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Reg. No. : | | | | | | | | | | |

Question Paper Code: 94403

B.E. / B.Tech. DEGREE EXAMINATION, NOV 2022

Fourth Semester

Electronics and Communication Engineering

19UEC403– SIGNALS AND SYSTEMS

(Regulation 2019)

Duration: Three hours | Maximum: 100 Marks

Answer ALL Questions

PART A - (5 x 1 = 5 Marks)

1. A resistive-capacitive network is a _____system. CO1-U

   (a) causal & static (b) Non causal & static

   (c) causal &dynamic (d) Non causal &dynamic

2. Fourier transform of a Gaussian pulse is CO1-U

   (a) Another Gaussian pulse (b) Squared Sinc pulse

   (c) Sinc pulse (d) Impulse train

3. CO3-App

   If $F(s) = L[f(t)] = \frac{2(s+1)}{s^2 + 4s + 7}$ then the initial value of the signal is

   (a) 0 (b) 2 (c) ½ (d) infinity

4. If the signal *x(t) = cos(2000πt)* is sampled at 5000 Hz such that $x(n)=x(nT_s)$, what is the fundamental frequency of x(n) in rad/sec? CO4- App

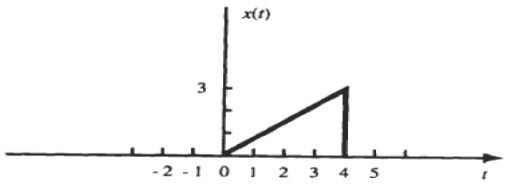
   (a) 2π/5 (b) π (c) 2π/8 (d) π/8

5. The ROC X(z) cannot contain any CO1- U

   (a) poles (b) zeros (c) poles or zeros (d) multiple poles

PART – B (5 x 3= 15 Marks)

6. Sketch the signal $x(-t+2)$ and $-x(t-5)$ CO1- U



7. Obtain the Fourier Transform of *sin* w_0t. Draw its magnitude spectrum CO3- App

8. Derive the L.T. of the signal u(t)* u(t-1) using the convolution property CO3-App

9. State sampling Theorem. CO1-U

10. Define ROC**.** Illustrate the Z-transform pair. CO1-U

PART – C (5 x 16= 80 Marks)

11. (a) Check whether the following systems are static/dynamic, causal/non-causal, linear/non-linear, time-variant/time-invariant CO1- U (16)

(a) y (n) = n x(n) b) $y(t) = e^{x(t)}$ c) y[t] = cos x[t]

Or

(b) Check all the system properties for the given CO2- App (16)

$(i)\ y(n) = x(n+1) - x(n-1)$

$(ii)\ \frac{dy(t)}{dt} + 5ty(t) = x(t)$

12. (a) Obtain the Fourier Transform of the signal $e^{-|t|}$ and plot its magnitude and phase spectrum. CO3-App (16)

Or

(b) Find the Fourier transform of a rectangular pulse of duration T with amplitude A and draw its spectrum CO2- App (16)

13. (a) Consider a discrete time LTI system described by the difference equation $y(n) - \frac{3}{4}y(n-1) + \frac{1}{8}y(n-2) = 2x(n)$ CO3- App (16)

(a) Determine the frequency response of the system

(b) Find the impulse response of the system

(c) Determine its response to the input is $x(n) = \left(\frac{1}{4}\right)^n u(n)$.

Or

(b) Determine the Laplace Transform for double exponential function given by $x(t)=e^{-2|t|}$; also plot its region of convergence. CO3- App (16)

14.	(a)	A signal **x(t)= SinC(150πt)** is sampled at a rate of a.100Hz b.200 Hz c.300 Hz. For each of these three cases, Explain if you can recover the signal x(t) from the sampled signal.	CO4- Ana	(16)
		Or		
	(b)	A pressure gauge that can be modeled as an LTI system has a time response to a unit step input given by $(1-e^{-t}-te^{-t})u(t)$. For a certain input x(t), the output is observed to be $(2-3e^{-t}+e^{-3t})u(t)$. For this observed measurement, determine the true pressure input to gauge as a function of time.	CO3- Ana	(16)
15.	(a)	Determine the solution of the difference equation $y(n) = 5/6\ y(n-1) - 1/6\ y(n-2) + x(n)$ for $x(n) = 3^n\ u(n)$ with initials conditions $y(-1) = 1, y(-2) = 0$.	CO4- App	(16)
		Or		
	(b)	Find the Z-Transform of the given signal $x(n) = 0.5^{\lvert n \rvert}$ and plot its magnitude and phase spectrum.	CO4- App	(16)