D 50513   (Pages : 2)   Name....................

                                                    Reg. No....................

SEVENTH SEMESTER B.TECH. (ENGINEERING) DEGREE EXAMINATION, NOVEMBER 2013

EC 09 701—INFORMATION THEORY AND CODING

Time : Three Hours   Maximum : 70 Marks

Part A

Answer all questions.

1. Find the self information of two messages with respective probabilities 0.1 and 0.9 comment on the results.

2. State the relationship between Mutual information and Channel capacity.

3. When is a set called as group ?

4. State the significance of Hamming distance and Hamming weight.

5. State a structural difference between the state diagram and trellis diagram representation of a convolutional encoder.

                                                    (5 × 2 = 10 marks)

Part B

Answer any four questions.

1. List the properties of entropy of a source. Find the entropy of a source with message probabilities {0.2, 0.5, 0.3}.

2. Give an example for group and justify your example.

3. Explain the error detection and correction capabilities of linear block coder.

4. State and prove the conditions under which a polynomial can behave as a generator polynomial.

5. Write notes on interleaved convolutional codes.

6. Explain briefly Trellis coding.

                                                    (4 × 5 = 20 marks)

Part C

1. (a) Encode the following source using Shannon-Fano and Huffmann coding. Compare their efficiencies :—

$$P (X) = \{0.1, 0.3, 0.25, 0.15, 0.2\}.$$

Or

   (b) Derive the expression for all possible entropies and channel capacity of a binary symmetric channel.

                                                    Turn over

2. (a) Explain the construction and properties of Galois field.

Or

    (b) Explain the method of BCH coding and Reed Solomon Coding.

3. (a) Explain the working of a (7, 4) cyclic encoder and decoder assuming suitable inputs.

Or

    (b) Explain the encoding and decoding procedures of a (7, 4) linear block encoder. Make suitable assumptions.

4. (a) Explain viterbi algorithm to decode convolutionally encoded message.

Or

    (b) Explain Turbo encoding and decoding methods.

(4 × 10 = 40 marks)