*R22 Regulation* *Subject code:4B2AF*

# TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

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

## B.Tech II Semester Supplementary Examinations, June 2026

## MATHEMATICAL TRANSFORMS

**(Common to EEE & ECE)**

***Maximum Marks: 60*** Date: 15.06.2026 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 (10X1M=10 Marks) | | Marks | CO | BTL |
|---|---|---|---|---|
| 1.a | Find the Laplace transform of $e^{4t}\sin 2t$. | 1M | CO1 | L1 |
| b | Find Laplace transform of cos(at+b) ,where a, b are constants. | 1M | CO1 | L1 |
| c | Find $L^{-1}(\frac{3s+4}{s^2+9})$ | 1M | CO2 | L1 |
| d | Find $L^{-1}(\frac{2s-5}{s^2-4})$ | 1M | CO2 | L1 |
| e | Find the value of $b_n$ in the Fourier expansion of $f(x)=\lvert\sin x\rvert$ in $(-\pi, \pi)$ | 1M | CO3 | L1 |
| f | Define periodic function. | 1M | CO3 | L1 |
| g | Write infinite Fourier cosine transform of f(x). | 1M | CO4 | L1 |
| h | Find the Fourier sine transform of $e^{-x}$. | 1M | CO4 | L1 |
| i | Find z(n) | 1M | CO5 | L1 |
| j | Find $Z^{-1}[\frac{z}{z-1}]$ | 1M | CO5 | L1 |

Part-B

| Answer All the following questions. (5X10M=50Marks) | | Marks | CO | BTL |
|---|---|---|---|---|
| 2 | If f(t) is a periodic function of period $2\pi$,then find L(f(t)), where $F(t)=\begin{cases}\sin t, & 0<t<\pi\\ 0, & \pi<t<2\pi\end{cases}$ | 10M | CO1 | L2 |
| | OR | | | |
| 3 | Evaluate $L\{\int_0^t te^{-t}\sin 4t\,dt\}$ | 10M | CO1 | L2 |
| 4 | Find $L^{-1}[\frac{1}{(s+1)(s^2+1)}]$ using convolution theorem. | 10M | CO2 | L2 |
| | OR | | | |
| 5 | Solve the D.E $\frac{d^2y}{dx^2}-4\frac{dy}{dx}-12y=e^{3x}$ given that $y(0)=0$ and $y'(0)=0$ | 10M | CO2 | L2 |
| 6 | Obtain the half range Fourier Sine series for the function $(x)=e^{ax}$ from x=0 to x=π. | 10M | CO3 | L2 |
| | OR | | | |

| | | | | |
|---|---|---|---|---|
| 7 | Obtain a half range cosine series for $f(x)=\begin{cases} kx, & 0 \le x \le l/2 \\ k(l-x), & l/2 \le x \le l \end{cases}$<br>Deduce that $\frac{1}{1^2}+\frac{1}{3^2}+\frac{1}{5^2}+.....+\infty=\frac{\pi^2}{8}$ | 10M | CO3 | L2 |
| 8 | Find the Fourier sine transform of f(x)= x: for 0<x<1<br>= 2-x : for 1<x<2<br>= 0 : for x>2 | 10M | CO4 | L2 |
| | OR | | | |
| 9 | Find the Fourier Sine and Cosine transform of x in $(0,\pi)$. | 10M | CO4 | L2 |
| 10 | Find $z^{-1}[\frac{z}{(z-a)}]^3$ using convolution theorem and deduce that<br>$z^{-1}[\frac{z}{(z-1)}]^3=\frac{(n+1)(n+2)}{2}$ | 10M | CO5 | L2 |
| | OR | | | |
| 11 | Solve $y_{n+2}-7y_{n+1}+12y_n=0$ with $y_0=1, y_1=2$ using z-transforms. | 10M | CO5 | L2 |