Q.1] (a) Calculate gain and bandwidth of a 2-stage amplifier with

$$A_{V1} = \frac{500}{\left(1+\frac{s}{2000}\right)} \qquad A_{V2} = \frac{250}{\left(1+\frac{s}{4000}\right)}$$

(b) Draw the frequency response for the overall gain.

Q.2] Three identical stages have an overall upper 3dB frequency of 20 KHZ and a lower 3dB frequency of 20 HZ. What are f_L and f_H of each stage? Assume non-interacting stages.

Q. 3] For the amplifier shown in Fig. 1, the transistor has the parameters: g_m= 5 mʊ, r_π= 200Ω, r_o= ∞, C_π= 100pF, C_μ= 10pF, and C_C= 0.1μF. If three non-interacting stages from this amplifier are connected in cascade, determine the mid-band gain and lower & higher 3dB frequencies.

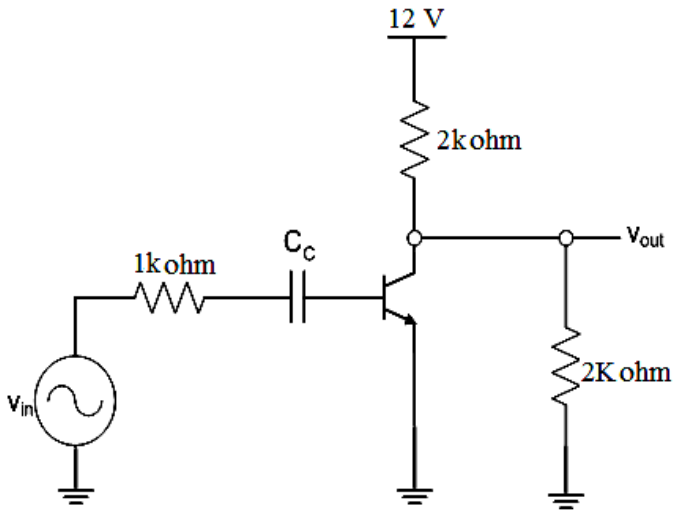

Fig. 1

Q. 4] For the single stage CE amplifier shown in the Fig. 2, let I_{CQ} = 1mA. If three capacitively coupled stages of this amplifier are cascaded and the first stage is driven by a 10-μV-rms signal source having resistance 1KΩ, what is the voltage across a 50KΩ load connected at the output of the third stage? (β=100, V_A = 100V)

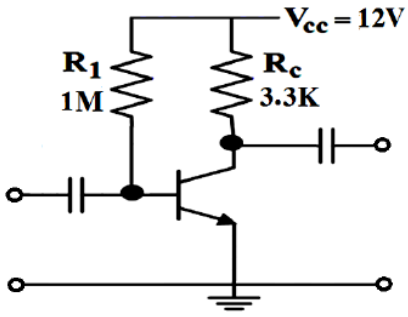

Fig. 2

✓ **Q. 5]** Draw the AC equivalent circuit and calculate V_o/V_i, R_i and R_o.

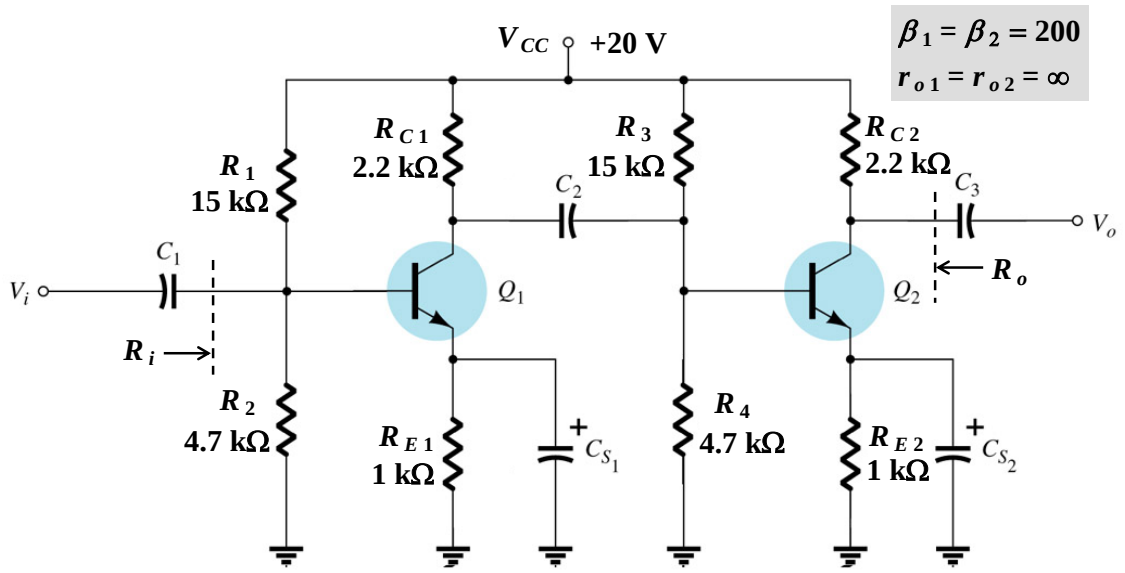

Fig. 3

Q. 6] A two-stage amplifier shown in Fig.4 is in CE-CC configuration. The transistor parameters are given as β=100 and r_π = 0.5 KΩ. Determine the overall voltage gain and current gain. Assume $r_o = \infty$.

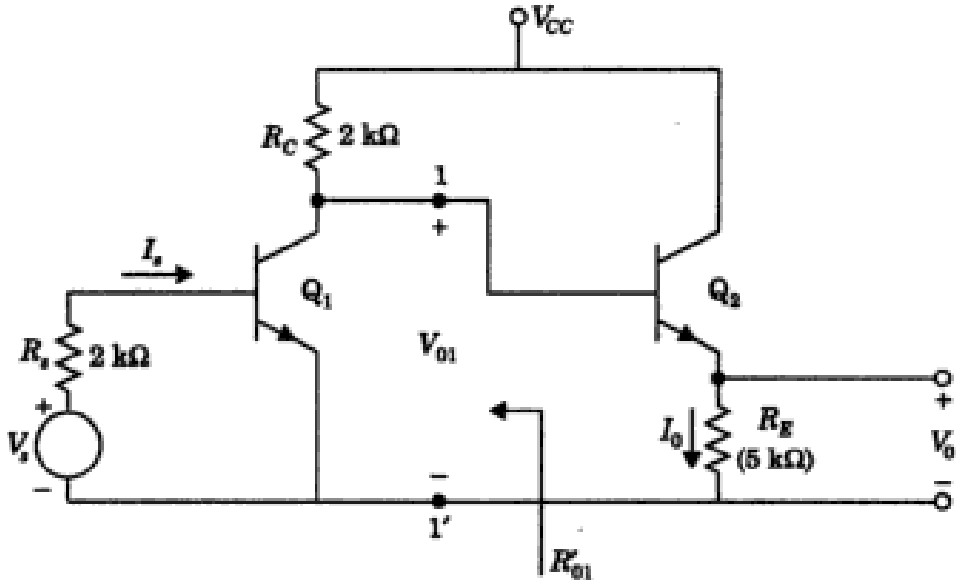

Fig. 4

Q. 7] Calculate the voltage gain (V_o/V_i), input impedance and output impedance for the two-stage amplifier shown in Fig.5. Assume β= 100.

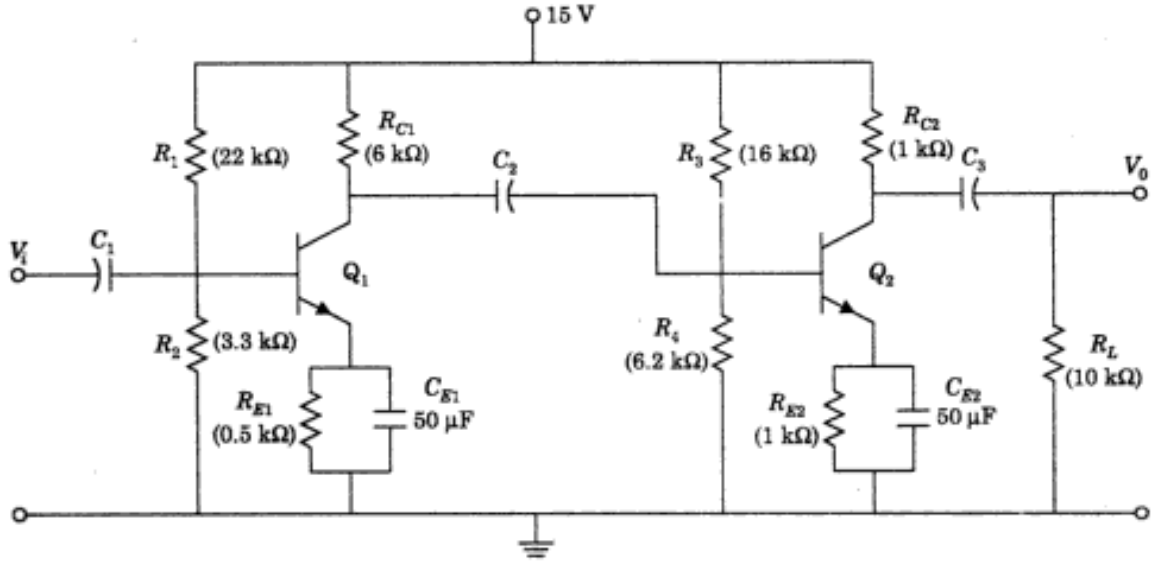

Fig. 5

✓ **Q. 8]** Determine the Q-point for Q_1 and Q_2, voltage gain v_o/v_s, current gain, input resistance R_i, and output resistance R_o for the darlington configuration shown in Fig.6. Assuming $\beta_1 = \beta_2 = 100$, $V_{A1} = V_{A2} = \infty$, and $V_{BE1(ON)} = V_{BE2(ON)} = 0.7$ V.

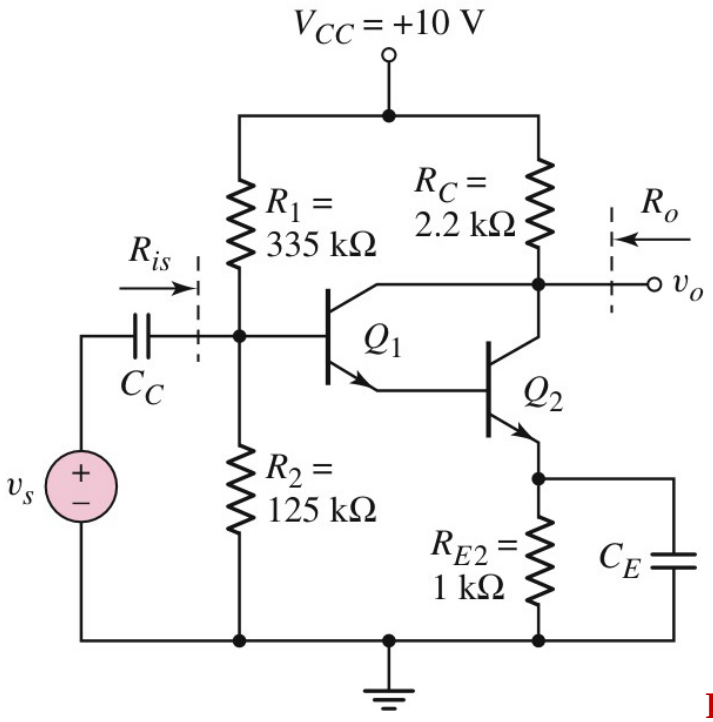

Fig. 6

✓ **Q. 9]** Calculate the overall voltage gain (v_o/v_s) for the circuit shown in Fig. 7. Assuming β_1 = 170, β_2 = 150 and $V_{BE(ON)}$ = 0.7 V.

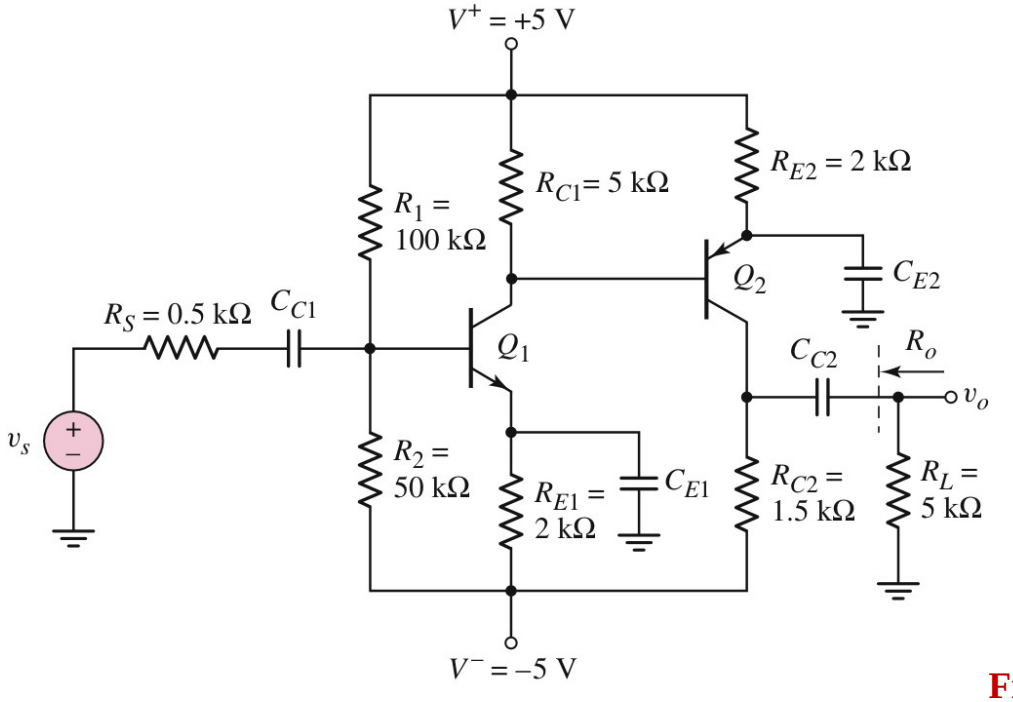

Fig. 7

Q. 10] A two-stage FET capacitively coupled amplifier has the following parameters: g_m =10 mA/V, r_0 =6 KΩ, R_D = 10 KΩ, R_G = 1 MΩ for each stage. Find the overall mid-band gain.

Best wishes