FOURTH SEMESTER B.TECH DEGREE EXAMINATION 2015

(2013 SCHEME)

13.404 DATA COMMUNICATION (FR)

MODEL QUESTION PAPER

Time: 3 hrs   Maximum marks: 100

PART – A

Answer all questions.Each question carries 4 marks

1. Distinguish between half duplex, full duplex and simplex transmission. Give examples.

2. What key factors affect channel capacity?

3. Explain any digital data to analog signal encoding in which each signaling element consists of more than one bit.

4. Compare single bit error and burst error.

5. List the benefits of spread spectrum.   (5 x 4 Marks = 20 Marks)

PART – B

Answer one full question from each module.Each question carries 20 marks.

Module I
6. (a)Define the following terms with respect to a channel:
           i) Data rate   ii) Bandwidth
           iii) Noise   iv) Bit Error Rate   (4 Marks)

   (b)A digital signaling system is required to operate at 9600 bps.
       (i)If a signal element encodes a 4-bit   word, what is the minimum required bandwidth of the channel?
       (ii)Repeat part (i) for the case of 8-bit words.   (6 Marks)

   (c)Compare terrestrial and satellite microwave links.   (10 Marks)

7. (a)Explain the different transmission impairments that affect data communications.
                                                                          (10 Marks)
   (b)Imagine the length of a 10Base-5 cable is 2500 metres. If the speed of propagation in a thick co-axial cable is 60% of the speed of light, how long does it take for a bit to travel from the beginning to the end of the cable? Ignore any propagation delay in the equipment. (Speed of light = 3 x 10^8 metres / sec)   (4 Marks)

   (c)Decribe the different optical fiber transmission modes.   (6 Marks)

Module II

8. (a)Explain differential encoding.Describe any two examples of differential encoding.
(7 Marks)

(b)How are binary values represented in amplitude shift keying and what is the limitation of this approach? (4 Marks)

(c)An NRZ-L signal is passed through a filter with r=0.5 and then modulated onto a carrier.The data rate is 2400 bps.Evaluate the bandwidth for ASK and FSK.For FSK assume that the two frequencies used are 50 kHz and 55 kHz. (4 Marks)

(d)State sampling theorem and describe Pulse Code Modulation. (5 Marks)

9. (a)For the bit stream 01001110,describe and sketch the waveforms for each of the codes below:

      (i)NRZ-L   (ii)NRZI   (iii)Bipolar-AMI   (iv)Pseudoternary
      (v)Manchester   (vi)Differential Manchester

Assume that the signal level for the preceding bit for NRZI was high;the most recent preceding 1 bit(AMI) has a negative voltage;and the most recent preceding 0 bit(pseudoternary) has a negative voltage. (16 Marks)

(b) Differentiate between asynchronous and synchronous transmission. (4 Marks)

Module III

10. (a)Explain Cyclic Redundancy Check with messageM=1010001101 and pattern P=110101.Assume FCS to be calculated is 5 bits. (10 Marks)

(b)Describe Frequency Division Multiplexing and Time Division Multiplexing.(10 Marks)

11. (a)A CRC is constructed to generate a 4-bit FCS for an 11-bit message.The generator polynomial is $X^4 + X^3 + 1$.

      (i)Encode the data bit sequence 10011011100(leftmost bit is the least significant) using the generator polynomial and give the codeword.

      (ii)Now assume that bit 7(counting from the LSB) in the codeword is in error and show that the detection algorithm detects the error. (15 Marks)

(b)Explain Forward Error Correction. (5 Marks)

Module IV
12. (a)Explain frequency hopping spread spectrum. (10 Marks)

(b)Describe code division multiple access. (10 Marks)

13. (a)Explain direct sequence spread spectrum. (10 Marks)

(b)Compare the circuit switching, datagram packet switching and virtual circuit packet switching. (10 Marks)