Code No: **RR210403**　　　　　　$\boxed{\textbf{RR}}$　　　　　　$\boxed{\textbf{Set No. 2}}$

II B.Tech I Semester Examinations,November 2010
PROBABILITY THEORY AND STOCHASTIC PROCESSES
Common to Electronics And Telematics, Electronics And Communication
Engineering
Time: 3 hours　　　　　　　　　　　　　　　　　　　　　　**Max Marks: 80**
Answer any FIVE Questions
All Questions carry equal marks
⋆ ⋆ ⋆ ⋆ ⋆

1. (a) If A and B are any events, not necessarily mutually exclusive events, derive an expression for probability of A Union B. When A and B are mutually exclusive, what happens to the above expression derived?

   (b) Define the term Independent events. State the conditions for independence of
       i. any two events A and B.
       ii. any three events A, B and C.

   (c) A coin is tossed. If it turns up heads, two balls will be drawn from box A, otherwise, two balls will be drawn from box B. Box A contains three black and five white balls. Box B contains seven black and one white balls. In both cases, selections are to be made with replacement. What is the probability that Box A is used, given that both balls drawn are black?　　　[5+6+5]

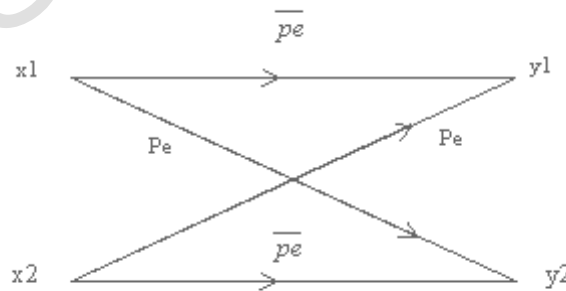2. (a) Find the channel capacity of BSC as shown in figure5a.

Figure 5a

   (b) Show that in general H (x $_1$, x $_2$, ..., x $_n$)　$\leq$　$\sum\limits_{i=1}^{n} H(x_i)$

   When does the equality hold?　　　　　　　　　　　　　　　　　　[8+8]

3. The Rayleigh density function is given by

$$f(x) = x\,e^{-x^2/2} \quad x \geq 0$$
$$= 0 \quad x < 0$$

   (a) Prove that f (x) satisfies the properties of the p.d.f.
       i. f(x)≥ 0 for all x and

1

ii. $\int_\infty^\infty f(x)\,dx = 1$

(b) Find the distribution function F (x)

(c) Find   P$(0.5 < x \le 2)$

(d) Find   P$(0.5 \le x < 2)$. [16]

4. White noise n(t) with $PSD = \frac{n}{2}$ is passed through a low pass RC network with a 3 db frequency f_c.

(a) Find the auto correlation R(τ) of the o/p noise of the network.

(b) Sketch $\rho(t) = \frac{R(\tau)}{R(o)}$ [12+4]

5. (a) Prove that PSD and Auto correlation function of Random process form a fourier transform pair.

(b) A random process has the power density spectrum $S_{xx}(\omega) = \frac{6\omega^2}{1+\omega^4}$ Find the average power in the process. [8+8]

6. (a) Find the noise bandwidth of a parallel RLC filter with 3db bandwidth B.

(b) Write short notes on "Available gain of two port network".

[8+8]

7. (a) What are the precautions to be taken in cascading stages of a network in the point of view of noise reduction?

(b) What is the need for band limiting the signal towards the direction increasing SNR. [8+8]

8. (a) Prove that mean is 'm' and variance is σ^2 for Gaussian distribution function.

(b) Find the moment generating and Characteristic function of the random variable X which has uniform distribution. [8+8]

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Code No: RR210403 $\boxed{\textbf{RR}}$ $\boxed{\textbf{Set No. 4}}$

II B.Tech I Semester Examinations,November 2010
PROBABILITY THEORY AND STOCHASTIC PROCESSES
Common to Electronics And Telematics, Electronics And Communication
Engineering
Time: 3 hours   Max Marks: 80
Answer any FIVE Questions
All Questions carry equal marks
⋆ ⋆ ⋆ ⋆ ⋆

1. The Rayleigh density function is given by

$$f(x) = x\,e^{-x^2/2} \quad x \geq 0$$
$$= 0 \; x < 0$$

   (a) Prove that f (x) satisfies the properties of the p.d.f.
       i. f(x)$\geq$ 0 for all x and
       ii. $\int_{\infty}^{\infty} f(x)\,dx = 1$
   (b) Find the distribution function F (x)
   (c) Find   P(0.5 < x $\leq$ 2)
   (d) Find   P(0.5 $\leq$ x < 2).   [16]

2. (a) If A and B are any events, not necessarily mutually exclusive events, derive
       an expression for probability of A Union B. When A and B are mutually
       exclusive, what happens to the above expression derived?
   (b) Define the term Independent events. State the conditions for independence of
       i. any two events A and B.
       ii. any three events A, B and C.
   (c) A coin is tossed. If it turns up heads, two balls will be drawn from box A,
       otherwise, two balls will be drawn from box B. Box A contains three black
       and five white balls. Box B contains seven black and one white balls. In both
       cases, selections are to be made with replacement. What is the probability
       that Box A is used, given that both balls drawn are black?   [5+6+5]

3. (a) Prove that mean is 'm' and variance is σ^2 for Gaussian distribution function.
   (b) Find the moment generating and Characteristic function of the random vari-
       able X which has uniform distribution.   [8+8]

4. (a) Prove that PSD and Auto correlation function of Random process form a
       fourier transform pair.
   (b) A random process has the power density spectrum $S_{xx}(\omega) = \frac{6\omega^2}{1+\omega^4}$
       Find the average power in the process.   [8+8]

5. (a) Find the noise bandwidth of a parallel RLC filter with 3db bandwidth B.

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(b) Write short notes on "Available gain of two port network".

[8+8]

6. White noise n(t) with $PSD = \frac{n}{2}$ is passed through a low pass RC network with a 3 db frequency f_c.

   (a) Find the auto correlation $R(\tau)$ of the o/p noise of the network.

   (b) Sketch $\rho(t) = \frac{R(\tau)}{R(o)}$ [12+4]

7. (a) What are the precautions to be taken in cascading stages of a network in the point of view of noise reduction?

   (b) What is the need for band limiting the signal towards the direction increasing SNR. [8+8]

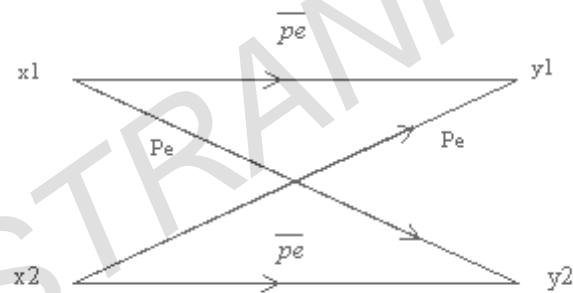8. (a) Find the channel capacity of BSC as shown in figure5a.

Figure 5a

   (b) Show that in general H (x $_1$, x $_2$, ..., x $_n$) $\leq \sum\limits_{i=1}^{n} H(x_i)$

   When does the equality hold? [8+8]

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Code No: **RR210403**   │**RR**│   │**Set No. 1**│

II B.Tech I Semester Examinations,November 2010
PROBABILITY THEORY AND STOCHASTIC PROCESSES
Common to Electronics And Telematics, Electronics And Communication
Engineering

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

Answer any FIVE Questions
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⋆ ⋆ ⋆ ⋆ ⋆

1. White noise n(t) with $PSD = \frac{n}{2}$ is passed through a low pass RC network with a 3 db frequency f_c.

   (a) Find the auto correlation R(τ) of the o/p noise of the network.

   (b) Sketch $\rho(t) = \frac{R(\tau)}{R(o)}$ [12+4]

2. (a) What are the precautions to be taken in cascading stages of a network in the point of view of noise reduction?

   (b) What is the need for band limiting the signal towards the direction increasing SNR.   [8+8]

3. (a) Prove that PSD and Auto correlation function of Random process form a fourier transform pair.

   (b) A random process has the power density spectrum $S_{xx}(\omega) = \frac{6\omega^2}{1+\omega^4}$
   Find the average power in the process.   [8+8]

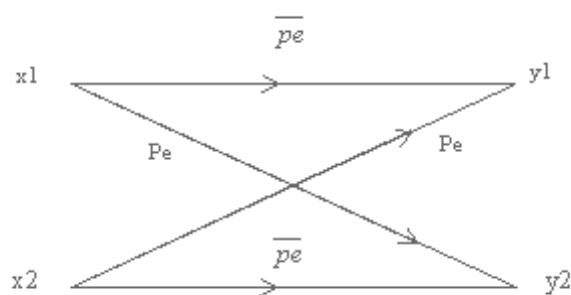4. (a) Find the channel capacity of BSC as shown in figure5a.

Figure 5a

   (b) Show that in general H (x_1, x_2, ..., x_n) $\leq$ $\sum\limits_{i=1}^{n} H(x_i)$

   When does the equality hold?   [8+8]

5. The Rayleigh density function is given by

$$f(x) = x\,e^{-x^2/2} \quad x \geq 0$$
$$= 0 \, x < 0$$

5

(a) Prove that f (x) satisfies the properties of the p.d.f.

    i. f(x)$\geq$ 0 for all x and

    ii. $\int_{\infty}^{\infty} f(x)\,dx = 1$

(b) Find the distribution function F (x)

(c) Find P$(0.5 < x \leq 2)$

(d) Find P$(0.5 \leq x < 2)$.   [16]

6. (a) If A and B are any events, not necessarily mutually exclusive events, derive an expression for probability of A Union B. When A and B are mutually exclusive, what happens to the above expression derived?

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7. (a) Find the noise bandwidth of a parallel RLC filter with 3db bandwidth B.

(b) Write short notes on "Available gain of two port network".

                                        [8+8]

8. (a) Prove that mean is 'm' and variance is σ^2 for Gaussian distribution function.

(b) Find the moment generating and Characteristic function of the random variable X which has uniform distribution.   [8+8]

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Code No: **RR210403** | **RR** | | **Set No. 3**

II B.Tech I Semester Examinations,November 2010
PROBABILITY THEORY AND STOCHASTIC PROCESSES
Common to Electronics And Telematics, Electronics And Communication
Engineering
Time: 3 hours **Max Marks: 80**
Answer any FIVE Questions
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⋆ ⋆ ⋆ ⋆ ⋆

1. The Rayleigh density function is given by

$$f(x) = x \, e^{-x^2/2} \quad x \geq 0$$
$$= 0 \; x < 0$$

   (a) Prove that f (x) satisfies the properties of the p.d.f.
      i. $f(x) \geq 0$ for all x and
      ii. $\int_{\infty}^{\infty} f(x)\,dx = 1$
   (b) Find the distribution function F (x)
   (c) Find $P(0.5 < x \leq 2)$
   (d) Find $P(0.5 \leq x < 2)$. [16]

2. (a) Prove that PSD and Auto correlation function of Random process form a fourier transform pair.
   (b) A random process has the power density spectrum $S_{xx}(\omega) = \frac{6\omega^2}{1+\omega^4}$
   Find the average power in the process. [8+8]

3. (a) Find the noise bandwidth of a parallel RLC filter with 3db bandwidth B.
   (b) Write short notes on "Available gain of two port network".

   [8+8]

4. White noise n(t) with $PSD = \frac{n}{2}$ is passed through a low pass RC network with a 3 db frequency f_c.

   (a) Find the auto correlation $R(\tau)$ of the o/p noise of the network.
   (b) Sketch $\rho(t) = \frac{R(\tau)}{R(o)}$ [12+4]

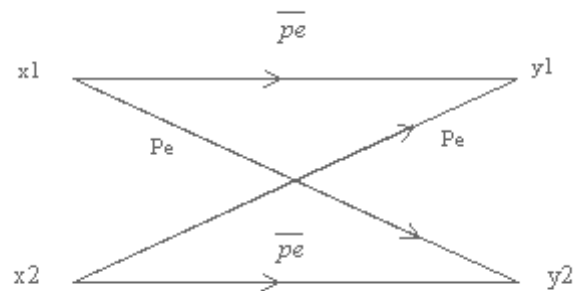5. (a) Find the channel capacity of BSC as shown in figure5a.

Figure 5a

(b) Show that in general H $(x_1, x_2, ..., x_n)$ $\leq$ $\sum_{i=1}^{n} H(x_i)$

When does the equality hold? [8+8]

6. (a) If A and B are any events, not necessarily mutually exclusive events, derive an expression for probability of A Union B. When A and B are mutually exclusive, what happens to the above expression derived?

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(b) Find the moment generating and Characteristic function of the random variable X which has uniform distribution. [8+8]

8. (a) What are the precautions to be taken in cascading stages of a network in the point of view of noise reduction?

(b) What is the need for band limiting the signal towards the direction increasing SNR. [8+8]

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