	Reg. No.:	
	Name :	

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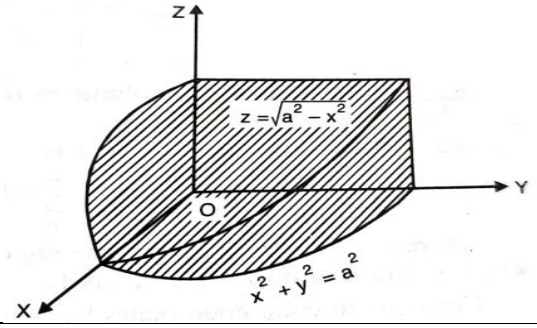
Mid-Term Examinations – October 2021

Programme	:	**BTECH**	Semester	:	**Fall 2021-22**
Course	:	**Calculus and Laplace Transform**	Code	:	**MAT1001**
Faculty	:	**Dr. Yogesh Shukla**	Slot/ Class No.	:	**A11+A12+A13/BL2021 221000146**
Time	:	**1 ½ hours**	Max. Marks	:	**50**

Answer all the Questions

Q.No.	Sub. Sec.	Question Description	Marks
1		If $\theta = t^n e^{\frac{-r^2}{4t}}$, where θ is dependent on t and r . Then find the value of n which makes $\frac{1}{r^2}\frac{\partial}{\partial r}\left(r^2\frac{\partial\theta}{\partial r}\right) = \frac{\partial\theta}{\partial t}$	**10**
2		If $x^2 + y^2 + z^2 - 2xyz = 1, then\ show\ that$ $\frac{dx}{\sqrt{1-x^2}} + \frac{dy}{\sqrt{1-y^2}} + \frac{dz}{\sqrt{1-z^2}} = 0$	**10**
3		Change the order of integration to evaluate $\iint \frac{x\,dy\,dx}{\sqrt{x^2+y^2}}$ over the region bounded by the given curves $x = 0, x = 1, y = x, y = \sqrt{2-x^2}$	**10**
4		Find the volume of common area given in following graph which is bounded by the cylinders $x^2 + y^2 = a^2$ and $x^2 + z^2 = a^2$ 	**10**
5		If the vector $\vec{F} = (ax^2y + yz)\hat{\imath} + (xy^2 - xz^2)\hat{\jmath} + (2xyz - 2x^2y^2)\hat{k}$ is solenoidal, find the value of a. Find also the curl of this solenoidal vector.	**10**

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