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Ans3. M is not a stable matching.

Explanation → According to stable matching algo a matching is unstable if →

there is a doctor α and a hospital B that would be both happier with each other than their current match.

From the given preference of doctor over hospitals & preference of hospitals over doctors → we know that doctor D_2 & Hospital H_5 would be both happier with each other than their current matches in M.

→ Execution of Gale Shapley algo →

(i) H_1 offers D_1 and D_1 accepts
(ii) H_2 —"— D_4 —"— D_4 —"—
(iii) H_3 —"— D_1 —"— D_1 rejects
(iv) H_3 —"— D_2, D_2 accepts.
(v) H_4 offer D_2, D_2 rejects.
(vi) H_4 offer D_3, D_3 accepts.
(vii) H_5 offer D_2, D_2 accepts.
(viii) H_3 offer D_4, D_4 acepts.
(ix) H_2 offer D_2, D_2 rejects.
(x) H_2 offer D_1, D_1 rejects
(xi) H_2 offer D_3, D_3 rejects.
(xii) H_2 offer D_5, D_5 accepts.

Ans 2.

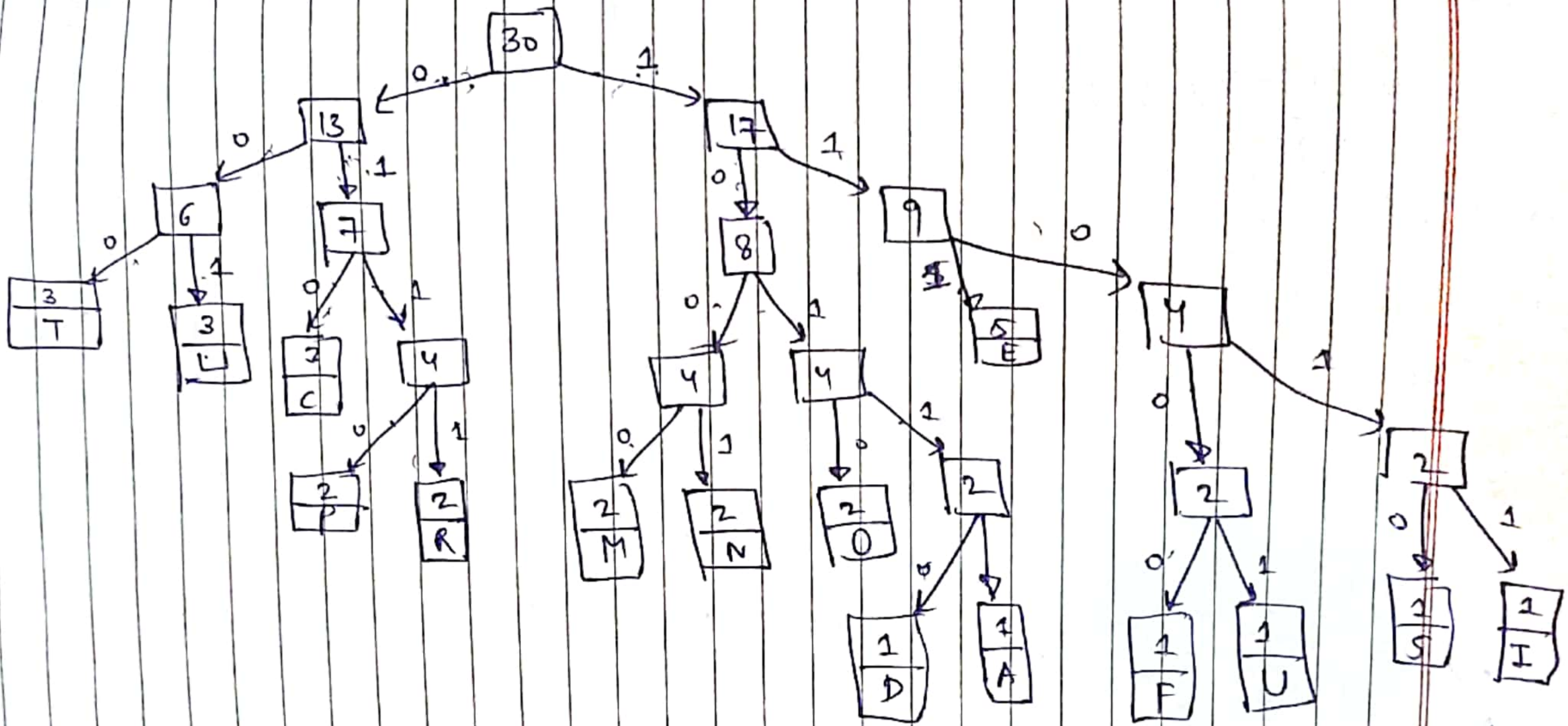
DEPARTMENT OF COMPUTER SCIENCE

Charac.	Freq.	Code lengths.	Cost
D	1	5	5
E	5	3	15
P	2	4	8
A	1	5	5
R	2	4	8
T	3	3	9
M	2	4	8
N	2	4	8
O	2	4	8
F	1	5	5
C	3	3	9
U	1	5	5
S	1	5	5
[illegible]	[illegible]	[illegible]	[illegible]
I	1	5	5
␣	3	3	9
			$\boxed{112}$ ans

$$\text{Cost} = \sum f(i) \cdot \text{depth}(i)$$

$$= \boxed{112} \text{ ans}$$

Huffman's Tree



Ans 1. (i) This couldnot work. For the given intervals →  , the greedy algo chooses the single interval in the middle, but the optimal schedule contains the other two intervals.

(ii) Yes, This greedy strategy will work. It's basically a time-reversed version of the greedy algo proved correct in class, And Correctness follows by induction from the below claim →

Claim :- There's an optimal schedule that includes the talk the talk that starts last.

Proof :-

1. Let x be the talk that starts last.
2. Let S be any schedule that does not contain x, and
3. Let z be the last talk in S.

Because x starts last, we have $S[z] < S[x]$. Thus $F[i] < S[z] < S[x]$ for every other talk i in S, which implies that $S' = S - z + x$ is still a valid schedule, containing the same number of talks as S.

In particular if S is an optimal schedule then S' is an optimal schedule containing x.