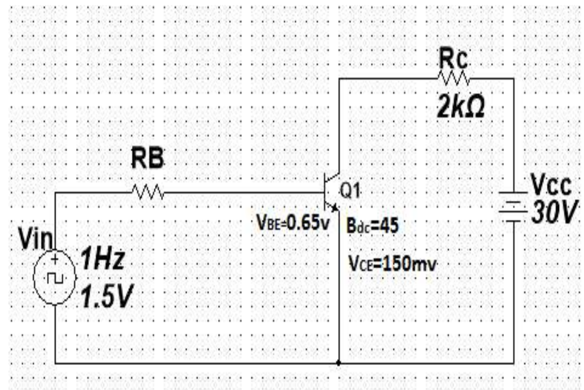
Q2] For the following circuit find the value of RB



Ans

$V_{CE(sat)} = 150 \times 10^{-3} = 1.5volt$

$I_c = I_{sat} = \frac{V_{cc}-V_{cE}}{R_c}$, $I_c = \frac{30-0.15}{2\times10^3} =$ 14.9mA

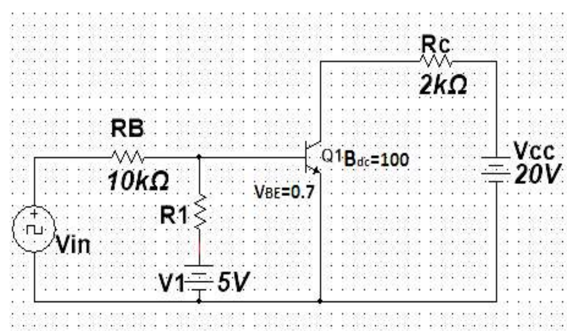
$I_{Bmin} = \frac{I_{c(sat)}}{B_{dc}}$, $I_c = \frac{14.9\times10^{-3}}{45} = 0.33mA$

$I_B = 3 \times I_{Bmin} = 3 \times 0.33 = 0.99mA$

$V_{in} = I_B R_B + V_{BE} = 0,\ R_B = \frac{V_{in}-V_{BE}}{I_B},\ R_1 = \frac{1.5-0.65}{1\times10^{-3}} = 850\Omega$

Q3] For the following circuit Find

1- The value of R1
2- The value of Vin



Ans

$I_c = \frac{V_{cc}-V_{cE}}{R_c}$, $I_c = \frac{20-0}{2\times10^3} =$ 10mA

$I_c = \frac{I_c}{B_{dc}},\ I_c = \frac{10\times10^{-3}}{100} = 100 \times 10^{-6}$

$I_1 = 2 \times I_{Bmin} = 2 \times 100 \times 10^{-6} = 200 \times 10^{-6}$

$V_1 - R_1 I_1 - 0.7 = 0,\ R_1 = \frac{V_1-0.7}{I_1},\ R_1 = \frac{5-0.7}{200\times10^{-6}} = 21.5K\Omega$

$V_{in} - R_B I_B - 0.7 = 0,$
$V_{in} = R_B I_B + 0.7,$
$V_{in} = 10 \times 10^3 \times 100 \times 10^{-6} - 0.7$
$V_{in} = 1.7v$

Q4] A common emitter NPN BJT switching circuit has the following data : V_{CC}= 100V, V_{CE}= 200mV, Maximum power handling of 1KVA, Maximum switching energy 5Mj, and total power dissipation = 52w.Find the value of switching frequency.

Ans

$$P_{ms} = w_s \times f_s$$
$$P_{total} = P_{heat} + P_{ms}$$
$$P_{ms} = P_{total} - P_{heat}$$
$$P_{heat} = V_{CE} \times I_C$$
$$P_{MS} = V_{CC} \times I_C \rightarrow I_C = \frac{P_{MS}}{V_{CC}} = \frac{1000}{100} = 10A$$
$$P_{heat} = V_{CE} \times I_C = 200 \times 10^{-3} \times 10 = 2\ watt$$
$$P_{ms} = 52 - 2 = 50watt$$
$$50 = 5 \times 10^{-3} \times f_s$$
$$f_s = \frac{50}{5\times10^{-3}} = 10000\text{Hz}$$

Q5] A common emitter NPN BJT switching circuit has the following data : V_{CC}= 100V, V_{CE}= 200mV, Maximum power handling of 1KVA. (1) Find the value of R_C (2) calculate the maximum power dissipated as a heat.

Ans

$$P_{MS} = V_{CC} \times I_C = 1 \times 10^3 = 1000VA$$
$$I_C = \frac{P_{MS}}{V_{CC}} = \frac{1000}{100} = 10A$$
$$R_C = \frac{V_{CC} - V_{CE(sat)}}{I_C} = \frac{100 - 200 \times 10^{-3}}{10} = 9.9\Omega$$
$$P_{heat} = P_{sat} = V_{CE} \times I_C = 200 \times 10^{-3} \times 10 = 2\ watts$$