Roll No. | | | | | | | | | | | | |

Total No. of Pages : 02

Total No. of Questions : 09

B.Tech.(EIE) (2011 & 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) Define unit ramp signal.

b) What is power spectral density?

c) Sketch the following signal:

$x(t) = A[u(t + a) - u(t - a)]$ *for* a > 0

d) What is matched filter?

e) How can you classify Random processes?

f) What is meant by signum function? Explain.

g) Explain the relationship between joint PDF and Probability.

h) Define Analog Signal

i) State the sampling theorem for low pass signals.

j) An amplifier has a bandwidth of 4 MHz with 10kΩ as the input resistor. Calculate the RMS voltage at the input to this amplifier if the room temperature is 25°C.

SECTION-B

Q2. Find the Fourier transform of an Impulse function $x(t) = \delta(t)$. Also draw its spectrum.

Q3. Show that a system with excitation $x(t)$ and response $y(t)$ described by $y(t) = u(x(t))$ is non-linear, time invariant, stable and non-invertible.

Q4. Explain the joint probability function and its various properties.

Q5. What do you mean by noise? How can you classify the noise?

Q6. A receiver having equivalent input noise resistance of 2500Ω and input resistance of 500 Ω is connected to an antenna of resistance 50Ω Calculate the noise figure in dBs and equivalent noise temperature of the receiver.

SECTION-C

Q7. Find the Fourier Transform of following signals $x1(t)$ and $x2(t)$

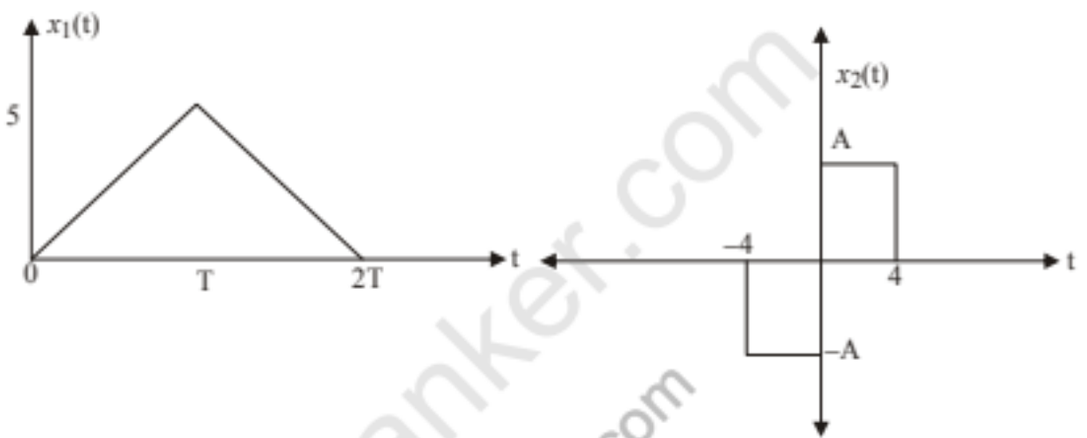

FIG.1

Q8. Explain what matched filter is. How it differs from optimum filter? Derive an expression for error probability of matched filter.

Q9. A random variable X has PDF as :

$$f_x(x) = \begin{cases} \frac{\pi}{16}\cos\left(\frac{\pi x}{8}\right), & -4 \le x \le 4 \\ 0 & elsewhere \end{cases}$$

Find :

a) Mean value

b) Variance

c) Mean Square value

d) Standard deviation

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.