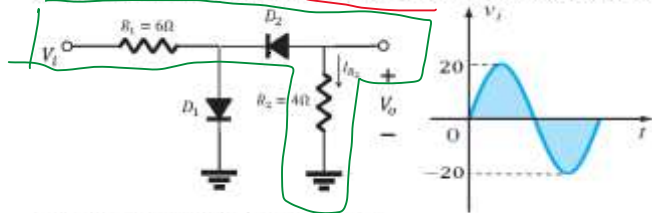


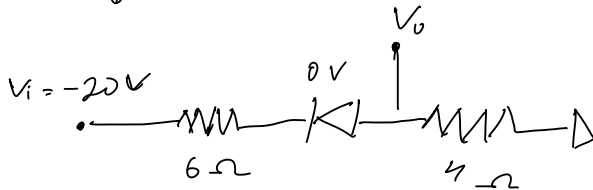
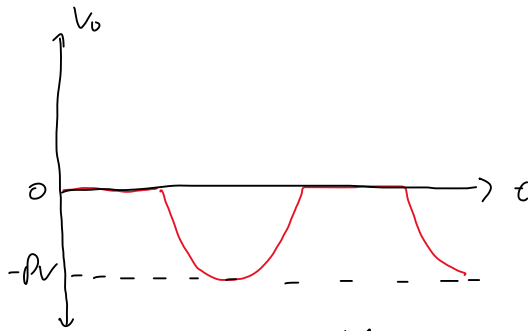
Soal 1: [25 poin]

Diketahui rangkaian berikut dengan D1 dan D2 ideal, dan grafik V_i sebagai berikut.



- Gambarkan grafik gelombang output (V_o)!
- Hitung nilai tegangan output (V_o) dan arus pada R_2 (I_{R2}) saat nilai $V_i = -5$ V!

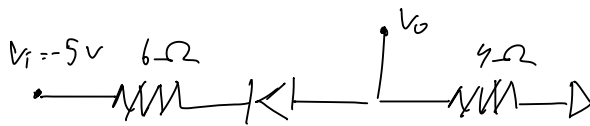
a.



$$I = \frac{-20 - 0}{6 + 4} = -2 \text{ A}$$

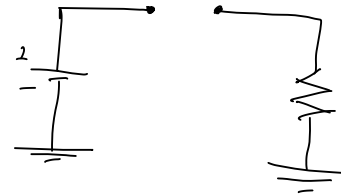
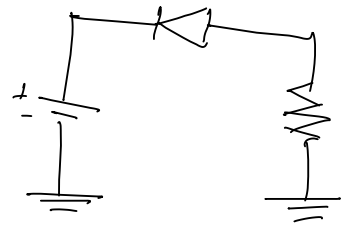
$$V_o = V_{R2} = -2 \cdot 4 = -8 \text{ V}$$

b.



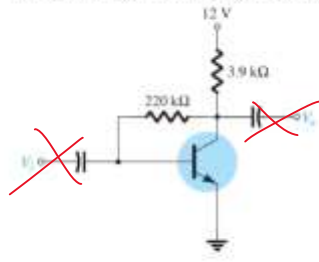
$$I = \frac{-5 - 0}{6 + 4} = -0.5 \text{ A}$$

$$V_o = V_{R2} = -0.5 \cdot 4 = -2 \text{ V}$$

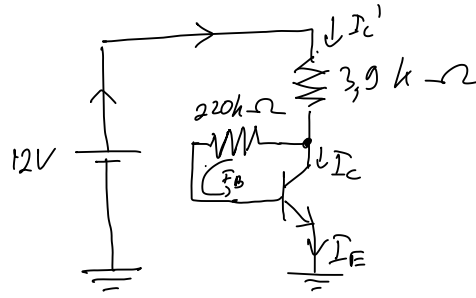


Soal 3: [25 poin]

Diketahui rangkaian BJT sebagai berikut dengan $\beta = 120$.



- Hitung nilai arus di base, emitter, dan collector!
- Hitung nilai tegangan V_{CE} !



$$V_{CC} - I_C' R_C - I_B R_B - V_{BE} = 0$$

$$12 - \beta I_B \cdot 3,9 \times 10^3 - I_B \cdot 220 \times 10^3 - 0,7 = 0$$

$$11,3 = (120 \cdot 3,9 \times 10^3 + 220 \times 10^3) I_B$$

$$11,3 = (600 \times 10^3) I_B$$

$$I_B = 16,42 \mu A$$

$$I_C' = \beta I_B = 120 \cdot 16,42 \mu A$$

$$= 1,97 \text{ mA}$$

$$I_C' = I_C + I_B$$

$$1,97 \text{ mA} = I_C + 16,42 \mu A$$

$$I_C = 1,95 \text{ mA}$$

$$I_E = I_C + I_B = I_C' = 1,97 \text{ mA}$$

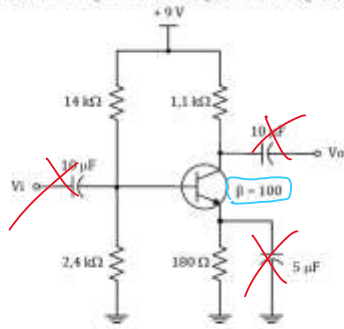
$I_B \rightarrow \text{Base}$

$I_C \rightarrow \text{Collector}$

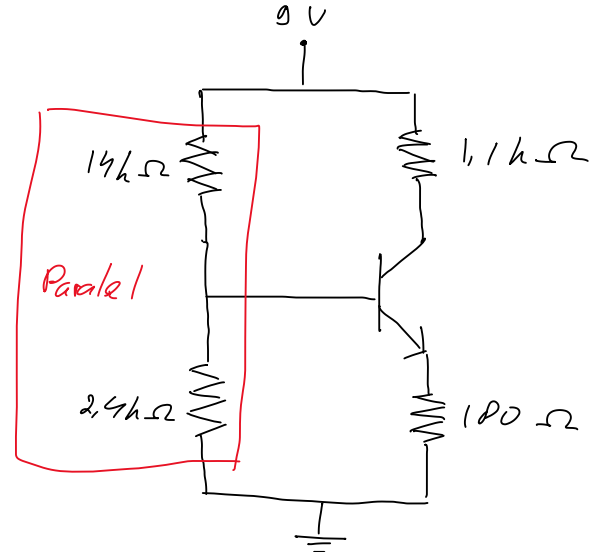
$I_E \rightarrow \text{Emitter}$

Soal 4: [25 poin]

Diketahui rangkaian BJT sebagai berikut dengan $r_o = \infty$.



- Hitung nilai I_c dan nilai r_o !
- Hitung Z_i , Z_o , dan penguatan yang terjadi pada rangkaian diatas!
- Hitung frekuensi cut-off rendahnya!



$$V_B = \frac{2.4}{14 + 2.4} \cdot 9 = 1.32 \text{ V}$$

Loop I :

$$V_B - I_B \cdot 2040.78 - I_E \cdot 180 - V_{BE} = 0$$

$$1.32 - I_B \cdot 2040.78 - (I_B + I_C) \cdot 180 - 0.7 = 0$$

$$1.32 - 2040.78 I_B - (I_B + 100 I_B) \cdot 180 - 0.7 = 0$$

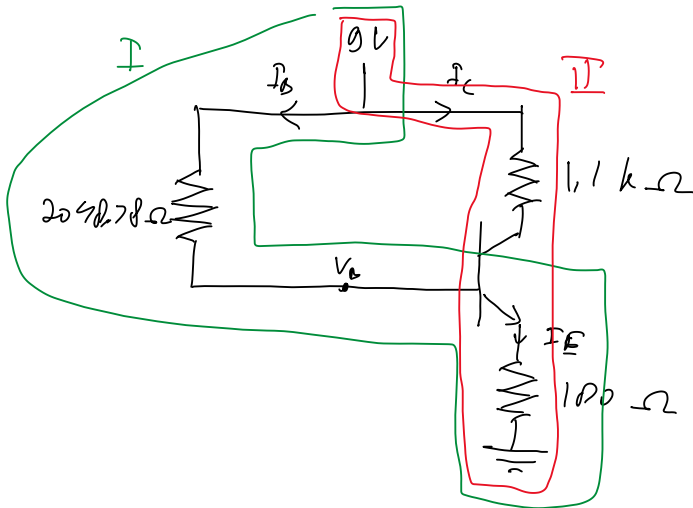
$$0.62 = (2040.78 + 101 \cdot 180) I_B$$

$$0.62 = (2040.78 + 18180) I_B$$

$$0.62 = 20220.78 I_B$$

$$I_B = 30.5 \mu A$$

$$a. R_P = \frac{14k \cdot 2.4k}{14k + 2.4k} = 2040.78 \Omega$$



βI_B

$$I_C = 100 \cdot I_B = 3.05 \text{ mA}$$

$$I_E = I_B + I_C = 30.5 \mu A + 3.05 \text{ mA} = 3.085 \text{ mA}$$