

Total No. of Questions :8]

SEAT No. :

P2858

[Total No. of Pages :3

[4958] - 1046

T. E. (E & TC)

INFORMATION THEORY & CODING TECHNIQUES

(2012 Pattern) (End - Sem) (Semester - II)

Time : 2½ Hours]

[Max. Marks :70

Instructions to the candidates:

- 1) *Solve Q1 or 2, Q3 or 4, Q5 or 6, Q7 or 8.*
- 2) *Use of calculator is allowed.*
- 3) *Assume suitable data if necessary.*

Q1) a) Find entropy to a gaussian source X having mean M_x and variance σ_x^2 . [6]

b) Find capacity of a channel having bandwidth 1MHz and signal to noise ratio of 10dB. [7]

c) What are cyclic codes? How are the cyclic codes represented? What is requirement of generator polynomial for cyclic codes? [7]

OR

Q2) a) Compare shannon - Fano- and Huffman coding techniques. [6]

b) What is standard array decoding? Explain with suitable example. [7]

c) For a (5, 1) cyclic code, the generator polynomial used is $g(x) = x^4 + x^3 + x^2 + x + 1$. Draw the encoder & decoder circuit for the cyclic code. [7]

P.T.O.

- Q3)** a) Outline the procedure for encoding of RS codes. [8]
- b) Explain the features of following codes. [8]
- i) BCH codes
- ii) Cyclic hamming codes
- iii) CRC Codes

OR

- Q4)** a) A (7, 4) single error correcting BCH code is generated using generator polynomial $g(x) = x^3 + x + 1$. If received code polynomial is $r(x) = x^6 + x^4$, find the corrected code polynomial. [8]
- b) What is stop - and - wait ARQ? Explain. [8]

- Q5)** a) “Convolutional coding can be alternative to block coding when block length is large”. Justify. [4]
- b) Draw the state diagram for convolutional encoder whose generators are given as [8]
- $$g_{11} = [1 \ 0 \ 1] \quad g_{12} = [1 \ 1 \ 0]$$
- c) Using polynomial description of convolutional codes, find the codeword generated for input [1 0 1]. Use the encoder given in Q. 5 (b). [6]

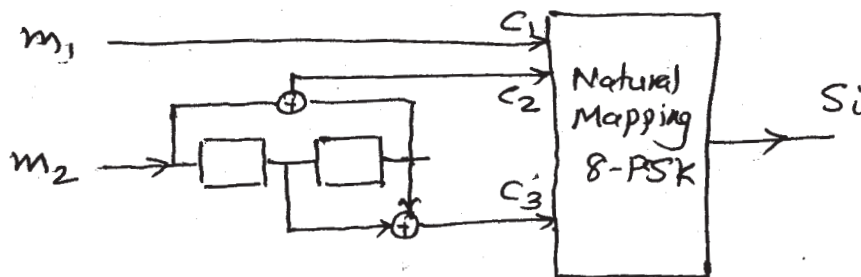
OR

- Q6)** a) Draw the steady state trellis for the convolutional encoder whose generators are given as [6]
- $$g_{11} = [1 \ 0 \ 1] \quad g_{12} = [1 \ 1 \ 0]$$
- b) What is sequential decoding of convolutional codes? Explain in brief. What is its disadvantage? [8]
- c) Write short note on Turbo codes. [4]

- Q7) a)** What are the goals & limitation of a communication system designer? Justify with example that some of these goals are conflicting with each other. [8]
- b) What is mapping by set partitioning in TCM? Explain with suitable example. [8]

OR

- Q8) a)** For the following TCM encoder draw the trellis diagram (Steady state). [8]



- b) Using error probability curves of MPSK modulation explain the various trade offs between p_e , E_b/N_0 and Bandwidth. [8]

