Reg. No.												

Question Paper Code	12914

B.E. / B.Tech. - DEGREE EXAMINATIONS, APRIL / MAY 2024

Third Semester

Electronics and Communication Engineering

(Common to Computer and Communication Engineering)

20ECPC303 – SIGNALS AND SYSTEMS

Regulations - 2020

Duration: 3 Hours Max. Marks: 100

PART - A (10 × 2 = 20 Marks)

Answer ALL Questions

		Marks	K – Level	CO
1.	List the classification of systems.	2	K1	CO1
2.	Compare energy and power signal.	2	K1	CO1
3.	State the Dirichlet's conditions of Fourier series.	2	K2	CO2
4.	Write the equations for trigonometric & exponential Fourier series.	2	K1	CO2
5.	Calculate the Laplace transform of the function x(t)=u(t)-u(t-2).	2	K3	CO3
6.	List out any four properties of Fourier Transform.	2	K1	CO3
7.	Given the input x(t)=u(t) and h(t)=δ(t-1).Determine the response y(t).	2	K3	CO4
8.	A causal LTI system has the system function $H(s)=\frac{1}{(s-5)}$. Determine the differential equation that describes the system.	2	K3	CO4
9.	Determine the DTFT of x(n)=δ(n)+δ(n-1).	2	K3	CO5
10.	What is the need for sampling?	2	K1	CO5

PART - B (5 × 13 = 65 Marks)

Answer ALL Questions

			Marks	K – Level	CO
11.	a)	Determine whether the system y(n) = x(n) - x(n-1) is static or dynamic, linear or non-linear, time invariant or time variant, casual or non-causal and stable or unstable.	13	K2	CO1
		OR			
	b) i)	Describe about elementary continuous time signals in detail.	8	K2	CO1
	ii)	Find whether the following signal is periodic. If periodic determine the fundamental period: $$x(t)=\cos\left(\frac{\pi}{3}t\right)+\sin\left(\frac{\pi}{4}t\right)$$	5	K2	CO1
12.	a)	Determine the exponential Fourier series for the signal $f(t)=e^{-t}, 0 \le t \le 0.5$.	13	K2	CO2

OR

b) Develop a trigonometric Fourier series of half wave rectified sine wave with a period of T=2π. 13 K3 CO2

13. a) Estimate the inverse Laplace Transform of the function. 13 K2 CO3

$$X(S) = \frac{2s+4}{(s+1)(s+3)}$$

ROC: -3 <Re(s) <-1 ,Re(s)< -3, Re(s)>-1.

OR

b) i) Interpret the inverse Fourier transform of X(ω)=δ(ω). 5 K2 CO3

ii) Estimate the Fourier Transform of $x(t) = 1 - e^{-|t|}\cos(\omega_0 t)$. 8 K2 CO3

14. a) Compute the Convolution of following signals. 13 K3 CO4

$x(t) = e^{-3t}u(t)$ and $h(t) = u(t-1)$.

b) The system produces the output y(t)=e^{-t}u(t) for an input x(t)=e^{-2t}u(t).

Predict (i) Frequency response 7 K3 CO4

(ii) Impulse response 6 K3 CO4

15. a) i) Consider an analog signal x(t)=5cos200πt. 7 K3 CO5

(a) Predict the minimum sampling rate to avoid aliasing.

(b) If sampling rate Fs =400Hz. Formulate the discrete time signal after sampling.

ii) Summarize the properties of ROC. 6 K2 CO5

OR

b) i) Infer the Z-transform and ROC of 7 K3 CO5

$$x[n] = 2^n u(n) + 3^n u(n-1)$$

ii) Determine the Z-transform of the sequences x(n)={5,3,2,4} 6 K3 CO5

PART - C (1 × 15 = 15 Marks)

16. a) Calculate the impulse and step response of the system described by the following difference equation 15 K3 CO6

$$y(n) + \frac{1}{3}y(n-1) = x(n).$$

OR

b) An input sequence x(n) = {2,1,0,1,2} is applied to a DSP system having an impulse response h(n) = {5,3,2,1}.Determine the output sequence produced by convolution. 15 K3 CO6