

Roll No.

Total No. of Questions : 09]

May-08

[Total No. of Pages : 02

Paper ID [EC206]

(Please fill this Paper ID in OMR Sheet)

B.Tech. (Sem. - 4th)

SIGNALS & SYSTEMS (EC - 206)

Time : 03 Hours

Maximum Marks : 60

Instruction to Candidates:

- 1) Section - A is **Compulsory**.
- 2) Attempt any **Four** questions from Section - B.
- 3) Attempt any **Two** questions from Section - C.

MAY 2008

Section - A

Q1)

(10 × 2 = 20)

- a) Give the Dirichlet condition.
- b) State the properties of linear convolution.
- c) State the condition for existence of Fourier integral.
- d) The joint probability of random variable X and Y is $f(x,y) = \frac{1}{4}e^{-|x|-|y|}$, $-\infty < x < \infty, -\infty < y < \infty$.
 - (i) Are X and Y statistically independent random variables?
 - (ii) Calculate the probability that $X \leq 1$ and $Y \leq 0$.
- e) What is the mean and variance of Gaussian pdf?
- f) What is central limit theorem?
- g) What do you mean ergodicity?
- h) What is center limit theorem?
- i) What is the difference between causal and non-causal system?
- j) Define Nyquist rate?

Section - B

(4 × 5 = 20)

- Q2) Derive the relationship between noise figure and equivalent noise temperature for a cascade system?

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Q3) Write a note on various type of noise?

Q4) Consider the probability density $f(x) = ae^{-b|x|}$ where X is a random variable whose allowable value range from $x=-$ to $x=$. find (a) the cumulative distribution function F(x) (b) the relationship between a and b and (c) the probability that the outcome X lies between 1 and 2.

Q5) For the sinusoidal signal $x(t) = \cos 8t$, find the following:

- (a) The value of sampling interval T_s so that $x(n) = x(n T_s)$ is a periodic sequence.
- (b) The fundamental period of $x(n) = x(n T_s)$ for $T_s = 0.2\pi$ seconds.

Q6) Prove the periodicity of $y(t) = \cos(\omega t + \phi)$ and $y(t) = e^{i\omega t}$ in both case $\omega \neq 0$. Find there fundamental period also.

Section - C

(2 × 10 = 20)

Q7) What is sampling theorem? Derive the expression for band limited and band pass signal.

Q8) Write a short note on:

- (a) Random variables.
- (b) Random process.
- (c) Match filter.

Q9) (a) Define the complex convolution theorem.

(b) Find the convolution of linear and circular convolution.

(c) Determine the Fourier transform of a triangular function shown in figure.

