

1. 11100011

$$x^3 + 1 = 1001$$

1001 $\overline{)$ 11100011000

1001 \downarrow

1110

1001 \downarrow

0110

1001 \downarrow

0111

1001 \downarrow

1101

1001 \downarrow

1000

1001

000100

Handwritten diagram illustrating the Huffman tree construction process for the binary sequence 111000111100. The sequence is divided into groups of four bits, and the Huffman tree is built by repeatedly merging the two smallest groups.

Initial groups (from left to right):

- 1110
- 0011
- 1110
- 00

Step 1: Merge 1110 and 0011 to form 1110011.

Step 2: Merge 1110011 and 1110 to form 1110011110.

Step 3: Merge 1110011110 and 00 to form the final Huffman tree structure.

The final Huffman tree structure is shown as a sequence of bits: 11100111100000.

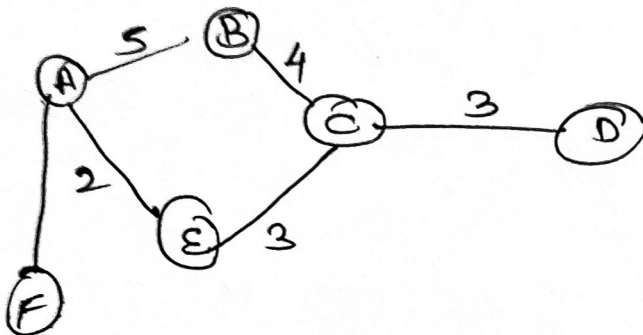
2. (a) $x^3 + x^2 + 1$

1101

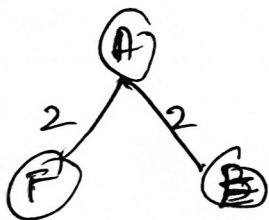
(b) $x^3 + x + 1$

1011

A.

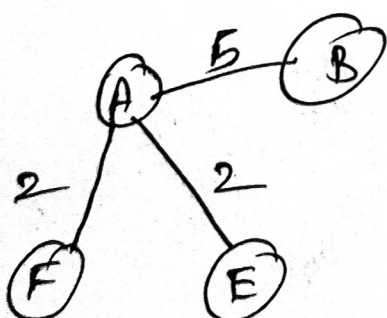


Step 1:



D, E, F

Step 2:



A, E, F, B.

00111001
 111110
 011110
 1001
 111110
 1001
 1001
 1001
 0001
 1001
 001000

0011110001
 111110
 011110
 1001
 011110
 1001
 111110
 1001
 1001
 1001
 1001
 1001