

Note: Attempt any three questions

- Q1.a) A silicon transistor with  $V_{BE(sat)} = 0.8\text{ V}$ ,  $h_{fe} = 100$ ,  $V_{CE(sat)} = 0.2\text{ V}$  is used in the circuit shown in fig 1. Find the maximum value of  $R_C$  for which the transistor remains in saturation

5 marks

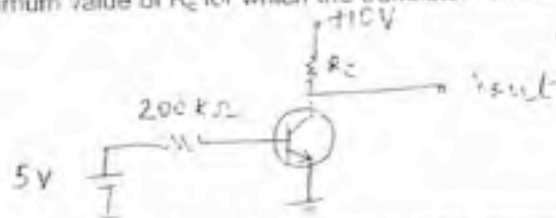


Fig 1

- b) Explain the working of self bias circuit and derive the expression of its stability factor

5 marks

- Q2.a) Draw the circuit of a RC coupled amplifier. Draw its frequency response and indicate the cut off frequency and bandwidth.

5 marks

- b) For the 2 stage RC coupled low level audio amplifier shown in figure 2, compute the following  
(1)  $R_i$  (2)  $A_{v1}$  (3)  $A_{v2}$  (4)  $A_v$  in db  
neglect  $V_{BE}$  and take  $R_w = 25\text{ mV}/I_E$

5 marks

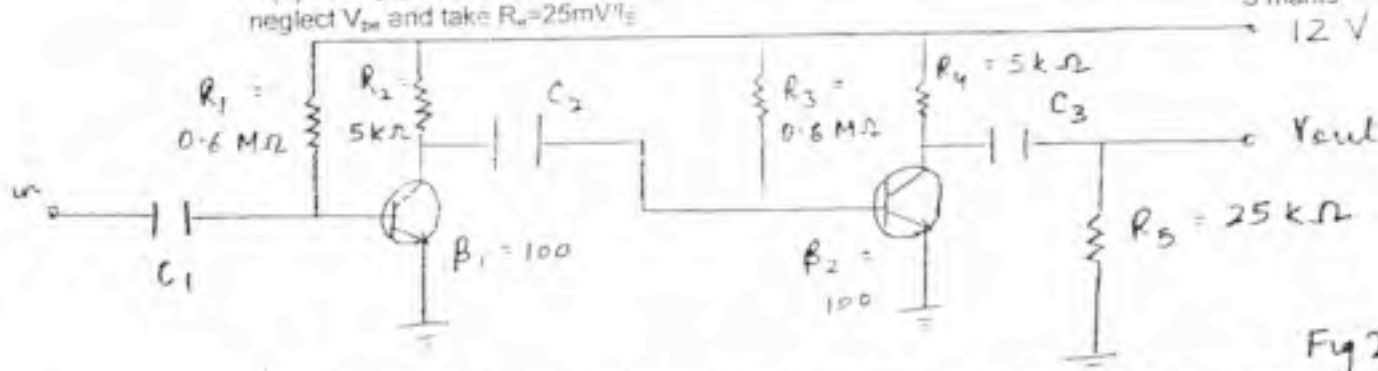


Fig 2

- Q3.a) An amplifier with a gain of 60 db has an output impedance of 10kΩ. It is required to modify its output impedance to 1kΩ. What type of feedback has to be applied. Calculate the feedback factor. Also find the percentage change in the overall gain, for a 10% change in the open loop gain of the amplifier.

5 marks

- b) Differentiate between positive and negative feedback. How does negative feedback modify the gain of an amplifier

5 marks

- Q4.a) A BJT has  $h_{ie} = 2\text{ kΩ}$ ,  $h_{fe} = 100$ ,  $h_{re} = 2.5 \times 10^{-4}$  and  $h_{oe} = 25\text{ μA/V}$  as parameters in CE configuration. It is used as an emitter follower amplifier with  $R_s = 1\text{ kΩ}$  and  $R_L = 500\text{ Ω}$ . Determine for the amplifier the voltage gain  $A_{vs} = V_o/V_s$ , the current gain  $A_{is} = I_o/I_s$ , the input resistance  $R_i$  and output resistance  $R_o$ .

5 marks

- b) Derive the expression for the current gain and voltage gain for a transistor amplifier circuit using h-parameters

5 marks