$Choose\ V_{E1}\ so\ that\ \frac{Vcc}{10} < V_{E1} < \frac{Vcc}{3}$

$(Vcc = 18V)$

$1.8V < V_{E1} < 6V$

$Choose\ V_{E1} = 4.2V$

V_{E1} and V_{C1} output voltage swing

$Make\ V_{C1}\ halfway\ between\ V_{E1} and\ V_{CC}$

$V_{C1} = V_{E1} + (V_{CC} - V_{E1})/2$

$V_{C1} = 4.2 + (18 - 4.2)/2 = 11.1V$

$V_{CE1} = V_{RC1} = 6.9V$

$Swing\ is\ up\ to\ 7.5V\ approx$

$V_{E1} = V_{C1} - V_{BE2}$

$V_{E2} \approx V_{C1} - t = 11.1 - t =$

$V_{E2} \approx V_{C1} - 0.100 = 11.1 - 0.100 = 11V$

Setting up R_{E1},R_{E2} and R_{C1}

$Set\ R_{E2}\ from\ V_{E2}\ and\ bias\ current\ R_{E2} = V_{E2}/I_{CQ2} = 11/15mA = 733\Omega$

$Set\ R_{E1}\ from\ V_{E1}\ and\ bias\ current\ R_{E1} = V_{E2}/I_{CQ1} = 4.2/800uA = 5250\Omega$

$Set\ R_{C1}\ from\ V_{E1}\ and\ bias\ current\ R_{E1} = V_{RC1}/I_{CQ1} = 6.9/800uA = 8625\Omega$

Finding maximum Q1 base bias current

$$I_{B1max} = \frac{I_{CQ1}}{B_{min}}$$

$B_{min}\ from\ datasheet\ is\ 200$

$I_{B1max} = 800uA/200 = 4uA$

Calculating R1 & R2

$I_1 = 40uA\ ,\ V_{B1} = \ = 4.2 + 0.08 = 4.28V$

$Set\ R_1\ from\ V_{B1}\ and\ I_1$

$R_1 = (V_{CC} - B_{B1})/I_1 = (18 - 4.28)/40uA = 343k\Omega$

$Set\ R_2\ from\ V_{B1}\ and\ I_1$

$R_2 = V_{B1}/I_1 = 4.28/40uA = 107k\Omega$

C_C and C_E for cut-off frequencies

$$\frac{1}{2\pi f R_C}$$

$$\frac{1}{2\pi * 18000 * 11500} = 0.7n$$

C_C and C_E for cut-off frequency

$$C_E = \frac{1}{2\pi f r_e}$$

$$r_e \approx \frac{25}{I_E}$$

$$r_{e1} \approx 25/0.5 = 50\Omega$$

$$C_E = 1/2\pi * 60 * 50 = 50n$$

C_1 Input coupling capacitor

$$\frac{1}{2\pi f r_{in}}$$

$$r_{be} + R_{E1} = B_{mn} R_{e1} + R_{E1} = 200 * 50 * 7000 = 17k\Omega$$

$$For\ 60Hz\ cut - off\ with\ this\ resistance\ (1/2\pi * 60 * 17k)\ C_1 = 0.03uF$$

We need the output resistance value $r_{out} = \left(\frac{r_{be}+R_s}{b+1}\right)$

$r_{be2} = b_{mn} r_{e2} = 200 * (25/18) = 280\Omega$

$R_s = R_c = 11500\Omega$

$B_{max} = 450\ (we\ get\ this\ from\ the\ data\ sheet)$

$r_{out} = (280 + 11500)/450 = 26[700 = 26\Omega]$

We need X_{C2} <<rout at lower cut off frequency so we do

$C_2 >> \frac{1}{2\pi f r_{in}}$

$for\ 60Hz\ cut\ off\ = (1/2\pi * 60 * 26)$

$C_2 = 10uFe$

$R_E = 5250\Omega$

$r_{e \approx} \frac{25}{I_e}$

$r_{e \approx} \frac{25}{0.5} = 50\Omega\ with\ I_e\ in\ mV$

$B = 200$

$RE = 5250 + 50 = 5300\Omega$

$5250.05(200 + 1) = 1065300$

$$\frac{1}{s(CE)} + r_e$$

$$\frac{1}{2*\pi*1000(50n)} + 50$$

$$s = jw = 2 * \pi * 1000Hz$$