

B.E./B.Tech.(Full Time) DEGREE END SEMESTER EXAMINATION , NOV/DEC 2012

Information Technology

Third Semester

EC9212 Communication Techniques

(Regulation : 2008)

Time: Three hours

Maximum ; 100 Marks

Answer all questions

Part- A (10x2=20 marks)

1. Draw the typical spectrum of FM signal and specify important parameters.
2. What is image frequency? Relate the frequencies of image signal, local oscillator (LO) and RF signal while frequency of LO is greater than RF signal.
3. If a signal has two sinusoids having frequencies of 2kHz and 5kHz. Then state low pass sampling theorem and calculate the minimum sampling frequency required to sample the signal according to it.
4. What is non-uniform quantization? Give an example.
5. Draw the BPSK and BFSK signal for the bit sequence [1 0 1 1 0 0]. Specify your assumptions of selection of carrier frequency and bit rate.
6. What is pulse shaping? and specify its importance.
7. What is Viterbi decoding?
8. Let a channel offers 10 kHz bandwidth and SNR of 511. Calculate the capacity of the channel.
9. What is CDMA?
10. What is the need for synchronization?

Part-B (5x16=80)

11. a) (i) Draw the basic block diagram of AM modulator with its governing equation and draw the schematic of envelop detector based demodulator (8)
- (ii) Draw the time domain signal and their respective frequency domain spectrums of amplitude modulated signal for the modulation index = 0.5, 1.0 and 1.5 (6)
- (iii) Specify the limit of modulation index and justify the reason. (2)

12. a) (i) Discuss the principle of delta modulation (DM) and demodulation with suitable block diagram (8)
(ii) Discuss on quantization noise associated with DM and derive the condition for optimum selection of step size. (8)

OR

- b) (i) What is channel vocoder? Brief the principle of one such coder. (8)
(ii) Briefly discuss on frequency division multiplexing with suitable diagram. (5)
(iii) If a FDM system multiplexes 4 channels each having signal bandwidth 5kHz and uses guard band of 1kHz between each pair of adjacent channels. Then, calculate the bandwidth required to transmit the FDM signal. (3)

13. a) (i) Describe the principle of operation of modified duo binary encoder with neat block diagram. (8)
(ii) Find the output of the above coder for the bit stream [1 0 1 1 0 0 0 1 ...] (8)

OR

- b) (i) Draw the eye pattern and point out the information received from it on the pattern (6)
(ii) Draw the schematic of modulator and coherent demodulator of QPSK scheme and draw the QPSK signal for the bit stream [1 1 0 1 0 0 1 0 ...] (10)

14. a) Briefly discuss about the linear shift register based encoder and decoder of a cyclic code. Explain its operation with a suitable example.

OR

- b) (i) Let a discrete memoryless source emits the symbols from the set $X = \{ x_i, i=1,2,3,4,5 \}$. The probability of four symbols are given by $P(x_1)=0.4$, $P(x_2)=0.3$, $P(x_3)=0.15$, and $P(x_4)=0.1$. Calculate the probability of fifth symbol and find the codeword for each symbol using Huffman Coding technique. (8)
(ii) State Kraft inequality and verify the optimality of above code (4)
(iii) Calculate the efficiency and redundancy provided by the code. (4)

15. a) With suitable diagrams, explain the operation of DSSS system and derive the processing gain offered by the same.

OR

- b) (i) Discuss the properties of PN sequence (8)
(ii) Write brief note on FHSS techniques (8)