Code No: 07A3EC10 **R07** **Set No. 2**

II B.Tech I Semester Examinations,MAY 2011
PROBABILITY THEORY AND STOCHASTIC PROCESSES
Common to Electronics And Computer Engineering, Electronics And Telematics, Electronics And Communication Engineering

Time: 3 hours **Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks
⋆ ⋆ ⋆ ⋆ ⋆

1. (a) Consider a probability space S = (Ω, F, P). Let Ω = {ξ1....ξ5} = {-1, -1/2, 0, 1/2, 1} with Pξ_i = 1/5 i = 1..5. Define two random variables on S as follows: X(ξ) =ξ and Y(ξ) =ξ^2
   i. Show that X and Y are dependent random variables
   ii. Show that X and Y are uncorrelated.

   (b) Let X and Y be independent random variables each N (0, 1). Find the mean and variance of Z =$(X^2+Y^2)^{1/2}$. [8+8]

2. (a) The PSD of random process is given by $S_{XX}(\omega) = \begin{matrix} \pi, & |\omega| < 1 \\ 0, & elsewhere \end{matrix}$. Find its Auto correlation function.

   (b) State and Prove any four properties of PSD. [8+8]

3. (a) Y = X_1+ X_2+..........+ X_N is the sum of N statistically independent random variables X_i where i = 1,2............N. Prove that $\phi_{X_1......X_N}(\omega_1.....\omega_N) = \prod_{i=1}^{N} \phi_{X_1}(\omega_1)$

   (b) Discuss jointly Gaussian Random Variables. [8+8]

4. (a) Explain about the poisson distribution function.

   (b) The probability of a bad reaction from on injection is 0.001. Determine the chanee that out of 2000 individuals more than two individuals will get a bad reaction. [8+8]

5. (a) What is Bayes' theorem? Explain.

   (b) Determine probabilities of system error and correct system transmission of symbols for an elementary binary communication system shown in figure 3b consisting of a transmitter that sends one of two possible symbols (a 1 or a 0) over a channel to a receiver. The channel occasionally causes errors to occur so that a '1' show up at the receiver as a '0?, and vice versa. Assume the symbols '1' and '0' are selected for a transmission as 0.6 and 0.4 respectively. [6+10]

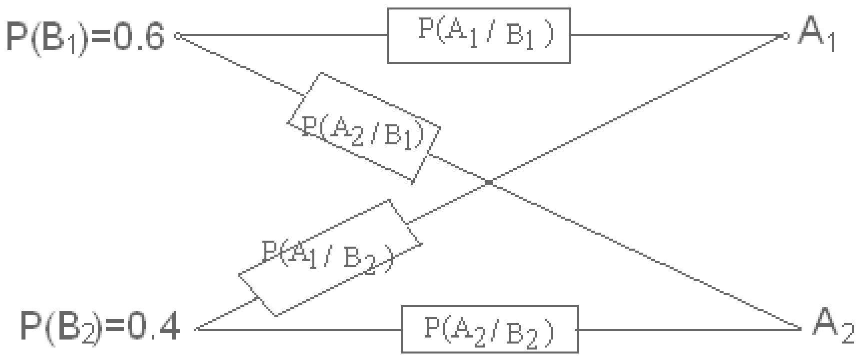

Figure 3b

6. (a) State the auto correlation function of the random process X(t) and Prove that $R_{XX}(-\tau) = R_{XX}(\tau)$.

   (b) State and prove the expression relating power and auto correlation function of random process. [8+8]

7. (a) Define conditional distribution function, probability mass function, skew and variance of a random variable.

   (b) If the number of items produced in a factory during a week is a random variable with mean 100 and variance 400, compute an upper bound on the probability that this week?s production will be atleast 120. [8+8]

8. (a) Determine which of the following impulse response do not correspond to a system that is stable or realizable or both and state why:

   i. h(t) = u(t+3)
   ii. h(t) = u(t) e-t^2
   iii. h(t) = e^+ sin(ω_0t), ω_0: real constant.
   iv. h(t) = u(t)e^{-3t}, ω_0 : real constant

   (b) A random process X(t) = A Sin (ω_0t $+\theta$) where A & ω_0 are real positive constants & θ is a random variable uniformly distributed in the internal (-π,π) is applied to the network shown in figure 5b. Find an expression for the networks response? [8+8]

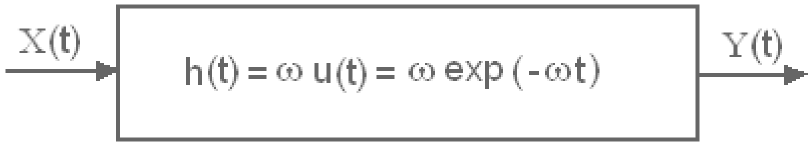

Figure 5b

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Code No: 07A3EC10 **R07** **Set No. 4**

II B.Tech I Semester Examinations,MAY 2011
PROBABILITY THEORY AND STOCHASTIC PROCESSES
Common to Electronics And Computer Engineering, Electronics And Telematics, Electronics And Communication Engineering

Time: 3 hours **Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks

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1. (a) Define conditional distribution function, probability mass function, skew and variance of a random variable.
   (b) If the number of items produced in a factory during a week is a random variable with mean 100 and variance 400, compute an upper bound on the probability that this week?s production will be atleast 120. [8+8]

2. (a) The PSD of random process is given by $S_{XX}(\omega) = \begin{matrix} \pi, & |\omega| < 1 \\ 0, & elsewhere \end{matrix}$. Find its Auto correlation function.
   (b) State and Prove any four properties of PSD. [8+8]

3. (a) State the auto correlation function of the random process X(t) and Prove that $R_{XX}(-\tau) = R_{XX}(\tau)$.
   (b) State and prove the expression relating power and auto correlation function of random process. [8+8]

4. (a) Y = X_1+ X_2+...........+ X_N is the sum of N statistically independent random variables X_i where i = 1,2............N. Prove that $\phi_{X_1......X_N}(\omega_1.....\omega_N) = \prod_{i=1}^{N} \phi_{X_1}(\omega_1)$
   (b) Discuss jointly Gaussian Random Variables. [8+8]

5. (a) Explain about the poisson distribution function.
   (b) The probability of a bad reaction from on injection is 0.001. Determine the chanee that out of 2000 individuals more than two individuals will get a bad reaction. [8+8]

6. (a) Determine which of the following impulse response do not correspond to a system that is stable or realizable or both and state why:
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      ii. h(t) = u(t) e-t^2
      iii. h(t) = e^+ sin(ω_0t), ω_0: real constant.
      iv. h(t) = u(t)e^{-3t}, ω_0 : real constant
   (b) A random process X(t) = A Sin (ω_0t +θ) where A & ω_0 are real positive constants & θ is a random variable uniformly distributed in the internal (-π,π) is applied to the network shown in figure 5b. Find an expression for the networks response? [8+8]

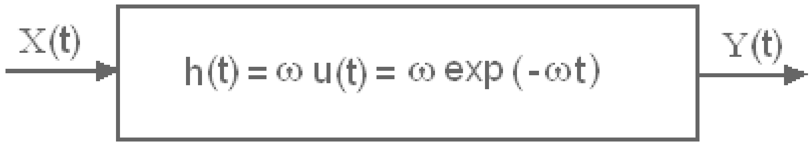

Figure 5b

7. (a) What is Bayes' theorem? Explain.

   (b) Determine probabilities of system error and correct system transmission of symbols for an elementary binary communication system shown in figure 3b consisting of a transmitter that sends one of two possible symbols (a 1 or a 0) over a channel to a receiver. The channel occasionally causes errors to occur so that a '1' show up at the receiver as a '0?, and vice versa. Assume the symbols '1' and '0' are selected for a transmission as 0.6 and 0.4 respectively. [6+10]

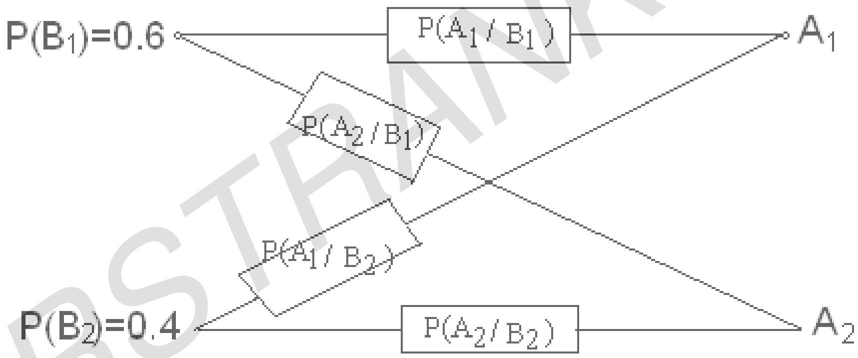

Figure 3b

8. (a) Consider a probability space S = (Ω, F, P). Let Ω = {ξ1....ξ5} = {-1, -1/2, 0, 1/2, 1} with $P\xi_i$ = 1/5 i = 1..5. Define two random variables on S as follows: X(ξ) =ξ and Y(ξ) =ξ^2

   i. Show that X and Y are dependent random variables
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   (b) Let X and Y be independent random variables each N (0, 1). Find the mean and variance of Z =$(X^2+Y^2)^{1/2}$. [8+8]

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Code No: 07A3EC10 **R07** **Set No. 1**

II B.Tech I Semester Examinations,MAY 2011
PROBABILITY THEORY AND STOCHASTIC PROCESSES
Common to Electronics And Computer Engineering, Electronics And Telematics, Electronics And Communication Engineering

Time: 3 hours **Max Marks: 80**

Answer any FIVE Questions
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   (b) The probability of a bad reaction from on injection is 0.001. Determine the chanee that out of 2000 individuals more than two individuals will get a bad reaction. [8+8]

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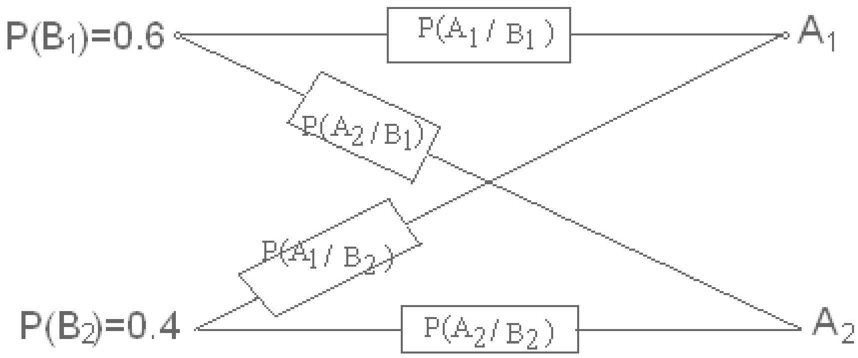

Figure 3b

4. (a) Consider a probability space S = (Ω, F, P). Let Ω = {ξ1....ξ5} = {-1, -1/2, 0, 1/2, 1} with $P\xi_i = 1/5$ i = 1..5. Define two random variables on S as follows: $X(\xi) = \xi$ and $Y(\xi) = \xi^2$
      i. Show that X and Y are dependent random variables
      ii. Show that X and Y are uncorrelated.

(b) Let X and Y be independent random variables each N (0, 1). Find the mean and variance of Z =$(X^2+Y^2)^{1/2}$. [8+8]

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   (b) A random process X(t) = A Sin (ω_0t +θ) where A & ω_0 are real positive constants & θ is a random variable uniformly distributed in the internal (-π,π) is applied to the network shown in figure 5b. Find an expression for the networks response? [8+8]

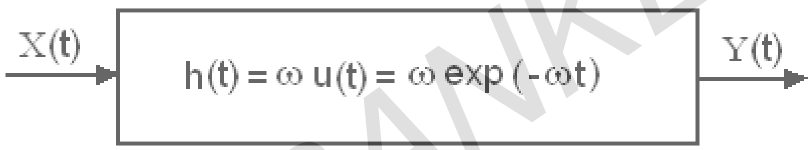

Figure 5b

6. (a) Define conditional distribution function, probability mass function, skew and variance of a random variable.

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   (b) Discuss jointly Gaussian Random Variables. [8+8]

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Code No: 07A3EC10 **R07** **Set No. 3**

II B.Tech I Semester Examinations,MAY 2011
PROBABILITY THEORY AND STOCHASTIC PROCESSES
Common to Electronics And Computer Engineering, Electronics And Telematics, Electronics And Communication Engineering

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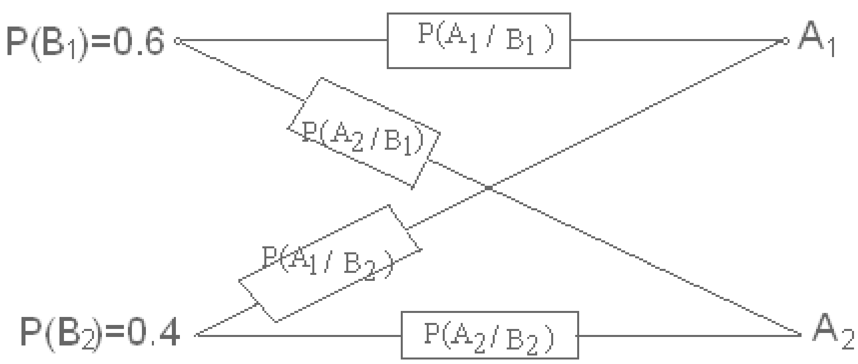

Figure 3b

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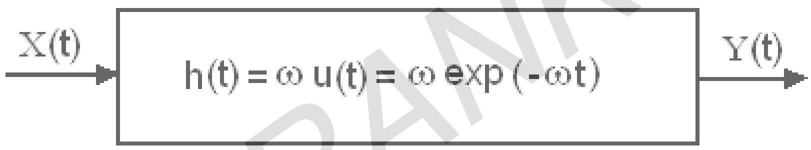

Figure 5b

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   (b) Discuss jointly Gaussian Random Variables. [8+8]

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