Inspiring Excellence

CSE250

SIMULATION PROJECT

NAME: TANAY PAUL

ID: 21301438

SEC: 03

SEMESTER: SPRING 2023

Methodology-1

a. Need to samap all digit of my Student ID.

a. Then, finding out the Equivalent Resistance R using own student ID.

b. Finding out the value of R_1, R_2, R_3.

b. Draw the circuit in LTSPice.

Ans to the Q No: 1

a) Student ID: '21301438'

So, total = 2+1+3+0+1+4+3+6 = 22 ms

Given, $C = 2\mu F$

So,

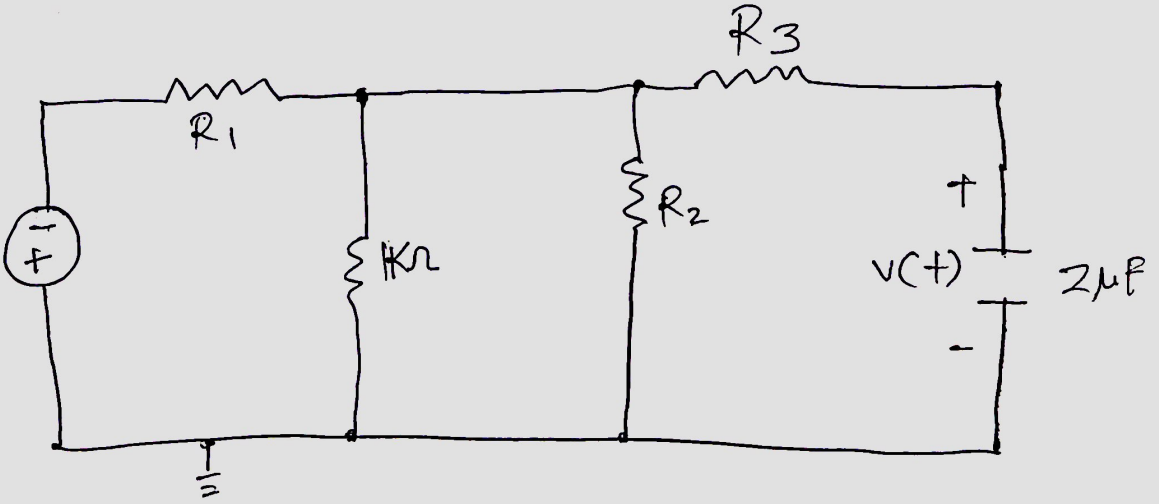
$5\tau = 22$

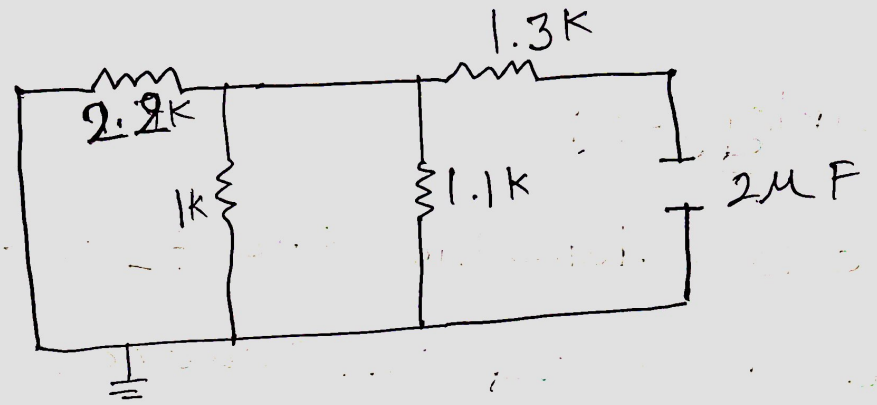
$\therefore \tau = 4.4$

$RC = 4.4$

$\therefore R = \frac{4.4}{2} = 2.2\ K\Omega$

So, can $R = 2.2K\Omega$





Here,

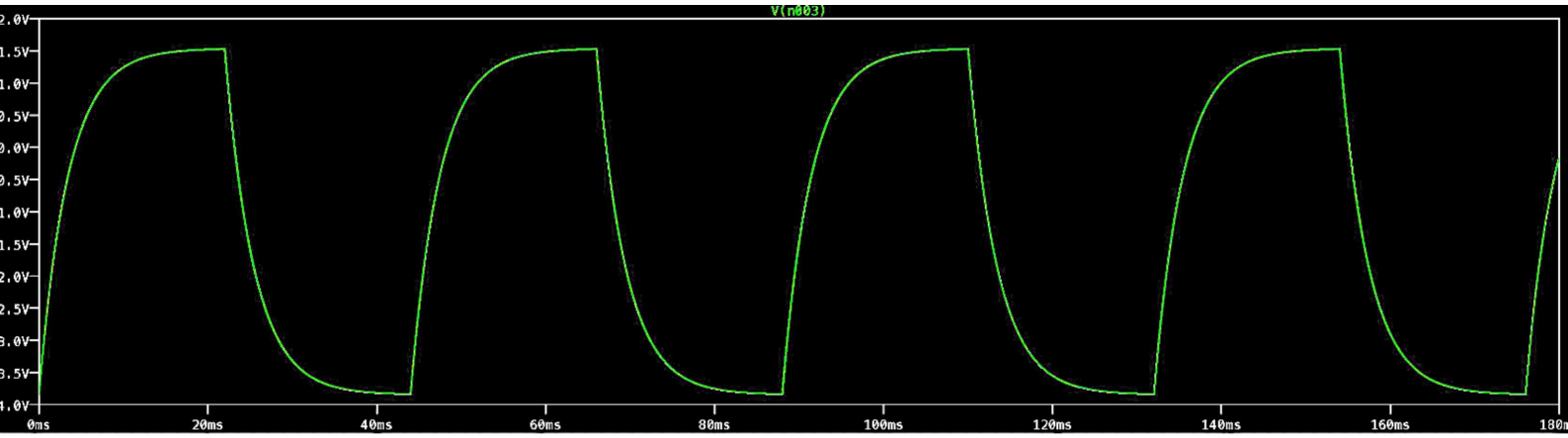
$$(R_1 \| R_2 \| 1K) + R_3$$

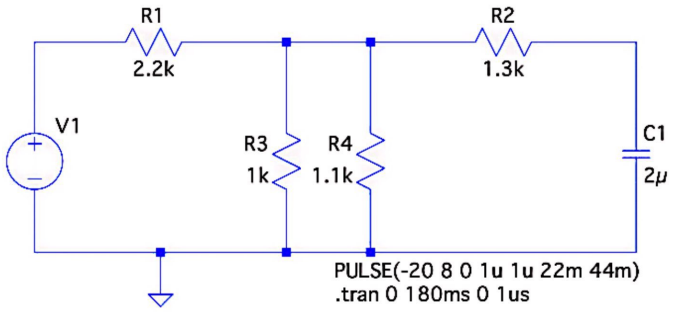
$$\Rightarrow (2.2^{-1} + 1.1^{-1} + 1^{-1})^{-1} + 1.3$$

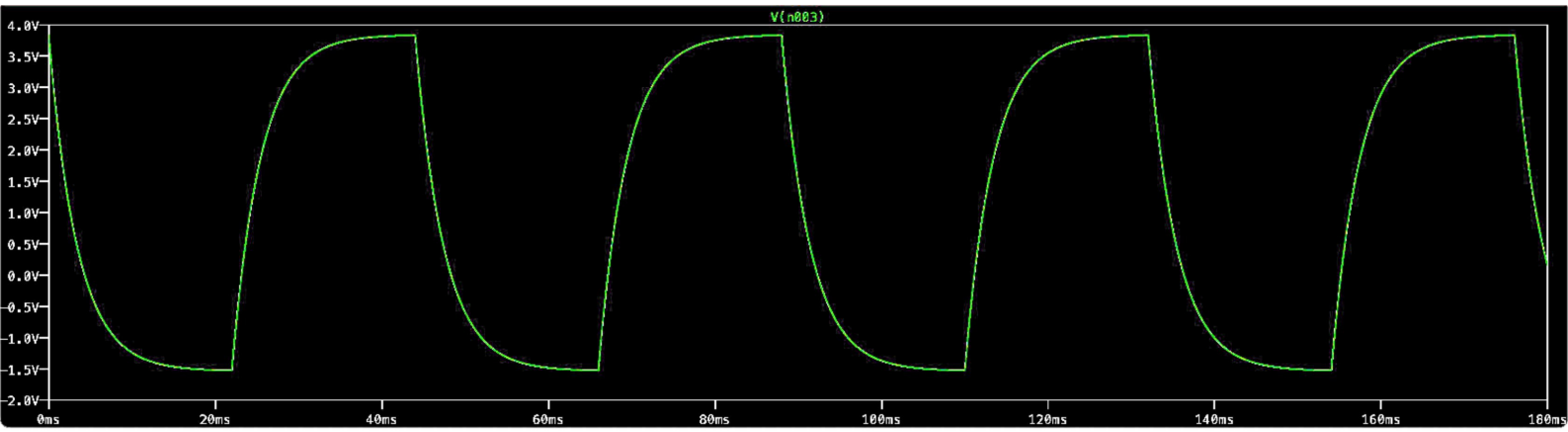
$$\Rightarrow 1.7 K\Omega$$

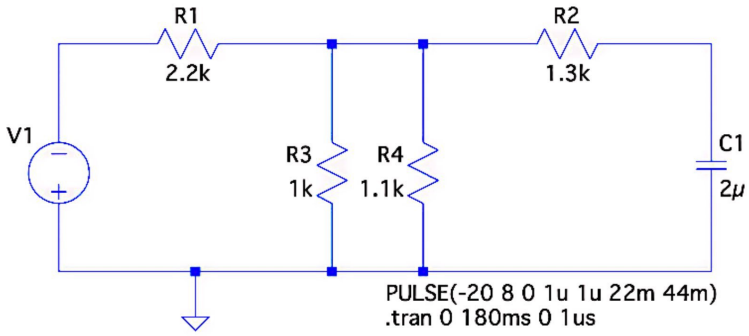
$$\equiv R_{eq}$$

c) The orginal circuit has been simulated in LTSpice and the generated plot is quit simmilar to that show in the question. Here, instead of using Switch used to rotate the voltage and simulate in LTSpice.









Methodology-2:

a. Need to determine the R_L or R_{th}. So we have to remove other power.

b. Need to sum all digits of my Student ID which will be equavelent to P_{max} and by using it, we can find V_{th}.

c. Use LTSPice to generate the Power Vs R_L Curve by simulating the reduced Thevenin circuit.

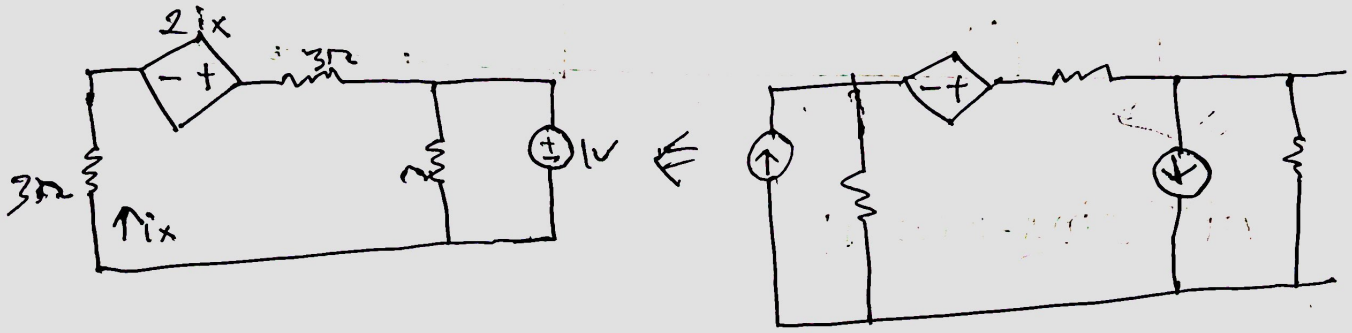
d. Determine the value of I_s.

e. Simulating the orginal circuit given in the ques.

Ans to the QNO:2

a) Here; my Student ID '21301438'

$= 2+1+3+0+1+4+3+8$ [redacted] $= 22\,m\Omega$



Mesh Applying :-

$3i_1 - 2i_1 + 3i_1 + 5i_1 - 5i_2 = 0$

$\boxed{9i_1 - 5i_2 = 0}$

$5i_2 - 5i_1 + 1 = 0$

$\boxed{-5i_1 + 5i_2 = -1}$

So, $i_1 = -0.2A$

$i_2 = -0.45A = i_o$

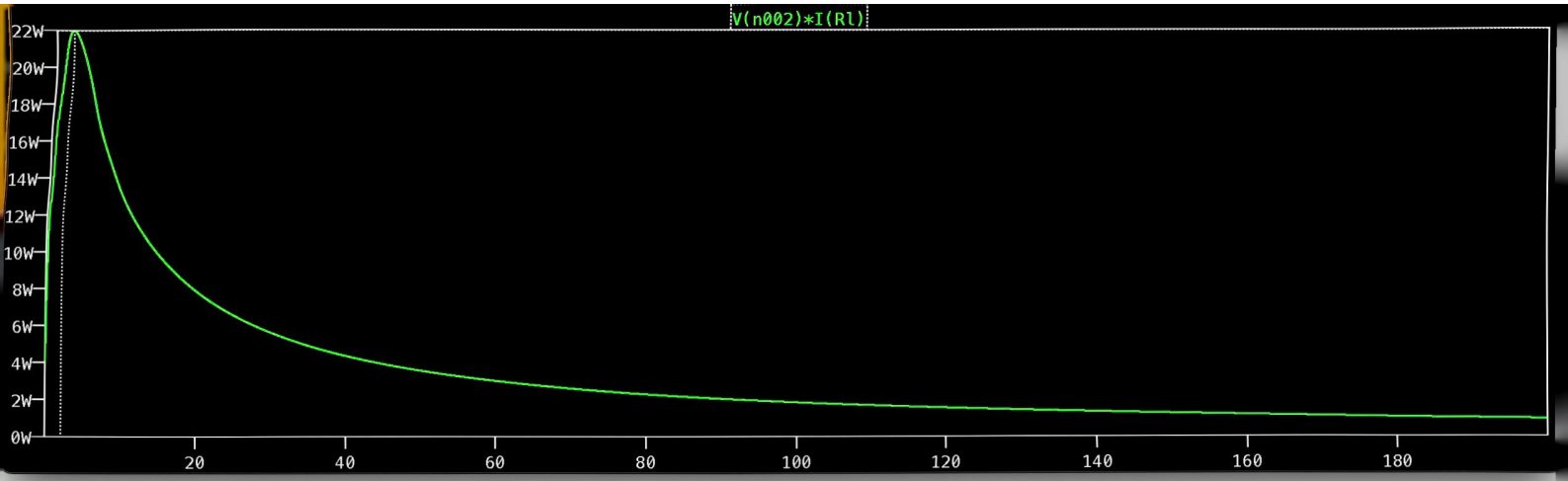
So, $R_{Th} = \frac{V}{-I_o} = \frac{1}{-(-0.45)} = \frac{1}{0.45} = 2.22\,\Omega$

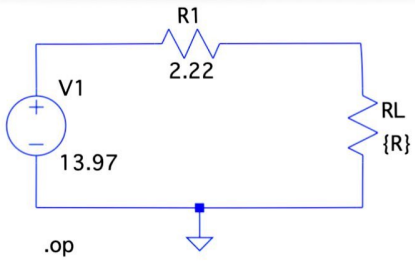
$P_{max} =$ [redacted] 22

So, $P_{max} = \frac{V_{th}^2}{4R_{th}}$

$\therefore V_{th} =$ [redacted]

$= 13.97V$

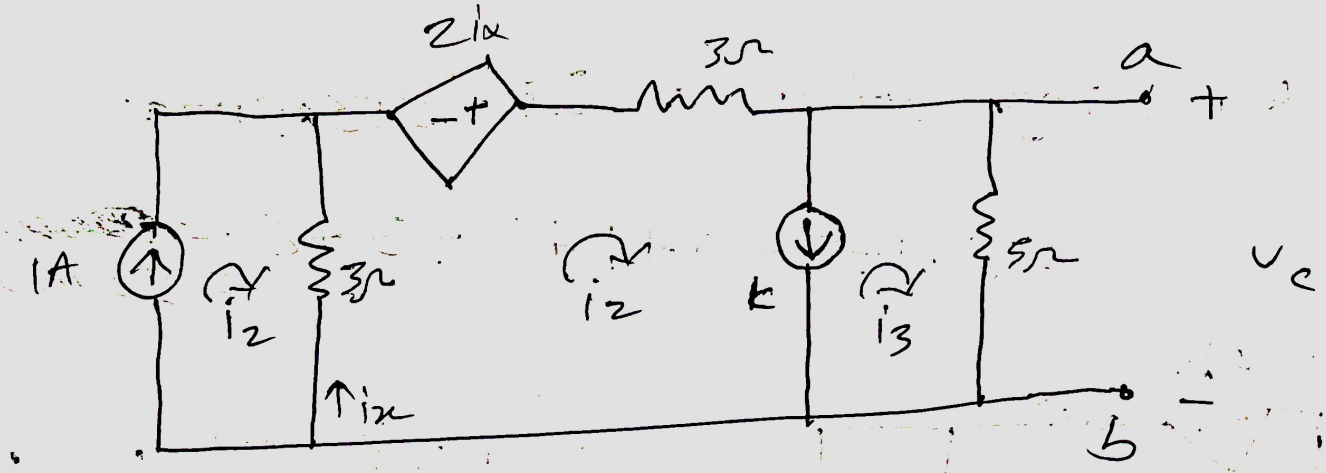




.op

.step param R .111 200 .111

c)



Applying mesh;

$i_1 = 1$; $i_x = i_2 - i_1 = 0$

1 - Per mesh; $\boxed{i_2 = i_3 + 1S}$ — (i)

$3i_2 - 3i_1 - 2i_x + 3i_2 + 5i_3 = 0$

$\boxed{4i_2 + 5i_3 = 1}$ — (ii)

$V_c = i_3 R$

$i_{20} = \frac{V_1}{R} = \frac{12.28}{5} = 2.456\,A$

from (ii),

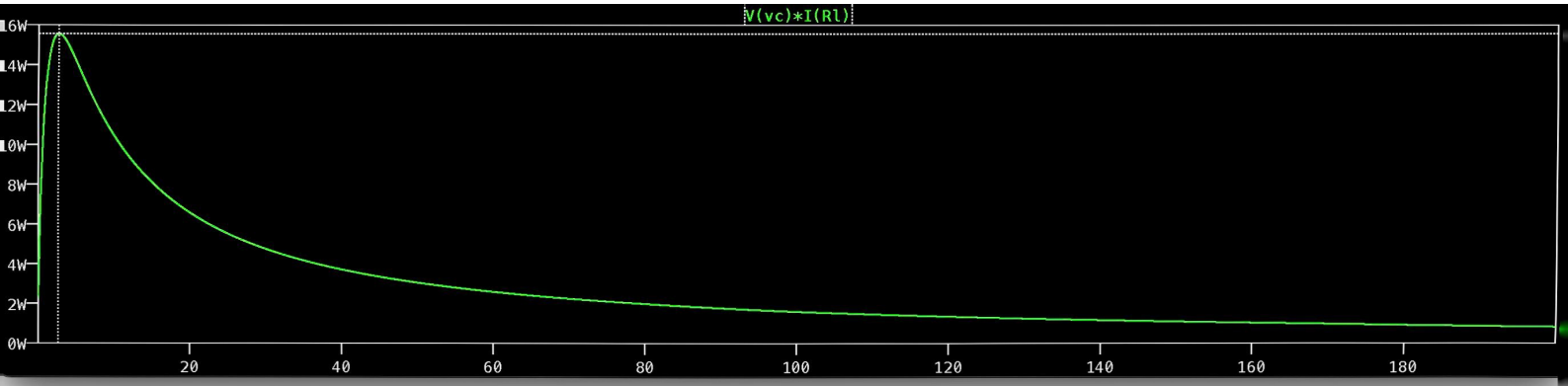
$i_2 = -2.82\,A$

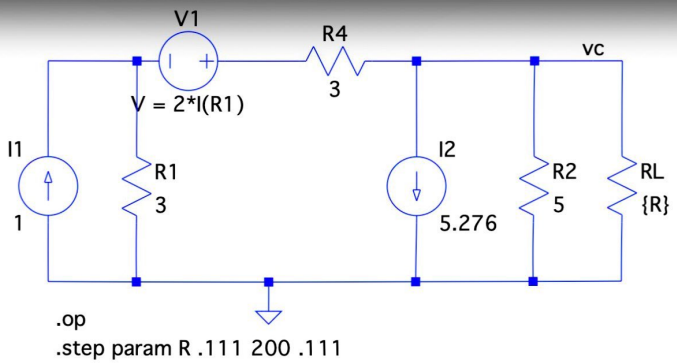
R eqn (i)

$$I_S = -2.82 - 2.456$$

$$= -5.276A$$

So, $I_S = 5.276A$ [downwards]





(d) The curves found in both (b) and (d) are matched, because, the Thevenin reduced circuit is nothing but the same circuit of the original one given in the question.