

USN:

--	--	--	--	--	--	--	--	--	--

CS2820 - Calculus for CS
B.Tech. CSE 4th Semester
Internal Assessment 2

Date: 16 April. 2024 (Tue) **FN**

(A)

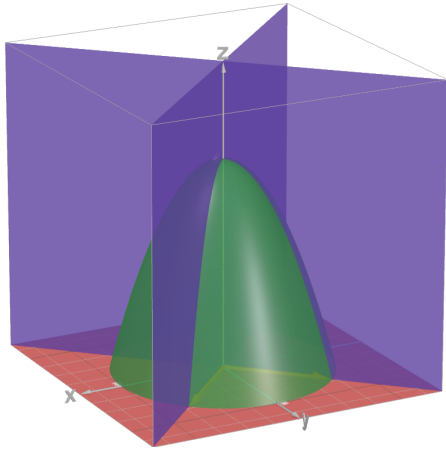
Marks: 15

Time: 1.0hr

Instructions

There are 7 questions. Q#1 is for 3 marks and is **compulsory**. Answer any 3 questions from Q#2 to Q#7. Only first 15 marks worth of attempt will be considered.

Q. No.	Question	Marks	CO	Blooms Level
1	Find all the second order partial derivatives of the function $f(x, y) = x^3 + \sin^2(xy)$	3	CO5	Ap
2	Find the tangent plane to the surface $x \sin z - y \cos z = 0$ at the point $\left(\frac{\pi}{4}, \frac{\pi}{4}, \frac{\pi}{4}\right)$.	4	CO5	Ap
3	<p>a). A particle at time t is at position: $(x, y) = (1+t^2, 1-t^2)$. When is the particle stationary (or when is its velocity zero)?</p> <p>b). Find the distance travelled by the particle during the time interval $[0, 5]$.</p>	4	CO5	Ap

Q. No.	Question	Marks	CO	Blooms Level
4	<p>Use polar coordinates to find the volume by double integration under a paraboloid $x^2 + y^2 = 4 - z$ bounded below by the xy plane and encompassed by the planes that contain the vectors $\mathbf{u} = (\sqrt{2}, \sqrt{2})$ and $\mathbf{v} = (-\sqrt{2}, \sqrt{2})$ in the anticlockwise direction.</p> 	4	CO8	Ap
5	<p>The gravitational potential of a body of some constant mass takes the form: $U(\mathbf{r}) = \frac{-k}{r}$ where k is some real constant and r is the radial coordinate in the polar coordinate system. Determine the direction from the point $(0, 1)$ along which the rate of potential change is highest. What is the rate of potential change at that point?</p>	4	CO6	Ap
6	<p>Find the linearization of $z = 1 + \sin(x) + \cos(x + y)$ at the point $\left(\frac{\pi}{2}, \frac{\pi}{4}\right)$ and hence calculate the linear approximation of $\left(\frac{3}{2}, \frac{3}{4}\right)$</p>	4	CO7	Ap
7	<p>Find the critical points of $f(x, y) = x^2 - 6xy + 4y^2 + 8x + 6y + 3$ and determine for each critical point whether it is a saddle point, a maximum or a minimum.</p>	4	CO6	Ap

END