



R20 Regulation

Subject code: 3P3DD

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	Define signum function.	2M	1	L1
2	What is orthogonal signal space?	2M	1	L1
3	State Time shifting property of Fourier transform.	2M	2	L1
4	What is the effect of wave symmetry?	2M	2	L1
5	What is aliasing effect?	2M	3	L1
6	Define ROC.	2M	3	L1
7	Define Energy Spectral Density.	2M	4	L1
8	Define correlation and convolution.	2M	4	L1
9	Define a filter.	2M	5	L1
10	What are the Conditions for a System to be LTI System?	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.	5M	1	L2
	b) Prove that the complete set $\{ 1, \cos w_0t, \cos 2w_0t, \cos 3w_0t, \dots, \sin w_0t, \sin 2w_0t, \sin 3w_0t, \dots \}$ are orthogonal over the interval $(t_0, t_0 + \frac{2\pi}{\omega})$.	5M		
OR				
12	Check whether the system is $\frac{d^3 y(t)}{dt^3} + 2\frac{d^2 y(t)}{dt^2} + 4\frac{dy(t)}{dt} + 3y^2(t) = x(t+1)$ i) Static or Dynamic ii) Linear or Non-Linear iii) Causal or Non-causal iv) Time-invariant or time variant.	10M	1	L2
13	Find the Exponential Fourier series for the Square wave shown below.	10M	2	L2

	OR			
14	Find the Fourier Transform of the following signals & plot frequency response. a) $\delta(t)$ b) Rectangular pulse c) $u(t)$	10M	2	L2
15	(a) write the properties of ROC for Laplace transform. (b) Find the Inverse Laplace transform of $X(S) = \frac{s^3+1}{s(s+1)(s+2)}$	5M 5M	3	L2
	OR			
16	Explain a) Ideal sampling b) Natural sampling techniques	5M 5M	3	L2
17	a) Write short notes on Power Spectral Density. b) State & prove properties of Auto-correlation of energy signals.	5M 5M	4	L2
	OR			
18	a) State & prove Frequency convolution theorem. b) Explain the detection of periodic signal in the presence of noise by Cross-correlation.	5M 5M	4	L2
19	a) State Paley-Wiener criterion for physical realization of a system. b) What conclusions can be drawn from the Paley-Wiener criterion.	5M 5M	5	L2
	OR			
20	Obtain the conditions for distortion less transmission through a system.	10M	5	L2