T. E. sem-VI (old) ENTC – DC   7/12/16
Digital communication.

QP CODE : 587002

(3 Hours)   [Total Marks : 100

N.B:
1. Question No.1 is compulsory.
2. Answer any four out of remaining six questions.
3. Assumptions made should be clearly stated.
4. Assume any suitable data whenever required but justify the same.

1. (a) For the bit sequence 10011101 draw the following line codes   8
    i) Polar RZ
    ii) AMI-RZ
    iii) Manchester
    iv) Dicode NRZ
   (b) Compare   8
    i) 16–PSK and 16 – QAM
    ii) Block codes and Convolutional codes
   (c) Explain correlator operation   4

2. (a) Draw the block diagram of OQPSK transmitter. A bit stream b(t) = 00101011010 is to be   8
       transmitted, sketch waveform at the o/p of each block.
   (b) Explain the transmitter and receiver of DEPSK system with block diagram, why error occurs   8
       in pairs in DEPSK system ? Give suitable example.
   (c) Write properties of matched filter   4

3. (a) Derive relation to find probability of error for an optimum filter. Hence derive the   8
       transfer function for an optimum filter.
   (b) Explain MSK with the help of relevant expressions and waveforms. Sketch the PSD of   8
       MSK and QPSK and compare them.
   (c) Draw waveform of DPSK system.   4

4. (a) For a source emitting 4 symbols with probabilities 0.5,0.25,0.125,0.125 Calculate entropy   6
       and also apply Huffman algorithm to find the codes assigned.
   (b) Consider (3,2,1) convolution code with $g^{(1)}$=(101) $g^{(2)}$=(110) $g^{(3)}$=(011). Draw the trellis diagram   8
       with min. 4 stages. Use this diagram to encode 110001.
   (c) The generator polynomial of a (7,4) code is given as G(x)= x^3+x^2+1. Find the code vector for the   6
       message 1101 in systematic and non-systematic form. Also draw the encoder.

5. (a) The binary data 010100101 is applied to the input of a modified duobinary encoder   10
       i) Construct the mo0dified duobinary coder output and corresponding receiver output without
          precoding.
       ii) Suppose that due to error during transmission, the produced by the third digit is changed.
           Construct the receiver output. What should be done to avoid error propagation..
   (b) i) Explain Nyquist Pulse Shaping theorem.   6
       ii) Compare BASK and BFSK   4

6. (a) Derive the PSD for Unipolar NRZ   8
   (b) i) Derive the expression for probability of error for QPSK.   5

       ii) Consider the following (K+1, K) systematic linear block code with the parity check   7
           digit C_{k+1} given as
                   C_{k+1}= d1+d2+.......+ dk
       (i)   Construct appropriate generator matrix for this code.
       (ii)   Construct the code generated by this matrix for k=3
       (iii)   Determine the error correcting and detecting capability

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7. (a) Write short note on: (Any four)   20
    i)   Intersymbol Interference
    ii) Viterbi Decoding
    iii) Equalization
    v)   RS Codes
    vi) Eye pattern

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