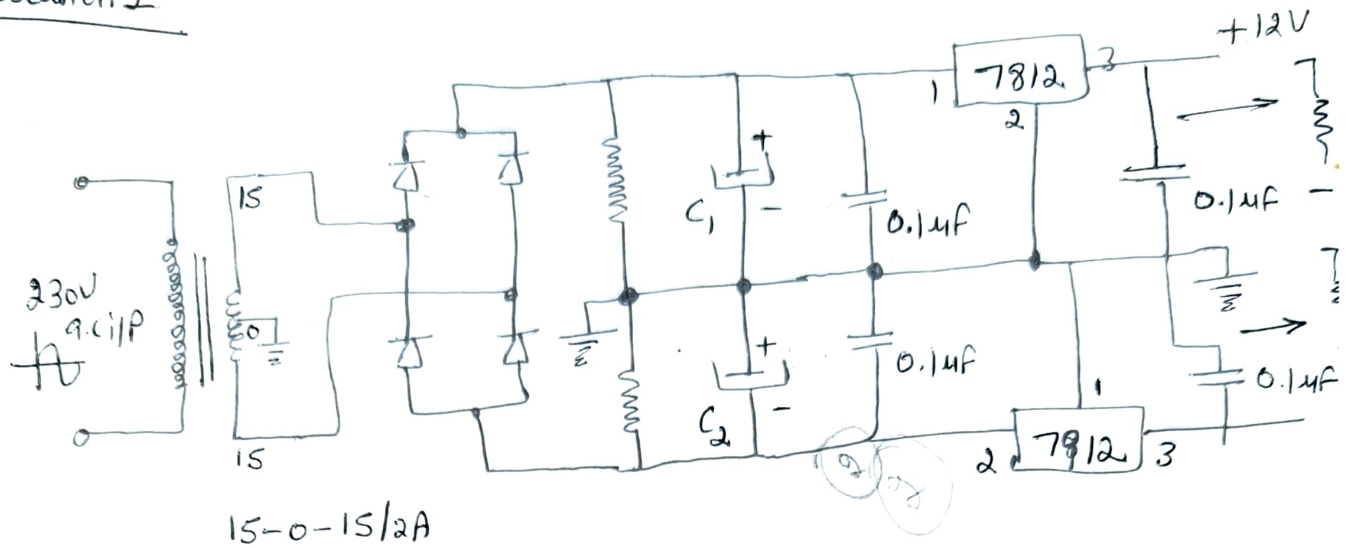
Solution 1




Given $V_r = 0.5V$

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

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

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

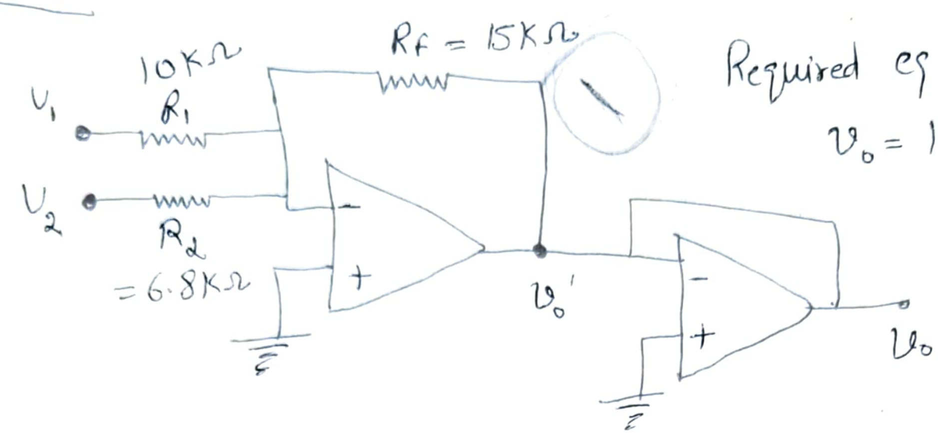
$$C = 4.242 \times 10^{-4} \times \frac{100}{100}$$

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

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

Diode 1N4007 → ~~Current~~ It can pass current upto 1A. and PIV rating 1000 Volts.

Solution: 2




Required eq.

$$v_o = 1.5V_1 + 2.2V_2$$

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

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

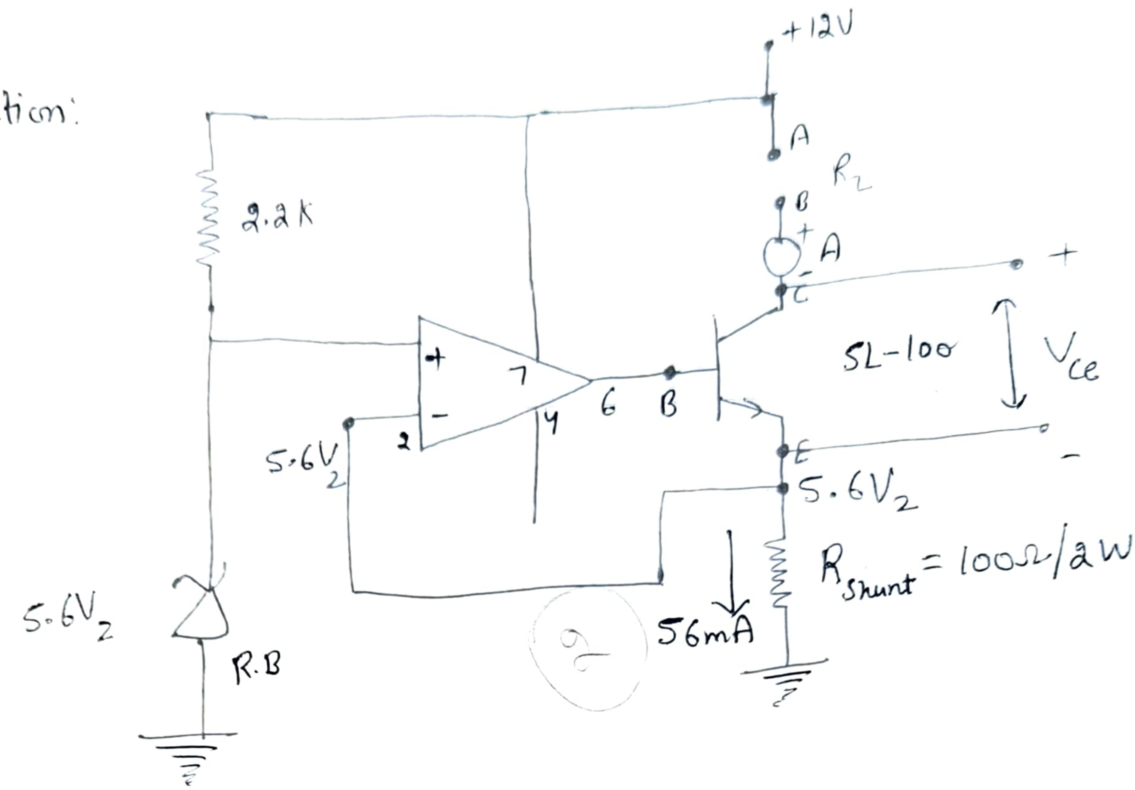
$$\frac{15K\Omega}{10K\Omega} = 1.5 \quad ; \quad \frac{15K\Omega}{6.8K\Omega} = 2.2$$

$$v_o = -v_o'$$

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

Q.3

Solution:




For $V_z = 5.6V_z$

| $R_L$ | $V_{ce}$ drop across transistor | Load current ($I_L$) |
|---|---|---|
| ① $R_L = 0$ | $V_{ce} = V_{cc} - V_{shunt}$<br>$= 12 - 5.6$<br>$V_{ce} = 6.4V$ | 56mA |
| ② $R_L = 10\Omega$ | $V_{ce} = V_{cc} - V_{shunt} - I_L R_L$<br>$= 12 - 5.6 - \frac{56}{1000} \times 10$<br>$= 12 - 5.6 - 0.56$<br>$= 5.84V$ | 56mA |
| ③ $R_L = 47\Omega$ | $V_{ce} = 12 - 5.6 - \frac{56}{1000} \times 47$<br>$= 12 - 5.6 - 2.632$<br>$= 3.768V$ | 56mA |
| ④ $R_L = 68\Omega$ | $V_{ce} = 12 - 5.6 - \frac{56}{1000} \times 68$<br>$= 12 - 5.6 - 3.808$<br>$= 2.592V$ | 56mA |
| [illegible] | [illegible] | [illegible] |

⑤ $R_L = 100\Omega$

$$V_{ce} = 12 - 5.6 - \frac{56}{1000} \times 100$$

$$= 12 - 5.6 - 5.6$$

$$V_{ce} = 0.8V$$

56mA

⑥ $R_L = 150\Omega$

$$V_{ce} = 12 - 5.6 - \frac{56}{1000} \times 150$$

$$= 12 - 5.6 - 8.4$$

$$V_{ce} = -2V.$$

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So, this ~~Constant~~ Circuit will provide Constant Current of 56mA upto $R_L = 100\Omega$. 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.