R22 Regulation *Subject code: 4B2AF*

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

(Autonomous, Accredited by NAAC with 'A+' Grade)

B.Tech II Semester Supplementary Examinations, January 2024

MATHEMATICAL TRANSFORMS

(ELECTRICAL & ELECTRONICS ENGINEERING)

Maximum Marks: 60 Date:19.01.2024 Duration: 3 hours

Note: **1.This question paper contains two parts A and B.**
2. Part A is compulsory which carries 10 marks. Answer all questions in Part A.
3. Part B consists of 5 Units. Answer any one full question from each unit.
4. Each question carries 10 marks and may have a, b, c, d as sub questions.

Part-A

All the following questions carry equal marks (10x1M=10 Marks)

			CO	Bloom Tx
1.	a	$L(e^{-2t}+e^{-5t}) =$ _____	CO1	L1
	b	$L(te^{3t}) =$ _____	CO1	L1
	c	$L^{-1}\left(\frac{s}{(s+3)^2+4}\right) =$ _____	CO2	L2
	d	$L^{-1}\left(\frac{1}{s-a}\right) =$ _____	CO2	L1
	e	The condition for odd function is _____	CO3	L2
	f	In Fourier series the function should be continuous or piecewise continuous. True or false?	CO3	L2
	g	Write down the formula of Fourier cosine transform.	CO4	L1
	h	The Fourier transform of $e^{-\alpha\|x\|} =$ _____	CO4	L2
	i	$Z(n) =$ _____	CO5	L1
	j	$Z^{-1}\left(\frac{z}{z-a}\right) =$ _____	CO5	L1

Part-B

Answer All the following questions. (5X10M=50Marks)

2	Find the Laplace transform of the function $f(t) = \begin{cases} 3, & 0 < t < \frac{b}{2} \\ -3, & \frac{b}{2} < t < b \end{cases}$, where, $f(t) = f(b+t)$. [10M]		CO1	L3
	OR			
3	Find the Laplace transform of $te^{-3t}\cos 4t$. [10M]		CO1	L3
4	Using convolution theorem, find $L^{-1}\left(\frac{s^2}{(s^2+a^2)(s^2+b^2)}\right)$. [10M]		CO2	L3
	OR			

5	Solve the differential equation $y'' + 3y' + 2y = 2$, given that $y'(0) = 0$ and $y(0) = 0$ using Laplace transform. [10M]	CO2	L5
6	Find the Fourier series expansion of $f(x) = (\pi - x)^2$ on $(0,2\pi)$. [10M]	CO3	L3
	OR		
7	Find the half range cosine series for $f(x) = x$ on $(0,\pi)$. [10M]	CO3	L3
8	Find the Fourier transform of the function $f(x) = \begin{cases} 1, & \text{IxI} < a \\ 0, & \text{IxI} \geq a \end{cases}$ [10M]	CO4	L3
	OR		
9	Evaluate $\int_0^\infty \frac{x^2 dx}{(x^2+a^2)(x^2+b^2)}$ using Fourier sine transform of e^{-ax} and e^{-bx} where a,b > 0. [10M]	CO4	L3
10	Evaluate $Z^{-1}\left[\frac{6z^2}{(2z-1)(3z+1)}\right]$ using convolution method. [10M]	CO5	L3
	OR		
11	Using Z-transform, find the response of the system $u_{n+2} - 3u_{n+1} - 10\,u_n = 0$ *given* $u_0 = 1$ *and* $u_1 = 0$. [10M]	CO5	L3