**MCQ Questions No. 3 (Source Coding and Compression)**

**1. According to the Source Coding Theorem, what is the minimum codeword length (L)?**

a) L ≥ H(x)
b) L = H(x)
c) L < H(x)
d) L > H(x)

**Correct answer:** a

**2. In source coding, what is the role of the source encoder?**

a) To map each source symbol to a corresponding codeword that fits the channel.
b) To decode the encoded words back into source symbols.
c) To transmit the data through the channel.
d) To ensure that the source symbols are easily readable.

**Correct answer:** a

#### **3. Which of the following is non-decodable**?

a) (Fixed-length code)
b) (Variable-length code)
c) (Variable-length code with prefix property)
d) (Variable-length code with ambiguity)

**Correct answer:** d)

#### **4. What is the efficiency of a source code?**

a) The ratio of the number of symbols to the total length of the codewords.
b) The ratio of the entropy H(x) of the source to the average codeword length L.
c) The ratio of the average codeword length L to the entropy H(x) of the source.
d) The sum of the lengths of all codewords.

**Correct answer:** b)

**5. What is the formula used to calculate the length L of a fixed-length code in source coding design?**

a) L =⌈$log\_{2}$​M⌉
b) L =⌈$log\_{D}$M⌉
c) L =⌈$log\_{M}D$⌉
d) L =⌈$log\_{3}M$⌉

**Correct answer:** b)

**6. When designing a ternary fixed-length code for a source with 7 symbols, what is the length of the codeword L?**

a) 3 ternary digits
b) 1 ternary digit
c) 2 ternary digits
d) 4 ternary digits

**Correct answer:** c)

**7. In fixed-length binary code, if M=5 and D=2, how do we calculate the codeword length L?**

a) 3
b) 4
c) 2
d) 5

**8. In fixed-length ternary code design for 6 symbol, how many ternary digits are used for each codeword length L?**

a) 3 ternary digits
b) 1 ternary digit
c) 2 ternary digits
d) 4 ternary digits

**Correct answer:** c)

**9. In the Fano Method, after dividing the symbols into subsets, what is the next step?**

a) Assign different code alphabets to each subset
b) Sum the probabilities of the last D symbols
c) Repeat until there is only one symbol in each subset
d) Assign codewords based on their symbols' length

**Correct answer:** a)

10. Which coding technique assigns shorter codes to more frequent symbols?

a) Huffman coding

b) Shannon-Fano coding

c) Run-length encoding (RLE)

d) Lempel-Ziv-Welch (LZW) coding

Answer: a) Huffman coding