

**VIT**Vellore Institute of Technology  
(Deemed to be University under section 3 of UGC Act, 1956)**Continuous Assessment Test 1 – October 2022**

Programme	B.Tech	Semester	FALLSEM 2022-23
Course	Calculus	Code	BMAT1011
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.	✓	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
✓		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 inscribed 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
4.		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 $u = \frac{x_2 x_3}{x_1}$ , $v = \frac{x_3 x_1}{x_2}$ , $w = \frac{x_1 x_2}{x_3}$ , find $\frac{\partial(x, y, z)}{\partial(x_1, x_2, x_3)}$ .	10