R18 Regulation *Subject code:2P3DD*

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

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

B.Tech III Semester Supplementary Examinations, December 2025

SIGNALS & SYSTEMS
(ECE)

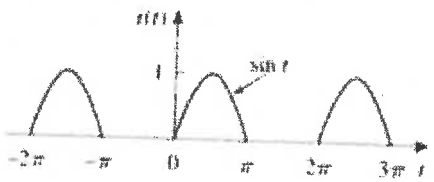
Maximum Marks: 70 Date:22.12.2025 Duration: 3 hours

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	List out conditions to be power signal, with an example.	2M	1	L1
2	Define the trigonometric Fourier series.	2M	1	L1
3	Define Hilbert transform of a signal.	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	List out the properties of convolution.	2M	4	L1
8	Define Cross-correlation.	2M	4	L1
9	Why ROC cannot contain poles?	2M	5	L1
10	Find the Z-transform of unit step function?	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 a function is approximated in set of mutually orthogonal functions. b) Define a signal. State any four characteristics of signal.	5M 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. 	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. 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 5M	3	L2
	OR			
16	Derive the relationship between rise time and bandwidth.	10M	3	L2
17	a) Find the convolution of the signals $x_1(t) = \cos t\, u(t)$; $x_2(t)=u(t)$. b) State & prove time convolution theorem.	5M 5M	4	L2
	OR			
18	Explain about cross power spectrum density and its properties with proofs (any three properties).	10M	4	L2
19	Prove that the signals $x(t) = e^{-a\,t}u(t)$ and $x(t) = -e^{-at}u(-t)$ have the same X(s) and differ only in ROC.	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