DA-IICT, Gandhinagar

EL213 Analog Circuits
End-semester exam
3rd July 2020

Time: 2 hr Maximum marks: 50

READ THE INSTRUCTIONS CAREFULLY:

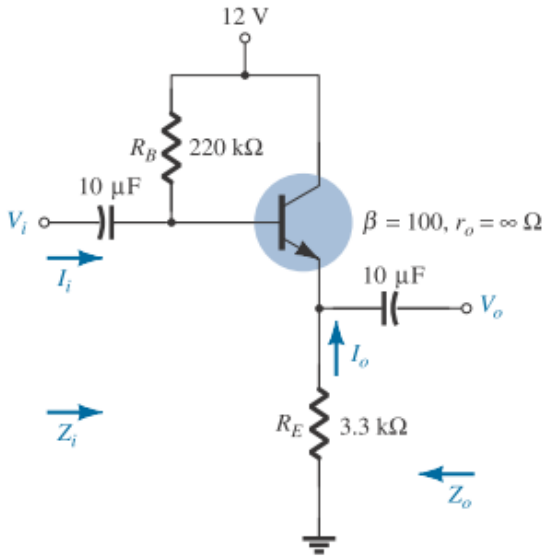
1. START EACH ANSWER IN A NEW PAGE.
2. MAKE PROPER ASSUMPTIONS WHERE NECESSARY.
3. CALCULATORS ALLOWED.
4. IN CASE OF ANY QUERY, MENTION IN THE PAPER AND WITH PROPER SUPPOSITIONS / ASSUMPTIONS PROCEED WITH THE EXAMPLE. MENTION WHAT YOU SUPPOSE CLEARLY.

Question 1 **10 Marks**

Determine, for the emitter-follower network of figure below,

a. r_e
b. Z_i
c. Z_0
d. A_v
e. Repeat parts (b) through (d) with r_o = 25 kΩ and compare results.

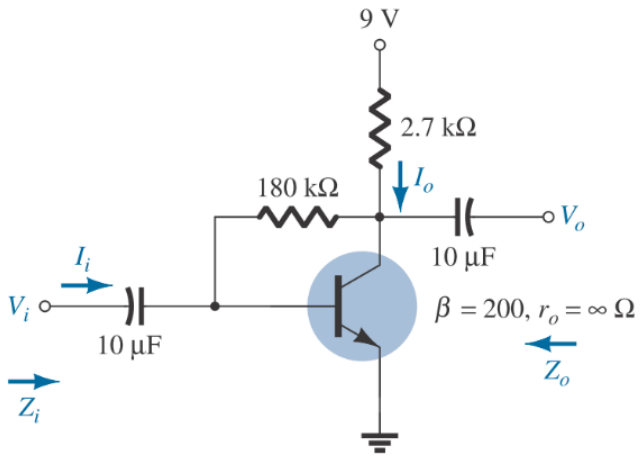
Here Z_i and Z_0 are input and output impedances or resistances.



OR

Determine for the below network:

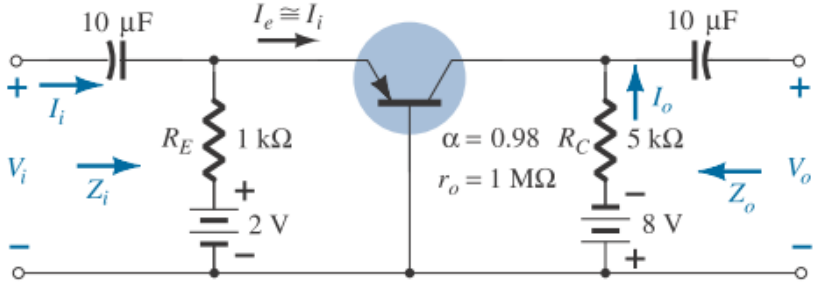
a. r_e
b. Z_i
c. Z_0
d. A_v
e. Repeat parts (b) through (d) with r_o = 20 kΩ and compare results.



Question 2 **8 Marks**

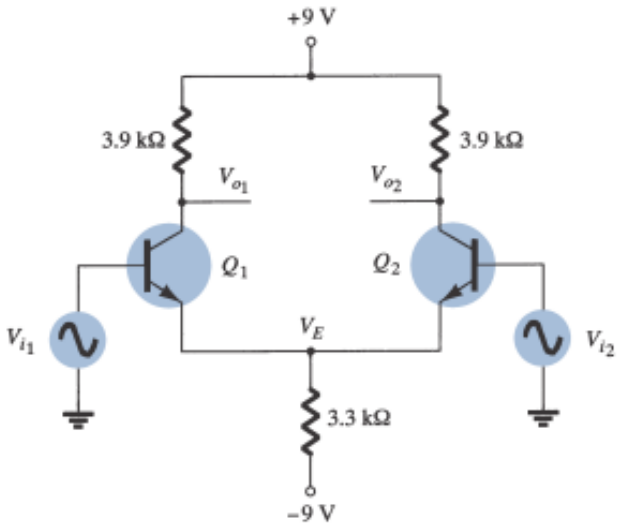
Determine for the below network:

a. r_e.
b. Z_i.
c. Z_o.
d. A_v.
e. A_i.



Question 3 **5 + 5 Marks**

I For the below circuit, calculate the DC voltages and currents.

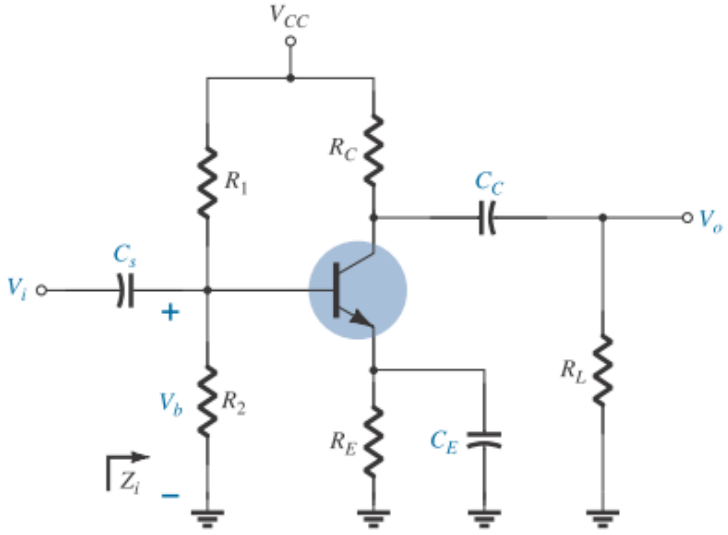


II Design circuit to provide outputs that are 10, 20 and 50 times larger than the input by connecting three operational amplifier stages. Use a feedback resistor of R_f = 500 kΩ in all the stages.

Question 4 **10 Marks**

Determine the lower cutoff frequency for the below network using the following parameters:

$C_s = 10\,\mu\text{F}, \quad C_E = 20\,\mu\text{F}, \quad C_C = 1\,\mu\text{F}$
$R_1 = 40\,\text{k}\Omega, \quad R_2 = 10\,\text{k}\Omega, \quad R_E = 2\,\text{k}\Omega, \quad R_C = 4\,\text{k}\Omega,$
$R_L = 2.2\,\text{k}\Omega$
$\beta = 100, \quad r_o = \infty\Omega, \quad V_{CC} = 20\,\text{V}$

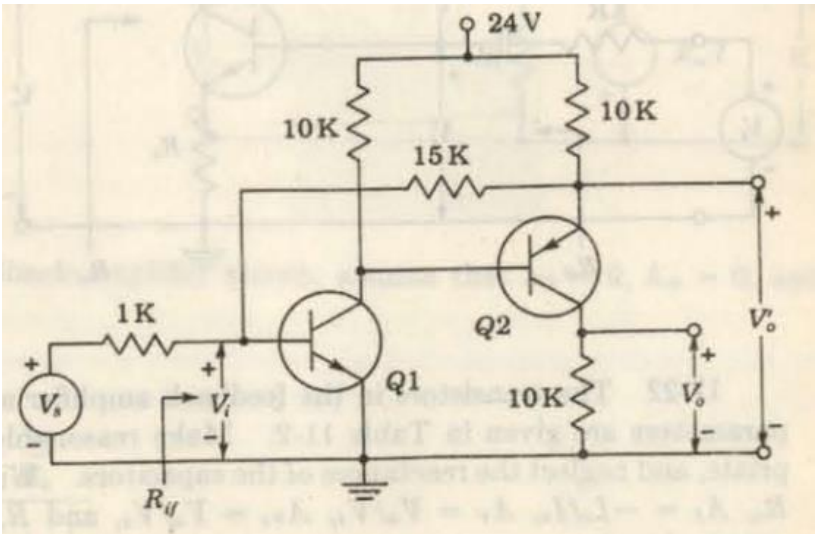


Repeat the analysis with a source resistance R_S of 1kΩ. The gain of interest will now be V_0 / V_S rather than V_0 / V_i. Compare results.

Question 5 **12 Marks**

In the two-stage feedback amplifier shown, the transistors are identical and have the following parameters: β = 50, r_Π = 2 K. Calculate for **any one circuit:**

a. $A'_V = V'_o / V_i$
b. R_{if}
c. $A_v = V_o / V_i$
d. $A_{vf} = V_o / V_S$



OR