C 58322 (Pages : 2) Name.....

Reg. No.....

SIXTH SEMESTER B.TECH. (ENGINEERING) DEGREE EXAMINATION
JUNE 2009

EC 2K 603—DIGITAL COMMUNICATIONS

Time : Three Hours Maximum : 100 Marks

Answer **all** *questions.*

1. (a) State sampling theorem.
   (b) Differentiate Noise and Fading.
   (c) What is the purpose of using an eye pattern ?
   (d) Why do you need adaptive equalization in a switched telephone network ?
   (e) Compare Coherent and Non-coherent detection.
   (f) Draw an illustrative figure to show the operation of a correlation receiver.
   (g) How will you define coding gain with reference to error control codes ?
   (h) Highlight the major difference between a QPSK signal and MSK signal.

(8 × 5 = 40 marks)

2. (a) An analog voltage waveform having an absolute bandwidth of 100 Hz and an amplitude range of –10 V to + 10 V is to be transmitted over a PCM system with ± 0.1% accuracy (full scale).
   (i) Determine the minimum sampling rate needed.
   (ii) Determine the number of bits needed in each PCM word.
   (iii) Determine the minimum bit rate required in the PCM signal.
   (iv) Determine the minimum absolute channel bandwidth required for transmission of this PCM signal.

Or

   (b) Explain the following :
   (i) NRZ.
   (ii) Bipolar.
   (iii) Manchester.

Turn over

3. (a) A base band binary digital communication system transmits data at 1 kbps. The PSD of noise is 10^{-7} W/Hz and the received signal amplitude is 20 mV.

(i) Find the error probability for bipolar rectangular signaling.

(ii) If the bit rate is 10 kbps to what value must A be adjusted in order to attain the same error probability as in part (i).

(iii) What is the required channel bandwidth in case (ii) ?

(iv) If not more than 95 kHz channel is available, what should be the value of A so that the data rate is maximized and the error probability is same as in part (i).

Or

(b) Explain :

(i) Correlative level coding.

(ii) Adaptive equalization of base band transmission.

4. (a) Consider a rate $\frac{-1}{2}$, non-systematic conventional code with $g^{(1)}$ ={1,0,1} and $g^{(2)}$ = {1, 1, 1}. Determine the encoder output corresponding to the data sequence {1 0 1 0 1}. If the first and the 4th bits of the encoded sequence are affected during transmission, demonstrate the error correcting capability of the Viterbi Algorithm.

Or

(b) Find the code polynomial in systematic form, for the message polynomial $m(D) = 1 + D^2 + D^4$. If $y(D) = 1 + D^4 + D^6 + D^8 + D^{14}$, a code polynomial. If not, find the syndrome of $y(D)$.

5. (a) Describe the design principles and implementation of a direct sequence spread spectrum system with coherent binary phase shift keying with appropriate diagrams.

Or

(b) Write detailed notes on :

(i) Generation of pseudo-noise sequence.

(ii) Generation of maximum length sequence.

[4 × 15 = 60 marks]