Reg. No.:	
Name :	

TERM END EXAMINATION (TEE)-DEC-2021

Programme	**B.Tech. (All Branches)**	**Semester**	**Fall 2021-22**
Course Name	**Calculus and Laplace Transforms**	**Course Code**	**MAT1001**
Faculty Name	**Dr. Manisha Jain**	**Slot / Class No**	**A21+A22+A23 BL2021221000125**
Time	**1.5 Hrs.**	**Max. Marks**	**50**

Answer ALL the Questions

Q. No.		**Question Description**	**Marks**
		PART - A – (3 x 10 = 30 Marks)	
1	(a)	Find the Directional Derivative of scalar function $f(x,y,z) = \sqrt{xyz}$ at the point A(2,2,3) in the direction of the outward drawn normal of the surface of the sphere having radius 6 cm through the point P	10
		OR	
	(b)	Evaluate the Integral $\int_0^1 \int_{y\sqrt{3}}^{\sqrt{4-y^2}} \sqrt{x^2+y^2}\,dxdy$ (1) Draw the region (2) High light all important points	10
2	(a)	Verify Gauss Divergent Theorem $\overline{A} = 4xi - 2y^2 j + z^2 k$ taken over the region bounded by $x^2 + y^2 = 4, z = 0 \text{ and } z = 3$	10
		OR	
	(b)	If $\overline{A} = (2x^2 - 3z)i - 2xyj - 4xk$ and V is the closed region bounded by the planes $x = 0, y = 0 \text{ and } 2x + 2y + z = 4$ evaluate $\iiint (\Delta \times \overline{A})dV$	10

3	(a)	Solve the differential equation by using variation of parameters method (Write and highlights all important results) $(D^2+2D+2)y=e^{-x}\sec^3 x$	10
	OR		
	(b)	Solve the following differential equation by using Laplace Transformation $\frac{d^2x}{dx^2}+5\frac{dx}{dx}+6x=5e^t; x(0)=2; x'(0)=1$	10
	Part - B – (2 x 10 = 20 Marks)		
4		Calculate the integral $\int_2^4\int_0^x\int_0^{x+y} zdx\,dy\,dz$ i. Describe the functions properly ii. Draw the figure iii. Correct the order of integration if required	10
5	(a)	Solve the differential equation $\left[x\tan\left(\frac{y}{x}\right)-y\sec^2\left(\frac{y}{x}\right)\right]dx+x\sec^2\left(\frac{y}{x}\right)dy=0$	10
	(b)	By using Laplace Transform find show that $\int_0^\infty e^{-st}t^3\sin t\,dt=\frac{24s(s^2-1)}{\left(s^2+1\right)^4}$ $Hence\, evaluate \int_0^\infty e^{-t}t^3\sin t\,dt$	