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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:
$$x(t) = A[u(t+a) - u(t-a)] \text{ for } a > 0$$
- 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 $10k\Omega$ 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 500Ω 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 $x_1(t)$ and $x_2(t)$

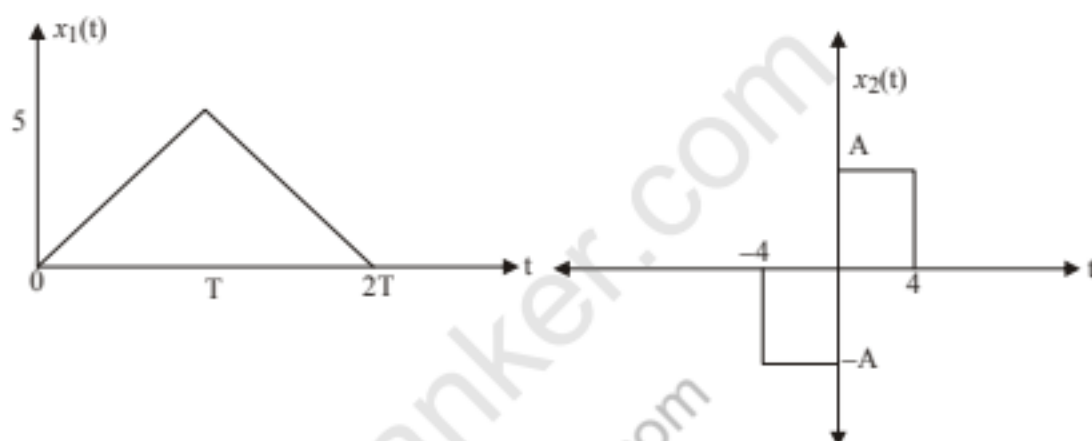


FIG.1

- 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

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

Find :

- Mean value
- Variance
- Mean Square value
- 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.