R20 Regulation *Subject code: 3B2AL*

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

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

B.Tech II Semester Supplementary Examinations, January 2024

TRANSFORM THEORY

(ECE)

Maximum Marks: 70 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 20 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 (10x2M=20 Marks)	CO	Bloom Tx
1	Find Laplace transform of $(t-2)^3u(t-2)$.	CO1	L3
2	Define Laplace transform of periodic function.	CO1	L1
3	Find inverse Laplace transform of $\frac{3s+1}{(s+1)^2}$	CO2	L3
4	State the inverse Laplace transform of derivatives	CO2	L1
5	If f(x) is to be expanded as a Fourier series in the interval $0 \le x \le 2\pi$ write formulae for a_0, a_n, b_n	CO3	L1
6	Find half range sine series for $f(x) = e^x$. in $(0,\prod)$	CO3	L3
7	Find the finite Fourier sine transform of $f(x) = \Pi - x$ in $(0,\Pi)$	CO4	L3
8	If F(s) and G(s) are Fourier transforms of f(x) and g(x) then prove that $F(a\,f(x)+b\,g(x)) = a\,F(s)+b\,G(s)$	CO4	L3
9	Find $z(a^n \sin n\theta)$	CO5	L3
10	Evaluate $Z^{-1}[(\frac{z}{z-a})^2]$	CO5	L5

Part-B

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

11	a) State and prove first shifting theorem in Laplace transforms b) Using Laplace transform evaluate, $\int_0^\infty \frac{\cos at - \cos bt}{t}\,dt$ [5+5]	CO1	L3
	OR		
12	Find the L.T of the rectified semi-wave function defined by [10] $F(f) = \begin{cases} \sin \omega t & 0 < t < \pi/\omega \\ 0 & \pi/\omega < t < 2\pi/\omega \end{cases}$	CO1	L3
13	a) Find The Inverse Laplace Transform of Log $(\frac{s^2+4}{s^2+9})$ b) Find $L^{-1}\left[\frac{s+3}{s^2-10s+29}\right]$ [5+5]	CO2	L3
	OR		
14	Solve the D.E $\frac{d^2y}{dx^2} - 4\frac{dy}{dx} + 12y = e^{3x}$ given that $y(0) = 0$ and $y'(0) = 0$ [10] Using Laplace Transform	CO2	L3

15	Obtain the Fourier series for the function $f(x) = x - x^2$ in the interval [-π,π].Hence show that $\frac{\pi^2}{12} = \frac{1}{1^2} - \frac{1}{2^2} + \frac{1}{3^2} - \frac{1}{4^2} + \ldots\ldots\ldots\ldots$ [10]	CO3	L4
	OR		
16	Find the half-range Fourier Cosine series of the function f(x) given by [10] $f(x) = \begin{cases} x, & for\ 0 < x < \pi/2 \\ \pi - x, & for\ \pi/2 < x < \pi \end{cases}$	CO3	L3
17	Find Fourier transform of $e^{-a\|x\|}$(a>0) and hence $\int_0^\infty \frac{\cos px}{a^2+p^2} dp = \frac{\pi}{2a} e^{-a\|x\|}$ [10]	CO4	L3
	OR		
18	Find the Fourier sine transform of f(x)= x: for 0<x<1 [10] = 2-x : for 1<x<2 = 0 : for x>2	CO4	L3
19	Find $z^{-1}[\frac{z}{(z-a)}]^3$ using convolution theorem and deduce that $z^{-1}[\frac{z}{(z-1)}]^3 = \frac{(n+1)(n+2)}{2}$ [10]	CO5	L3
	OR		
20	Solve $y_{n+2} - 6y_{n+1} + 8y_n = 2^n + 6n$ using z-transforms. [10]	CO5	L3