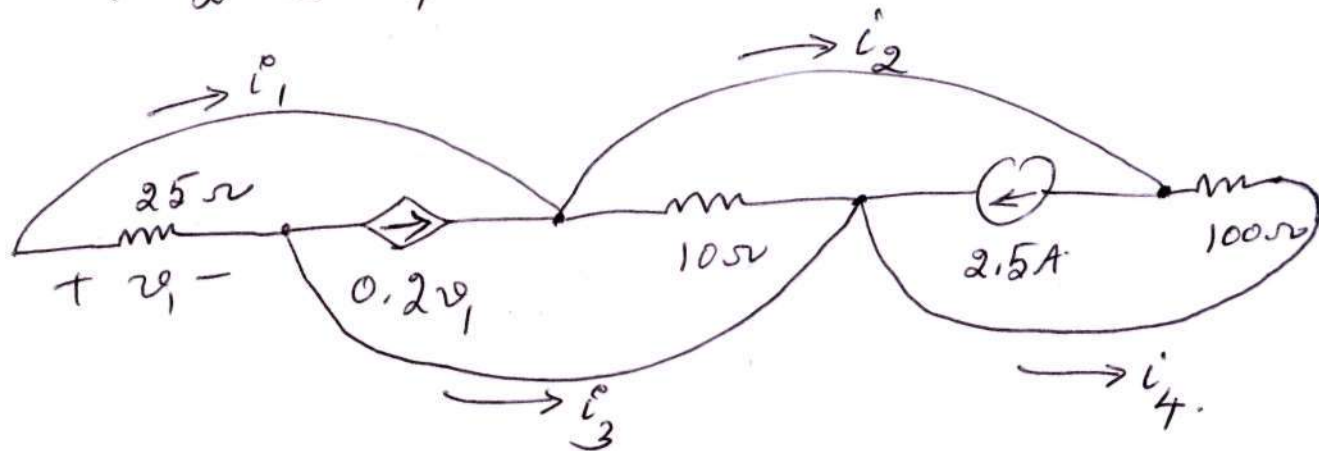


Sub: Electrical Networks

Date: 01/08/2011

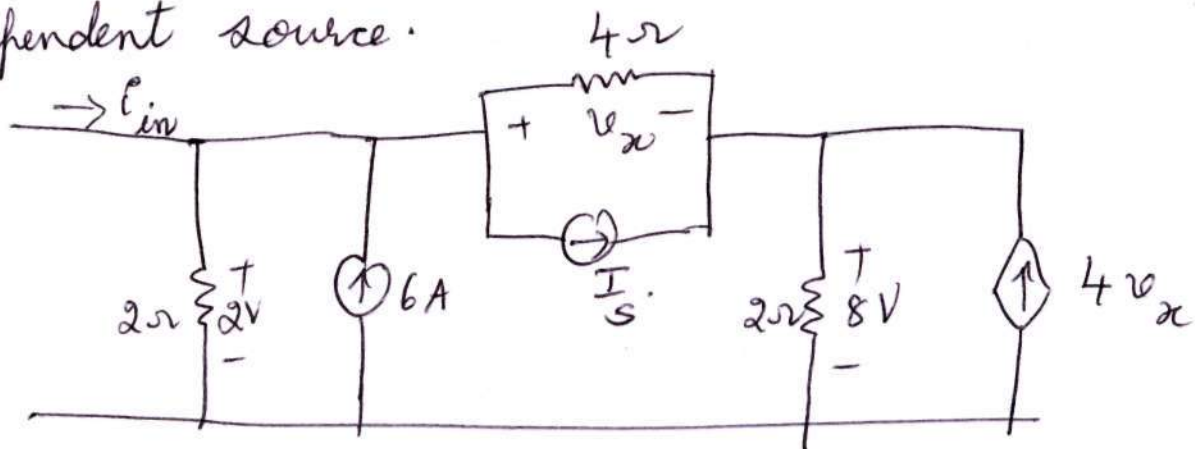
Sem: III (EXTC)

1) Find $i_1^o, i_2^o, i_3^o, i_4^o$.



[Ans: $i_1^o = -2A, i_2^o = 3A, i_3^o = -8A,$
 $i_4^o = -0.5A$].

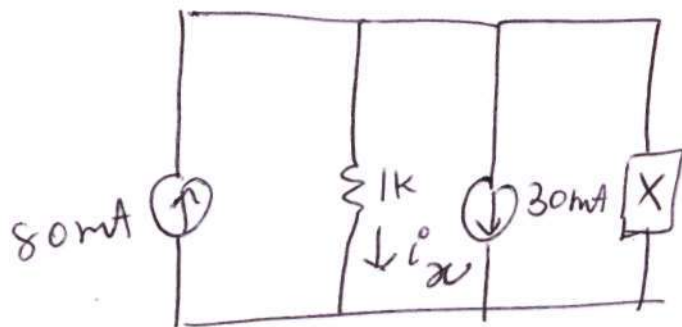
2) Use Ohm's law and Kirchhoff's laws to find
 a) v_x b) i_{in}^o c) I_s d) power provided by the dependent source.



[Ans: $v_x = -6V, i_{in}^o = 23.4A, I_s = 29.9A,$
 power provided = $-192W$].

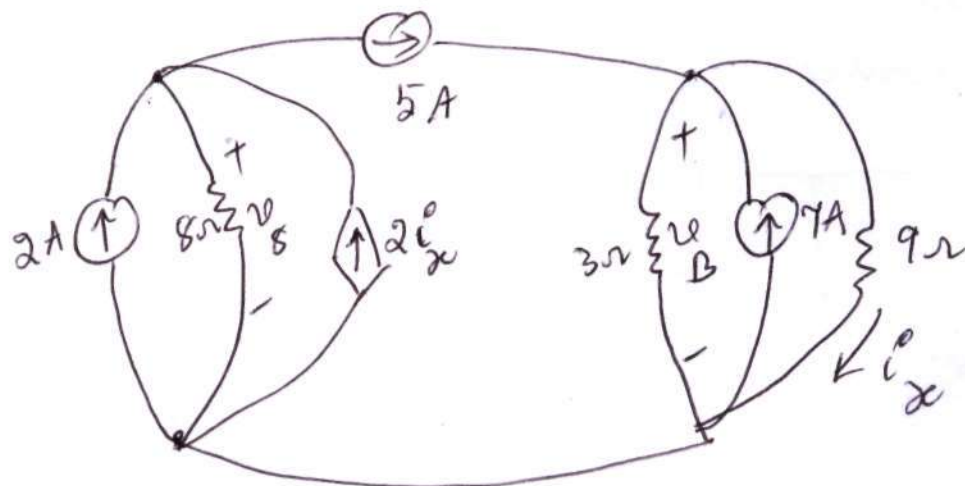
3) a) Let element X in fig be an independent current source, arrow directed upward, labelled i_s .

What is i_s if none of the four circuit elements absorb any power. b) Let element X be an independent voltage source + ref on top labelled v_s . What is v_s if the voltage source absorbs no power.



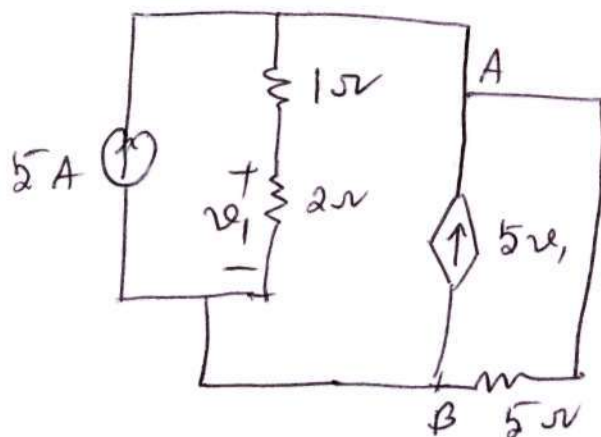
[Ans: a) $i_s = -50 \text{ mA}$
b) $v_s = 50 \text{ V}$]

4) a) Apply the techniques of single node/pair analysis to the upper right node in fig below & find i_x b) Now work with the upper left node & find v_s . How much power is 5A source generating.



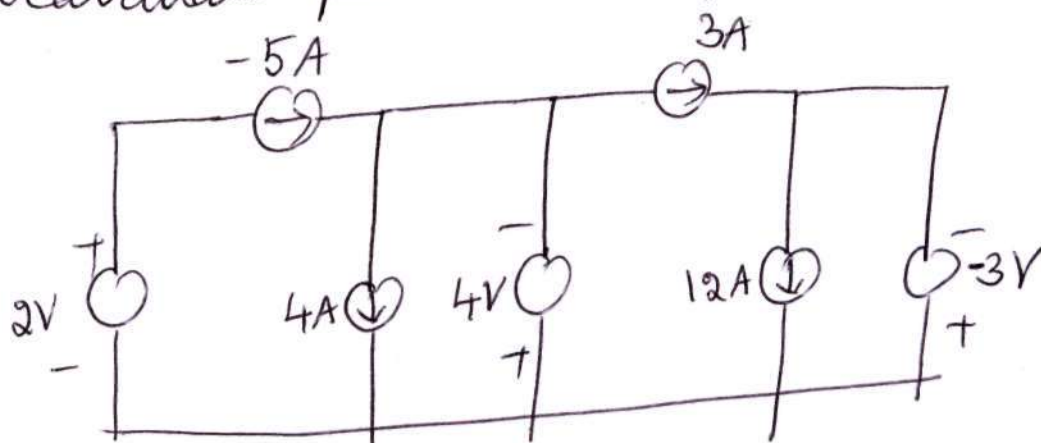
[Ans: a) $i_x = 3 \text{ A}$, $v_s = 24 \text{ V}$, Power = 15 W]

5) Find power absorbed by 5Ω resistor.



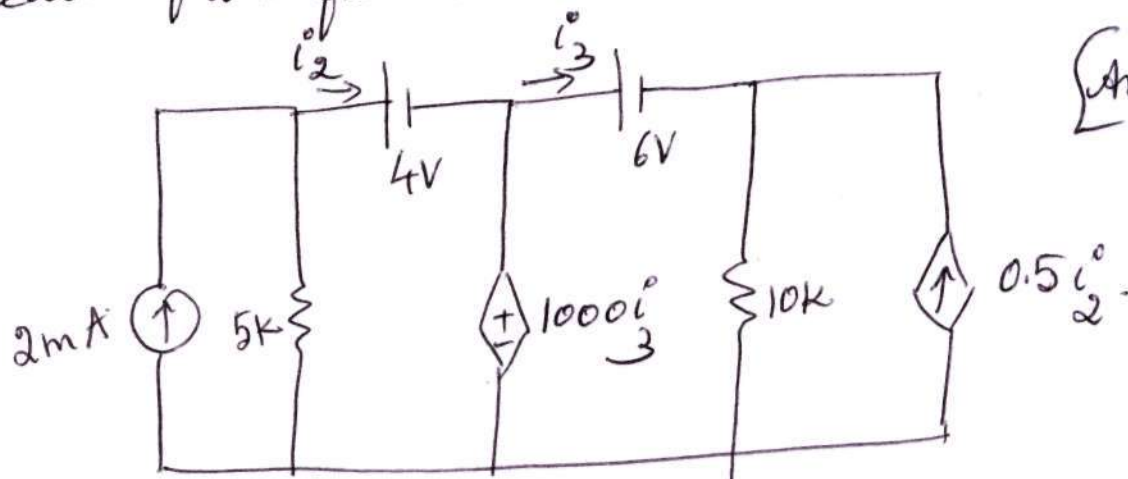
[Ans: $0.638W$]

6) Calculate power absorbed/delivered by each source.



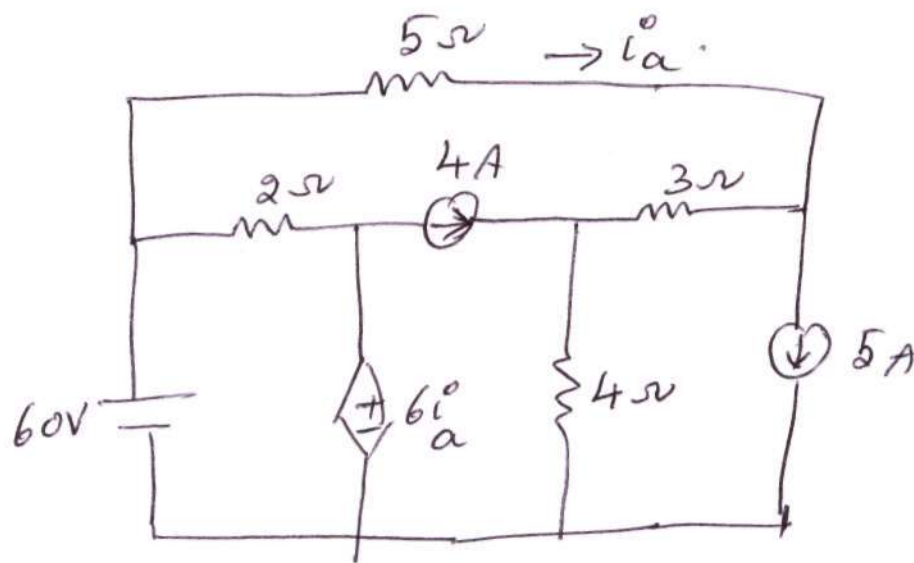
Ans: $[10W, -30W, 16W, 16W, -21W, 36W, -27W]$.

7) Use mesh analysis to find the power generated by each of the five sources.



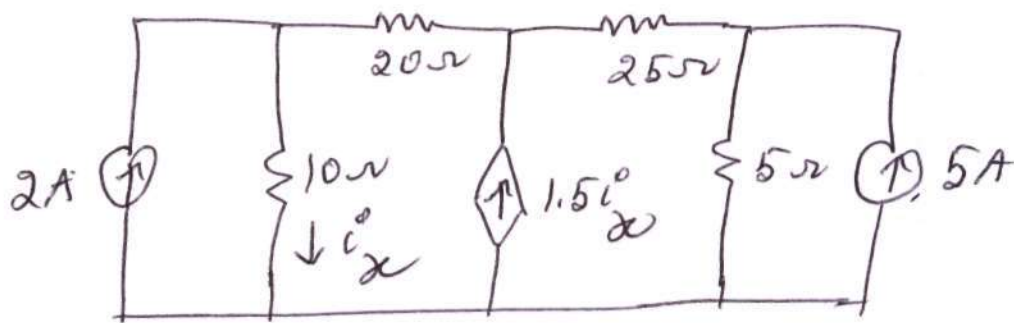
[Ans: $-6mW,$
 $9mW$
 $-5mW$
 $4.5mW$
 $-5.625mW$]

- 8) Use mesh analysis to find power dissipated in 2Ω resistor.



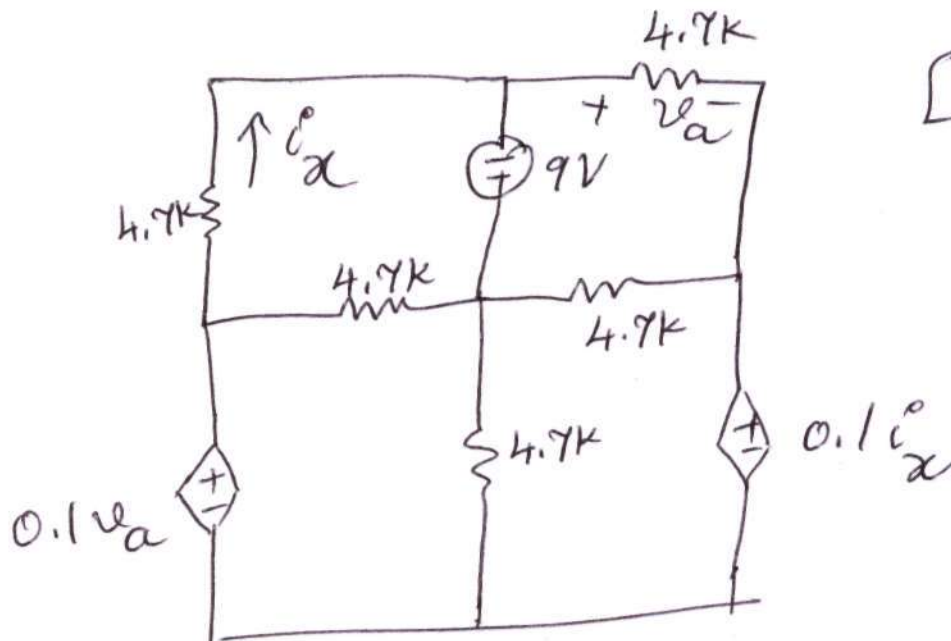
[Ans: ~~1540.125W~~
210W]

- 9) Use mesh analysis to find i_x .



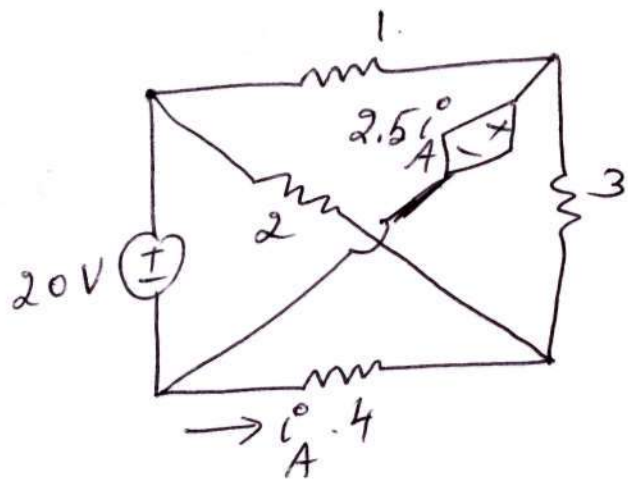
[Ans: ~~0.11A~~
8.334A]

- 10) Find clockwise mesh currents for the ckt. below.



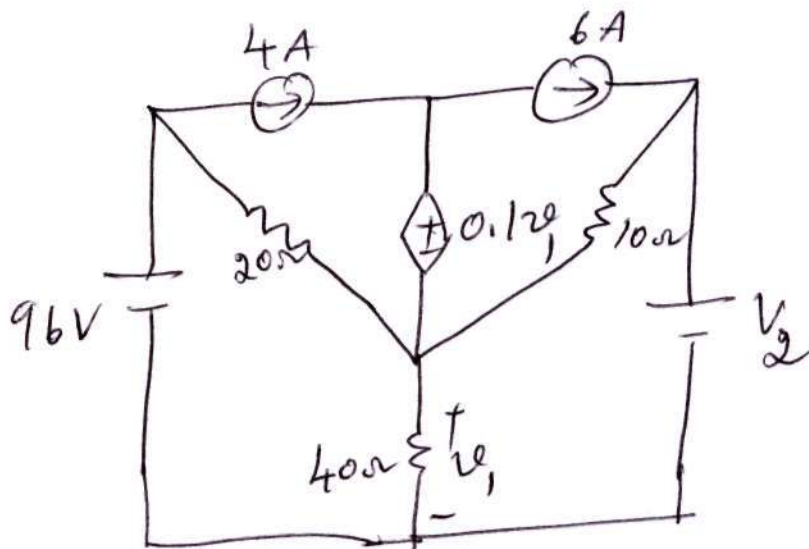
[Ans: 1.067mA
-1.212mA
0.219mA
-0.51mA]

i) Find i_A^o .



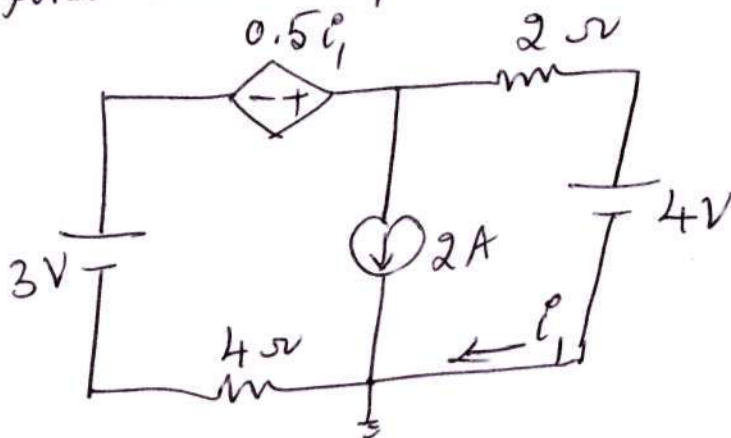
[Ans: $-1.94 A$]

12) Use nodal analysis to find value of V_2 that will result in $v_1 = 0$



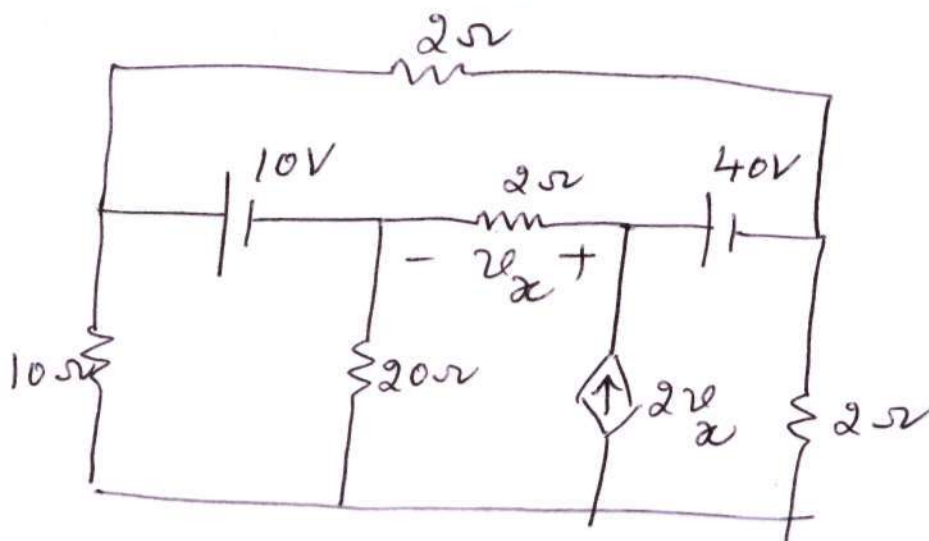
[Ans: $-28V$]

13) Find current i_1 .



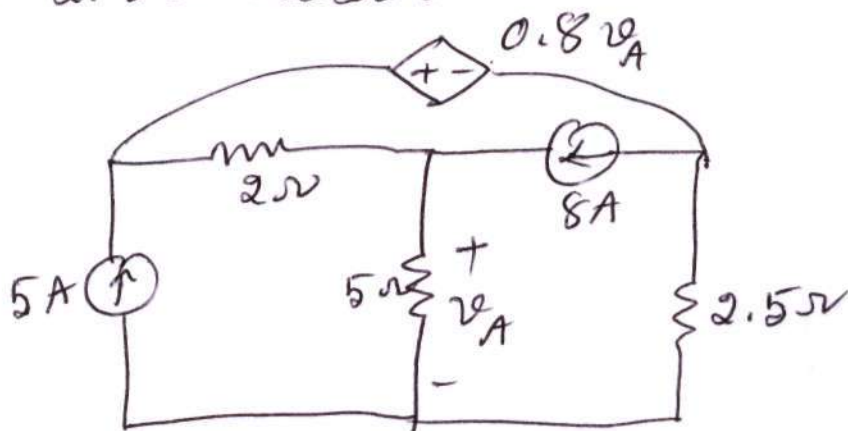
[Ans: $-1.636 A$]

14) Find nodal voltages



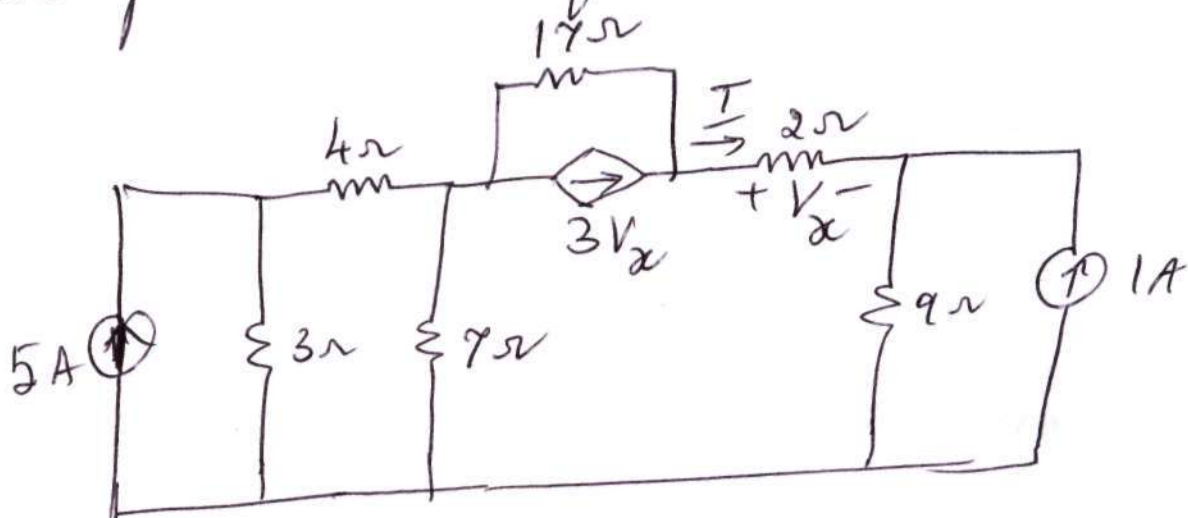
[Ans: $-16.22V$
 $-6.22V$
 $-32.65V$
 $7.35V$]

15) Use nodal analysis to find v_A & power dissipated in 2.5Ω resistor.



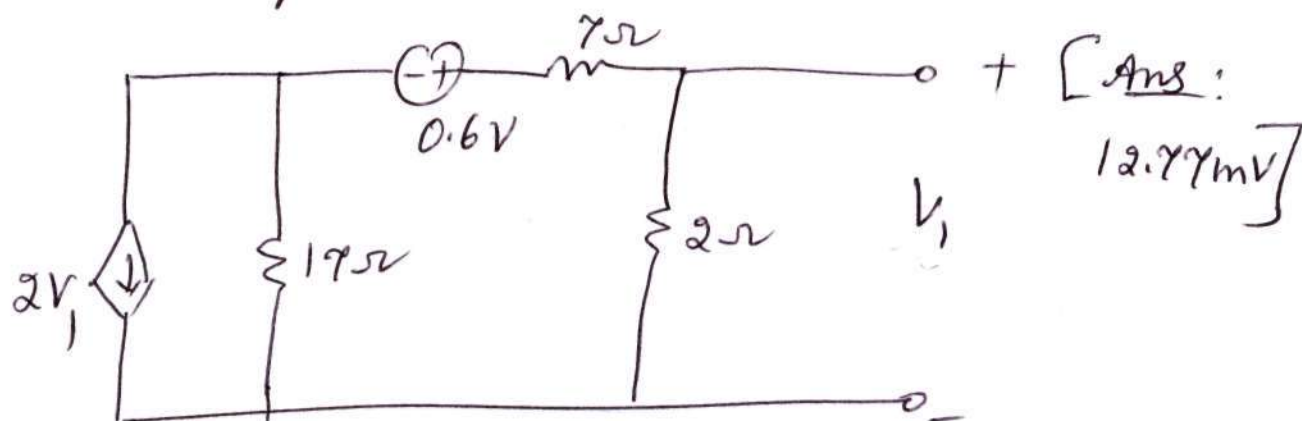
[Ans: $25.91V$
 $0.083W$]

16) Calculate the current through the 2Ω resistor by using source transformations

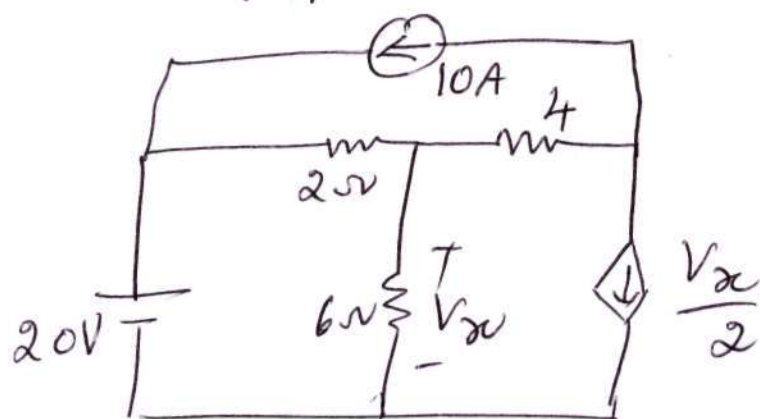


[Ans: $21.28mA$]

1) Find V_1 using source transformation.



18) Use superposition theorem to find V_x

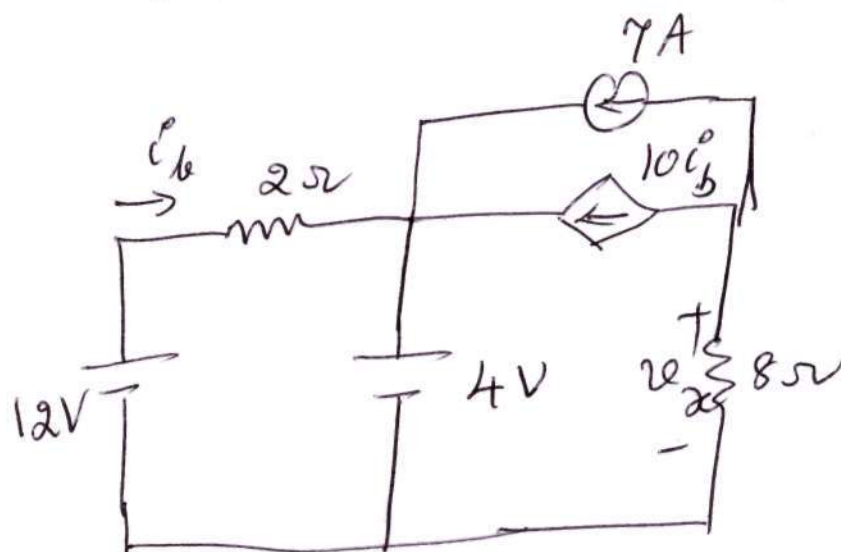


[Ans: $V_x' = 8.5714V$

$V_x'' = 8.5715V$

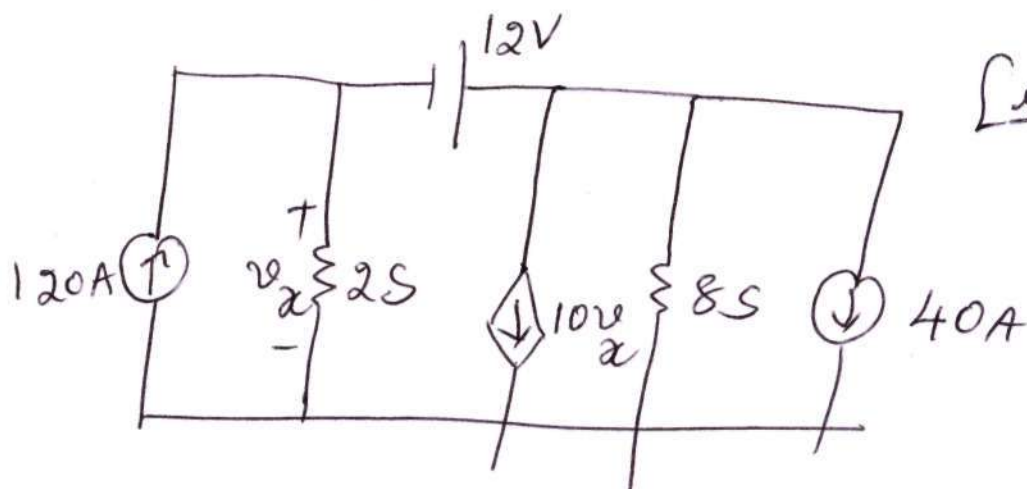
$\therefore V_x = 10.001V$]

19) Use superposition theorem to find v_x .



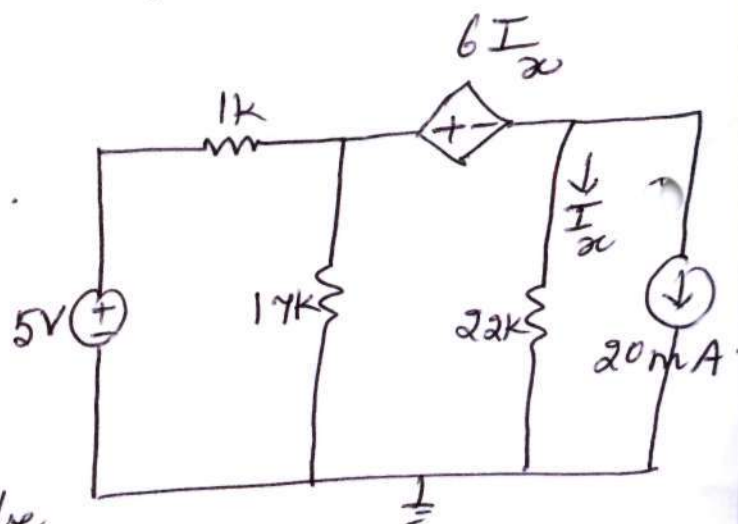
[Ans -376V]

20) Find v_x using superposition theorem.



[Ans: $-0.8V$]

21) Use superposition to find voltage across $17k\Omega$ resistor. If the max. power rating of the resistor is $250mW$, what is the max. positive voltage to which the $5V$ source can be increased before the resistor overheats.



[Ans: $V' = 4.568V$,
 $V'' = -18.29V$
 $V = 91.37V$]

Assignment groups.

Group no 1: (1 to 15) $\rightarrow 1, 5, 7, 11, 12, 16, 18$

Group no 2: (16 to 30) $\rightarrow 2, 5, 8, 11, 13, 16, 19$

Group no 3: (31 to 45) $\rightarrow 3, 6, 9, 11, 14, 17, 20$

Group no 4: (46 onwards) $\rightarrow 4, 6, 10, 11, 15, 17, 21$

Date of submission: 12/08/2011