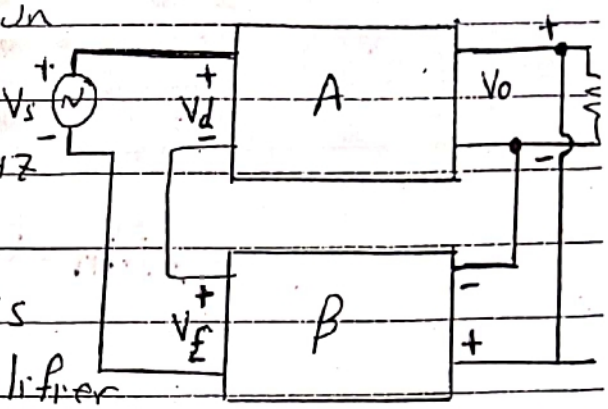
Feedback sheet

17.

Q_1 For the F.B amplifier shown the amplifier has: $R_i = 1K$, $R_o = 5K$, $f_L = 500HZ$ $f_H = 50KHZ$. $A = 50$. with. NO F.B. If 8% -ve F.B is applied, recalculate the Amplifier parameters? sketch the freq. response with and without F.B?



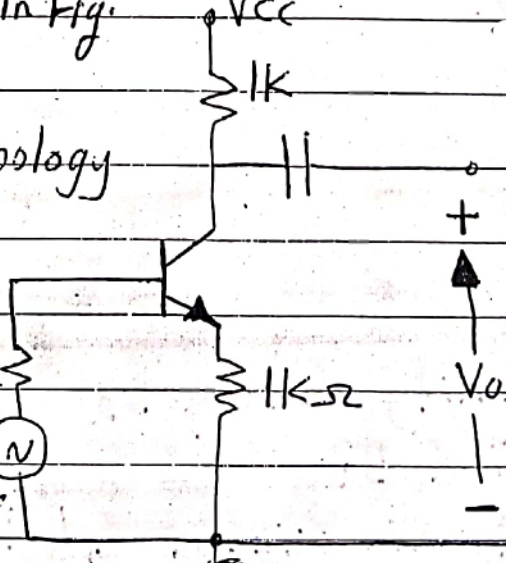
Q_2 A current amplifier has $A_I = 40$ dB, $R_i = 2K\Omega$ $R_o = 1K\Omega$. If it is required to make $R_i = 200\Omega$

(i) What type of -ve F.B is required, draw block diagram

(ii) Recalculate A_I, R_o and find the required β?

(iii) Suggest a F.B network to realize this β?

Q_3 For the ckt. shown in Fig.



(i) What type and Topology of the F.B?

(ii) How does this F.B affect the input & output impedances.

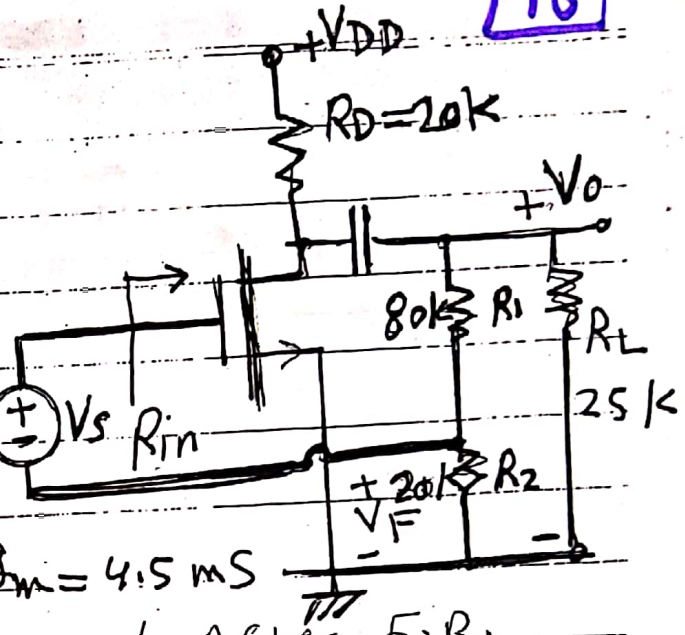
(iii) Draw the block diagram representation for the above F.B.

P.T.O →

Q4

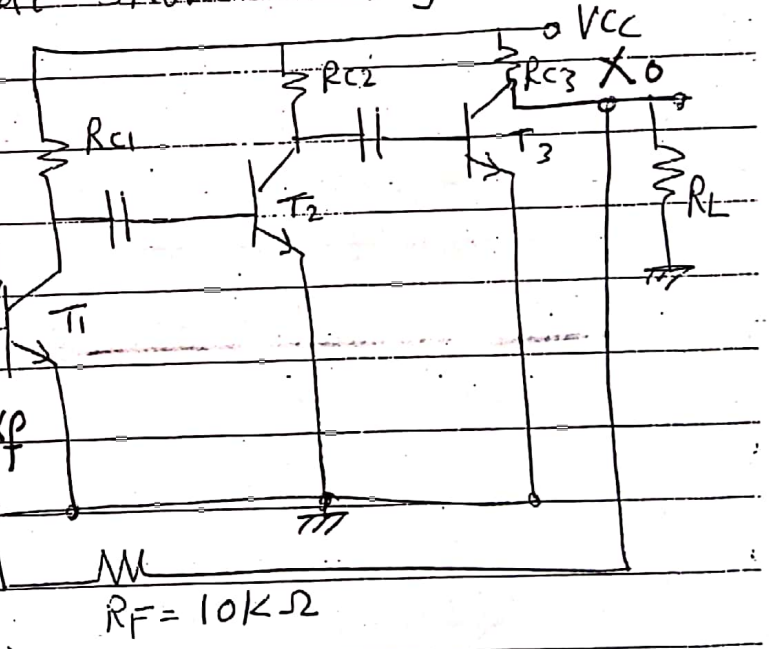
Given: $g_m = 4.5 mS$

1) Identify F.B Topology
2) Find Av, Ro, β
Avf, Rof, Rin, Rinf
3) If $f_L = 500HZ$
$f_H = 500KHZ$



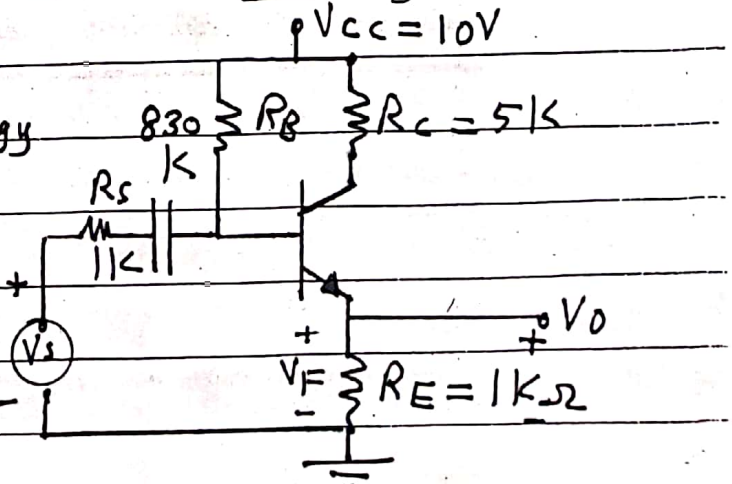
Draw freq. Response befor and After F.B.

Q5: Consider the Circuit shown in Fig.



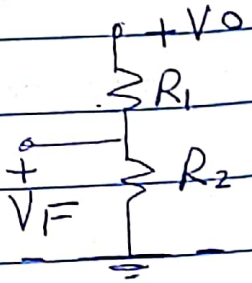
I) Identify type and topology of this F.B.
2) Indicate Xs, Xf Xd, Xo
3) How does this F.B affect Zi & Zo.
4) Name this Amp. and indicate A type & units, β value & unit.

Q6: Identify the topology and Find B?
Estimate Rin without F.B and with F.B?
Sketch Block diagram.



Q4: The F.B is through R_1 & R_2 where V_F is across R_2. Since the form a Voltage-divider

$$V_F = \frac{V_o \cdot R_2}{R_1+R_2} \Rightarrow B = \frac{V_F}{V_o} = \frac{R_2}{R_1+R_2} \quad \text{VDR}$$

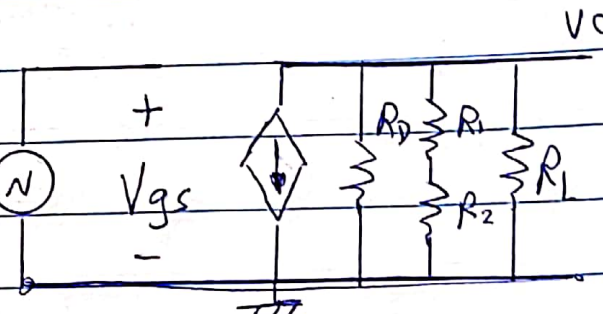


i.e $V_f \propto V_o \Rightarrow$ If $V_o = 0$, $V_f = 0$, No F.B"

So it is voltage from o/p, V_f is mixed in Series with $V_s \Rightarrow$ So it is "Voltage-Series" and used with "Voltage-Amplifier"

① without F.B:

$$A_V = \frac{V_o}{V_s} = \frac{-g_m V_{gs} (R_D \| (R_1+R_2) \| R_L}{V_{gs}}$$



$\therefore |A_V| = g_m (R_D \| (R_1+R_2) \| R_L$

$= 4.5(20 \| (100) \| 25) = 10 K\Omega$ $g_m = 4.5 mS$

$\therefore |A_V| = 45$ $4.5 mS$ $R_D = 20K$, $R_L = 25K$

$R_{in} = \infty$, $R_o = R_D \| (R_1+R_2)$ $R_1 = 80K$, $R_2 = 20K$

$= 16.666 K\Omega$

$f_L = 500HZ$, $f_H = 500KHZ$.

with F.B: $B_v = \frac{V_F}{V_o} = \frac{R_2}{R_1+R_2} = \frac{20}{100} = 0.2$

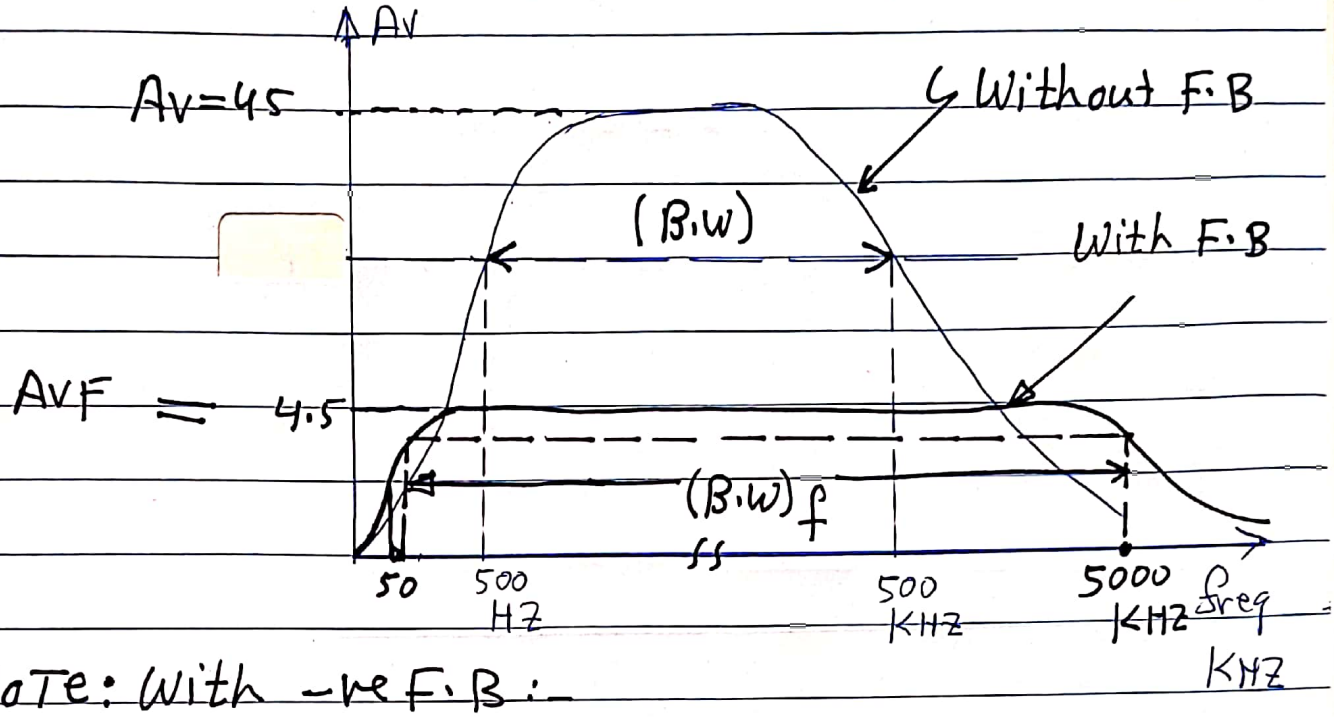
$$A_{VF} = \frac{A_V}{1+B_v A_V} = \frac{45}{1+0.2\times 45} = 4.5$$

$$R_{in_f} = R_{in}(1+B_v A_v) = \infty(10) = \infty$$

$$R_{of} = R_o / 1+BA = 16.666/10 = 1.666 K\Omega$$

$$f_{L_f} = f_L / (1+BA) = 500/10 = 50HZ$$

$$f_{Hf} = f_H (1+BA) = 500KX10 = 5000KHZ = 5MHZ.$$



NoTe: With -ve F.B :-
Av → decreases
(B.W) → extends (Increases).
* This is True Since Gain x B.W ≈ Constant.

Q5: The topology is "Voltage-Shunt"
We Sample from Node ⇒ Voltage
& Mix Current ⇒ Shunt.
$Z_{inf} = Z_{in}/(1+\beta A)$, $Z_{of} = Z_o/(1+\beta A)$
Amp :→ Transresistance Amp.
$A = \frac{V_o}{I_s} = R(\Omega)$, $\beta = \frac{I_f}{V_o} \approx \frac{1}{R_F}(\Omega)$

$X_o \rightarrow V_o$
$X_f \rightarrow I_f$
$X_s \Rightarrow I_s$
$X_d \Rightarrow I_d$
$R_{inf}\downarrow$, $R_o\downarrow$

Q6: Topology ⇒ Voltage-Series because $V_f \propto V_o$ and
If $V_o = 0$, $V_f = 0$. $\beta = \frac{V_F}{V_o}$ and Since $V_f = V_o$, $\beta = 1$
* Without F.B , $R_{in} = R_B // r_\pi$ (No R_E), $R_E \cong 0$
* with F.B $R_{inf} = R_B // (r_\pi + (\beta+1)R_E)$
Since R_E is present and causes -ve F.B, Series ⇒ I/p