

(DEC 226)

B.Tech. DEGREE EXAMINATION, MAY - 2015

(Examination at the End of Second Year)

ELECTRONICS & COMMUNICATIONS

Paper - VI : Signals & Systems

Time : 3 Hours

Maximum Marks : 75

Answer question No.1 compulsory

(15)

Answer ONE question from each unit

(4 × 15 = 60)

1) Write briefly on :

- a) What is aliasing effect.
- b) What are the properties of correlation function.
- c) Define Sample Space & Event.
- d) Give short notes on Mean Ergodic processes.
- e) Distinguish between auto correlation & cross correlation.
- f) What is equally likely event.
- g) What is the importance of sampling theorem.
- h) Find the signal band width of $\cos 100\pi t + \cos 200\pi t$.

UNIT - I

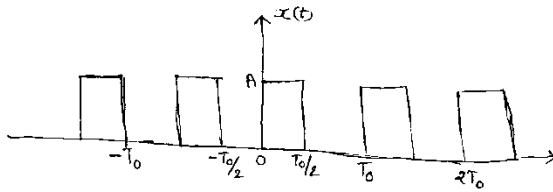
- 2) a) State & prove sampling theorem for band limited signals.
- b) Check whether the following signals are orthogonal (or) not.

$$X_1(n) = e^{jk\left(\frac{\pi}{8}\right)n}$$

$$X_2(n) = e^{jm\left(2\pi + \frac{\pi}{8}\right)n}$$

OR

- 3) a) Consider the periodic square wave $x(t)$ as shown in figure below. Determine the complex exponential Fourier series of $x(t)$.



- b) State & prove the properties of Fourier transform.
- i) Time shifting
 - ii) Time scaling

UNIT - II

- 4) a) What is Paley – winer criterion? Explain its significance.
- b) Verify parseval's theorem for the energy signal.
- $x(t) = 2 \cdot e^{-2t} \cdot u(-t)$

OR

- 5) a) Discuss power density spectrum properties.
- b) Give short notes on convolution, stability & causality.

UNIT - III

- 6) a) The antenna is having temperature 30°K is connected to the input of receiver equivalent input noise temperature is 270°K . The mid band available power gain is 10^{10} . The noise band-width is 1.5 MHz . Find out the available out put noise power.
- b) Derive the expression for the noise figure in terms of the input & output signal-to noise ratios.

OR

- 7) Write short notes on
- a) Thermal noise.
 - b) White noise.
 - c) Amplifier noise.
 - d) Upon what factors does the noise voltage depend?
 - e) Noise figure.

UNIT - IV

- 8) a) Let 'x' be a random variable with distribution f_x given by

$$f_x(x) = \begin{cases} 1 - e^{-\lambda x} & , \quad 0 \leq x \leq \alpha \\ 0 & , \quad \textit{otherwise} \end{cases}$$

Find the pdf of x . Determine the mean & variance of the distribution.

- b) State & prove the Baye's theorem.

OR

- 9) a) A random process $X(t)$ is applied to a system whose impulse response is

$$h(t) = 3.4(t) \cdot t^2 \cdot \exp(-8t)$$

If $E[X(t)] = 2$, what is the mean value of the system response $y(t)$.

- b) Give short notes on Average noise figure.

