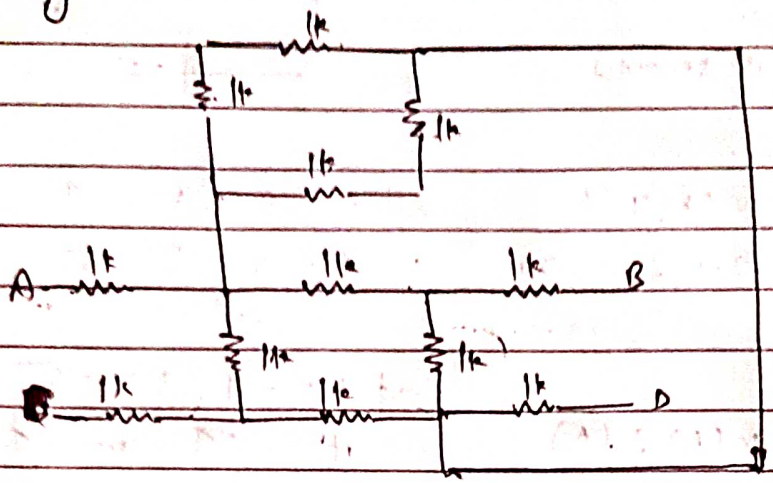
Basic - Electronics
Assignment-1

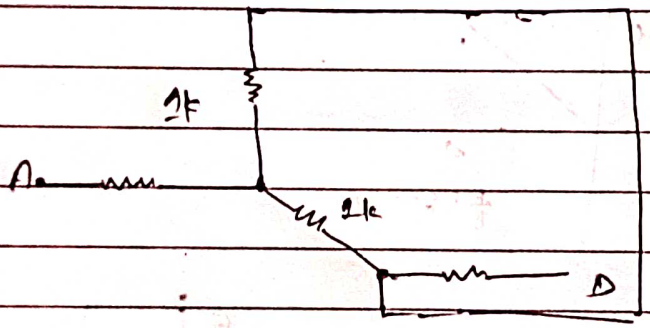
DATE

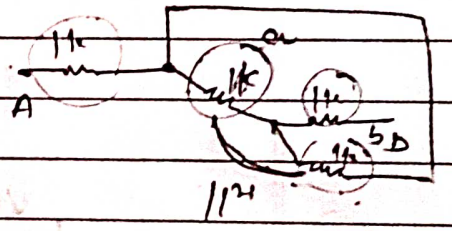
Q-1 Find Equivalent resistance between the points A and D in the given below circuit



SHORT CIRCUIT

a and b are in 11th and after terms all are in Series





(Equivalent Resistance) $\Rightarrow \frac{1}{1k} + \frac{1}{2k} = \frac{2}{1k} \Rightarrow R_e' = \frac{1k}{2}$

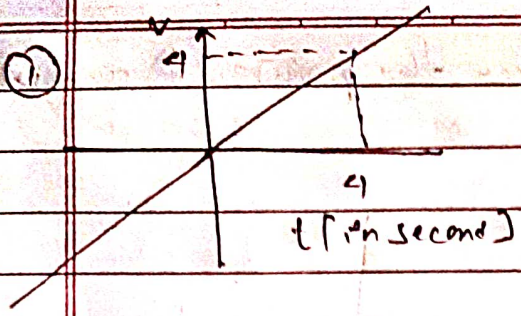
$R_e = 1k + 1k + \frac{1k}{2}$ (Series Connection)

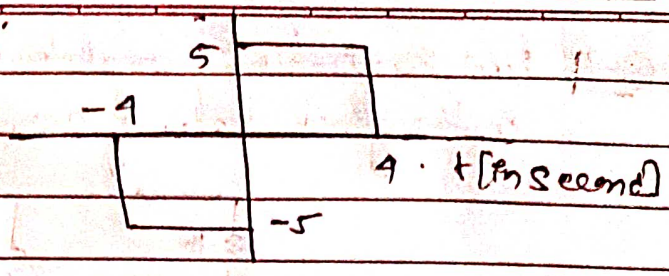
$R_e = 1k\left(\frac{5}{2}\right)$ - Equivalent Resistance

Q-2 The voltage v(t) and current i(t) through an electrical circuit element is given below. Draw the absorbed power in each and every Cases (for all time period)

(2)

(1)





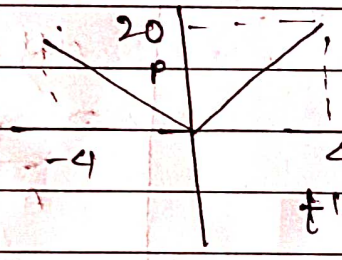
$p(t) = v(t) I(t)$ at $t = 4$ $v = 4$

at $t=4$ $P(t) = 4 \times 5 = 20$ $t = 4$ $I = 5$

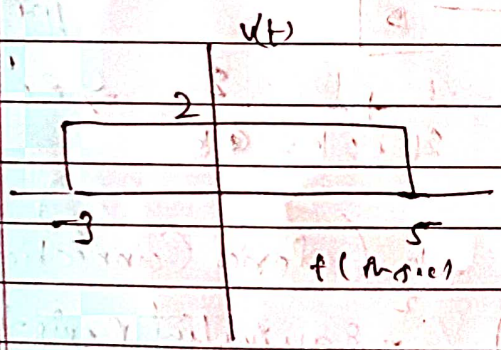
at $t = -4$ $I = -5$

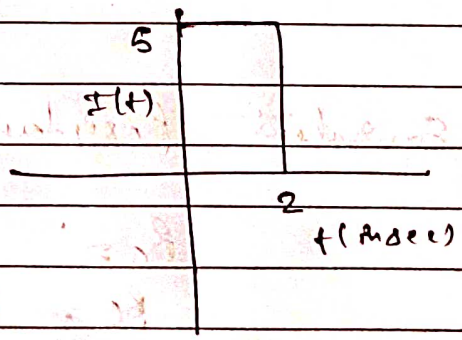
$P(t) = v(t) I(t)$ $t = -4$, $v = -4$

$P(t) = -4 \times -5 = +20$



(2)

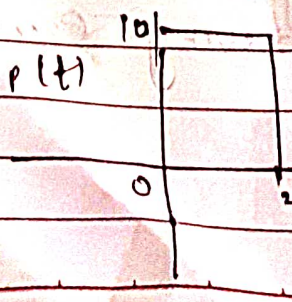




$P(t) = v(t) I(t)$

v(t) Constant in between (0 to 2) sec

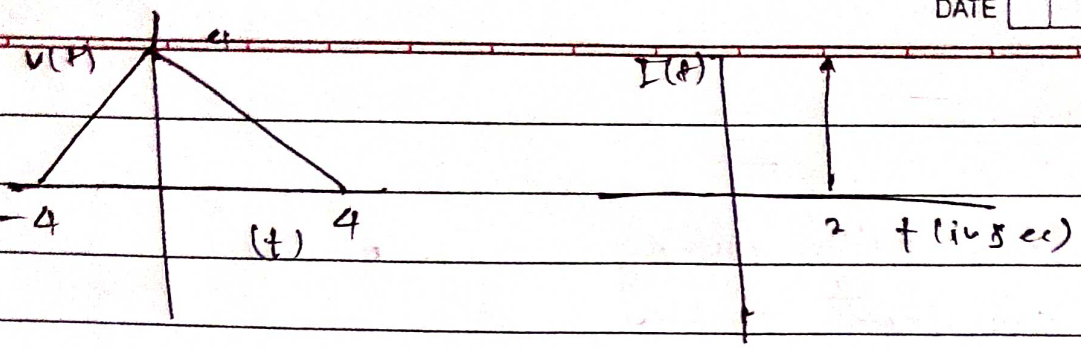
I(t) " "

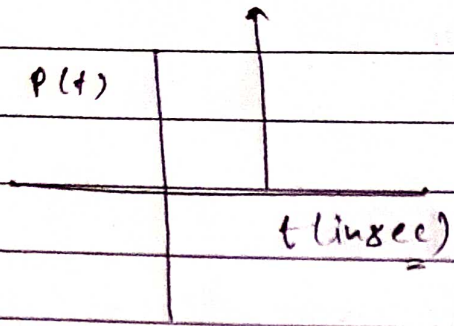


3

DATE

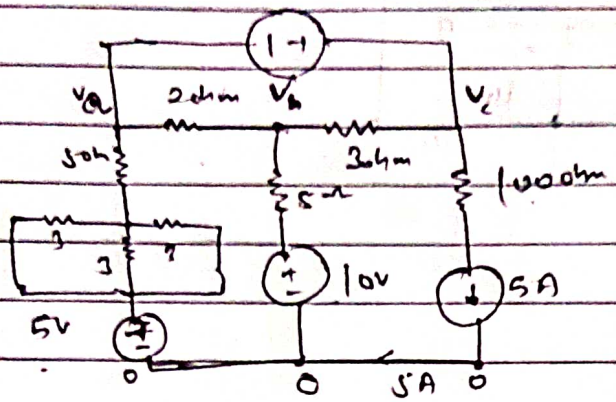
(3)





DATE

Q.6 In the given following circuit find the value of node voltage V_a, V_b, and V_c with the help of KVL, KCL and ohm's law.



Using KCL at node I :

$$\frac{V_b - V_a}{2} + \frac{V_b - V_c}{3} + \frac{V_b - 10}{5} = 0 \Rightarrow 31V_b - 15V_a - 10V_c = 0 \quad \text{---(1)}$$

Using KVL in loop II :

$$+2 + \frac{V_a - V_b}{2} + \frac{V_b - V_c}{3} = 0$$

Or $$10 + 3V_a - 3V_b + 2V_b - 2V_c = 0$$

$$3V_a - 3V_b - 2V_c = 12 \quad \text{---(2)}$$

$$\longrightarrow 5 = \frac{5 - V_a}{6} + \frac{10 - V_b}{5}$$

$$\Rightarrow V_a + V_b = -6.5 \quad \text{---(3)}$$

Take eq^n (1) and (2)

Subtracting (1) from (II)

$$15V_a - 5V_b - 10V_c = 60$$

$$+ 31V_b - 15V_a - 10V_c = 0$$

$$(30V_a + 36V_b = 60)$$

PAGE

DATE

$30V_a + 36V_b = 60$

$5V_a + 6V_b = 10$

$V_a + V_b = -65$

$V_b = 335$

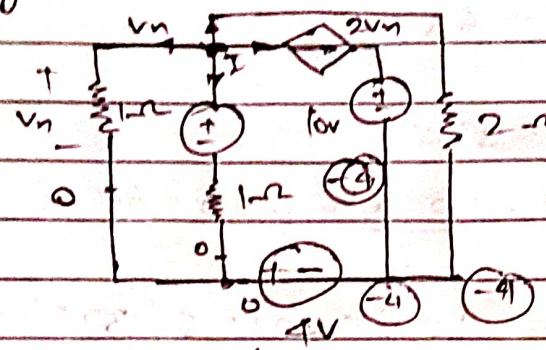
$V_a = \frac{10 - 6V_b}{5} = \frac{10 - 6(335)}{5} = -400V$

$V_c = \frac{15(-400) - 5(335) - 60}{10} = -2335V$

$V_b = 335$
$V_a = -400V$
$V_c = -2335$

DATE

Q3 Find the value of 'Vn' with the help of nodal analysis in the given below circuit.



Use nodal voltage at I

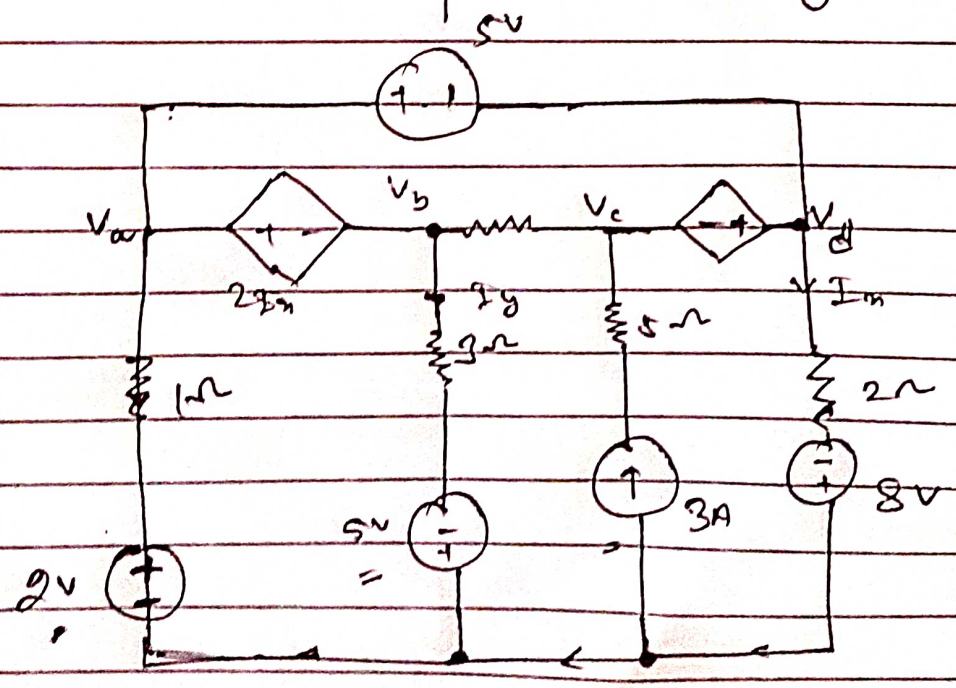
$$\frac{V_n - 0}{1} + 2V_n + \frac{V_n + 4}{2} + \frac{V_n - 4}{1} = 0$$

or $V_n + 2V_n + \frac{V_n}{2} + 2 + V_n - 4 = 0$

$\frac{9}{2} V_n = 2$

$$\boxed{V_n = 4/9 V}$$

Q4 In the given following circuit find the node voltage. V_a, V_b, V_c and V_d with the help of nodal analysis.



PAGE

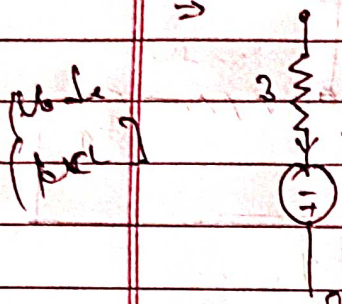
DATE

Applying loop law in outer loop

$= 5 + 2I_x - 8 - 2 + I_x + I_y = 0$

$\Rightarrow 3I_x + I_y = 8$

$\Rightarrow$



node (b)

$\Rightarrow 8 - 2I_x - (5 - 2I_x)$

$5 - 2I_x - 3I_y + 5 = 8 - 2I_x$

$I_y = \frac{2}{3} A$

$I_x = \frac{8 - I_y}{3} = \frac{8 - 2/3}{3}$

$\Rightarrow \frac{22}{9}$

$V_a = 5V$

$V_b = 5 - 2I_x = \left(5 - \frac{44}{9}\right) V = 13/9\ V$

$V_c = -3I_y = -3 \times \frac{2}{3} = -2V$

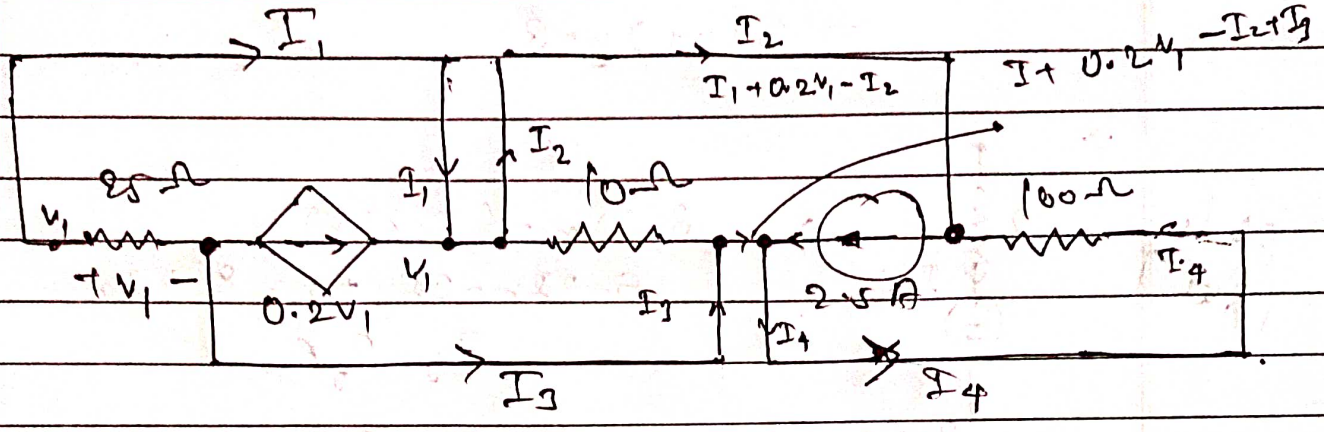
$V_d = 0V$

$V_a = 5\ V$
$V_b = 13/9\ V$
$V_c = -2V$
$V_d = 0V$

PAGE

DATE

Q.5 In the given following circuit, find the value of current I_1, I_2, I_3 & I_4 with the help of nodal analysis.



$$\Rightarrow I_1 + 0.2V_1 - I_2 + I_3 + 2.5 = I_4$$

$$\Rightarrow I_1 + 0.2V_1 - I_2 + I_3 + 2.5 = I_4$$