

B.TECH. SEM -V INFO. TECH. 2014 COURSE (CBCS) : WINTER - 2017

SUBJECT: ELECTIVE-I 4) INFORMATION THEORY & CODING

Day: Saturday
Date: 20/01/2018

Time: 02.30 PM TO 05.30 PM
Max. Marks: 60

W-2017-2156

N.B:

- 1) All questions are **COMPULSORY**.
- 2) Figures to the right indicate **FULL** marks.
- 3) Use of non-programmable **CALCULATOR** is allowed.
- 4) Draw neat and labeled diagrams **WHEREVER** necessary.

Q.1 Explain group theory, average mutual information and entropy. **(10)**

OR

Q.1 Explain mark-off statistical model for information source. **(10)**

Q.2 Explain information capacity theorem. **(10)**

OR

Q.2 Explain channel model and channel capacity. **(10)**

Q.3 Encode string MALAYALAM MADAM using Shannon-Fano algorithm. **(10)**

OR

Q.3 Explain Huffman and Arithmetic coding. **(10)**

Q.4 Consider the BCH (15,5) triple error correcting code with the generator polynomial **(10)**

$$g(x) = x^{10} + x^8 + x^5 + x^4 + x^2 + x + 1$$

Find BCH decoding for generator polynomial mentioned above.

OR

Q.4 Explain method for generating cyclic codes and matrix description of cyclic codes. **(10)**

Q.5 Design a (12, 3) systematic convolution encoder with a constraint length $v = 3$ and $d^* \geq 8$. **(10)**

- i) Construct the trellis diagram for this encoder.
- ii) What is the d_{free} for these codes?

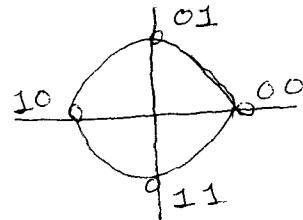
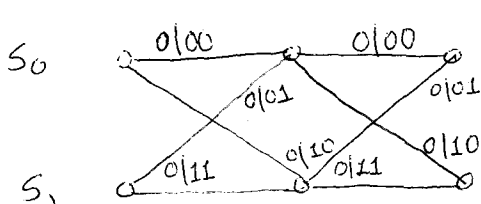
OR

Q.5 Explain Viterbi decoding of convolution codes. **(10)**

Q.6 Explain performance evaluation for AWGN channel. **(10)**

OR

Q.6 Consider a rate $\frac{1}{2}$ TCM scheme with $m = 1$ and $m = 4$. It takes one bit at a time and encodes it into two bits, which are then mapped to one of the four QPSK symbols. The two state Trellis diagram and the symbol allocation from the 4-PSK constellation is given in Figure mentioned below. **(10)**



- a) Find error state diagram for this TCM scheme.
- b) Calculate matrix transfer function of the error state diagram.
- c) Find scalar transfer function.

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