T.E.(E&TC)

INFORMATION THEORY, CODING & COMMUNICATION NETWORK

(2015 Course) (Semester - II)

Time : 2½ Hours]   *[Max. Marks : 70*

Instructions to the candidates:

    1)   *All questions are compulsory.*

    2)   *Figures to the right indicate full marks.*

Q1) a)   A source emits 1000 symbols per second from a range of 5 symbols with probabilities $\left[\dfrac{1}{2}, \dfrac{1}{4}, \dfrac{1}{8}, \dfrac{1}{16}, \dfrac{1}{16}\right]$ find source entropy and information rate. **[6]**

    b)   For a systematic (7,4) LBC, the parity matrix is given by [110; 011;111;101] **[7]**

        i)   Construct Generator matrix

        ii)   Find code vectors for messages 1100, 0011

        iii) If the received code vector is R = 0111101, find the corrected codeword.

    c)   Construct GF(2^3) finite field for a primitive polynomial $x^3 + x + 1$. Find minimal polynomials for all elements. **[7]**

OR

Q2) a)   Apply Huffman coding for the symbols [A E H N G S] generated by a DMS with probabilities [0.19 0.15 0.2 0.16 0.4 0.08]. Also calculate coding efficiency. **[7]**

    b)   State information capacity theorem. A channel has B.W. of 5kHz and signal to Noise power ratio of 63. Determine the BW needed if SNR is reduced to 31. **[7]**

    c)   Obtain Generator & Parity check matrix for (7,4) systematic cyclic code, using Generator polynomial $G(x) = x^3 + x + 1$. **[6]**

*Q3)* a)   Define following terms related to convolutional code **[8]**

        i)   Constraint length

        ii)   Code rate

        iii) Free length

        iv) Path metric

b) For (15,7) double error correcting BCH code with primitive poly $p(x) = x^4 + x + 1$, the received codeword polynomial is $r(x) = x^9 + x^6 + x^5 + x^4 + x + 1$. Find the corrected codeword. **[10]**

OR

Q4) a) For the convolutional encoder shown in fig, show state table, state diagram and code tree. Find the codeword sequence for input message sequence 1011 **[8]**
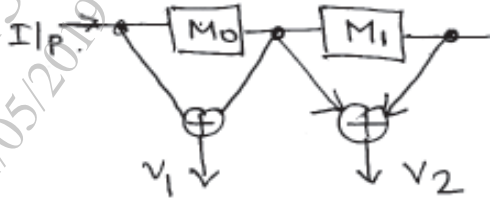
b) For (15,11) RS code, find generator polynomial find code for the message polynomial $(x + 1)$. **[10]**

Q5) a) Explain classes of transmission media & give example of each. **[8]**

b) What is Network? Compare OSI & TCP/IP models. **[8]**

OR

Q6) a) Explain types of addresses in TCP-IP. **[8]**

b) Explain design issues for Network layers. **[8]**

Q7) a) What is ARQ? Explain three types of ARQ. **[8]**

b) Explain different data transfer modes of HDLC. **[8]**

OR

Q8) a) Give functions/services of DLL. Compare Data Link Layer with physical layer. **[8]**

b) Draw & explain HDLC frame format. Explain the control field used in HDLC for different frames types. **[8]**

♦ ♦ ♦