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TERM END EXAMINATIONS (TEE) – December 2021-January 2022

Programme	B.Tech	Semester	Fall 2021-2022
Course Name	Calculus and Laplace transforms	Course Code	MAT1001
Faculty Name	Dr. A.Manickam	Slot / Class No	A11+A12+A13/0608
Time	1½ hours	Max. Marks	50

Answer ALL the Questions

Q. No.	Question Description	Marks
PART - A – (3 x 10 = 30 Marks)		
1	(a) Find the dimensions of the rectangular box without a top of maximum capacity, whose surface is 108 sq.cm	10
OR		
	(b) Evaluate $\iiint \frac{dzdydx}{(x+y+z+1)^3}$ where v is the region bounded by the lines $x = 0, y = 0, z = 0, x + y + z = 1$	10
2	(a) Verify Green's theorem in a plane for the integral $\int_C (y - \sin x) dx + \cos x dy$ using Green's theorem where C is triangle OAB where O(0,0); A $(\frac{\pi}{2}, 0)$; B $(\frac{\pi}{2}, 1)$	10
OR		
	(b) Solve $(D^2 - 4D + 4)y = 8(x^2 + \sin 2x + e^{2x})$	10
3	(a) Solve by using the method of undetermined coefficients $x^2 \frac{d^2y}{dx^2} - 4x \frac{dy}{dx} + 6y = x^2 + \log x$	10
OR		
	(b) Apply the convolution theorem to find the inverse Laplace transform of the function $\frac{s^2}{(s^2+4)(s^2+9)}$	10

Part - B – (2 x 10 = 20 Marks)

4	Obtain Taylor series expansion of $\tan^{-1}\left(\frac{y}{x}\right)$ about (1,1) up to second degree terms.	10
5	Find the Laplace transform of the half sine wave rectifier function given by $f(t) = \begin{cases} \sin t, & 0 < t < \pi \\ 0, & \pi < t < 2\pi \end{cases}$ & $f(t + 2\pi) = f(t)$, for all values of t	10
$\Leftrightarrow\Leftrightarrow\Leftrightarrow$		