Code No: 07A4EC17 $\boxed{\textbf{R07}}$ $\boxed{\textbf{Set No. 2}}$

II B.Tech II Semester Examinations,APRIL 2011
PRINCIPLES OF COMMUNICATIONS
Common to Bio-Medical Engineering, Electronics And Computer
Engineering

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

Answer any FIVE Questions
All Questions carry equal marks
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1. A channel has a uniform noise power density spectrum $S_n(\omega) = 0.25 \times 10^{-3}$. A DSB-SC signal with carrier frequency of 200 kHz is transmitted over this channel. The modulating signal f(t) is band limited to 10 kHz. The power of the sideband signal is 5 kw. The incoming signal at the receiver is filtered through an ideal bandpass filter before it is fed to the demodulator.

   (a) What is the transfer function of this filter at the receiver?

   (b) Find the S/N ratio at the demodulator input and output.

   (c) Find and sketch the noise power density spectrum at the demodulator output.
   [6+6+4]

2. (a) Show that the nonzero code polynomial of minimum degree in a cyclic code C is unique.

   (b) Find a generator polynomial g(x)for a (7, 4) cyclic code?

   (c) Consider a (7, 4) cyclic code with g(x) = $1+x+x^3$.

      i. Let data word d=(1010). Find the corresponding code word.
      ii. Let the code word c=(1100101). Find the corresponding data word.
   [5+5+6]

3. (a) With a neat block diagram explain noncoherent detection of ASK receiver.

   (b) Distinguish between QAM and Multi-phase PSK.   [10+6]

4. Prove the properties of Fourier Transform.

   (a) Conjugate function.

   (b) Frequency differentiation theorem.   [8+8]

5. A carrier is frequency-modulated by a sinusoidal modulating signal of frequency 2 kHz, resulting in a frequency deviation of 5 kHz. What is the bandwidth occupied by the modulated waveform? The amplitude of the modulating sinusoid is increased by a factor of 3 and its frequency lowered to 1 kHz. What is the new bandwidth?
   [16]

6. (a) Show that, using sampling, that the total information in binary units that can be transmitted in a communication channel in time T is given by WT log_2 $\left(1 + \frac{P_S}{P_N}\right)$

1

Where W is the channel bandwidth P_S is the signal power and P_N is the noise power in the channel.

(b) What conditions have to be satisfied by K and the code length for the coding efficiency to be 100 percent, if a discrete memoryless source whose alphabet consists of K equiprobable symbols? [8+8]

7. Compare the Natural and Flat-top sampling. [16]

8. (a) Describe different types of signaling formats with neat sketches.

(b) Explain the features of Flat top Sampling and Aperture effect. [8+8]

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$\boxed{\textbf{R07}}$ $\boxed{\textbf{Set No. 4}}$

II B.Tech II Semester Examinations,APRIL 2011
PRINCIPLES OF COMMUNICATIONS
Common to Bio-Medical Engineering, Electronics And Computer
Engineering

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

Answer any FIVE Questions
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   Where W is the channel bandwidth P_S is the signal power and P_N is the noise power in the channel.

   (b) What conditions have to be satisfied by K and the code length for the coding efficiency to be 100 percent, if a discrete memoryless source whose alphabet consists of K equiprobable symbols? [8+8]

2. (a) With a neat block diagram explain noncoherent detection of ASK receiver.

   (b) Distinguish between QAM and Multi-phase PSK. [10+6]

3. A channel has a uniform noise power density spectrum $S_n(\omega) = 0.25 \times 10^{-3}$. A DSB-SC signal with carrier frequency of 200 kHz is transmitted over this channel. The modulating signal f(t) is band limited to 10 kHz. The power of the sideband signal is 5 kw. The incoming signal at the receiver is filtered through an ideal bandpass filter before it is fed to the demodulator.

   (a) What is the transfer function of this filter at the receiver?

   (b) Find the S/N ratio at the demodulator input and output.

   (c) Find and sketch the noise power density spectrum at the demodulator output. [6+6+4]

4. A carrier is frequency-modulated by a sinusoidal modulating signal of frequency 2 kHz, resulting in a frequency deviation of 5 kHz. What is the bandwidth occupied by the modulated waveform? The amplitude of the modulating sinusoid is increased by a factor of 3 and its frequency lowered to 1 kHz. What is the new bandwidth? [16]

5. Prove the properties of Fourier Transform.

   (a) Conjugate function.

   (b) Frequency differentiation theorem. [8+8]

6. (a) Describe different types of signaling formats with neat sketches.

   (b) Explain the features of Flat top Sampling and Aperture effect. [8+8]

3

7. (a) Show that the nonzero code polynomial of minimum degree in a cyclic code C is unique.

   (b) Find a generator polynomial g(x)for a (7, 4) cyclic code?

   (c) Consider a (7, 4) cyclic code with g(x) = 1+x+x^3.

      i. Let data word d=(1010). Find the corresponding code word.
      ii. Let the code word c=(1100101). Find the corresponding data word.

      [5+5+6]

8. Compare the Natural and Flat-top sampling. [16]

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Code No: 07A4EC17   **R07**   **Set No. 1**

II B.Tech II Semester Examinations,APRIL 2011
PRINCIPLES OF COMMUNICATIONS
Common to Bio-Medical Engineering, Electronics And Computer Engineering

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

Answer any FIVE Questions
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1. (a) Describe different types of signaling formats with neat sketches.

   (b) Explain the features of Flat top Sampling and Aperture effect.   [8+8]

2. A channel has a uniform noise power density spectrum $S_n(\omega) = 0.25 \times 10^{-3}$. A DSB-SC signal with carrier frequency of 200 kHz is transmitted over this channel. The modulating signal f(t) is band limited to 10 kHz. The power of the sideband signal is 5 kw. The incoming signal at the receiver is filtered through an ideal bandpass filter before it is fed to the demodulator.

   (a) What is the transfer function of this filter at the receiver?

   (b) Find the S/N ratio at the demodulator input and output.

   (c) Find and sketch the noise power density spectrum at the demodulator output. [6+6+4]

3. (a) Show that, using sampling, that the total information in binary units that can be transmitted in a communication channel in time T is given by WT log_2 $\left(1 + \frac{P_S}{P_N}\right)$

   Where W is the channel bandwidth P_S is the signal power and P_N is the noise power in the channel.

   (b) What conditions have to be satisfied by K and the code length for the coding efficiency to be 100 percent, if a discrete memoryless source whose alphabet consists of K equiprobable symbols? [8+8]

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   (a) Conjugate function.

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   (c) Consider a (7, 4) cyclic code with g(x) = 1+x+x^3.

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8. (a) With a neat block diagram explain noncoherent detection of ASK receiver.

   (b) Distinguish between QAM and Multi-phase PSK.   [10+6]

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Code No: 07A4EC17 | **R07** | **Set No. 3**

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Engineering

Time: 3 hours | Max Marks: 80

Answer any FIVE Questions
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1. Prove the properties of Fourier Transform.

   (a) Conjugate function.

   (b) Frequency differentiation theorem. [8+8]

2. (a) With a neat block diagram explain noncoherent detection of ASK receiver.

   (b) Distinguish between QAM and Multi-phase PSK. [10+6]

3. Compare the Natural and Flat-top sampling. [16]

4. A carrier is frequency-modulated by a sinusoidal modulating signal of frequency 2 kHz, resulting in a frequency deviation of 5 kHz. What is the bandwidth occupied by the modulated waveform? The amplitude of the modulating sinusoid is increased by a factor of 3 and its frequency lowered to 1 kHz. What is the new bandwidth? [16]

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   (b) Find a generator polynomial g(x)for a (7, 4) cyclic code?

   (c) Consider a (7, 4) cyclic code with g(x) = 1+x+x^3.

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   (a) What is the transfer function of this filter at the receiver?

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   (c) Find and sketch the noise power density spectrum at the demodulator output. [6+6+4]

7

8. (a) Show that, using sampling, that the total information in binary units that can be transmitted in a communication channel in time T is given by WT log_2 $\left(1 + \frac{P_S}{P_N}\right)$

   Where W is the channel bandwidth P_S is the signal power and P_N is the noise power in the channel.

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