

Roll No.

Total No. of Pages : 02

Total No. of Questions : 09

B.Tech.(ECE)(EIE) (Sem.-4)
SIGNALS AND SYSTEMS

Subject Code : EC-206

Paper ID : [A0308]

Time : 3 Hrs.

Max. Marks : 60

INSTRUCTION TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students has to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students has to attempt any TWO questions.

SECTION-A

1. Write briefly :

- a. Write the mathematical and graphical representation of a unit step sequence.
- b. Determine the even and odd components of $x(t) = \cos t + \sin t$
- c. State the necessary and sufficient conditions for the existence of the Fourier series representation for a signal.
- d. Determine the Z transform of unit impulse sequence.
- e. Test the system $y(t) = 7x(t) + 5$ for linearity.
- f. Define signal analysis in context with electronic communications.
- g. What is the significance of probability density function?
- h. What is an ergodic random process? How is it related to a stationary random process?
- i. How is shot noise represented?
- j. What is meant by Noise temperature?

SECTION-B

2. Derive the expression for Trigonometric Fourier series.
3. If the Fourier transform of $f(t)$ is given as $F(j\omega) = \frac{1}{\omega^2 + 1} e^{-2\omega^2/\omega^2 + 1}$, then what would be the Fourier transform of (a) $f(2t)$, (b) $4 \frac{d}{dt} f(t)$, (c) $f(t-2) e^{jt}$?
4. Discuss sampling theorem for low pass and band pass network.
5. From a well shuffled pack of cards, two cards are drawn simultaneously at random. What is the probability that they form a king-ace combination?
6. Derive an expression for noise in an envelope detector.

SECTION-C

7. a) State and prove that convolution theorem in relation of Fourier transform.
b) Determine the Fourier transform of $x(t) = e^{-at} \cos \omega_0 t u(t)$.
8. a) Derive the z-transform of $x(n) = \cos \omega_0 nT$ for $n \geq 0$
b) Determine Z transform and region of convergence of the discrete time sequence $x(n) = (0.5)^n u(n) + (0.8)^n u(-n - 1)$.
9. Write a short note on :
 - a) Avalanche noise
 - b) Bipolar transistor noise.