Reg. No.:

Name :

VIT®

Vellore Institute of Technology

(Deemed to be University under section 3 of UGC Act, 1956)

Continuous Assessment Test (CAT)- II– December, 2022

Programme	:	**B.Tech.**	Semester	:	**Fall Semester Year I 2022-2023**
Course Title	:	**Calculus**	Code	:	**BMAT101L**
			Slot	:	**E1+TE1**
Faculty	:	**Dr. Saroj Kumar Dash, Dr. Manivannan A, Dr. C. Rajivganthi, Dr. Harshavarthini, Dr. Prosenjit, Dr. Ashis Bera, Dr. Ankit Kumar, Dr. Sandip Saha, Dr. Kriti Arya**	Class Nbr	:	**CH2022231700190, 189, 191, 192, 196, 194, 257, 323, 883**
Duration	:	**1 ½ Hours**	Max. Marks	:	**50**

Answer all the Questions (50 marks)

Q.No.	Question Description	Marks
1.	A space probe in the shape of the ellipsoid $4x^2 + y^2 + 4z^2 = 16$ enters Earth's atmosphere and its surface begins to heat. After 1 hour, the temperature at the point (x, y, z) on the probe's surface is $T = 8x^2 + 4yz - 16z + 600$. Find the hottest point on the probe's.	[10]
2.	Find the absolute maximum and minimum of $f(x, y) = x + y - xy$ on the triangle ABC with vertices A (0,50), B(50,0) and C(-50,-50).	[10]
3.	a) Change the order of integration, evaluate $\int_0^2 \int_0^{9-x^2} x\, dy\, dx$.	[7]
	b) Find the area of $r = \sin\theta$ in polar coordinates.	[3]
4.	A spherical tank of radius 3 meters is filled with water to a height of 2 meters. Find the volume of the water using the cylindrical coordinates.	[10]
5.	a) Evaluate $\int_0^\infty \sqrt{x}\ e^{-x^5}\, dx$.	[5]
	b) Evaluate $\int_0^1 x^7(1-x^2)^6 dx$.	[5]

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