B.E. sem 7 (Rev.) Digital Communications 04/6/08.
Etrx. & EXTC.

P3/1 H KL-08/ 520

Con. 3032-08. (REVISED COURSE) CO-3388

(3 Hours) [Total Marks : 100

N. B. : (1) Question No. **1** is **compulsory**.
(2) Attempt any **four** questions out of remaining **six** questions.
(3) Assume any **suitable** data wherever required but justify the **same**.

1. Attempt any **four** from the following :— 20
   (a) Explain linearity and cyclic property of cyclic code.
   (b) Determine the bandwidth required for M-ary PSK system. Draw the geometrical representation of M-ary PSK and find out distance between signal point.
   (c) Using duo-binary encoding, how is the bandwidth requirement reduced by half.
   (d) What is matched filter ? How it differs from optimum filter ?
   (e) Draw the model of spread spectrum digital communication system and explain correlation and Run property of maximum length sequence.

2. (a) A (7, 4) cyclic code is generated using the polynomial $x^3 + x + 1$. 10
   (i) What would be the generated codeword for the data sequence 1000 and 1100 ?
   (ii) Draw the circuit diagram to generate this code and show how parity bits are generated for the data sequence 1000.
   (iii) Draw the circuit for syndrome calculator and obtain the syndrome for the received code word 1000110.
   (iv) Draw the block diagram of cyclic code decoder.

   (b) A convolutional encoder has single shift register with three modulo-2 adder and an output multiplexer. The following generator sequences are combined by the multiplexer to produce the encoder output. 10
   $g_1 = 100$; $g_2 = 111$ and $g_3 = 101$
   (i) Draw block diagram of the encoder.
   (ii) If input message sequence is 10110 determine the output sequence of the encoder.
   (iii) Draw the codetree, state and trellier diagram for the same.

3. (a) The binary sequence 1011011110 is applied to the DPSK transmitter : 10
   (i) Draw the block diagram of DPSK transmitter and receiver and sketch the resulting waveform at the output.
   (ii) Show that, in the absence of noise the original binary sequence is reconstructed at the receiver output.
   Calculate the Bandwidth of DPSK signal.

   (b) Differentiate between :— 10
   (i) QASK and QPSK
   (ii) BPSK and BFSK

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4. (a) Show that duobinary signalling suffers from error propogation while precoded duobinary signalling doesnot. Explain with encoder and decoder block diagrams and decoding logic. 10

(b) Derive the expression for error Probability of a matched filter and justify that P_e doesnot depend on the shape of the Input waveform. 10

5. (a) What is Intersymbol Interference ? Show how transversal equalizer reduces ISI. 10

(b) Derive the expression for a signal to noise ratio of an integrater and dump circuit and hence explain how the signal is emphasized relative to noise. What is the ideal sampling time ? 10

6. (a) What are Pseudo-noise sequences in spread spectrum technology ? Why they are used in spread spectrum modulation ? Explain the method to generate a Pseudo-noise sequence. 10

(b) Explain the basic principle of frequency Hop spread spectrum. Explain with waveforms, slow frequency hopping and fast frequency hopping. 10

7. Write short notes on any **four** :— 20

(i) Huffman coding

(ii) QASK (Quadarature Amplitude Shift Keying)

(iii) Viterbi decoding

(iv) Direct sequence spread spectrum

(v) ISI and Eye Pattern.