

**C 58322**

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Name .....

Reg. No. ....

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

**EC 2K 603—DIGITAL COMMUNICATIONS**

Time : Three Hours

Maximum : 100 Marks

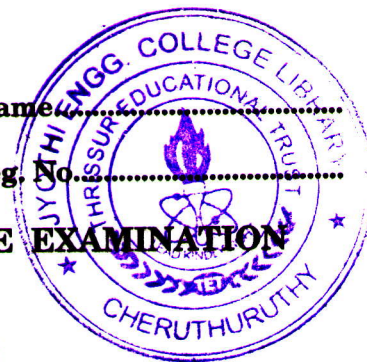
*Answer all questions.*

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  $\pm 0.1\%$  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]