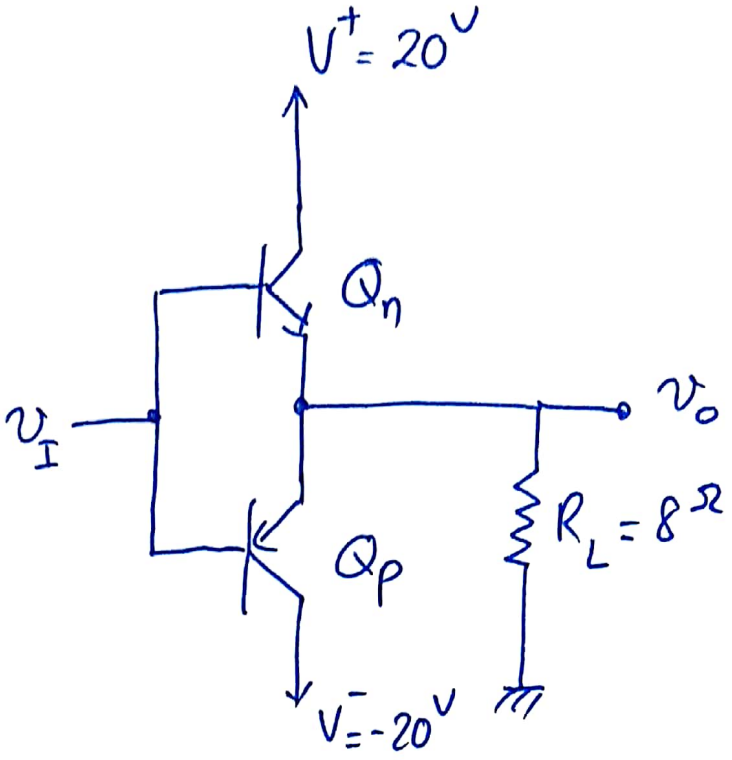
# ANALOG ELECTRONICS

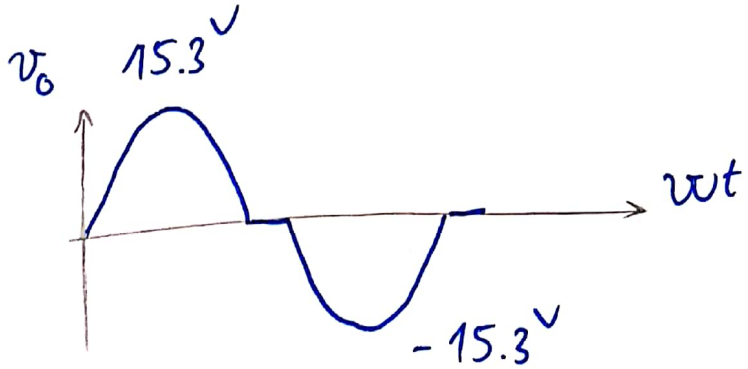
## QUIZ #6.1

(1)




a) $v_{Ip} = \mp 16^V \Rightarrow v_{op} = \mp 15.3^V$ (Because $|V_{BE}| = 0.7^V$)

b)




Assuming that $v_o$ can be considered as a sinusoid:

$$P_L = \frac{v_{orms}^2}{R_L} = \frac{v_{op}^2}{2R_L} = \frac{15.3^2}{2\times 8} \simeq 14.63\ (W)$$

c) $V_{DC} = V^+ = 20^V$

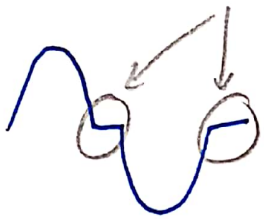
$$I_p = \frac{V_{op}}{R_L} = \frac{15.3}{8} \simeq 1.91\,(A) \Rightarrow I_{DC} = \frac{I_p}{\pi} = 0.6088\,(A)$$

$$\Rightarrow P_{av} = V_{DC} \times I_{DC} = 20 \times 0.6088 = 12.17\,(W)$$

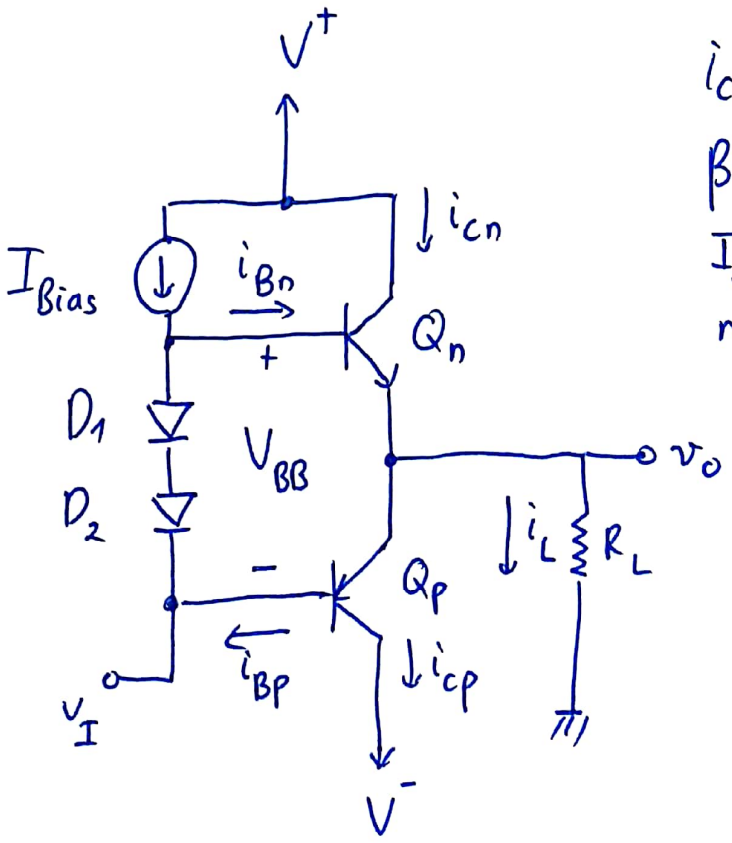
Note: Please differentiate between average value (DC) and rms value

d) $$\eta = \frac{P_L}{2P_{av}} \times 100\% = \frac{14.63}{2 \times 12.17} \times 100\% = 50\%$$

e) Cross over distortion increases THD



(2)




$i_{cn} = i_{cp} = 20^{mA}$

$\beta = 50$

$I_S = 10^{-14}\,A$

$n = 1$

a) $i_{Cn} = 20^{mA} \Rightarrow i_{Bn} = \frac{20^{mA}}{\beta} = 0.4^{mA}$

$I_{D1} = I_{D2} = I_{Bias} - i_{Bn} = 10^{mA} - 0.4^{mA} = 9.6^{mA}$

$V_{D1} = V_{D2} = n V_T \ln \frac{I_{D1}}{I_S} \simeq 0.689^{V}$

$\Rightarrow V_{BB} = 2V_{D1} = 1.38^{V}$

b) $P_L = 10^{W} = \frac{V_{op}^2}{2R_L} \Rightarrow V_p = \sqrt{2P_L R_L}$

$V_p = \sqrt{2 \times 10 \times 8} = 12.65^{V}$

$\Rightarrow$ Choose $V^+ = V_p + 4^V = 16.65^V$ or $17^V$

$V^- = -V_p - 4^V = -17^V$