

5E1351

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B. Tech. V - Sem. (Main / Back) Exam., Feb.-March - 2021
Computer Science & Engineering
5CS3 – 01 Information Theory & Coding

Time: 2 Hours

Maximum Marks: 65
Min. Passing Marks: 23

Instructions to Candidates:

Attempt all five questions from Part A, four questions out of six questions from Part B and one questions out of three from Part C.

Schematic diagrams must be shown wherever necessary. Any data you feel missing may 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

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PART – A

(Answer should be given up to 25 words only)

[5×2=10]

All questions are compulsory

Q.1 State the channel coding theorem for a discrete memoryless channel.

DMC

Q.2 What is prefix coding?

Q.3 Explain channel capacity theorem.

Q.4 Define efficiency of the source encoder.

Q.5 Define mutual information.

*80-90%
30 video 8 ITC*

PART - B

(Analytical/Problem solving questions)

[4×10=40]

Attempt any four questions

Q.1 An alphabet set contains 3 letters A, B, C transmitted with probabilities of 1/3, 1/4, 1/4.

Find entropy.

$$H(x) = -\sum P(x) \log_2 P(x)$$

Q.2 What is the difference between block codes and convolutional codes?

Q.3 Show that for a discrete binding channel -

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

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

$$H = \sum P(x) \log_2 \frac{1}{P(x)}$$

$$H = \frac{1}{3} \log_2 \frac{1}{1/3} + \frac{1}{4} \log_2 \frac{1}{1/4} + \frac{1}{4} \log_2 \frac{1}{1/4}$$

Q.4 Write short note on Noise free channel and Shannon's theorem.

Q.5 Consider a source $S = [S_1, S_2]$ with probabilities 3/4 and 1/4 respectively. Obtain

Shannon - Fane code for source S its 2nd and 3rd extensions. Calculate efficiency for each case.

Q.6 What is coding efficiency? Show that coding efficiency is maximum when $P(0) = P(1)$.

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PART - C

(Descriptive/Analytical/Problem Solving/Design Questions)

[1×15=15]

Attempt any one questions

Q.1 The intersection of cyclic codes is cyclic. Find the generator polynomial of $C_1 \cap C_2$.

Q.2 Explain the need of error correcting codes. How its Encoding/Decoding take place?

Explain with help of parity example.

Q.3 Write short notes (any two) -

(a) Hamming code and their applications

(b) Fading channel ✓

(c) Huffman coding ✓

(d) Advantages and disadvantages of convolutional codes ✓

30

Jai Hind
Jai Bharat