D 4058

B.E./B.Tech. DEGREE EXAMINATION, MAY/JUNE 2007.

Third Semester

Information Technology

IT 1202 – PRINCIPLES OF COMMUNICATION

(Regulation 2004)

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — ($10 \times 2 = 20$ marks)

1. The antenna current of an AM transmitter is 8 A when only carrier is sent, but it increases to 8.96 A when the carrier is modulated by a single tone sinusoid. Find the percentage modulation.

2. A super heterodyne receiver is tuned to receive a 1000 KHz carrier amplitude modulated by 1 KHz sine wave. Assuming the IF frequency to be 455 KHz, list the frequency components at the input and output of the IF amplifier. Assume the IF bandwidth to be 10 KHz.

3. Sketch the block diagram for generating FM signal using PM modulator and PM signal using FM modulator.

4. Calculate the bandwidth of commercial FM transmission assuming $\Delta f = 75$ KHz and $W = 15$ KHz.

5. Illustrate binary modulated waveforms ASK and FSK for the bit sequence 1 0 0 1 0 0 1 1.

6. Show the arrangement for non-coherent detection of FSK binary signal.

7. What is known as aliasing effect?

8. Encode the given data stream using Manchester (split phase) signaling format. 0 1 0 0 1 1 1 0.

9. Define processing gain.

10. List out the advantages of Direct sequence spread spectrum technique.

PART B — (5 × 16 = 80 marks)

11. (a) Illustrate time domain and frequency domain representation of standard AM with necessary mathematical representations and explanation for the conditions $|K_a m(t)|$ less than, equal to and greater than one, assuming both baseband and single tone sinusoid as a modulating signal. (16)

Or

(b) Explain the process of generating DSBSC modulated signal using ring modulator with the help of neat circuit diagram and waveforms. (16)

12. (a) (i) A carrier of frequency 10^6 Hz and amplitude 3 volts is frequency by a sinusoidal modulating signal frequency 500 Hz and of peak amplitude 1 Volt. The frequency deviation is 1 KHz. The level of the modulating waveform is changed to 5 V peak and the modulating frequency is changed to 2 KHz. Write the expression for the new modulated waveform. (12)

(ii) An FM carrier is sinusoidally modulated. When does all the power lie in the sidebands (i.e. no power in the carrier)? (4)

Or

(b) (i) Explain in detail about the indirect method of generating wideband FM. (12)

(ii) Draw a simplified block diagram of a commercial FM generation system using Armstrong method. (4)

13. (a) Explain in detail about the generation and coherent detection of QPSK signal with neat block diagram. (16)

Or

(b) Explain the process of generating and detecting DPSK signal with the help of block diagram and given binary data sequence assuming starting reference bit as one 0 0 1 0 0 1 0 0 1 1. (16)

14. (a) (i) Consider a sinusoidal signal given by $s(t) = 3\cos(1000\pi t)$ Find the signal-to-quantization noise ratio when the signal is quantized using 10 bit PCM. Also find the minimum number of bits needed to achieve a signal-to-noise ratio of atleast 40 dB. (12)

(ii) List out the information provided by eye pattern about the system performance. (4)

Or

(b) (i) Draw the block diagram of a duobinary encoder and explain the concept of this signaling scheme. (8)

(ii) What is the advantage of precoded duobinary scheme over duobinary signaling scheme? Explain the encoding and decoding process of a precoded duobinary scheme. (8)

15.

15. (a) Describe the baseband direct sequence spread spectrum technique with suitable block diagram and waveform. (16)

Or

(b) Describe slow frequency hopping M-ary Frequency shift keying system with transmitter and receiver block diagram. (16)