evaluate $\int_0^a \int_{\frac{x^2}{a}}^{2a-x} x y dy dx$.	10	2	3