Roll No. ☐☐☐☐☐☐☐☐☐☐☐   **Total No. of Pages : 02**

Total No. of Questions : 09

B.Tech.(EIE) (2012 & Onwards)   (Sem.–4)

SIGNALS AND SYSTEMS

Subject Code : EC-206

M.Code : 57512

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 have to attempt any FOUR questions.**
3. **SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.**

SECTION-A

Q1. Explain briefly :

a. Two balanced dices are being rolled simultaneously. If sum of the numbers shown at a time on two faces is 7. What is the probability that the number shown by one of the face to the dice in this case is 1?

b. Find out even and odd component of the following signals :

   (i) $X(t) = \cos^2\left(\frac{\pi t}{2}\right)$ (ii) $x[n] = \cos^2\left[\frac{\pi}{4}n\right]$

c. Determine the fundamental period of the following signal :

$$x(t) = 2\cos\frac{2\pi t}{3} + 3\cos\frac{2\pi t}{7}$$

d. If x (t) = u (t–3) –u (t–5) and h (t) = e^{-3t^*} u(t). Find x (t)*h (t).

e. Let x(t) = u(t+0.5) –u(t–0.5). Sketch y(t) = 2x(t) + x(t/2)

f. Define impulse response and step response of a continuous time system.

g. For the given system, determine whether it is i) memory less, ii) causal, iii) time - invariant

$$y[n] = nx[n]$$

h. What is the mean and variance of Gaussian pdf?

i. What do you mean by Eygodicity?

j. Define Nyquist rate.

SECTION-B

Q2. Explain the following :

    a. Gaussian noise.

    b. FET noise

Q3. What are the properties of Fourier Transform? Prove any three properties.

Q4. Derive Parseval's relation for periodic signal.

Q5. What is sampling Theorem? Derive the expression for Band Pass and Band Limited signal.

Q6. Calculate the SNR for a Matched filter.

SECTION-C

Q7. Write short notes on **any two** of the following :

    a. Match Filter.

    b. Random Variables.

    c. Shot Noise.

Q8. Determine the Fourier transform of the triangular signal shown below :
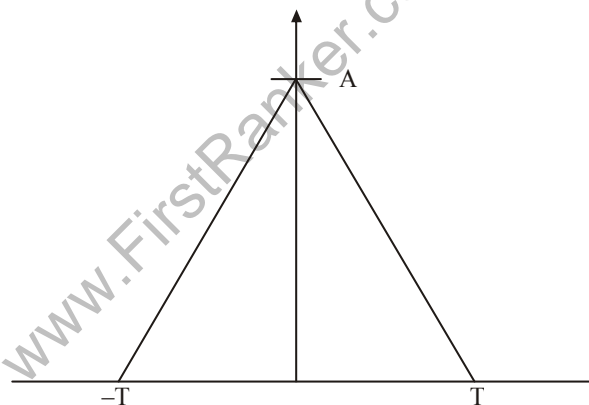
FIG.1

Q9. A random process is given by $X(t) = A \cos(\omega_o, t + \theta)$, where A and ω_o is constant and θ is variable uniformly distributed in the interval $(-\pi, \pi)$. Determine the power spectrum density of $X(t)$.

NOTE : Disclosure of Identity by writing Mobile No. or Making of passing request on any page of Answer Sheet will lead to UMC against the Student.