*R18 Regulation* *Subject code:2P3DD*

# TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

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

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

## SIGNALS & SYSTEMS

## (ECE)

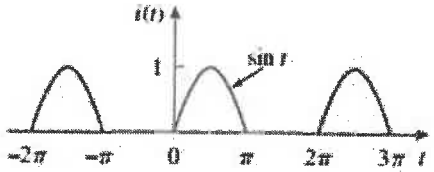
*Maximum Marks: 70* Date: 18.06.2026 Duration: 3 hours

**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 (10X2M=20 Marks) | | Marks | CO | BTL |
|---|---|---|---|---|
| 1 | Write short notes on unit impulse function. | 2M | 1 | L1 |
| 2 | What are the Dirichlet's conditions for existence of Fourier Series. | 2M | 1 | L1 |
| 3 | What is frequency spectrum? | 2M | 2 | L1 |
| 4 | What are the effects of sampling rate? | 2M | 2 | L1 |
| 5 | Does the impulse response of a nonlinear system characterize the system? | 2M | 3 | L1 |
| 6 | Define Causality of signal. | 2M | 3 | L1 |
| 7 | Write any two properties of Autocorrelation. | 2M | 4 | L1 |
| 8 | Define Power Spectral Density. | 2M | 4 | L1 |
| 9 | State initial value theorem of Laplace transform. | 2M | 5 | L1 |
| 10 | What is condition for Z-transform to exist? | 2M | 5 | L1 |

Part-B

| Answer All the following questions. (5X10M=50Marks) | | Marks | CO | BTL |
|---|---|---|---|---|
| 11 | a) Discuss the concept of impulse function. Explain how signum function is expressed in terms of unit step function.<br>b) Prove that the complete set { 1, $\cos \omega_0 t$, $\cos 2\omega_0 t$, $\cos 3\omega_0 t$,..... $\sin \omega_0 t$, $\sin 2\omega_0 t$, $\sin 3\omega_0 t$..... } are orthogonal over the interval$(t_0, t_0 + \frac{2\pi}{\omega})$. | 5M<br>5M | 1 | L2 |
| | OR | | | |
| 12 | Discuss about wave symmetry of Fourier Series in detail. | 10M | 1 | L2 |
| 13 | Find the Trigonometric Fourier series of the half wave rectified sine wave as shown below.<br> | 10M | 2 | L2 |
| | OR | | | |

| | | | | |
|---|---|---|---|---|
| 14 | State sampling theorem & explain the different types of sampling techniques. | 10M | 2 | L2 |
| 15 | a) Give the classification of systems.<br>b) For a system excited by $x(t)=e^{-3t}u(t)$, the impulse response is $h(t)= e^{-2t}u(t)+ e^{2t}u(-t)$ find the output for the system. | 5M<br>5M | 3 | L2 |
| | OR | | | |
| 16 | Derive the relationship between rise time and bandwidth. | 10M | 3 | L2 |
| 17 | a) Write short notes on Power Spectral Density.<br>b) State & prove properties of Auto-correlation of energy signals. | 5M<br>5M | 4 | L2 |
| | OR | | | |
| 18 | a) State & prove Frequency convolution theorem.<br>b) Explain the detection of periodic signal in the presence of noise by Cross-correlation. | 10M | 4 | L2 |
| 19 | a) State Paley-wiener criterion for physical realization of a system.<br>b) What conclusions can be drawn from the paley-wiener criterion. | 10M | 5 | L2 |
| | OR | | | |
| 20 | Solve the z-transform and ROC of the following sequences<br>i) $x[n]=[4(5^n)-3(4^n)]\ u(n)$ ii) $x[n]= (1/3)^n\ [u(-n)-u(n-8)]$ | 5M<br>5M | 5 | L2 |