*R18 Regulation* *Subject code:2P6BD*

# TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

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

**B.Tech VI Semester Supplementary Examinations, April 2026**

## SIGNALS AND SYSTEMS

**(EEE)**

*Maximum Marks: 70* Date: 21.04.2026 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 (10X2M=20 Marks) | | Marks | CO | BTL |
|---|---|---|---|---|
| 1 | Define the energy signal. | 2M | 1 | L1 |
| 2 | Differentiate between analog and discrete signal. | 2M | 1 | L1 |
| 3 | Define state space. | 2M | 2 | L1 |
| 4 | State sampling theorem. | 2M | 2 | L1 |
| 5 | Does the impulse response of a nonlinear system characterize the system? | 2M | 3 | L1 |
| 6 | State the conditions for stability and causality. | 2M | 3 | L1 |
| 7 | Find the convolution of two sequences x(n)={1,1,1,1} and h(n)={2,2}? | 2M | 4 | L1 |
| 8 | Explain about spectral density. | 2M | 4 | L1 |
| 9 | Estimate final value of laplace transform $X(s)=2/(s^2+4s-2)$ | 2M | 5 | L1 |
| 10 | Determine Z transform of x(n)={1 ,2, 3,-1, 3,-2} | 2M | 5 | L1 |

Part-B

| Answer All the following questions. (5X10M=50Marks) | | Marks | CO | BTL |
|---|---|---|---|---|
| 11 | a) Develop the expression for mean square error when functions is approximated in set of mutually orthogonal functions.<br>b) Define a signal. What is different type of signals. | 5M<br>5M | 1 | L2 |
| | OR | | | |
| 12 | Measure the systems stability, causalitity and linearity<br>i) $y(t)=e^{x(t)}$; $\|x(t)\|<10$<br>ii)$y(t)= x(t^2)$ iii)$y(t) = \int_{\tau=0}^{\infty} x(t-\tau)d\tau$ | 5M<br>5M | 1 | L2 |
| 13 | a) Evaluate fourier transform of non periodic signal from the fourier series of a periodic signal<br>b) Find the fourier transform of symmetrical gate pulse of duration $(-\tau/2,\tau/2)$ and sketch the spectrum. | 5M<br>5M | 2 | L2 |
| | OR | | | |
| 14 | a) With the help of graphical example analyze sampling theorem for low pass signals .<br>b)Explain the signal recovery from its sampled signals. | 5M<br>5M | 2 | L2 |

| | | | | |
|---|---|---|---|---|
| 15 | a) A system is excited by $x(t)=e^{-3t}u(t)$, the impulse response is $h(t)=e^{-2t}u(t)+e^{-2t}u(t)$. Measure the output for the system.<br>b) Derive the conditions for distortion less transmission. | 5M<br>5M | 3 | L2 |
| | OR | | | |
| 16 | State and prove time convolution and time differentiation properties of Fourier series. | 10M | 3 | L2 |
| 17 | a) Determine the convolution of two functions $x(t)=a\,e^{-at}$ ; $y(t)=u(t)$.<br>b) Obtain relation between convolution and correlation. | 5M<br>5M | 4 | L2 |
| | OR | | | |
| 18 | a) Show that $R(\tau)$ and PSD form a Fourier transform pair<br>b) What is the necessary and sufficient condition on impulse response for stability? | 5M<br>5M | 4 | L2 |
| 19 | Determine the inverse laplace transform with all possible ROC's for $X(s)=\frac{1}{s(s+1)(s+2)(s+3)}$ | 10M | 5 | L2 |
| | OR | | | |
| 20 | Develop the inverse Z-transform of $X(z)=\frac{z}{z(z-1)(z-2)^2}$ using long division method. | 10M | 5 | L2 |