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Total No. of Pages : 02

Total No. of Questions : 18

B.Tech. (ECE) (E-I 2012 to 2017) (Sem.-6)

INFORMATION THEORY AND CODING

Subject Code : BTEC-907

M.Code : 71236

Time : 3 Hrs.

Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION-A**Answer briefly :**

1. What is meant by stop-and-wait ARQ? Explain.
2. An alphabet set contains 3 letters A, B, C transmitted with probabilities of $1/3$, $1/4$, $1/4$. Find entropy.
3. What is meant by linear code?
4. Write Lempel Ziv source coding algorithm.
5. Why cyclic codes are extremely well suited for error detection?
6. Define the terms Coding Efficiency and Redundancy.
7. State two properties of mutual information.
8. What is Source Coding? Define code length & code efficiency. Give the relation between it.
9. Define Channel Capacity of the discrete memoryless channel.
10. What is meant by Cyclic Code?

SECTION-B

11. Explain briefly the syndrome calculation circuit for (n,k) cyclic code.
12. Briefly describe the steps of Viterbi algorithm.
13. Give the relation between channel capacity C, bandwidth W and signal to noise ratio S/N of AWGN channel. Explain the trade-off between them.
14. Verify the following expression :

$$H(X,Y) = H(X|Y) + H(Y)$$

15. State Hartley-Shannon Law.

SECTION-C

16. A DMS has five equally likely symbols.
 - a) Construct a Shannon- Fano code for X, and calculate the efficiency of the code.
 - b) Construct another Shannon- Fano code and compare the results.
 - c) Repeat the Huffman code and compare the results.
17. Explain the maximum likelihood decoding and viterbi decoding algorithms of a convolution encoder.
18. For a systematic linear block code, the three parity check digits, C_4 , C_5 and C_6 are given by :

$$C_4 = m_1 \oplus m_2 \oplus m_3$$

$$C_5 = m_1 \oplus m_2$$

$$C_6 = m_1 \oplus m_3$$

- a) Construct generator matrix.
- b) Construct code generated by this matrix.
- c) Determine error detecting probability.
- d) Prepare decoding table.
- e) Decode the received word 101100 and 000110.

NOTE : Disclosure of Identity by writing Mobile No. or Making of passing request on any page of Answer Sheet will lead to UMC against the Student.