1 Md. Sharfuddin

2023100000158

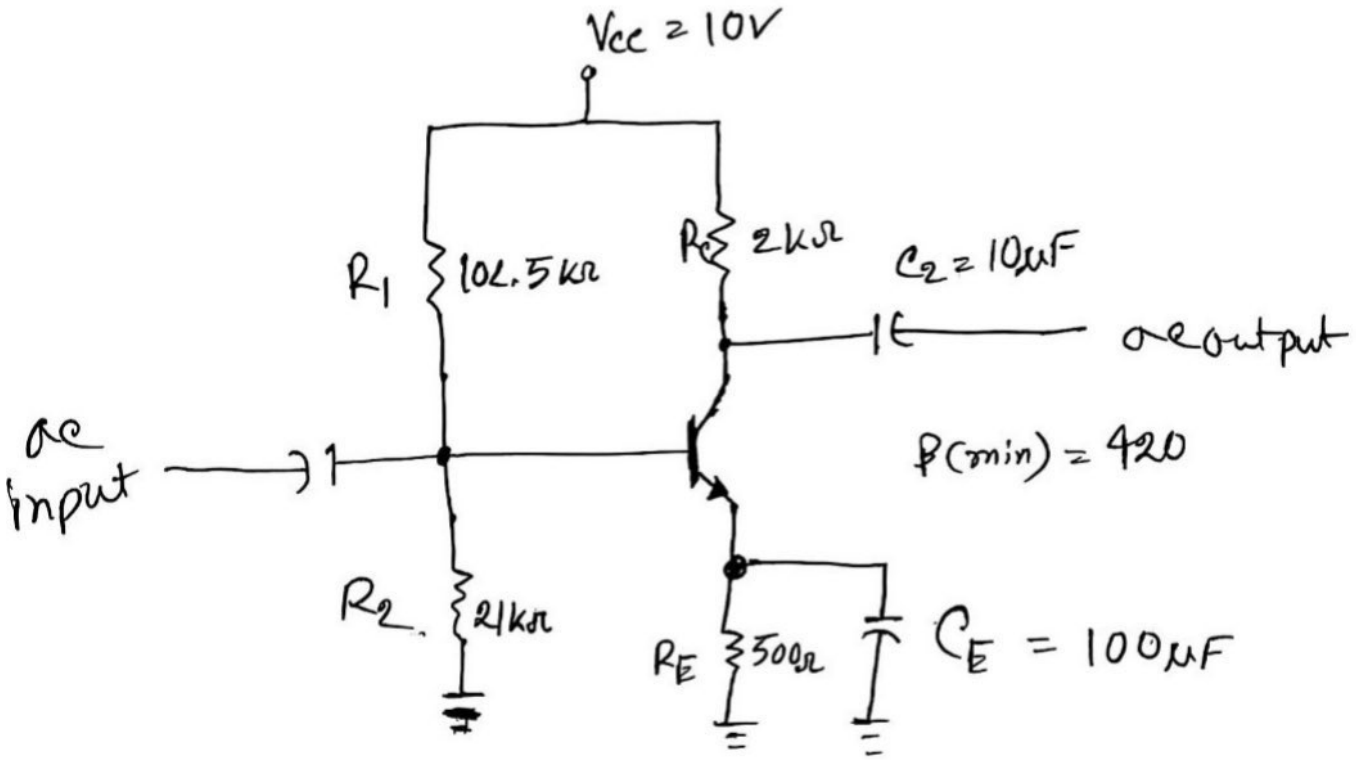
1+5+8 = 14 (even) ; BJT model is BC547C

$V_{cc} = 2 V_{CE} = 10V$

$I_C = 2.0mA \quad V_{CE} = 5.0V$

$\beta(min) = 420$

$$I_B = \frac{I_c}{\beta} = \frac{2mA}{420} = 4.76 \times 10^{-3}$$



$$V_E = \frac{1}{10} V_{cc} = \frac{1}{10} \times 10 = 1V$$

$$R_E = \frac{V_E}{I_E} \cong \frac{V_E}{I_c} = \frac{1}{2 \times 10^{-3}} = 500\Omega$$

$$V_{Rc} = V_{cc} - V_{CE} - V_E = 10 - 5 - 1 = 4V$$

$$R_c = \frac{V_{Rc}}{I_c} = \frac{4V}{2 \times 10^{-3}} = 2000\Omega$$

$$= 2K\Omega$$

$$V_B = V_{BE} + V_E = 0.7 + 1V$$

$$= 1.7V$$

$$V_B = \frac{R_2}{R_1 + R_2} V_{CC}$$

$$1.7 = \frac{21}{R_1 + 21} \times 10$$

$$= 102.5\ K\Omega$$

$$R_2 \leq \frac{1}{10} \beta R_E$$

2) [illegible]

$$\therefore R_2 \leq 21\ K\Omega$$

$$r_e = \frac{26mV}{I_E} = \frac{26mV}{I_c} = \frac{26mV}{2mA}$$

$$= 13\Omega$$

Input impedence, $Z_{in} = R_1 \| R_2 \| \beta R_e$

$$= \frac{1}{102.5} + \frac{1}{21} + \frac{1}{\beta(13\times10^{-2})}$$

$$= 4.157\ k\Omega$$

Output impedence, $Z_{out} = R_c \| r_o \quad [r_o \simeq \infty]$

$$= \frac{1}{R_c} + \frac{1}{r_o}$$

$$= \left(\frac{1}{R_c} + \frac{1}{\infty}\right)^{-1}$$

$$= \left(\frac{1}{R_c}\right)^{-1}$$

$$= R_c$$

$$= 2\ k\Omega$$

Input AC $V = \frac{1+5+8}{3} = 4.67_{m}V$

2

mine is even

model no SRD-09VDC-SL-C

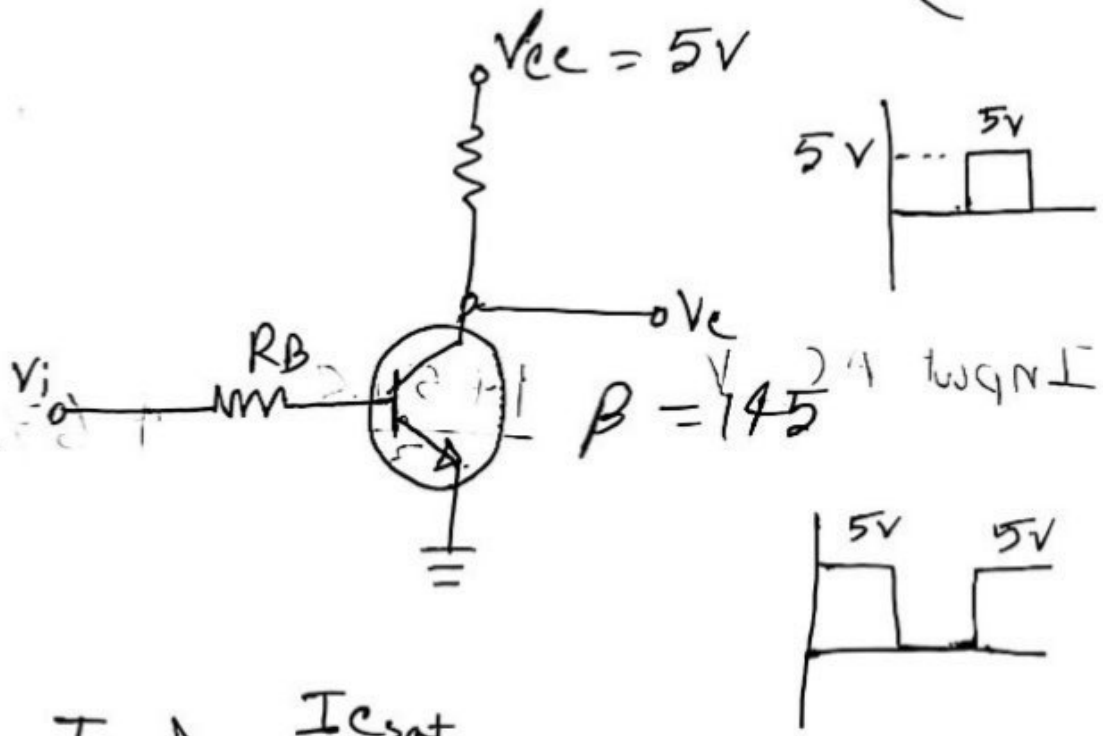
9V

here,

$I_{C_{sat}} = 50mA$ [datasheet]

Using BC637 BJT

for 50 mA, $\beta = 145$ (120 to 160)

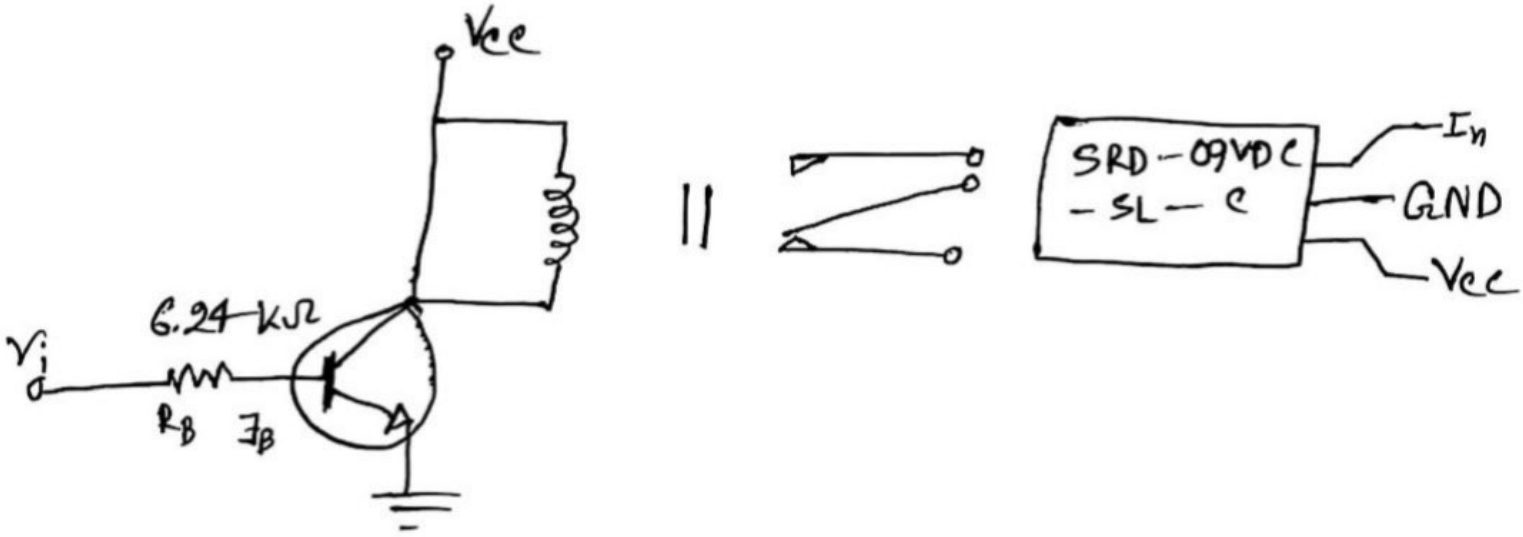


$I_B > \frac{I_{C_{sat}}}{\beta}$

$\therefore I_B > 0.34mA$

Let, $I_B = 0.689\ mA$

$$R_B = \frac{V_i - 0.7}{0.689} = 6.24\ k\Omega$$



Relay driver