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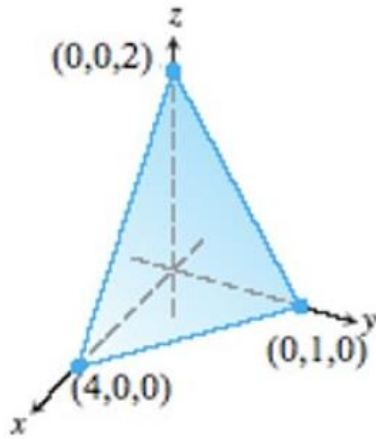
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MID TERM EXAMINATION – OCTOBER 2021

Programme	: B.Tech. (All Branches)	Semester	: FALL 2021-22
Course	: Calculus and Laplace Transform	Code	: MAT1001
Faculty	: Dr. Manisha Jain	Slot/Class Number	: A21+A22+A23 BL2021221000125
Time	: 1 ½ hours	Max. Marks	: 50

Answer all the Questions

Q.No.	Question Description	Marks
1.	<p>If $x^2 = am + bn, y^2 = am - bn$ and V is a function of x and y find the value of</p> <p>i. $x \frac{\partial V}{\partial x} + y \frac{\partial V}{\partial y}$</p> <p>ii. $m \frac{\partial V}{\partial m} + n \frac{\partial V}{\partial n}$</p> <p>Is there any relation between both the results ?</p>	10
2	<p>Consider a sphere of unit sphere from the origin in x-y-z space. Find the minimum and maximum distance of the point $(3, 4, 12)$ from the sphere by using Lagrange's Multiplier.</p>	10
3	<p>By using the concept of change the order of integration evaluate the following (refer the figure) by assuming $f(x,y)=1$</p> <p>(i) Evaluate area for the function $y=f(x)$</p> <p>(ii) Evaluate area for the function $x=f(y)$</p> <p>(iii) Write all necessary mathematical expressions</p>	10
4	<p>Find the mass M of the tetrahedron bounded by the coordinate planes and the plane as shown in the figure.</p>	10



given that the density F at any point $P(x,y,z)$ is xyz

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A particle moves along the curve $x = e^{-t}$, $y = 2\cos 3t$, where t is the time. Determine at $t = 0$ its

- (i) Velocity and acceleration vectors
- (ii) Magnitude of Velocity and acceleration vectors
- (iii) Components of Velocity and acceleration vectors
In the direction of the vector $2i - 4j + 6k$

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