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**SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR**  
(AUTONOMOUS)**M.Tech I Year II Semester (R16) Regular Examinations May/June 2017****CODING THEORY & TECHNIQUES**

(DECS)

(For Students admitted in 2016 only)

Time: **3 hours**Max. Marks: **60**(Answer all Five Units **5 X 12 =60** Marks)**UNIT-I**

- 1 a. Explain the concept of mathematical and logarithmic measure of information with example. 6M
- b. Define the following terms.
- i) Entropy
- ii) Rate of information
- iii) Mutual information 6M

**OR**

- 2 a. Prove that  $H(X, Y) = H(X/Y) + H(Y)$   
 $= H(Y/X) + H(X)$  6M
- b. State and prove properties of Entropy. 6M

**UNIT-II**

- 3 a. Find codes for the following message ensembles using Shanon-Fano coding.
- $$[X] = [x_1 \ x_2 \ x_3 \ x_4 \ x_5 \ x_6 \ x_7]$$
- $$[P] = [0.4 \ 0.2 \ 0.12 \ 0.08 \ 0.08 \ 0.08 \ 0.04]$$
- 6M
- b. Explain the concept of Syndrome decoding. 6M

**OR**

- 4 a. Construct (6,3) code for all possible data words taking the generator matrix as
- $$G = \begin{bmatrix} 1 & 0 & 0 & 1 & 0 & 1 \\ 0 & 1 & 0 & 0 & 1 & 0 \\ 0 & 0 & 1 & 1 & 1 & 0 \end{bmatrix}$$
- 6M
- b. Explain error detecting and correcting capability of Linear block codes. 6M

**UNIT-III**

- 5 a. The generator polynomial of a (7, 4) cyclic code is  $g(x) = 1 + x^2 + x^3$ . Find the codeword for the message  $D = [1110]$  in the form of
- Systematic
  - Non-systematic
- b. Explain the following:
- Hamming distance
  - Error detecting and correcting capabilities of hamming codes.

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**OR**

- 6 a. Draw the block diagram of general type-II one step majority-logic decoder and explain it.
- b. Explain Syndrome decoding procedure for Hamming codes.

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**UNIT-IV**

- 7 a. How trellis diagram is used to encoding and decoding of convolution codes.
- b. Construct the syndrome decoder for (7, 4) cyclic code whose generator polynomial is  $g(x) = x^3 + x + 1$ .

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**OR**

- 8 a. Consider the (3, 1, 2) convolutional code with
- $$g^{(1)} = (110)$$
- $$g^{(2)} = (101)$$
- $$g^{(3)} = (111)$$
- Draw the encoder block diagram
  - Find the generator matrix.
  - Find code word corresponding to the information sequence given as  $u = (1 \ 1 \ 1 \ 0 \ 1)$
- b. Explain Sequential decoding of convolution codes.

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**UNIT-V**

- 9 a. Explain error correcting procedure for BCH codes.
- b. Write a stack sequential decoding algorithm for convolution codes.

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**OR**

- 10 a. Explain in detail the Viterbi algorithm for decoding of convolutional codes with a suitable example.
- b. Explain construction of Falois Fields GF.

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6M

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