COMMNET-PS1

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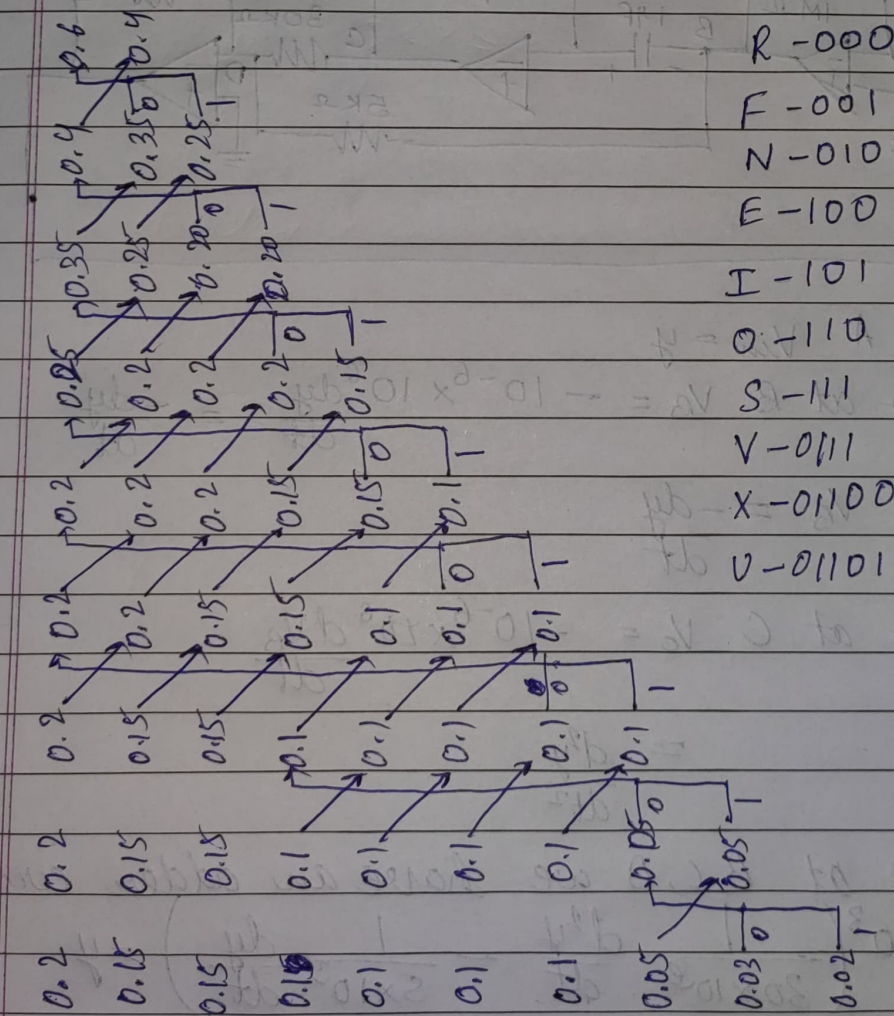
Huffman Decoding



R - 000
F - 001
N - 010
E - 100
I - 101
O - 110
S - 111
V - 0111
X - 01100
U - 01101

$K_1 - \underbrace{111}_{S}\underbrace{101}_{1}\underbrace{01100}_{X}$ " 6

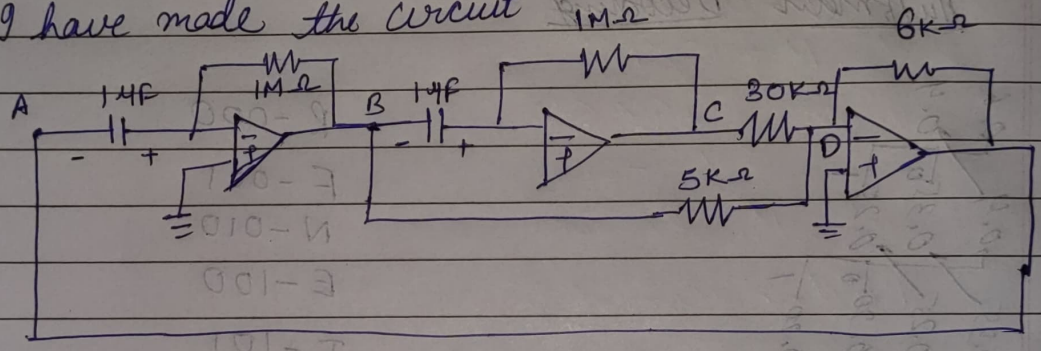
$K_2 - \underbrace{001}_{F}\underbrace{101}_{I}\underbrace{0111}_{V}\underbrace{100}_{E}$ 5

So the differential equation is

$$\frac{d^2y}{dt^2} - 6\frac{dy}{dt} + 5y = 0$$

Circuit (Using differentiator circuits of op-amps)

→ I have made the circuit



→ . Let at A $V_{in} = y$

So at B $V_B = -10^{-6} \times 10^6 \frac{dy}{dt} = -\frac{dy}{dt}$

. At B $V_B = -\frac{dy}{dt}$

So at C $V_c = -10^{-6} \times 10^6 \frac{dV_B}{dt}$

$$= \frac{d^2y}{dt^2}$$

Now at B, C, D we have an adder circuit

$$-6 \times 10^3 \left(\frac{1}{30 \times 10^3} \frac{d^2y}{dt} - \frac{1}{5 \times 10^3} \frac{dy}{dt} \right) = y$$

$$\boxed{\frac{d^2y}{dt^2} - 6\frac{dy}{dt} + 5y = 0} \rightarrow \text{Required diff eqn.}$$

⇒ Now for initial conditions

Let v_c be voltage ~~across~~ at $t=0$ across 1st capacitor so $V_A + v_c = 0$ (According to polarity)

$$y|_{t=0} + v_c = 0$$

$$\boxed{v_c = -2V}$$

Let v_b be voltage at $t=0$ across 2nd capacitor

so $-\frac{dv_b}{dt} + \frac{dv}{dt} = 0$

$$\boxed{\frac{dv_b}{dt} = 5V}$$

⇒ From the graph $y(t) = 6$ at $t \approx 1ns$