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NPTEL

Courses » **Information Theory, Coding and Cryptography**

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Unit 3 - Week 2

Course outline

How to access the portal

Week 1

Week 2

● Variable Length Codes, Prefix Codes

○ Source Coding Theorem

● Various Source Coding Technique: Huffman, Arithmetic, Lempel Ziv, Run Length

○ Optimum Quantizer, Practical Application of Source Coding: JPEG Compression

● Introduction to Super Information

○ Quiz : Assignment 2

Week 3

Week 4

Assignment 2

The due date for submitting this assignment has passed.
As per our records you have not submitted this assignment.   **Due on 2018-08-15, 23:59 IST.**

1) Consider a DMS with source probabilities {0.35, 0.25, 0.20, 0.15, 0.05}. The average length **1 point** $\overline{R}$ of the codewords is given by

○ 2.0 bits

○ 2.1 bits

○ 2.2 bits

○ 2.3 bits

No, the answer is incorrect.
Score: 0

Accepted Answers:
2.2 bits

2) Which coding technique(s) is a fixed length code?   **1 point**

○ Lempel Ziv coding

○ Huffman coding

○ Zig-zag coding

○ None of the above

No, the answer is incorrect.
Score: 0

Accepted Answers:
Lempel Ziv coding

3) The variable length code C_2 = {00, 01, 100, 101, 11} is   **1 point**

○ Uniquely decodable.

Accepted Answers:
Both a. and b

4) One possible Huffmann code for the DMS with source probabilities {0.35, 0.25, 0.20, 0.15,   *1 point*
0.05} is

- {0, 1, 10, 110, 111}.
- {00, 01, 10, 110, 111}.
- {00, 01, 10, 111, 1111}.
- {00, 11, 10, 101, 111}.

No, the answer is incorrect.
Score: 0

Accepted Answers:
{00, 01, 10, 110, 111}.

5) The efficiency η of the code for DMS with source probabilities {0.35, 0.25, 0.20, 0.15, 0.05}   *1 point*
is

- 95.4%
- 96.5%
- 96.4%
- 94.6%

No, the answer is incorrect.
Score: 0

Accepted Answers:
96.4%

6) One possible Shannon-Fano-Elias code for the probability distribution {0.25, 0.25, 0.20,   *1 point*
0.15, 0.15} is

- {01, 11, 101, 110, 111}.
- {001, 011, 1001, 1100, 1110}.
- {011, 111, 1001, 1101, 1010}.
- {101, 010, 1011, 1000, 1010}.

No, the answer is incorrect.
Score: 0

Accepted Answers:
{001, 011, 1001, 1100, 1110}.

7) In a rainbow-colored urn, I have seven balls: 1 violet colored ball, 2 indigo colored balls, 3   *1 point*
blue colored balls, 4 green colored balls, 5 yellow colored balls, 6 orange colored balls and 7 red
colored balls. From this urn, I intend to pick up a ball at random and indicate the color of the ball using
an efficient code. A ternary code for doing so would be

- {1, 2, 20, 01, 120, 021, 022}.
- {0, 1, 2, 00, 01, 02, 001}.
- {1, 2, 00, 01, 20, 21, 22}.
- {1, 2, 00, 01, 020, 021, 022}.

No, the answer is incorrect.
Score: 0

Accepted Answers:
{1, 2, 00, 01, 020, 021, 022}.

8) Consider the quaternary sequence 133002021113000022122233. In the process for **1 point** Lempel Ziv Coding (assuming 0, 1, 2 and 3 are already in the codebook), after parsing we obtain

    ◯ 13,30,02,021,11,300,00,22,12,223.

    ◯ 1,3,30,02,02,111,300,00,22,122,233.

    ◯ 13,30,020,211,130,000,221,22,233.

    ◯ 133,002,021,113,000,022,122,233.

No, the answer is incorrect.
Score: 0

Accepted Answers:
13,30,02,021,11,300,00,22,12,223.

9) Let our alphabet consists of only three symbols A, B and C with probabilities of occurrence**0 points** P(A) = 0.5, P(B) = 0.25 and P(C) = 0.25. After arithmetic coding, the sequence 'B A C A' can be represented as

    ◯ 0.64

    ◯ 0.62

    ◯ 0.52

    ◯ 0.40

No, the answer is incorrect.
Score: 0

Accepted Answers:
0.62

10) Let a source $S\{X_k\}$ generate mutually independent symbols X_k, such that $H(X_k) = k$ for $k \geq$ **1 point** 1. Then, the entropy rate of this source is given by

    ◯ 0

    ◯ 1

    ◯ 0.5

    ◯ does not exist

No, the answer is incorrect.
Score: 0

Accepted Answers:
does not exist

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