B.E. COMPUTER SCIENCE AND ENGINEERING

SECOND YEAR SECOND SEMESTER EXAM 2017 (Old)

DATA COMMUNICATION SYSTEMS

Time : Three hours Full Marks : 100

Answer any *five* questions.

1. What does the sampling theorem tell us concerning the rate of sampling required for an analog signal? What is the significance of Fourier analysis? Frequency spectrum and bandwidth. State Nyquist theorem. What does the Shannon capacity have to do with communications? 5+5+4+3+3=20

2. What does decibel measure mean? Describe different categories of noise. What are reasons for different types of distortions of signals? Define noise factor and noise figure. 3+6+6+5=20

3. What do you mean by unguided media? What are different propagation modes of unguided media? What are advantages and disadvantages of optical fibre? Describe the basic principle of signal propagation through fiber optic cable. 4+6+6+4=20

4. Discuss synchronous and asynchronous time division multiplexing. What are disadvantages of synchronous time division multiplexing? How are these overcome in asynchronous time division multiplexing? A synchronous TDM system is used to transmit 24 voice-bad channels. Each channel is sampled and using 512 quantization levels, each sample is converted to a PCM code. Determine (i) minimum sampling rate, and (ii) required line speed in bps. 6+3+3+8=20

5. Discuss the disadvantages of NRZ digital-to-digital encoding technique. Also describe how these disadvantages are overcome in RZ and Biphase encoding techniques. Encode the following data streams using (a) RZ and (b) Manchester encoding techniques –
   a) 1010000110 b) 0101010101. 5+5+10=20

6. Discuss FHSS and explain how it achieves bandwidth spreading. What is Hamming distance? What is minimum Hamming distance? Find the minimum Hamming distance of the coding scheme having codewords: 00000, 01011, 10101, 11110. 6+2+2+10=20

7. Describe Pulse Code Modulation technique for analog to digital encoding. How the problems in PCM technique is overcome in Delta Modulation? Five frequency-multiplexed signals, each requiring 4000 Hz and each separated from the other using 200 Hz guard bands, are transmitted through one output cable. What is the minimum bandwidth requirement of the cable ? 6+6+8=20

8. What is the importance of flow control? Briefly discuss the Sliding Window mechanism for flow control. What is the significance of the term "Sliding Window"? If the frame size is 960 bits on a satellite channel operating at 960 bps, what is the maximum link utilization for Stop-and-Wait flow control mechanism? What is the maximum link utilization for Sliding Window flow control (i) with window size 7, and (ii) with window size 127? Assume propagation delay of 270 ms. 3+6+3+8=20

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