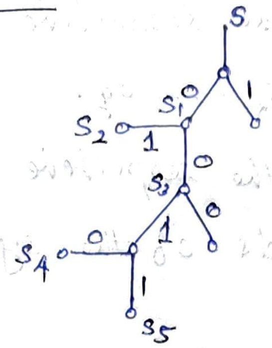
For code 'O':



Hw: Draw for code P and code Q?

eg: If the received sequence $R = 0, 110, 1111, 1110, 10, \ldots$

Decode using decision tree (code N): After decoding each symbol, the decoder resets to initial state.

Code words: $S_1\ S_3\ S_5\ S_4\ S_2$.

Hw2: Which set of word length given below are acceptable for the existence of an instantaneous code given $X = \{0,1,2\}$

Word Length (l_i)	Number of words with lgt l_i		
	Code R	Code S	Code T.
l_1	2	2	1
l_2	1	2	4
l_3	2	2	6
l_4	4	3	0
l_5	1	1	0

Construction of Instantaneous Codes:

By applying Kraft inequality, we can know if an instantaneous code can be constructed or not, keeping in mind the prefix property which says that "no complete word of a code be a prefix of any other code word".

Code Efficiency And Redundancy:

Let the average length of code be L, then

$$\boxed{L = \sum_{i=1}^{q} p_i l_i} \text{ bits/msg.}$$

where $p_i \rightarrow p_1, p_2 \cdots p_q$, the respective probabilities of the source symbols $s_1, s_2 \cdots s_q$.

$l_i \longrightarrow l_1, l_2 \cdots l_q$, the respective word lengths in binits of the codewords of the symbols $s_1, s_2 \cdots s_q$.

The entropy is given by :

$$\boxed{H(S) = -\sum_{i=1}^{q} p_i \log p_i} \text{ bits/msg.}$$

$H(S) \rightarrow$ for binary codes.

$H_r(S) \longrightarrow$ for r-ary codes.

Then $\boxed{H_r(S) = \dfrac{H(S)}{\log_2 r}}$ where $H(S)$ in bits/msg and

r is the number of different symbols used in code alphabet.

Code Efficiency (η_c) :

$$\eta_c = \frac{H(S)}{L} \text{ ; for binary codes.}$$

$$\eta_c = \frac{H_r(S)}{L} \text{ ; for r-ary codes.}$$

Here, $L \geq H(S)$; So $\eta_c \leq 100\%$.

Code Redundancy (R_c) :

$$\boxed{R_c = 1 - \eta_c}$$

Here η_c and R_c are expressed as percentage.