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Question Paper Code: 34404

B.E. / B.Tech. DEGREE EXAMINATION, APRIL 2019

Fourth Semester

Electronics and Communication Engineering

01UEC404 – SIGNALS AND SYSTEMS

(Regulation 2013)

Duration: Three hours   Maximum: 100 Marks

Answer ALL Questions.

PART A - (10 x 2 = 20 Marks)

1. Sketch the signal $x(t)=e^{-t}$ for an interval $0 \le t \le 2$.

2. Write the equations for energy and power of CT signals.

3. State Parseval's theorem for continuous time Fourier series.

4. Find the Fourier transform of signal $x(t)=\delta(t)$.

5. State and prove the differentiation property of Laplace transform.

6. Find the impulse response of two LTI systems when it is connected in parallel?

7. Prove the time shifting property of discrete time Fourier transform.

8. Find $y(n)$ for the input $x(n)=\{ 1\ 2\ 3\}$ and $h(n)= \{1,\ 1\}$ using convolution.

9. Find the z- transform of the sequence $x(n)= \{ 3,\ 2,\ -1,\ -4,\ 1\}$.

10. What are the different methods evaluating inverse z- transform?

11. (a) (i) Determine whether the following signals are energy or power signal and also calcute their energy and power.

(1) $x(t) = \cos^2(\omega_0 t)$

(2) $x(n) = \left(\frac{1}{2}\right)^n u[n]$.   (10)

(ii) Find the fundamental period T of the signal

$$x[n] = \cos\left[\frac{n\pi}{2}\right] - \sin\left[\frac{n\pi}{8}\right] + 3\cos\left[\frac{n\pi}{4} + \frac{\pi}{3}\right]$$ (6)

Or

(b) Explain the classification of signals in details.   (16)

12. (a) Obtain the trigonometric Fourier series for the half wave rectified sine wave.   (16)

Or

(b) (i) Find the Fourier series for the periodic signal $x(t) = t$ for $0 \le t \le 1$ and repeats every one sec's.   (12)

(ii) Find Fourier transform of $x(t) = e^{at}u(-t)$.   (4)

13. (a) (i) Find the Laplace transform of $f(t) = \sin t \cosh(t)$.   (10)

(ii) Discuss the properties of convolution integral.   (6)

Or

(b) Determine the inverse Laplace transform of $F(s) = \dfrac{2s^2 + 3s + 3}{(s+1)(s+3)^3}$ and explain the state variable technique.   (16)

14. (a) State and Explain the sampling theorem for low pass bandlimited signal and explain the process of reconstruction of the signal from its samples.   (16)

Or

(b) Discuss the concept of convolution sum, LTI systems using DIFT.   (16)

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15. (a) (i) Find Z-Transform and ROC of the following sequence of signal is $x(n) = a^n u(n) + b^n u(-n - 1)$. (10)

     (ii) State and prove frequency shifting property of Z-Transform. (6)

Or

(b) (i) Find the inverse Z transform of $X(z) = \dfrac{z^2}{(z-1)(z-0.2)}$ (6)

     (ii) Find the Z transform of the following sequence $\left(\dfrac{1}{3}\right)^{\eta} u(-\eta)$ and explain about state variable equations. (10)

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