Reg. No.															

Question Paper Code	13460

B.E. / B.Tech. - DEGREE EXAMINATIONS, APRIL / MAY 2025

Third Semester

Electronics and Communication Engineering

20ECPC303 - SIGNALS AND SYSTEMS

Regulations - 2020

Duration: 3 Hours | Max. Marks: 100

PART - A (MCQ) (10 × 1 = 10 Marks)

Answer ALL Questions

		Marks	K – Level	CO
1.	The type of systems which are characterized by input and the output quantized at certain levels are called as (a) analog (b) discrete (c) continuous (d) digital	1	K1	CO1
2.	In real valued function and complex valued function, time is _____ (a) Real (b) Complex (c) Imaginary (d) Not predictable	1	K1	CO1
3.	If the fourier transform of x(t) is X(f), then the fourier transform of dx(t)/dt is (a) $j2\pi fX(f)$ (b) $jfX(f)$ (c) $-jfX(f)$ (d) $-j2\pi X(f)$	1	K1	CO2
4.	The CTFT of a signal x(t) is represented by which variable? (a) $F(\omega)$ (b) $X(\omega)$ (c) X(t) (d) X(s)	1	K1	CO2
5.	Laplace transform of a unit step function is (a) 1 (b) s (c) 1/s (d) None of the mentioned	1	K1	CO3
6.	Find the fourier transform of the F[2sgn(t)]? (a) $2/j\omega$ (b) $4/j\omega$ (c) $1/j\omega$ (d) $8/j\omega$	1	K1	CO3
7.	The BIBO stability of a system is determined from its_____. (a) Impulse response (b) Input (c) Output (d) None of the mentioned	1	K1	CO4
8.	In s-domain if the transfer function of an LTI system is given, then the impulse response can be found by finding the _____of transfer function. (a) Fourier transform (b) Inverse Fourier transform (c) Laplace transform (d) Inverse Laplace transform	1	K1	CO4
9.	When do DTFT and ZT are equal? (a) When $\sigma = 0$ (b) When $r = 1$ (c) When $\sigma = 1$ (d) When $r = 0$	1	K1	CO5
10.	Find the convolution of x(n)={4,-2} and h(n)={-2,4,2}. (a) {-14,20,0,-7} (b) {-18,45,0,-9} (c) {-8,20,0,-4} (d) none of the mentioned	1	K1	CO6

PART - B (12 × 2 = 24 Marks)

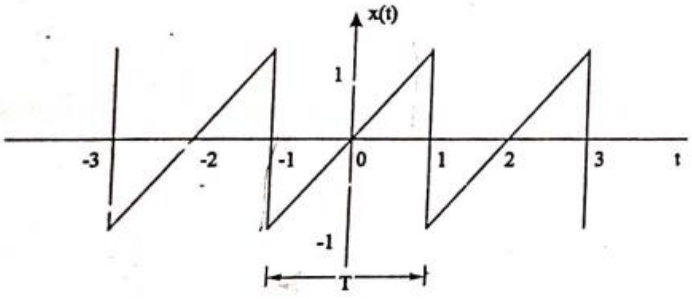
Answer ALL Questions

11.	Check Whether the following system is Time Invariant and Causal: $y(t)=x(e^{-t})$.	2	K2	CO1
12.	Sketch the following signals :rect(t+1)/4 and 5r(t/2).	2	K2	CO1
13.	State the conditions for the existence of Fourier series.	2	K1	CO2
14.	Write the equations for trigonometric & exponential Fourier series.	2	K2	CO2
15.	Find the Laplace transform of the signal, $x(t)=e^{at}u(t)$.	2	K2	CO3
16.	List out any four properties of Fourier Transform.	2	K1	CO3
17.	Consider the LTI system with transfer function $H(S) = \frac{1}{(s+1)(s-3)}$ Re(s)>3, determine h(t).	2	K2	CO4
18.	What are all the steps involved in Convolution Integral?	2	K1	CO4
19.	What is the main condition to avoid aliasing?	2	K1	CO5
20.	Write the condition for existence of DTFT.	2	K1	CO5
21.	Differentiate between DFT and DTFT.	2	K2	CO6
22.	State the condition for an LTI discrete time system to be causal and stable in terms of ROC.	2	K2	CO6

PART - C (6 × 11 = 66 Marks)

Answer ALL Questions

23.	a)	Find out whether the following signals are periodic or not. If periodic find the period (i) x(t) = 2cos(10t+1)-sin(4t-1) (ii) x(n) = cos(0.1πn)	11	K2	CO1
		OR			
	b)	Given the input –output relationship of a continuous time system y (t) =t x (-t). Determine whether the system is causal, stable and linear and time invariant.	11	K2	CO1
24.	a)	Calculate the trigonometric Fourier Series for the periodic signal shown in figure.	11	K2	CO2



		OR			
	b)	Determine the exponential Fourier series for the signal f(t) =e^{-t} ,0 ≤ t ≤ 0.5.	11	K2	CO2
25.	a)	Find the Fourier transform of the signal $x(t) = cos\Omega_o t\ u(t)$	11	K2	CO3
		OR			
	b)	Find the inverse Laplace transform of X(s) =$\frac{4}{(s+2)(s-4)}$ if the ROC is (i) –2>Re{s}> -4 (ii) Re{s} < -4	11	K2	CO3
26.	a)	Convolve the following signals x(t)= e^{-5t} u(t) and h(t)= u(t+5).	11	K3	CO4
		OR			
	b)	A System is described by the following differential equation. $\frac{d^2y(t)}{dt^2} + 5\frac{dy(t)}{dt} + 7y(t) = \frac{dx(t)}{dt}$ + x(t). Determine Impulse response of the system and output response of the system for the input signal x(t) =$e^{-4t}u(t)$.	11	K3	CO4
27.	a)	Prove the sampling theorem and explain how the original signal can be reconstructed from the sampled version with necessary illustrations.	11	K2	CO5
		OR			
	b)	Compose the inverse z-transform of $X(z)=\frac{1+2z^{-1}}{1-2z^{-1}+z^{-2}}$ when x(n) is anti-causal.	11	K2	CO5
28.	a)	Find the impulse response, frequency response, magnitude response and phase response of the second order system. $y(n) - y(n-1) + \frac{3}{16}y(n-2) = x(n) - \frac{1}{2}x(n-1)$	11	K3	CO6
		OR			
	b)	Find the cascade and parallel of system described by the difference equation y(n)= 0.75y(n-1) - 0.125y(n-2) + x(n) +7x(n-1) + x(n-2).	11	K3	CO6