

Reg. No.:

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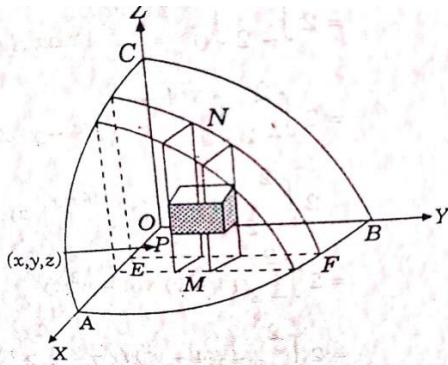


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Mid-Term Examinations – October 2021

Programme	: BTECH	Semester	: Fall 2021-22
Course	: Calculus and Laplace Transform	Code	: MAT1001
Faculty	: Dr. Yogesh Shukla	Slot/ Class No.	: A21+A22+A23/BL2021 221000147
Time	: 1 ½ hours	Max. Marks	: 50

Answer all the Questions

Q.No.	Sub. Sec.	Question Description	Marks
1		<p>If function $u = (1 - 2xy + y^2)^{-1/2}$ where u is dependent on x and y then prove that</p> $\frac{\partial}{\partial x} \left\{ (1 - x^2) \frac{\partial u}{\partial x} \right\} + \frac{\partial}{\partial y} \left\{ y^2 \frac{\partial u}{\partial y} \right\} = 0$	10
2		<p>If Z is dependent variable on two independent variables x and y as $z = f(x, y)$, where $x = e^u + e^{-v}$, $y = e^{-u} - e^v$, show that $\frac{\partial z}{\partial u} - \frac{\partial z}{\partial v} = x \frac{\partial z}{\partial x} - y \frac{\partial z}{\partial y}$</p>	10
3		<p>Find the area by double integration, the smaller of the areas bounded by the circle $x^2 + y^2 = 9$ and the straight line $x + y = 3$.</p>	10
4		<p>Find the volume which is bounded by ellipsoid $\frac{x^2}{a^2} + \frac{y^2}{b^2} + \frac{z^2}{c^2} = 1$</p> <p>As given in following figure</p> 	10
5		<p>Find the value of n for which the vector $r^n \vec{r}$ is solenoidal, where $\vec{r} = x\hat{i} + y\hat{j} + z\hat{k}$.</p>	10

