**MCQ Questions No. 2 (Source Coding and Compression)**

**1. What is the average source coding length for a source with symbols**

$X=\{x\_{1},x\_{2},…,x\_{m}\}$ **with probabilities {P(**$x\_{1}$**),P(**$x\_{2}$**)….P(**$x\_{i}$**​)}?**

a) L=∑ P ($x\_{i}$) ⋅$l\_{i}$ b) L=∑P (xi).L c) L=∑$l\_{i}$.L d) L=P ($x\_{i}$).L

**Correct answer:** a

**2. In source coding, what happens in the case of a binary channel?**

a) Source symbols are represented using the binary alphabet {0, 1}.
b) Source symbols are represented using the quaternary alphabet {0, 1, 2, 3}.
c) Source symbols are represented using the ternary alphabet {0, 1, 2}.
d) Source symbols are converted into secret words.

**Correct answer:** a

#### **3. What does the prefix property ensure in a source code?**

a) Codewords are of equal length.
b) No codeword is the prefix of another codeword.
c) The codewords are always the shortest possible.
d) The code is always non-decodable.

**Correct answer:** **b)**

#### **4. What does 100% efficiency mean in the context of source coding?**

a) The code has no redundancy and uses the minimal number of bits per symbol.
b) The code has the longest possible codewords.
c) The code is always decodable.
d) The code has fixed-length codewords.

**Correct answer:** a)

**5. In fixed-length binary code design, what is the calculated value of L for the given source with 7 symbols?**

a) 2 bits per symbol
b) 3 bits per symbol
c) 1 bit per symbol
d) 4 bits per symbol

**Correct answer:** b)

**6. What is the value of efficiency ηsc ​ for the fixed-length, where the entropy H(x)=1.875bits per symbol and L=3?**

a) 62.5% b) 100% c) 85% d) 95%

**Correct answer:** a) 62.5%

**7. What is the code efficiency for the ternary fixed-length code where the entropy H(x)=1.771 ternary units and L=2 ternary digits?**

a) 100%
b) 90%
c) 88%
d) 50%

**Correct answer:** c)

**8. Which of the following is true about fixed-length source coding?**

a) Each symbol is assigned a codeword of varying lengths based on its probability.
b) The length of the codeword is determined by the number of source symbols and the alphabet size.
c) Fixed-length codes are not efficient for sources with different symbol probabilities.
d) The codeword lengths can vary in fixed-length codes.

**Correct answer:** b) Top of Form

**9. for the source shown below what is the total average length L of the code, in Fano method?**

|  |  |
| --- | --- |
| Symbol  | probability |
| X1 | 0.5 |
| X2 | 0.2 |
| X3 | 0.3 |

a) 1.5 bits per symbol
b) 1.4 bits per symbol
c) 3 bits per symbol
d) 4 bits per symbol

**Correct answer:** b)

10. Which data compression technique uses variable-length codes?

a) Huffman coding

b) Shannon-Fano coding

c) Run-length encoding (RLE)

d) Lempel-Ziv-Welch (LZW) coding

Answer: c