Reg. No.:

Name :

VIT

Vellore Institute of Technology

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

Continuous Assessment Test I – October 2022

Programme	:	B.Tech	Semester	:	FALLSEM 2022-23
Course	:	Calculus	Code	:	BMAT101l
Faculty	:	Dr. R. Radha Dr. N. Nathiya Dr. Sowndarrajan P T Dr. Manoj Kumar Singh Dr. Harshavarthini Shanmugam Dr. Manimaran J	Slot	:	A1+TA1
			Class Number	:	CH2022231700297 CH2022231700423 CH2022231700424 CH2022231700298 CH2022231700617 CH2022231700608
Time	:	1½ hours	Max. Marks	:	50

Answer ALL the Questions (5 x 10 = 50 marks)

Q.No.	Sec	Question Description	Marks
1.	a.	Suppose that $f(x)$ is continuous and differentiable on the interval $[-2,2]$ such that $f(-2) = 3$ and $f'(x) \leq 4$. What is the largest possible value for $f(2)$?	5
	b.	Find the intervals in which the given function $f(x) = \frac{1}{2x^2+5}$ is increasing, decreasing, concave up and concave down.	5
2.		Find the dimensions of a right circular cylinder of maximum volume that can be inspired in a sphere of radius 10 cm. What is the maximum volume?	10
3.		Find the volume of the solid generated by revolving the region in the first quadrant bounded above by the curve $y = x^2$, below by x-axis and on the right side by $x = 1$ about the line $x = -1$.	10
		Show that the function $f(x,y) = \begin{cases} \frac{xy}{\sqrt{x^2+y^2}}, & (x,y) \neq (0,0) \\ 0, & (x,y) = (0,0) \end{cases}$ is continuous.	10
		If $x = u - y - z$, $y = uv - z$, $z = uvw$ and $u = \frac{x_2x_3}{x_1}$, $v = \frac{x_3x_1}{x_2}$, $w = \frac{x_1x_2}{x_3}$, find $\frac{\partial(x,y,z)}{\partial(x_1,x_2,x_3)}$.	10