R20 Regulation *Subject code: 3P3DD*

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

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

B.Tech III Semester Supplementary Examinations, July 2024

SIGNALA AND SYSTEMS

(ECE)

Maximum Marks: 70 Date:25.07.2024 Duration: 3 hours

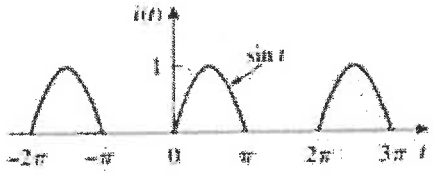
Note: 1.This question paper contains two parts A and B.
2. Part A is compulsory which carries 20 marks. Answer all questions in Part A.
3. Part B consists of 5 Units. Answer any one full question from each unit which carries 10M.
4. Each question carries 10 marks and may have a, b, c, d as sub questions.

Part-A

All the following questions carry equal marks (10X2M=20 Marks)		CO	Bloom Tx
1	Define Hilbert transform of a signal.	1	L1
2	What are the effects of sampling rate?	1	L1
3	What is frequency spectrum?	2	L1
4	What are the effects of sampling rate?	2	L1
5	Define periodic signal and non periodic signal.	3	L1
6	What is the relationship between input and output of an LTI system?	3	L1
7	What is distortion less transmission?	4	L1
8	List out conditions to be power signal and energy signal, with an example.	4	L1
9	State initial value theorem of Laplace transform.	5	L1
10	Define the linear time-invariant system.	5	L1

Part-B

Answer All the following questions. (5X10M=50Marks)			
11	a) Discuss the concept of impulse function. Explain how signum function is expressed in terms of unit step function. [4M] b) Prove that the complete set { 1, ***cos w_0t, cos $2w_0t$, cos $3w_0t$,..... sin w_0t, sin $2w_0t$, sin $3w_0t$.....*** } are orthogonal over the interval(t_0,$t_0+\frac{2\pi}{\omega}$). [6M]	1	L2
	OR		
12	Check whether the system is $\frac{d^3y(t)}{dt^3}+2\frac{d^2y(t)}{dt^2}+4\frac{dy(t)}{dt}+3y^2(t)=x(t+1)$ 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 Fourier Transform of the signals [5+5]M a) Signum function b) $e^{-a\|t\|}$	2	L2
	OR		
14	Find the Trigonometric Fourier series of the half wave rectified sine wave as	2	L2

	shown below. [10M] 		
15	a) What is over sampling and under sampling? Outline the effects of under sampling? [5M] b)Determine Nyquist sampling rate and Nyquist sampling interval for $x(t)=1+\cos(2000\pi t)+\sin(4000\pi t)$. [5M]	3	L2
	OR		
16	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]	3	L2
17	a) Write short notes on Power Spectral Density. [5M] b) State & prove properties of Auto-correlation of energy signals. [5M]	4	L2
	OR		
18	Explain about cross power spectrum density and its properties with proofs. [10M]	4	
19	a) Define transfer function. [3M] b) Write the properties of an LTI system. [7M]	5	
	OR		
20	Derive the relationship between Bandwidth and Risetime. [10M]	5	