R22 Regulation *Subject code: 4E3DE*

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

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

B.Tech III Semester Supplementary Examinations, July 2024

SIGNALS AND SYSTEMS

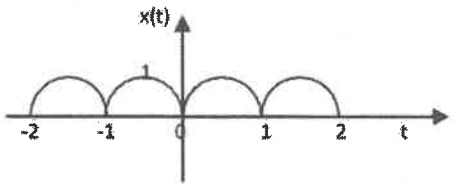
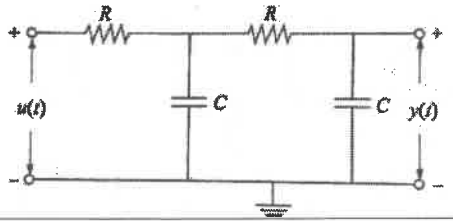
(ECE)

Maximum Marks: 60 Date:27.07.2024 Duration: 3 hours

Note: **1.This question paper contains two parts A and B.**
2. Part A is compulsory which carries 10 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	CO	Bloom Tx
All the following questions carry equal marks (10x1M=10 Marks)			
a)	Sketch the following signals: x(t)=u(t+3)	CO1	L3
b)	Determine whether the following system is stable or not $\boldsymbol{h\,t = e^{-4t}u(t)}$	CO1	L3
c)	Define exponential Fourier series.	CO2	L2
d)	Find Fourier transform of impulse signal.	CO2	L3
e)	Where are Laplace transforms used?	CO3	L1
f)	Give the advantage of flat top sampling.	CO3	L2
g)	What are the properties of cross correlation for energy signals?	CO4	L2
h)	Differentiate ESD and PSD.	CO4	L1
i)	List the ideal characteristics of high-pass filter.	CO5	L1
j)	The System matrix of a continuous time system, described in the state variable form is $A = \begin{bmatrix} x & 0 & 0 \\ 0 & y & -1 \\ 0 & 1 & -2 \end{bmatrix}$ Determine the range of x and y so that the system is stable.	CO5	L3

	Part-B		
Answer All the following questions. (5X10M=50Marks)		CO	Bloom Tx level
2	Discuss the classification of signals in both continuous time and discrete time with suitable examples. [10]	CO1	L2
	OR		
3	Explain the closed or complete set of orthogonal functions and Orthogonality in complex functions. [10]	CO1	L2
4	Obtain Fourier series of the following full wave rectified sine wave shown in figure. [10]	CO2	L3

			
	OR		
5	Find the Fourier transform of the following signals. [10] i. $x(t)=e^{-3t}u(t)$ ii. $x(t)=te^{-at}\,u(t)$ iii. $x(t)=e^{-t}\sin 5t\,u(t)$ iv. $x(t)=e^{-t}\cos 5t\,u(t)$	CO2	L4
6	Find impulse response of the following equation. [10] $\frac{d^2y(t)}{dt^2}+5\frac{dy(t)}{dt}+6y(t)=x(t)$	CO3	L5
	OR		
7	State and prove Sampling theorem for band limited signal. [10]	CO3	L5
8	Explain the extraction of a signal from noise by filtering. [10]	CO4	L2
	OR		
9	State and prove properties of autocorrelation functions. [10]	CO4	L3
10	Obtain the relationship between the bandwidth and rise time of ideal low pass Filter. [10]	CO5	L3
	OR		
11	Obtain the state model for a system represented by an electrical system as shown in figure. [10] 	CO5	L4