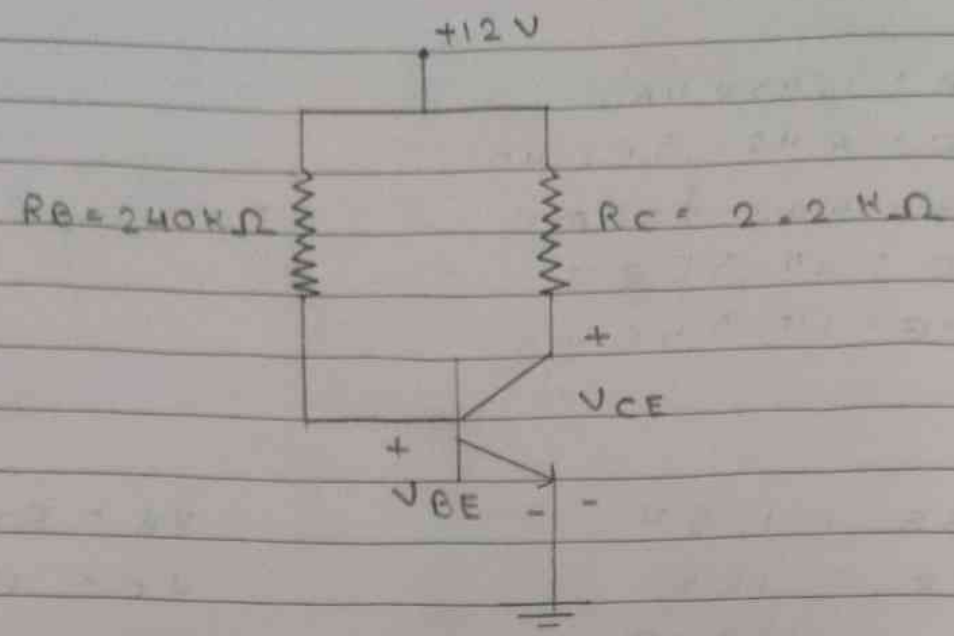
1)



Here, Apply KVL in i/p loop -

$$V_{CC} - I_B R_B - V_{BE} = 0$$

$$I_B = \frac{12 - 0.7}{240\,K} = 47\,\mu A$$

Now $I_C = \beta I_B$

$= (50)(47\,\mu A)$

$= 2.35\,mA$

NOW Apply KVL in o/p loop -

$$V_{CC} - I_C R_C - V_{CE} = 0$$

$$V_{CE} = V_{CC} - I_C R_C$$

$= 12 - (2.35\,m)(2.2\,K)$

$= 12 - 5.17$

$= 6.83\,V$

Now $V_B = 12 - (240K)(47\mu)$

$= 12 - 11.28$

$= 0.72\ V$

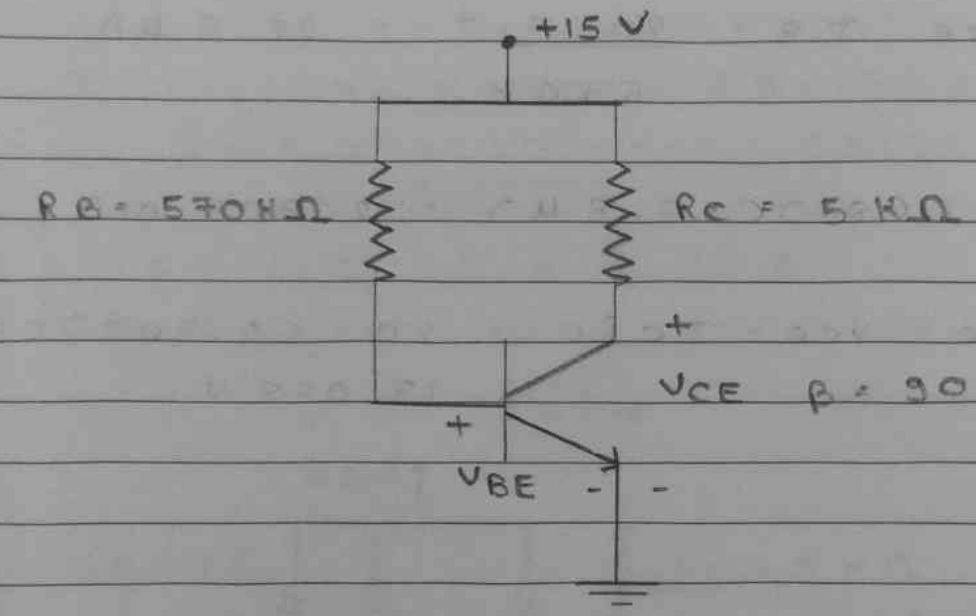
and $V_C = 12 - (2.2)(2.35)$

$= 6.83\ V$

and $V_{BE} = V_B - V_E$

$= -6.11\ V$

2)



Here Apply KVL

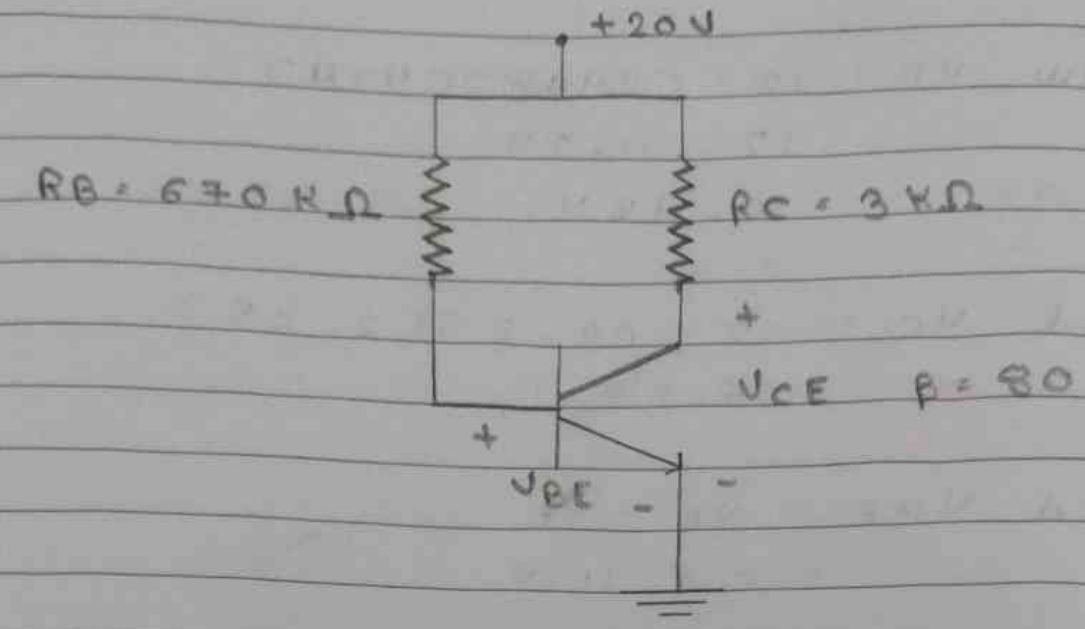
$$I_B = \frac{15 - 0.7}{570K} = 25\mu A$$

$$I_C = \beta I_B = 90 \times 25\mu A = 2.25\ mA$$

$$V_{CE} = 15 - (2.25\ mA)(5K\Omega)$$

$$= 15 - 11.25 = 3.75\ V$$

3)



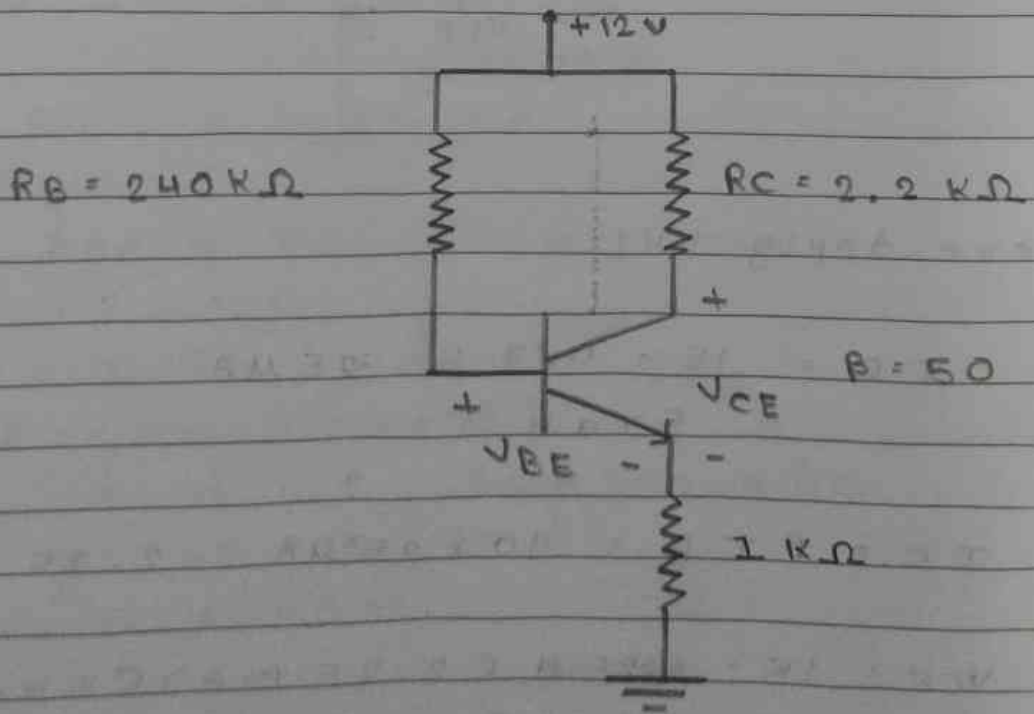
Here $I_B = \frac{20 - 0.7}{670\,K} = 28.8\ \mu A$

$I_C = (80)(28.8\ \mu) = 2.308\ mA$

$V_{CE} = V_{CC} - I_C R_C = 20 - (2.308)(3)$

$= 13.088\ V$

4)



Apply KVL in i/p loop:

$12 - I_B(240\,K\Omega) - V_{BE} - I_B(\beta+1)(1\,K\Omega) = 0$

$12 - I_B(240 + 50) - 0.7 = 0$

$I_B = 38.83\,\mu A$

Now $I_C = \beta I_B = 50 \times 38.83\,\mu A = 1.9415\,mA$

and Apply KVL in o/p loop -

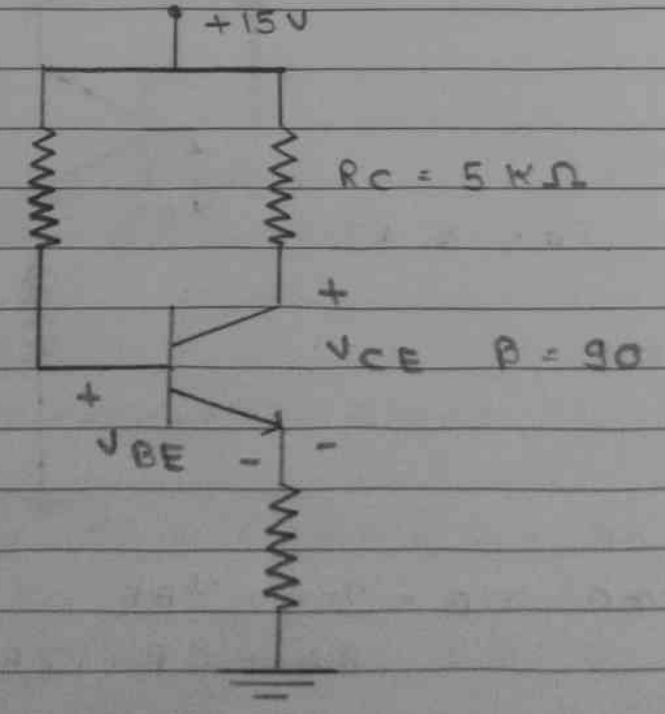
$12 - I_C(2.2\,K\Omega) - V_{CE} - (\beta+1) I_B(1K\Omega) = 0$

$12 - (1.9415)(2.2) - V_{CE} - (51)(0.038) = 0$

$V_{CE} = 12 - 4.2713 - 1.938$

$= 5.7907$

5)



Here $I_B = \frac{V_{CC} - V_{BE}}{R_B + (\beta+1)R_E}$

$= \frac{15 - 0.7}{570 + (90)(2K)} = 19\ \mu A$

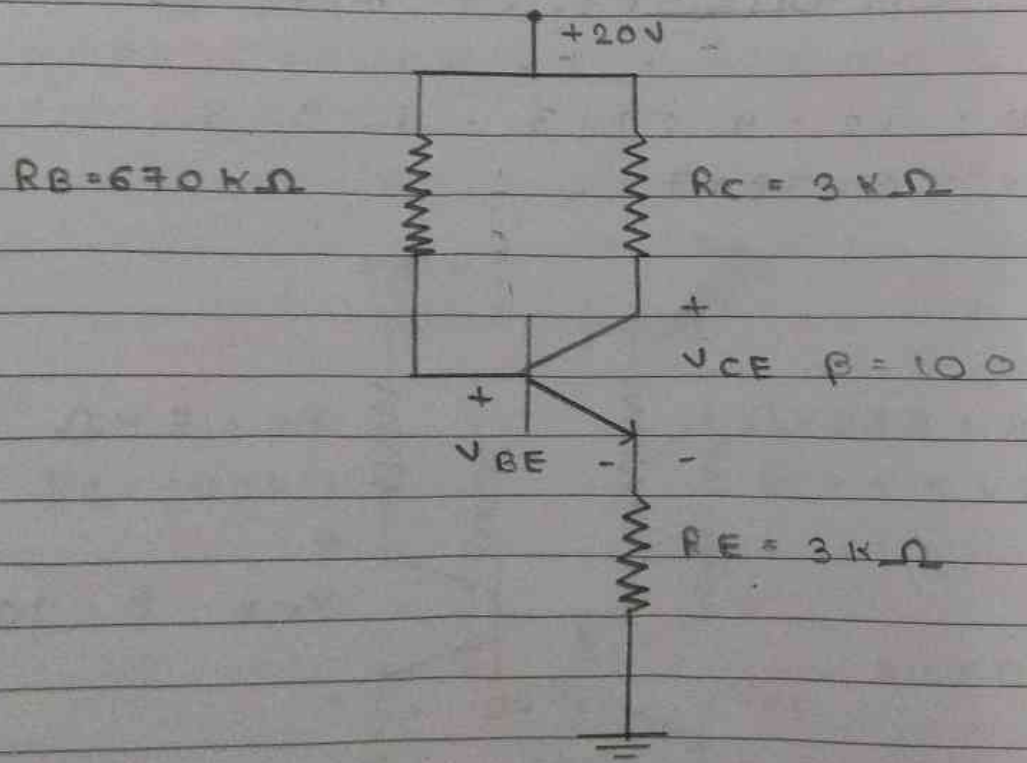
$I_C = \beta I_B = (90)(19\ \mu A) = 1.71\ mA$

$V_{CE} = V_{CC} - I_C(R_C + R_E)$

$= 15 - 1.71(5+2)$

$= 15 - 11.97 = 3.03\ V$

6)



Here $I_B = \frac{V_{CC} - V_{BE}}{R_B + (\beta+1)R_E}$

$= \frac{20 - 0.7}{670K + (100)(3)} = \frac{19.3}{970K} = 19.89\ \mu A$

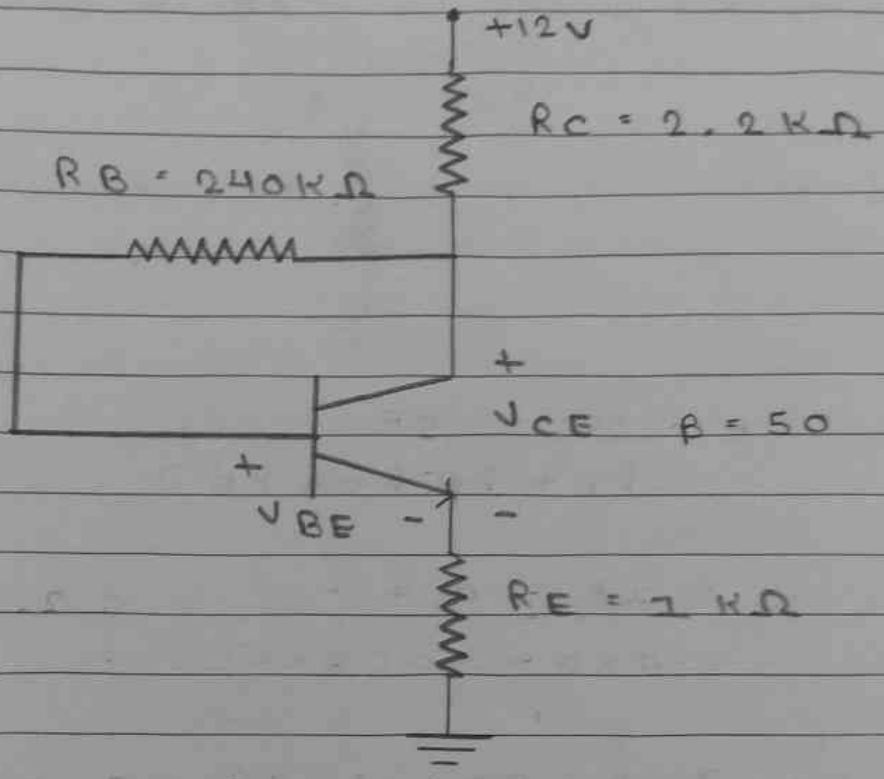
Now $I_C = \beta I_B = 1.989\ mA$

and $V_{CE} = V_{CC} - I_C(R_C + R_E)$

$= 20 - (1.989)(6)$

$= 8.066\ V$

7)



Here $I_B = \dfrac{V_{CC} - V_{BE}}{R_B + \beta C R_C + R_E)}$

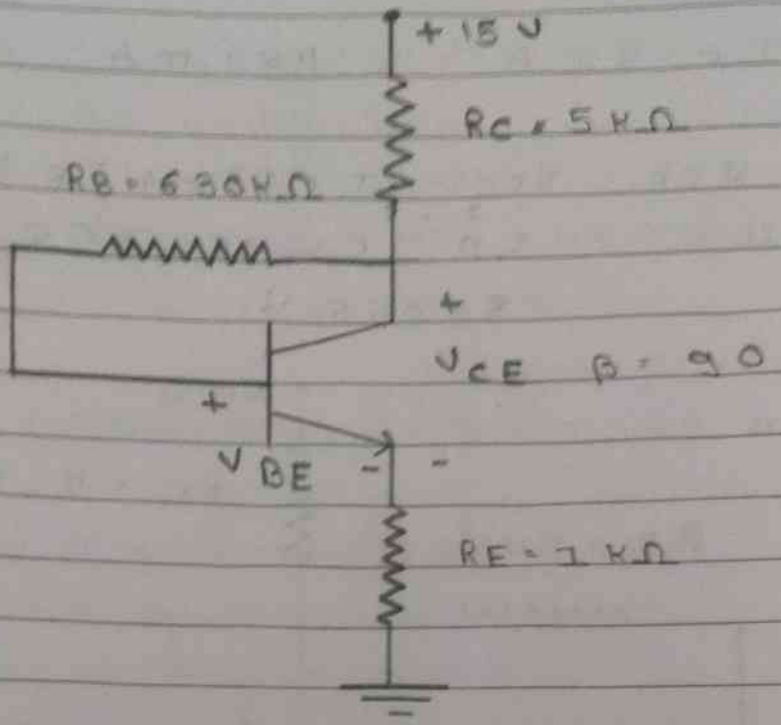
$= \dfrac{12 - 0.7}{240K + 50(2.2 + 1)} = 28.25\ \mu A$

$I_C = \beta I_B = (50)(28.25\ \mu A) = 1.4125\ mA$

and $V_{CE} = 12 - (1.4125)(3.2)$

$= 7.48\ V$

8)



Here, $I_B = \frac{V_{CC} - V_{BE}}{R_B + \beta(R_C + R_E)}$

$= \frac{15 - 0.7}{630 + 90(5+1)} = 12.23\ \mu A$

Now $I_C = \beta I_B = 90 \times 12.23 = 1.1\ mA$

and $V_{CE} = V_{CC} - I_C(R_C + R_E)$

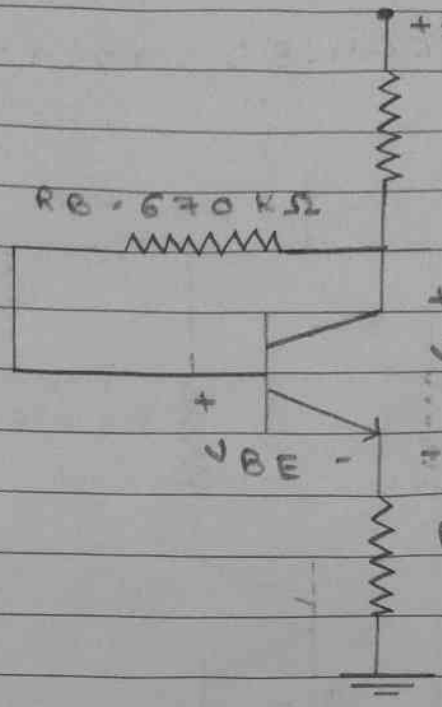
$= 15 - 1.1(5+1) = 8.4\ V$

9) Here, $I_B = \frac{V_{CC} - V_{BE}}{R_B + \beta(R_C + R_E)} = \frac{20 - 0.7}{670K + 600K}$

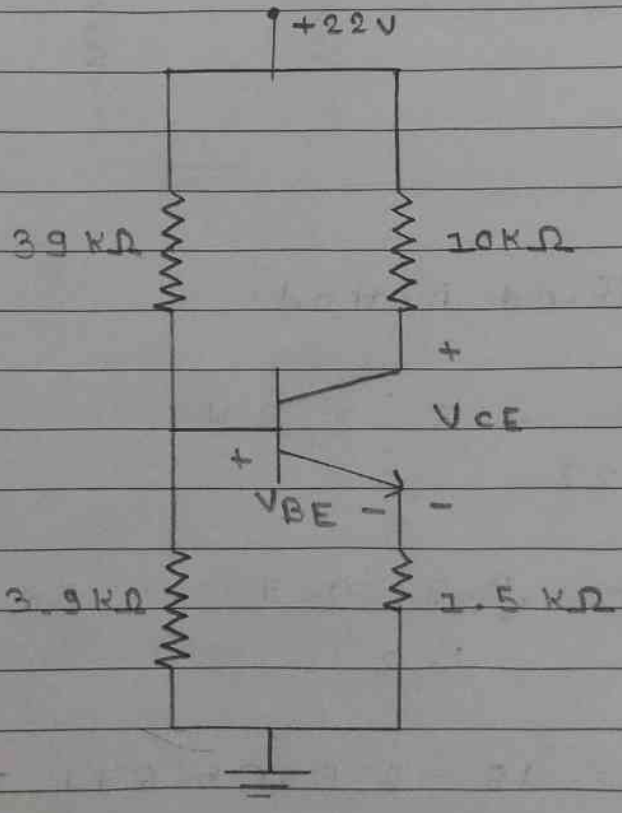
$= 15.19\ \mu A$

Now $I_C = \beta I_B = 1.5\ mA$

and $V_{CE} = V_{CC} - I_C(R_C + R_E) = 11\ V$



10)

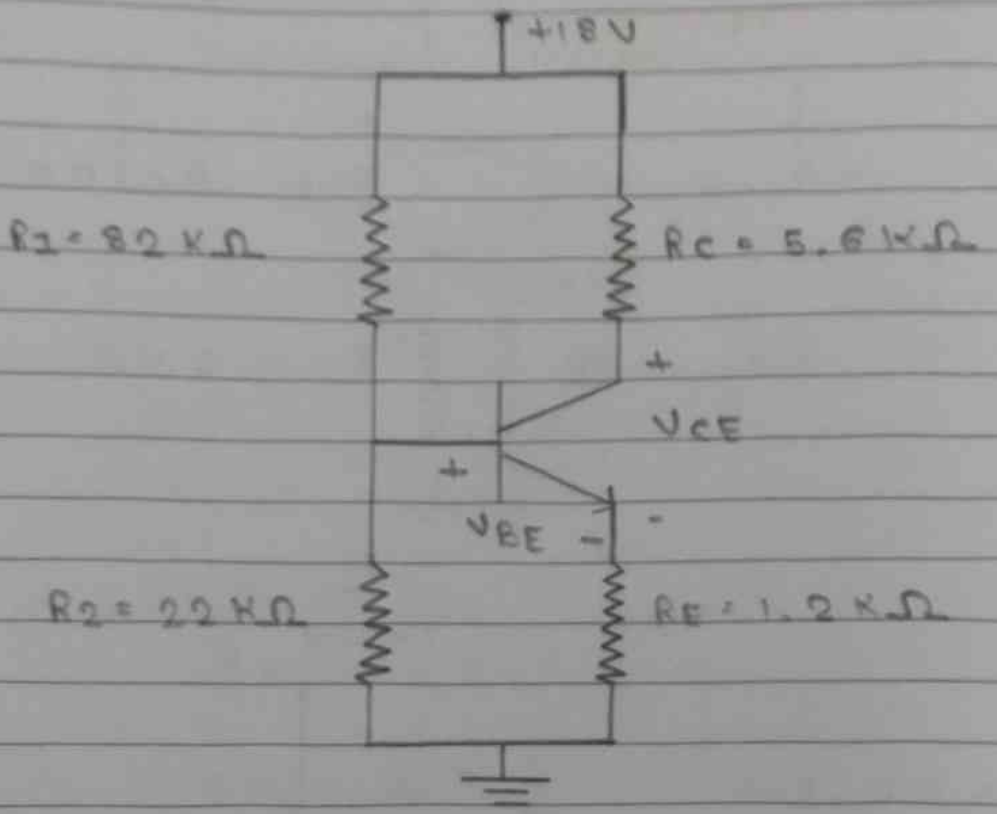


By simplified method - $I_C = \frac{V_2 - V_{BE}}{R_E}$

$V_2 = \frac{3.9}{39+3.9} \cdot 22 = 2\,V$ $\quad I_C = \frac{1.3}{1.5\,K\Omega} = 0.86\,mA$

and $V_{CE} = 22 - 0.86(11.5) = 12.11$ V

12)



→ By simplified method:

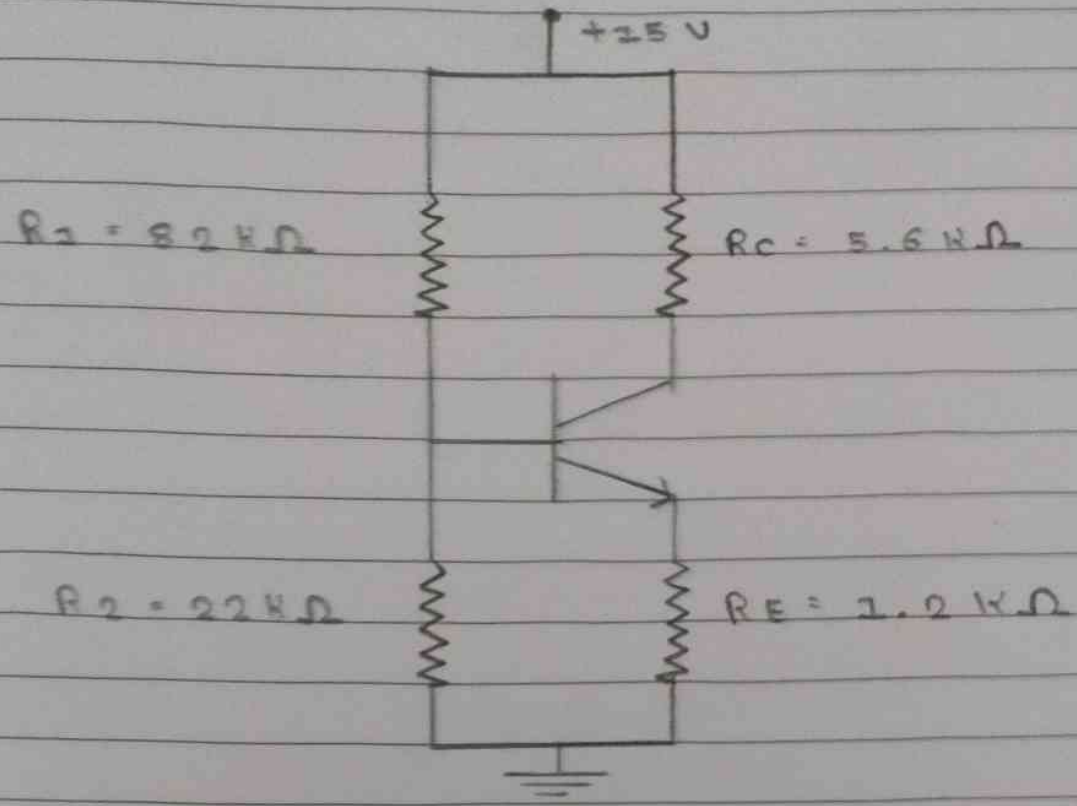
$$V_2 = \frac{22}{82+22} \cdot 18 = 3.8 \text{ V}$$

Now $I_C = \frac{3.8 - 0.7}{1.2} = 2.58$ mA

and $V_{CE} = 18 - 2.58(5.6 + 1.2)$

$= 0.456$ V

12)



→ By simplified method -

$$V_2 = \frac{22}{104} \times 15 = 3.173 \text{ V}$$

Now, $$I_C = \frac{3.173 - 0.7}{1.2} = 2.06 \text{ mA}$$

and $V_{CE} = 15 - 14.008$

$= 0.992 \text{ V}$