5E5108

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B. Tech. (Sem. V) (Mercy Back) Examination, November 2018
Computer Sc. & Engineering
5CS6.3A Information Theory & Coding

Time : 3 Hours

Maximum Marks : 80
Min. Passing Marks : 24

*Attempt any **five** questions, selecting **one question** from **each unit**. All questions carry **equal** marks. (Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly. Units of quantities used/calculated must be stated clearly.*

Use of following supporting material is permitted during examination. (Mentioned in form No. 205)

1. NIL 2. NIL

UNIT - I

1 (a) Show that for a discrete binding channel :

$H(x,y) = H(x/y) + H(y)$

$H(x, y) = H(x) + H(y)$

4+4=8

(b) Prove the following properties of mutual information :

$I(x; y) = H(x) - H(x/y)$

$I(x;y) = H(x) + H(y) - H(x,y)$

$I(x;y) = H(x) = H(y)$ (for noise free channel)

3+3+2=

OR

1 (a) Discuss and categorize channels for information communication. 8

(b) What is source coding theorem ? State its utility. 8

UNIT - II

2 Explain Huffman coding with help of suitable example. 16

OR

2 (a) Consider a source $S = [S_1, S_2]$ with probabilities 3/4 and 1/4 respectively. Obbtain Shannon-fono code for source S, its 2^{nd} and 3^{rd} extensions. Calculate efficiency for each case. 10

(b) Write short note : (any **one**)

(i) Noise free channel

(ii) Shannon's theorem. 3+3=6

UNIT - III

3 *Explain the need of error correcting codes. How its Encoding/Decoding take place ? Explain with help of parity example.* 16

OR

(a) Explain the types of errors and classification of codes. 8

(b) What is coding efficiency ? Show that coding efficiency is maximum when $P(0) = P(1)$. 8

UNIT - IV

4 The intersection of cyclic codes is cyclic. Find the generator polynomial of $C_1 \cap C_2$.

16

OR

4 Design a (4,2) LBC :

(i) Find the generator matrix for code vector set

(ii) Find the parity check matrix.

(iii) Make an encoding ckt

(iv) Draw the encoding ckt

(v) Draw the syndrome calculation ckt.

16

UNIT - V

5 Write short notes on :

(a) Maximum likelihood decoding of convolution codes. 8

(b) Describe Viterbi Algorithm. 8

OR

5 (a) Code tree. 8

(b) Decoding Probability of Convolution code. 8