Roll No. .....

22144

M. Tech 1st Semester Electronics & Communication Engineering

Examination–May, 2015

Information and Communication Theory

Paper-MEEC-505

Time : 3 hours ***Max. Marks : 100***

Before answering the questions, candidates should ensure that they have been supplied the correct and complete question paper. No complaint in this regard will be entertained after the examination.

Note : Attempt any **five** questions. All questions carry equal marks.

1. (a) State and explain Shannon-Hartley theorem. [10]

(b) Prove that I (X; Y ZW) = I (X; Y) +I(X ; Z/ Y) + I (X; W / ZY) [10]

2. (a) Show that {01,100,101,1110,1111, 0011,0001} cannot be a Huffman code for any source probability distribution. [10]

(b) What are Hamming Codes ? What are their properties? [10]

3. A source has an alphabet {al, a2, a3, a4} with corresponding probabilities (0.1,0.2,0.3,0.4). [20]

(a) Find the entropy of the source.

(b) What is the minimum required average code word length to represent this source for error-free reconstruction?

(c) Design a Huffman code for the source and compare the average length of the Huffman code with the entropy of the source.

4. A (15,5) linear cyclic has a generator polynomial, G (p)= p^{10}+ p^8 +p^5 +p^4 +p^2 +p + 1. [20]

(a) Draw the block diagram of an encoder and syndrome calculator for this code.

(b) Find the code polynomial for the message polynomial M (p) = p4 + p2 + 1 in systematic form.

5. (a) What are code tree, code trellis and state diagrams for convolutional encoders? Also discuss the constant length for convolutional encoders. [12]

(b) Discuss the followings : [8]

(i) Justen codes

(ii) Idempotent and Mattson Solomon polynomials.

6. Discuss the vertical redundancy check (VRC) & longitudinal redundancy check (LRC) used in parity coding. Also discuss the advantages of LRC over VRC. Discuss the drawback of LRC. [20]

7. Discuss the various decoding methods of convolutional codes. [20]

8. Discuss the following (any **four**) : [20]

(a) BCH code

(b) Continuous entropy

(c) Rate distortion functions

(d) Viterbi decoding algorithms

(e) Code incurable error probability

(f) Optimum coding.
