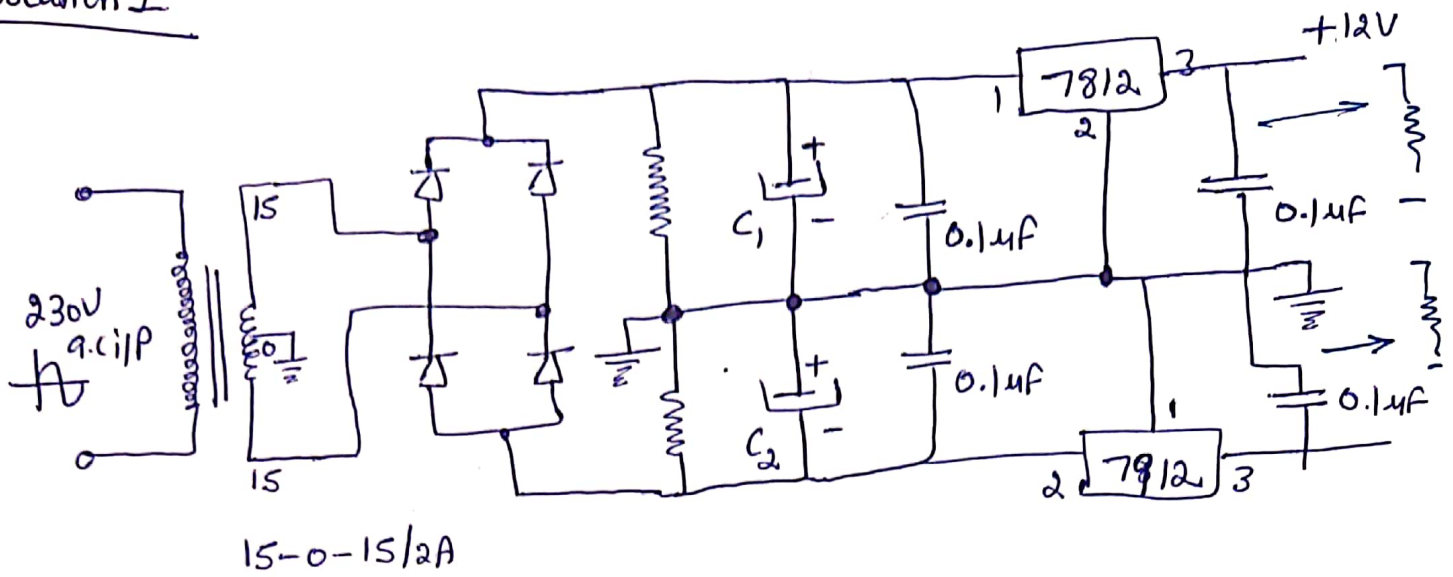
Solution 2



Given $V_r = 0.5V$

$$V_r = \frac{1}{2} \cdot \frac{V_p}{RC f_{in}}$$

$$0.5 = \frac{1}{2} \cdot \frac{15\sqrt{2}}{(1000)(C)50}$$

$$C = \frac{21.21}{5,0000}$$

$$C = 4.242 \times 10^{-4} \times \frac{100}{100}$$

$$\boxed{C = 424.2\,\mu F}$$

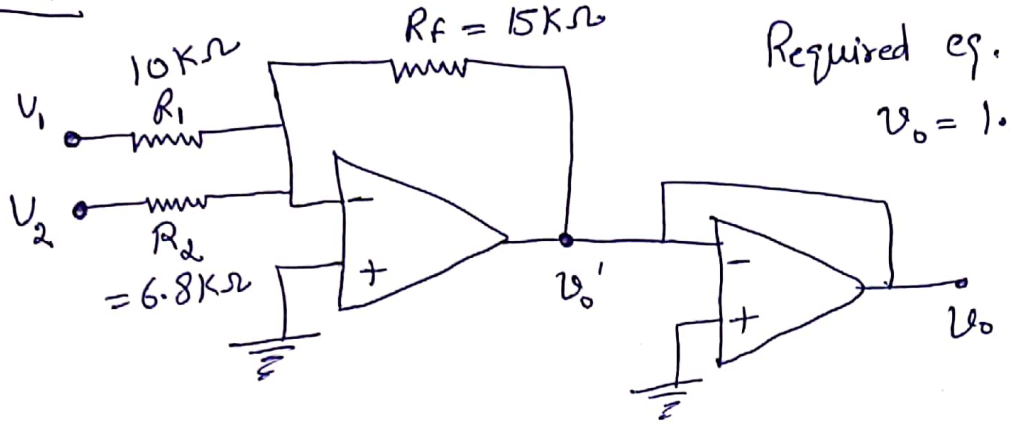
$\boxed{C_1 = C_2 = 330\mu F \text{ and } 100\mu F \text{ Connected in parallel}}$

Diode IN4007 → ~~Current~~ It can pass current upto 1A. and PIV rating 1000 Volts.

Secondary Voltge = $15\sqrt{2} = 21V$

So voltge rating of Capacitor should be more than 21V.

Solution: 2



Required eq.

$$v_o = 1.5V_1 + 2.2V_2$$

$$v_o' = -\left[\frac{R_F}{R_1}V_1 + \frac{R_F}{R_2}V_2\right]$$

$$\frac{R_F}{R_1} = 1.5 \quad ; \quad \frac{R_F}{R_2} = 2.2$$

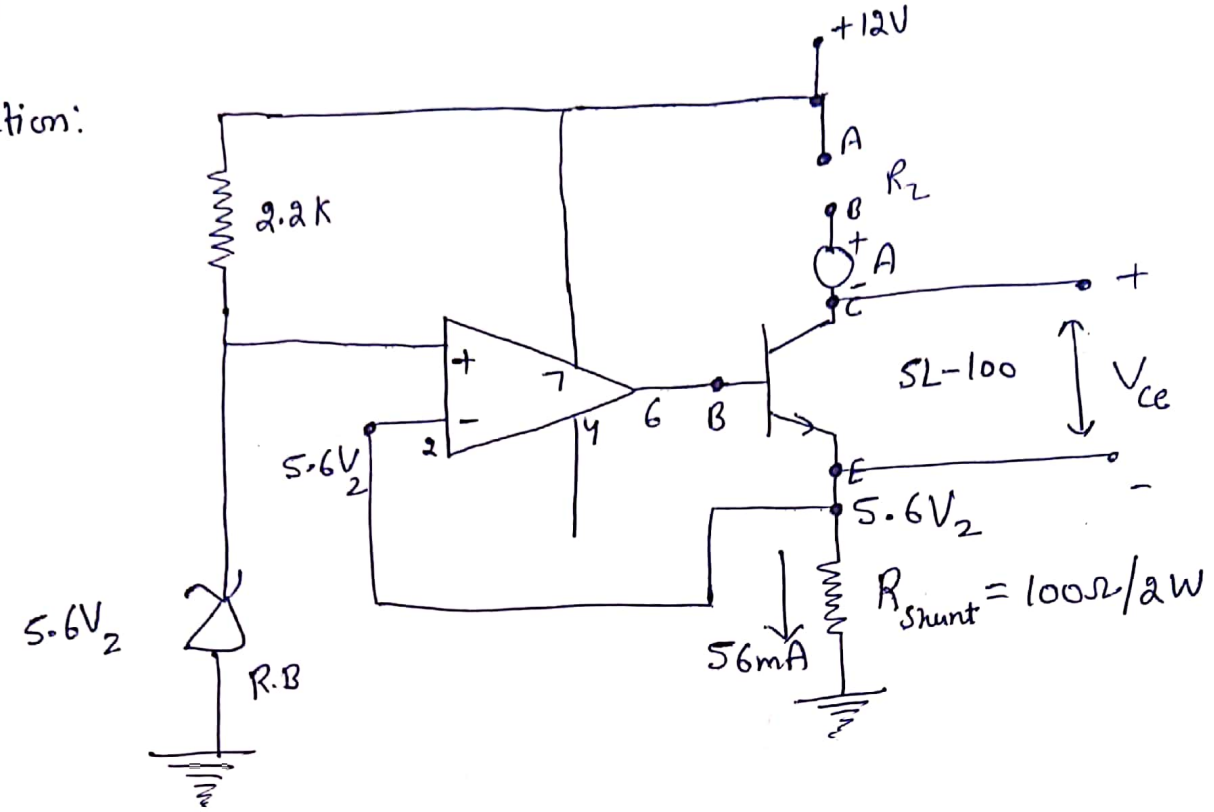
$$\frac{15K\Omega}{10K\Omega} = 1.5 \quad ; \quad \frac{15K\Omega}{6.8K\Omega} = 2.2$$

$$v_o = -v_o'$$

$$\therefore v_o = +\left[1.5V_1 + 2.2V_2\right]$$

Q.3

Solution:



For $V_2 = 5.6V_2$

R_L	V_{ce} drop across transistor	Load current (I_L)
① $R_L = 0$	$V_{ce} = V_{cc} - V_{shunt}$ $= 12 - 5.6$ $V_{ce} = 6.4V$	56mA
② $R_L = 10\Omega$	$V_{ce} = V_{cc} - V_{shunt} - I_L R_L$ $= 12 - 5.6 - \frac{56}{1000} \times 10$ $= 12 - 5.6 - 0.56$ $= 5.84V$	56mA
③ $R_L = 47\Omega$	$V_{ce} = 12 - 5.6 - \frac{56}{1000} \times 47$ $= 12 - 5.6 - 2.632$ $= 3.768V$	56mA
④ $R_L = 68\Omega$	$V_{ce} = 12 - 5.6 - \frac{56 \times 68}{1000}$ $= 12 - 5.6 - 3.808$ $= 2.592V$	56mA
⑤ $R_L = 82\Omega$	$V_{ce} = 12 - 5.6 - \frac{56}{1000} \times 82$ $= 12 - 5.6 - 4.592$ $= 1.808V$	56mA

⑤ $R_L = 100\Omega$

$V_{ce} = 12 - 5.6 - \frac{5.6}{1000} \times 1000$

$= 12 - 5.6 - 5.6$

$V_{ce} = 0.8V$

56mA

⑥ $R_L = 150\Omega$

$V_{ce} = 12 - 5.6 - \frac{56}{100} \times 150$

$= 12 - 5.6 - 8.4$

$V_{ce} = -2V.$

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So, this ~~Constant~~ Circuit will provide Constant current of 56mA upto $R_L = 1000\Omega$. After, this, for higher values of Load Resistor, Base current has no Control over collector current as transistor is in Saturation Now. Here Load Resistor Controls Load Current No.