2013:

2.(b) Here,

$$I_1 = \frac{v_1}{r_1} = \frac{6}{0.5} = 12 \text{ Amp}.$$

$$I_2 = \frac{v_2}{r_2} = \frac{12}{1} = 12 \text{ Amp}.$$

Here, let current through 6Ω is

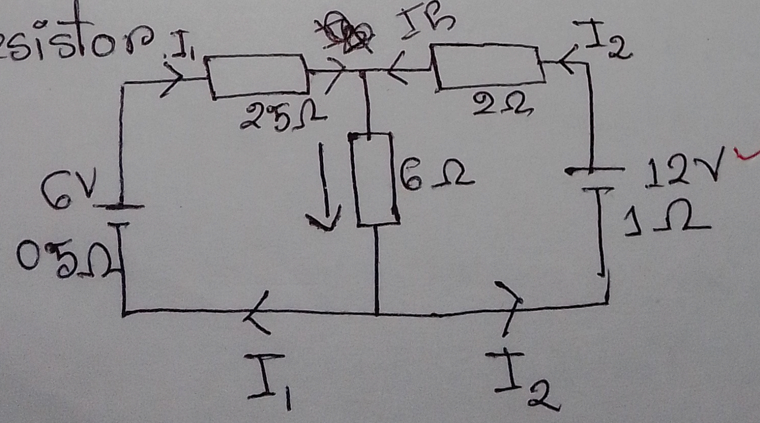
$$I_3 = I_1 + I_2 = 24 \text{ Amp}$$

$$V = IR = I_3 \times 6 = 24 \times 6 = 144 \text{ V}$$

$v_1 = I_1 \, 2.5$
$= 12 \times 2.5$
$= 30 \text{ v}$
$v_2 = 24 \text{ v}.$

~~Sir, I think the above math is wrong. Still I did it please check~~

2(b) In figure-1, let the battery e.m.fs be 6v & 12V their internal resistance 0.5Ω & 1Ω. The values of resistances are as indicated. Find the current flowing in different branches & voltage across 6Ω resistor.



$I_1 = -I_2 + I_r + I_2$

1. (d) For a certain transistor, $I_C = 5.505\,mA$, $I_B = 50\,\mu A$, $I_{CO} = 5\,\mu A$.

Determine i) Value of α, β & I_E.

ii) the new level of I_B required to make $I_C = 10\,mA$.

i) $\beta = \frac{I_C}{I_B} = \frac{5.505\times10^{-3}}{50\times10^{-6}} = 110.1$

$\alpha = \frac{\beta}{1+\beta} = \frac{110.1}{1+110.1} = 0.990$

$I_E = I_B + I_C = (50\times10^{-6} + 5.505\times10^{-3})\,A$

$= 5.55\times10^{-3}\,A$

$= 5.55\,mA$

ii) $\beta = \frac{I_C}{I_B}$ $\quad I_C = 10\,mA$

$I_B' = \frac{I_C}{\beta} = \frac{10\times10^{-3}}{110.1} = 90\times10^{-6} = 90\,\mu F$

$= \cancel{\frac{5.505\times10^{-3}}{110.1}}$

$= \cancel{5\times10^{-5}\,A}$

New, $I_B' = 90\,\mu F$

Old $I_B = 50\,\mu F$

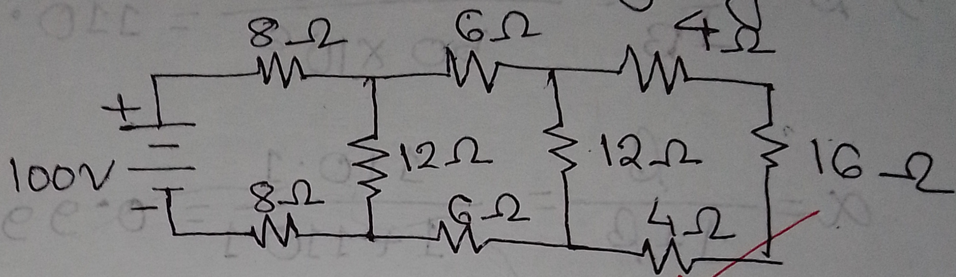
$\therefore$ Increase = 90 μF

2014

1.(b) Calculate i) equivalent resistances across the terminal of supply.

ii) total Current supplied by the source.

(iii) Power delivered to 16 Ω resistor as shown in following fig-1.



(i) $R_f = 8 + ((6 + ((4+16+4) \| 12) + 6) \| 12) + 8$

$= \cancel{8+} 16 + ((6 + (24 \| 12) + 6) \| 12) \cancel{8}$

$= 16 + \left(\left(12 + \frac{24 \times 12}{24+12}\right) \| 12\right)$

$= \cancel{12}\, 16 + ((12 + 8) \| 12)$

$= 16 + 20 \| 12$

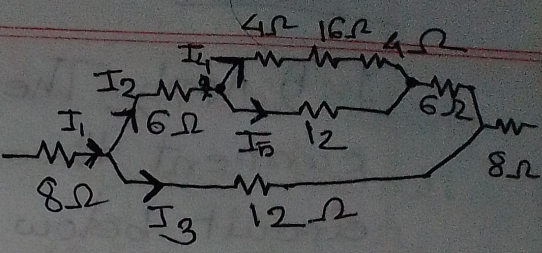
$= 16 + \frac{20 \times 12}{20+12}$

$= 16 + 7.5$

$= 23.5\ \Omega$

(ii) $I = \frac{V}{R} = \frac{100}{23.5} = 4.255$ Amp.

(iii) $I_1 = 4.25$ Amp.



$$I_2 = \frac{12}{12+20} \times I_1 = 1.593 \text{ Amp.}$$

$$I_4 = \frac{12}{12+24} \times I_2 = 0.531 \text{ Amp.}$$

$\therefore$ P through 16Ω, $P = I^2R = (0.531)^2 \times 16$

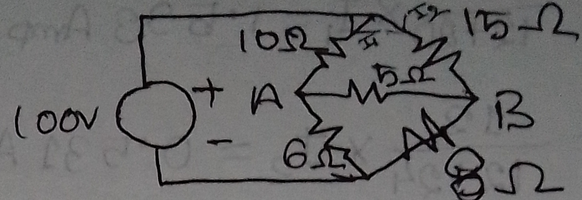
$= 4.511$ W

Sir, please differentiate between avalanche & zener breakdown. It contains 3 mark. I am unable to find suitable differences.

Avalance breakdown: occours when the ionisation of electron & hole recomdination occours.

2016

1. b) Apply Thevenin's theorem to calculate the current through the 5Ω resistor of the circuit below:



Soln:

Removing load resistance,

$$\cancel{I_a}\ I_1 = \frac{V}{15+8} = \frac{100}{23} = 4.347\ A$$

$$I_2 = \frac{V}{10+6} = \frac{100}{16} = 6.25\ A$$

Voltage at point B & A,

$$V_B = 100 - 15 \times I_1 = 34.75\ V$$

$$V_A = 100 - 10 \times I_2 = 37.5\ V.$$

$$V_{th} = V_A - V_B = 2.75\ V.$$

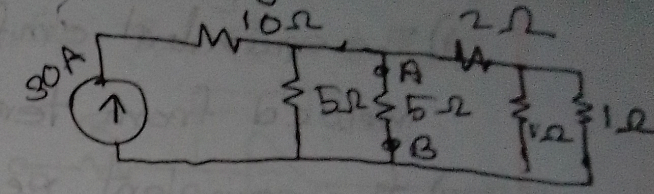
$$R_{th} = \frac{16 \times 23}{16+23} = 9.44\ \Omega.$$

$$I_{th} = \frac{V_{th}}{R_{th}} = \frac{2.75}{9.44} = 0.291\ A.$$

$$I_L = \frac{R_{th}}{R_L + R_{th}} \times I_{th} = \frac{9.44}{9.44+5} \times 0.291$$

$$= 0.190\ A\ (Ans)$$

2(c) Apply Norton's theorem to calculate current flowing through the terminal AB of the figure below:



Solⁿ: While determining equivalent resistance the the load resistance is open.

$$R_N = 10 + ((2+(1 \parallel 1)) \parallel 5)$$

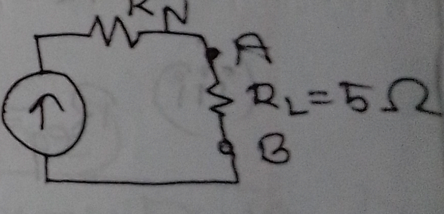
$$= 10 + \left(\left(2 + \frac{1\times1}{1+1}\right) \parallel 5\right)$$

$$= 10 + \frac{2.5\times5}{2.5+5} = 11.67\,\Omega$$

$$V = IR_N = 30 \times 11.67 = 350.1\,V.$$

$$I_L = \frac{V_N}{R_L} = \frac{350.1}{5} = 70.02\,A$$

(Ans)



2016/ 6.(c) -> Op Transistor very complex math. Did not write the Question

$1-x \geq 0$
$-x \geq -1$
$x \leq 1$

2017.

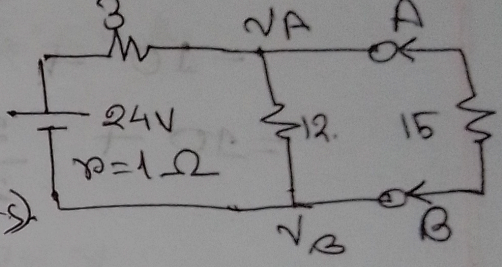
3. b). With reference to the network of fig-2 by applying Thevnin's theorem find:

i) The equivalent emf of the network when viewed from terminal A & B.

ii) The equivalent resistance of the network when looked from terminal AB.

iii) Current in the load resistance R_L of 15Ω

~~Ans~~ Solⁿ:



i) $V_{th} = \frac{12}{3+12} \times 24 = 19.2\,V$ (Ans)

ii) $R_{th} = \frac{3 \times 12}{3+12} = 2.4\,\Omega$ (Ans).

(iii) $R_{eq} = 3 + \frac{15 \times 12}{15+12} = 6.67\,\Omega$.

$I = \frac{V}{R_{eq}} = \frac{24}{6.67}$
$= 3.59$
$= 3.6A$

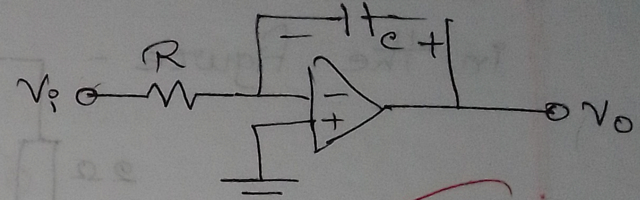
$I_{15} = \frac{12}{12+15} \times 3.6$

$= 1.6A$ (Ans).

Jency

2018

4.c) A 10 mV, 5 KHz sinusoidal signal is applied to the input of an OP-AMP integrator as shown below for which $R = 100 k\Omega$ & $C = 1\ \mu F$. Find output voltage



Sol^n: We know,

$$V_{out} = -\frac{1}{RC}\int V_i(t)\,dt$$

$$= -\frac{1}{RC}\int V_0 \sin\omega t\, dt$$

$$= -\frac{V_0}{RC}\left(-\frac{\cos\omega t}{\omega}\right)$$

$$= \frac{V_0 \cos\omega t}{RC\omega}$$

$$= \frac{10\times10^{-3}\times\cos(2\times\pi\times5000\times t)}{100\times10^{3}\times1\times10^{-6}\times2\times\pi\times5\times10^{3}}$$

$$= 3.16\times10^{-6}\cos(31416\, t) \text{ (Ans)}$$

$$\left(4^{-1}+12^{-1}\right)^{-1}$$

$$=$$