

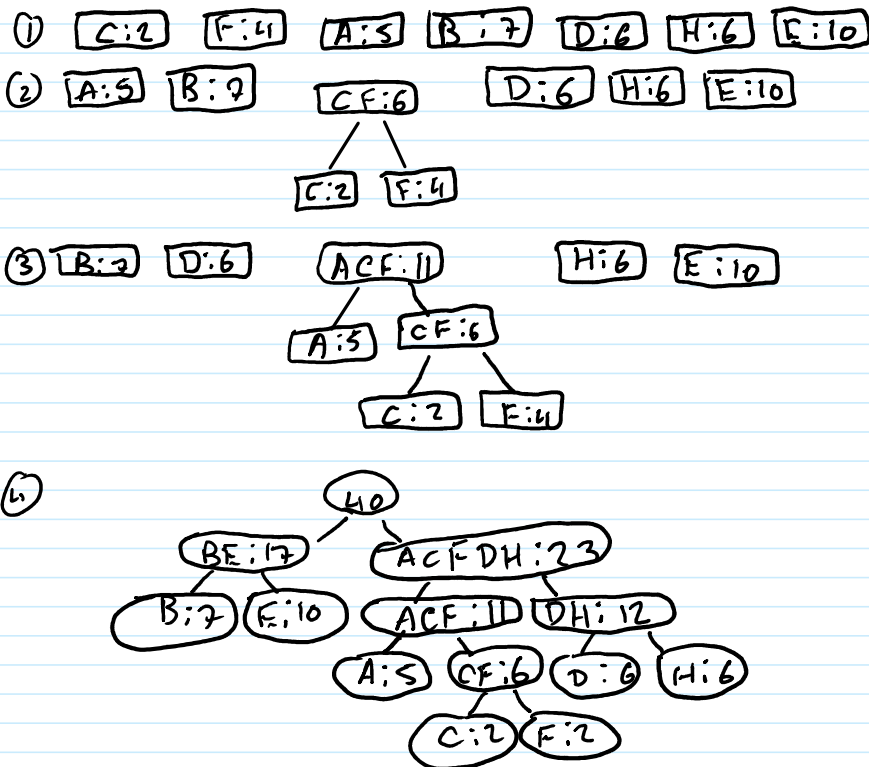
# Jugal Patel's Greedy Algorithm Activity:

Saturday, November 16, 2024 5:43 PM

B) The following table shows the frequency of different characters in a file.

Character	A	B	C	D	E	F	H
Frequency	5	7	2	6	10	4	6

1. Determine the code of each character using Huffman's algorithm. Show the final tree.



2. What is the length of the file (in No. of bits) if you use Huffman's codes for encoding the file?

The length of the file using Huffman's code for encoding the file is

Character	Frequency	Huffman Code	Code Length
A	5	1100	4
B	7	00	2
C	2	11010	5
D	6	1110	4
E	10	01	2
F	4	11011	5
H	6	1111	4

$$\begin{aligned}
 5 \times 4 &= 20 \\
 7 \times 2 &= 14 \\
 2 \times 5 &= 10 \\
 6 \times 4 &= 24 \\
 10 \times 2 &= 20 \\
 4 \times 5 &= 20 \\
 6 \times 4 &= 24
 \end{aligned}$$

$$\begin{aligned}
 \text{Total Bits} &= 20 + 14 + 10 + 24 + 20 + 20 + 24 \\
 &= 132
 \end{aligned}$$

∴ There are 132 bits

3. What is the size of the file (in No. of bits) if you use fixed-size codes for encoding the file?

① To find the size of the file using fixed-size codes, we need to ensure that:

① To find the size of the file using fixed-size codes, we need to ensure that:

- Fixed-Size codes have the same # of bits for all characters.
- # of bits required for each code is:

$$\lceil \log_2 (\# \text{ of characters}) \rceil$$

- Find the 7 unique characters (A to H):

$$\lceil \log_2 (7) \rceil = 3 \text{ bits/character.}$$

②  $5 + 7 + 2 + 6 + 10 + 4 + 6 = 40$  } sum up the frequencies

③ Total Bits =  $40 \times 3$   
 $= 120 \text{ bits}$  } multiply them

$\therefore$  the size of the file using fixed-size code is 120 bits