

[4858]-1046

T.E. (E & TC) (End - Semester) (Semester - II)
INFORMATION THEORY & LODING TECHNIQUES
(2012 Pattern)

Time : 2 ½ Hours]

[Max. Marks : 70

Instructions to the candidates:

- 1) Answer Q1 or 2, Q3 or 4, Q5 or 6, Q7 or 8.
- 2) Neat diagrams must be drawn wherever necessary.
- 3) Assume suitable data, if necessary.
- 4) Use of logarithmic tables slide rule, mollier charts, electronic pocket calculator and steam tables is allowed.

Q1) a) Design a Huffman code for a source generating 4 different types of messages with probabilities 0.3, 0.2, 0.4, 0.1. Find the coding efficiency. [7]

- b) What are Golay codes? Explain with suitable example. [7]
- c) Write the procedure for coding of cyclic codes. [6]

OR

Q2) a) A 3 bit PCM system generates 1000 samples/sec. If the quantized samples are produced by the system with probabilities $\left\{ \frac{1}{4}, \frac{1}{4}, \frac{1}{8}, \frac{1}{8}, \frac{1}{16}, \frac{1}{16}, \frac{1}{16}, \frac{1}{16} \right\}$

Then find the rate of information. If the samples are equiprobable, what will be rate of information? [7]

- b) What are Hamming codes? Explain with suitable example. [7]
- c) For a (7,4) cyclic code, with generator polynomial $g(x) = x^3 + x^2 + 1$, what will be codewords for following message words. [6]
 - i) 1011
 - ii) 1110

Q3) a) Find the generator polynomial for BCH code with codeword length $n = 15$ and error correcting capability $t_c = 2$. [10]

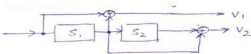
- b) Explain Go-Back-N ARQ. [6]

P.T.O.

OR

- Q4)** a) For a (7,5) RS code, the received codeword polynomial is given as:
 $r(x) = x^5 + \alpha^5 x^4 + \alpha^2 x^3 + x^2 + \alpha^6 x + \alpha^3$ where α is element of $\text{GF}(2^3)$.
Find the corrected codeword polynomial, if there is single error in the received codeword. [8]
- b) Write features of BCH codes. [4]
- c) What is FEC & ARQ systems? [4]

- Q5)** a) Draw the trellis diagram for following encoder [8]



- b) Explain with example polynomial description of convolutional codes. [8]
- c) Draw the block diagram for coding process Turbo codes. [2]

OR

- Q6)** a) Explain viterbi's algorithm for decoding of convolutional codes. [8]
- b) Explain generating function for convolutional codes. [8]
- c) Write any two features of LDPC codes. [2]

- Q7)** a) What are the goals of communication system designer? Explain any three of them. [6]
- b) What is Nyquist minimum bandwidth? [4]
- c) Explain in brief trade off between modulation and coding. [4]

OR

- Q8)** a) Explain how coding gain is improved in TCM. [8]
- b) Write Shannon-Hartley capacity theorem. What are its implications? [8]

