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

Question Paper Code: 54404

B.E. / B.Tech. DEGREE EXAMINATION, DEC 2021

Fourth Semester

Electronics and Communication Engineering

15UEC404- SIGNALS AND SYSTEMS

(Regulation 2015)

Duration: Three hours Maximum: 100 Marks

Answer ALL Questions

PART A - (5 x 1 = 5 Marks)

1. Time shifting property mathematically can be expressed as CO1- R

(a) y(t) = x(t-T) (b) y(t) = x(t) (c) y(t) = x(t) +1 (d) y(t) = x(t) -1

2. A periodic signal $x(t)$ *of period* T_0 is given by $x(t) = \begin{cases} 1 & |t| < T_1 \\ 0 & T_1 < |t| < \frac{T_0}{2} \end{cases}$ CO2- R

The dc component of (t) is

(a) $\frac{T_1}{T_0}$ (b) $\frac{T_1}{2T_0}$ (c) $\frac{2T_1}{T_0}$ (d) $\frac{T_0}{T_1}$

3. The inverse Laplace transform of CO3- R

$\frac{-a}{s(s-a)}$

(a) e^{at} (b)-e^{at} (c)1 - e^{at} (d)-1 + e^{at}

4. The F.T. of a conjugate symmetric function is always CO4- R

(a) Imaginary (b) Real (c) Conjugate unsymmetric (d) Conjugate symmetric

5. The Region of Convergence(ROC) of the Z-transform of a unit step function is CO5- R

(a) $|z| < 1$ (b) (Real Part of Z) > 0 (c) (Real Part of Z) < 0 (d) $|z| > 1$

PART – B (5 x 3= 15 Marks)

6.	Draw a graph and write the mathematical expression for unit parabolic function..	CO1- R
7.	What is the difference between tabulation and graphical methods?	CO2- R
8.	What is meant by recursive and non-recursive systems?	CO3- R
9.	Differentiate convolution and multiplication property.	CO4- R
10.	Define system function.	CO5- R

PART – C (5 x 16= 80 Marks)

11.	(a)	(i) Find the signal $x(n) = (1/3)^n u(n)$ is energy signal or not.	CO1- U	(6)
		(ii) Explain with supporting equations of energy and power signals.	CO1- App	(10)
		Or		
	(b)	(i) What are the mathematical operations that can be performed on discrete time signals?	CO1 App	(8)
		(ii) Determine whether the following systems are time invariant or not. 1. $y(t)=2tx(t)$, 2. $y(t)= x(t)\sin 20\pi t$	CO1 App	(8)
12.	(a)	Find the Fourier series of the signal $x(t) = \int_0^{2\pi} \sin 2\pi f_0 mt \ \cos 2\pi f_0 nt \ dt$ Where f_0 is the fundamental frequency and m and n are any positive integer	CO2- App	(16)
		Or		
	(b)	Determine the forced response of the system described by the equation $5\frac{dy(t)}{dt} + 10y(t) = 2x(t), for\ the\ input, (t) = 2u(t)$	CO2- App	(16)
13.	(a)	Explain and prove any five properties of Laplace transform	CO3- Ana	(16)
		Or		
	(b)	Find the Inverse Laplace transform of $X(S) = (2S+1) / (S+1)(S^2+2S+2)$.	CO3- Ana	(16)
14.	(a)	Find the frequency response of a I order system described by difference equation $y(n) = a\ y(n-1) + x(n)$. Plot magnitude and phase response for a = 0.5.	CO4- U	(16)
		Or		

(b) (i) Find the linear convolution of CO4- U (8)

$x(n) = \{1,2,3,4\} \quad and \quad h(n) = \{2,3,4,1\}$

(ii) Find the DTFT of the given periodic signal CO4- U (8)

$$x[n] = \cos \omega_0 n = \frac{1}{2} e^{j\omega_0 n} + \frac{1}{2} e^{-j\omega_0 n}, \text{ with } \omega_0 = \frac{2\pi}{3},$$

15. (a) List the properties of Z-transform and explain briefly. CO5- Ana (16)

Or

(b) Realize direct form-I and direct form-II realization of the discrete time system having system function CO5- Ana (16)

$$H(z) = \frac{2(z+2)}{z(z-0.1)(z+0.5)(z+0.4)}$$

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