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Question Paper Code: 50444

B.E. / B.Tech. DEGREE EXAMINATION, MAY 2017

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
(a) $y(t) = x(t-T)$ (b) $y(t) = x(t)$ (c) $y(t) = x(t) + 1$ (d) $y(t) = x(t) - 1$
2. If $x(t)$ is both real and even, then $x(j\Omega)$ will be
(a) Real and Odd (b) Real and Even
(c) Imaginary and Odd (d) Imaginary and Even
3. If $\delta(t)$ denotes a unit impulse, then the Laplace transform of $(d^2\delta(t)/dt^2)$ will be
(a) 1 (b) S^2 (c) S (d) S^{-2}
4. If Fourier transform of $x(n)$ is $X(e^{j\omega})$ then Fourier transform of $x^*(-n)$ is
(a) $X^*(e^{-j\omega})$ (b) $X(e^{-j\omega})$ (c) $X^*(e^{j\omega})$ (d) $jX^*(e^{-j\omega})$
5. The Region of Convergence(ROC) of the Z-transform of a unit step function is
(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.
7. What is meant by half wave symmetry?

8. What are the drawbacks of transfer function method of representing system?
9. List the properties of frequency response of $H(e^{j\omega})$ of an LTI system.
10. Define system function.

PART - C (5 x 16 = 80 Marks)

11. (a) (i) Explain with supporting equations of energy and power signals. (10)
- (ii) Find the signal $x(n) = (1/3)^n u(n)$ is energy signal or not. (6)

Or

- (b) (i) Explain in detail about stable and unstable systems. (8)
- (ii) Check whether the following system are static/dynamic and linear/non-linear,
A modulator whose carrier frequency is Ω_c giving an output $y(t) = x(t) \cos \Omega_c t$. (8)

12. (a) Explain in detail about the properties of continuous time Fourier series signals. (16)

Or

- (b) Find the Fourier transform of the signal $x(t) = \cos(\Omega_0 t)$. (16)

13. (a) (i) List the properties of Region of Convergence (ROC). (8)
- (ii) State and prove the transformation of the integrals. (8)

Or

- (b) Find the Inverse Laplace transform of $X(S) = (2S+1) / (S+1)(S^2+2S+2)$. (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 $a = 0.5$. (16)

Or

- (b) State and prove the following properties of discrete time Fourier transform

- (i) Linearity (8)
- (ii) Convolution in time domain (8)

15. (a) (i) List the properties of Z-transform and explain briefly. (10)

- (ii) Determine the Z-transform, ROC and pole-zero locations of $X(Z)$ for,
 $x(n) = (2/3)^n u(n) + (-1/2)^n u(n)$. (6)

Or

- (b) (i) Obtain the Cascade form realization of the system described by the difference equation $y(n) - (1/4) y(n-1) - (1/8) y(n-2) = x(n) + 3 x(n-1) + 2 x(n-2)$. (8)

- (ii) Obtain the direct form-I realization for the system described by the difference equation $y(n) - (5/6) y(n-1) + (1/6) y(n-2) = x(n) + 2 x(n-1)$. (8)
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