VIT
Vellore Institute of Technology
CHENNAI

Reg. Number:	25BAI1562

Continuous Assessment Test (CAT) – I AUGUST 2025

Programme	:	B.Tech	Semester	:	FALL 2025-26
Course Code & Course Title	:	BAMAT101 & Multivariable Calculus and Differential Equations	Slot	:	E1+TE1
Faculty	:	Dr. Durga Nagarajan Dr. Somnath Bera Dr. Sankarsan Tarai Dr. Saurabh Chandra Maury Dr. M. Kaliyappan Dr. Nazeer Ansari Dr. V. Prabhakar Dr. Padmaja N Dr. Sriraman R Prof. S. Suganya Dr. Dhivya M Dr. M. Gayathri	Class Number	:	CH2025260103501 CH2025260103502 CH2025260103504 CH2025260103505 CH2025260103506 CH2025260103507 CH2025260103509 CH2025260103512 CH2025260103513 CH2025260103517 CH2025260103530 CH2025260103741
Duration	:	1.5 hrs	Max. Mark		50

General Instructions:

- Write only your registration number on the question paper in the box provided and do not write other information
- Only non-programmable calculator without storage is permitted

Answer all questions

Q. No	Sub Sec.	Description	Marks	CO	BT Level
1.		Find the extrema for $f(x,y) = x^3 + 3xy^2 - 15x^2 - 15y^2 + 72x + 54$ and discuss its nature at all the stationary points.	10	1	K3
2	(a)	Are $u = \frac{x}{y}$ and $v = \frac{x+y}{x-y}$ functionally related? If so, find its dependency.	5	1	K2
	(b)	If $u = x^2 + y^2 + z^2$ and $x = e^{2t}, y = e^{2t}\cos 3t,\ z = e^{2t}\sin 3t$. Find $\frac{du}{dt}$ as a total derivative and verify the result by direct substitution.	5	1	K2
3	(a)	Expand $f(x,y) = x^2y + 3y - 2$ as a Taylor's series about the point $(1,-2)$ up to second degree terms.	5	1	K3
	(b)	Using the method of Lagrange multipliers find the maximum value of x^2yz^2 subject to the condition $x + y + z = 5$.	5	1	K3
4	(a)	Using double integral, find the area of the region bounded by the line $y = x$ and curve $y = x^2 - 4x$.	5	2	K3
	(b)	Evaluate $\int_0^{\pi}\int_0^{x} x\,siny\,dy\,dx$.	5	2	K3
5		Evaluate the following integral by changing the order of integration: $\int_0^1\int_0^{2y}\frac{\sin x}{1-x/2}dx\,dy + \int_1^3\int_0^{3-y}\frac{\sin x}{1-x/2}dx\,dy$.	10	2	K3

**********All the best **********