R22 Regulation *Subject code: 4B2AF*

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

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

B.Tech II Semester Regular/Supplementary Examinations, June 2024

MATHEMATICAL TRANSFORMS

(Common to EEE & ECE)

Maximum Marks: 60 Date:24.06.2024 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	Define Laplace Transform.	1	1
	b	Find $L\{te^{2t}\}$.	1	2
	c	State Convolution theorem.	1	1
	d	Find $L^{-1}\left\{\frac{2s^2-4s+5}{s^3}\right\}$.	1	2
	e	Find the constant a_0 of the Fourier series for the function $f(x) = x$ in $0 \le x \le 2\pi$.	3	2
	f	Define periodic function and write examples.	4	1
	g	State Fourier integral theorem.	5	1
	h	Define Fourier transform and its inverse transform.	5	1
	i	Find $Z[e^{-an}]$.	6	2
	j	Find $Z[n^2]$.	6	2

Part-B

Answer All the following questions. (5X10M=50 Marks)				
2		A. Find Laplace transform of $e^{-t}\left[\int_0^t \frac{\sin u}{u}\, du\right]$. [5] B. Find Laplace transform of $te^{3t}cos2t$ [5]	1 1	2 2
		OR		
3		Evaluate $\int_0^\infty \frac{e^{-t}-e^{-2t}}{t}$ dt using Laplace Transform. [10]	1	3
4		A. Find Inverse Laplace transform of $\frac{3s+7}{s^2-2s-3}$. [5] B. Solve $y'' + 4y = 0, y(0) = 1, y'(0) = 6$ using Laplace transforms. [5]	1 2	2 4

	OR		
5	Solve the initial value problem $y'' + 3y' + 2y = e^{-t}, y'(0) = 0, y''(0) = -1$ using Laplace transforms. [10]	2	4
6	Obtain the Fourier series for the function $f(x) = \begin{cases} -1, if -2 \le x \le -1 \\ x, \ if -1 \le x \le 1 \\ 1, \ if \ 1 \le x \le 2 \end{cases}$ [10]	3	3
	OR		
7	Obtain the Fourier series expansion of f(x) given that $f(x) = (\pi - x)^2$ in $0 < x < 2\pi$. [10]	3	4
8	Show that the Fourier transform of $f(x) = \begin{cases} a - \lvert x \rvert, & \lvert x \rvert < a \\ 0, & \lvert x \rvert > a \end{cases}$ is $\sqrt{\frac{2}{\pi}}\left[\frac{1-cos}{\alpha^2}\right]$. [10]	5	4
	OR		
9	Find the Fourier transform of $f(x) = \begin{cases} 1, & \lvert x \rvert < a \\ 0, & \lvert x \rvert > a \end{cases}$ [10]	5	2
10	Using Z transform solve $u_{n+2} + 4u_{n+1} + 3u_n = 3^n$ with $u_0 = 0, u_1 = 1$ [10]	6	3
	OR		
11	Find $Z^{-1}\left[\frac{2z^2+3z}{(z+2)(z-4)}\right]$. [10]	6	2