R20 Regulation Subject code: 3B2AL

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

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

B.Tech II Semester Regular/Supplementary Examinations, October 2022

TRANSFORM THEORY

(ECE)

Maximum Marks: 70 Date:11.10.2022 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)

1 Find the Laplace transform of t^2e^{-2t}

2 Find $L[e^{-3t}\sinh 3t]$

3 Find the inverse Laplace transform of $\frac{2s-5}{s^2-4}$

4 State the Convolution theorem

5 Find a_0 in Fourier Series expansion of $f(x)=\begin{cases}0, if -\pi \le x \le 0\\ x^2, if 0 \le x \le \pi\end{cases}$

6 Write Fourier series formula in an interval (c, c+2L) of period 2L also write a_0, a_n & b_n formula

7 State and prove Linear property of Fourier transforms.

8 If the Fourier sine transform of $f(x)=\frac{1-\cos n\pi}{n^2\pi^2}(0 \le x \le \pi)$, find f(x).

9 Find the Z-transform of $(n+1)^2$

10 Find $Z(\cos\theta + i\sin\theta)^n$

Part-B

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

11 a) Find the Laplace transform of $3\cos 3t.\cos 4t$. [5M]

b) Find $L\left[\frac{e^{-t}\sin t}{t}\right]$ [5M]

OR

12 a) Using Laplace transform, evaluate $\int_0^\infty \frac{e^{-t}-e^{-2t}}{t}dt$ [7M]

b) State first shifting theorem in Laplace Transform. [3M]

13 Find $L^{-1}\left[\frac{s^2}{(s^2+4)(s^2+9)}\right]$ using convolution theorem. [10M]

OR

14 Solve the differential equation $\frac{d^2y}{dx^2}-3\frac{dy}{dx}+2y=4t+e^{3t}, y(0)=1, y'(0)=1$ [10M]

15 Obtain the Fourier series to represent $f(x)=\frac{1}{4}(\pi-x)^2$ in $0<x<2\pi$ [10M]

OR

16 Expand $f(x)=3x^2-2$ as a Fourier series in the interval (-3, 3) [10M]

17 Find the Fourier transform of $f(x)=\begin{cases}\sin x, if\, 0<x<\pi\\ 0, otherwise\end{cases}$

OR

18 Find the inverse Fourier cosine transform of $\frac{\sin ap}{p}$ [10M]

19 Find the inverse Z- transforms of $\frac{z^3-20z}{(z-2)^3(z-4)}$ [10M]

OR

20 Solve $y_{n+2}+6y_{n+1}+9y_n=2^n$ with $y_0=y_1=0$ using Z-transforms. [10M]