PRN No.		PAPER CODE	U213-295 (RE)

December 2023 (REEXAM)

SY Electronic & Telecommunication (SEMESTER - I)

COURSE NAME: Signals and Linear Systems   **COURSE CODE: ETUA21205**

(PATTERN 2020)

Time: [2 Hrs]   [Max. Marks: 60]

(*) Instructions to candidates:
1) Figures to the right indicate full marks.
2) Use of scientific calculator is allowed
3) Use suitable data wherever required
4) All questions are compulsory. Solve any two sub questions each from each Question 1 ,2, 3,4,5,and 6 respectively

Q. No.	Question Description	Max. Marks	CO mapped	BT Level
Q.1	a) Find whether given signal is energy or power, find appropriate value $$x(n) = A\sin\omega_0 n$$	[5]		Evaluate
	b) Express the CT signal $$x(t) = \begin{cases} t, & 0 \leq t < 1 \\ 0, & elsewhere \end{cases}$$ as a combination of even and odd signal	[5]	CO1	Apply
	c) Inspect whether the following signals are periodic; if they are periodic, calculate the fundamental period. $$x(t)=5\cos(5t+30) +18 \sin(6t+20)$$	[5]		Understand
Q2	a) Distinguish whether the following systems are: (1) static / Dynamic (2) causal/non-causal (3) linear/nonlinear (4) Time invariant/variant $$y(t) = x(t+10) + x^2(t)$$	[5]		Understand
	b) When you will call the system as static? Identify whether the following systems are dynamic or not. (i) $y(t)=x(t-2)$ (ii) $y[n] = x[2n]$ (iii) $y(t)= x^2(t)$	[5]	CO2	Understand
	c) The system with excitation x(t), and response y(t), described by:	[5]		Under

	$y(t) = x\left(\dfrac{t}{2}\right)$ Determine whether it is causal, Linear, Time Invariant, Stable?			stand
Q3.	a) Perform convolution of the following signals x(n) = u(n+3) – u(n-1) h(n) = u(n+1) – u(n-2)	[5]		Apply
	b) Determine the impulse response of the system described by the equation given below. Using impulse response determine whether the following system is: (1) stable / Unstable (2) causal/non-causal $y[n] = \dfrac{1}{3}\{x[n] + x[n-1] + x[n-2]\}$	[5]	CO3	Analy ze
	c) Determine and sketch the step response of the systems with the following impulse responses: h(t) = δ(t+2) – δ(t-1)	[5]		Apply
Q.4	a) Find CTFT of the following signal using Frequency shifting property. $x(t) = A cos(w_0 t)$	[5]		Apply
	b) Calculate CTFT of the rectangular function given as $f(t) = 3 \, \text{rect}\left(\dfrac{t}{\tau}\right)$	[5]	CO4	Evalu ate
	c) Evaluate convolution y(t)= rect(t) * rect(t) using FT	[5]		Apply
Q.5	a) Using the definition of IDFT find sequence x[n] for which X[k] is given by X[k] = {3 , 2+j, 1, 2-j}	[5]		Under stand
	b) Find linear convolution of following sequences using overlap add method x₁(n) = { 1, 3, 5, 7, -2, 1, 2, 3 , -1 } and x₂(n) = { 1, 4, 2}	[5]	CO5	Apply
	c) Draw Butterfly structure of 8 point DIT FFT	[5]		Reme mber
Q.6)	a) Explain how ROC is important to determine the causality and stability of LTI discreet time system	[5]		Under stand

b) Sate and Prove following properties of Z- Transform i) Differentiation in Z- domain ii) Convolution in Time Domain	[5]	CO6	Reme mber
c) Compute ZT of following sequences using appropriate properties and draw its ROC i) $x(n) = (a)^n u(n)$ ii) $x(n) = (-b)^n u(-n-1)$	[5]		Apply