

S.E. ExTc sem II CBSQS M-2014

Sub:- AE -II

19/5/14

QP Code : NP-19691

(3 Hours)

[Total Marks : 80

- N.B. : (1) Question No. 1 is Compulsory.
(2) Solve any **three** questions from remaining **five** questions.
(3) **Figures** to the right indicate **full marks**.
(4) Assume suitable data if necessary and mention the same in answer sheet.

1. Solve any **five**

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- Compare ideal and practical Op Amp.
- Consider a BJT has parameters $f_T = 500$ MHz at $I_C = 1$ mA, $\beta = 100$ and $C_\mu = 0.3$ pF. Calculate bandwidth f_β and capacitance C_π of a BJT.
- What is cross-over distortion in power Amplifier. How it is overcome?
- Which type of biasing technique is used to bias Integrated Circuit and why?
- Find output voltage of differential amplifier if its differential gain $A_d = 100$, common mode gain $A_c = 0.1$ and input voltage are $V_1 = 2 + 0.55 \sin \omega t$ and $V_2 = 0.5 - 0.005 \sin \omega t$.
- Explain line regulation and load regulation of voltage regulator. Draw load and line regulation characteristics of ideal and practical voltage regulator.

2. (a) For the circuit shown in Fig 2a, the parameters are $R_s = 0.1$ k Ω , $R_1 = 20$ k Ω , $R_2 = 2.2$ k Ω , $R_E = 0.1$ K Ω , $C_c = 47$ μ f, and $V_{CC} = 10$ V. The transistor parameters are : $V_{BE(ON)} = 0.7$ V, $\beta = 200$, and $V_A = \infty$.

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- Derive expression for lower cut-off frequency (or time constant) due to coupling capacitor C_c ,
- Determine lower cut off frequency and midband voltage gain.

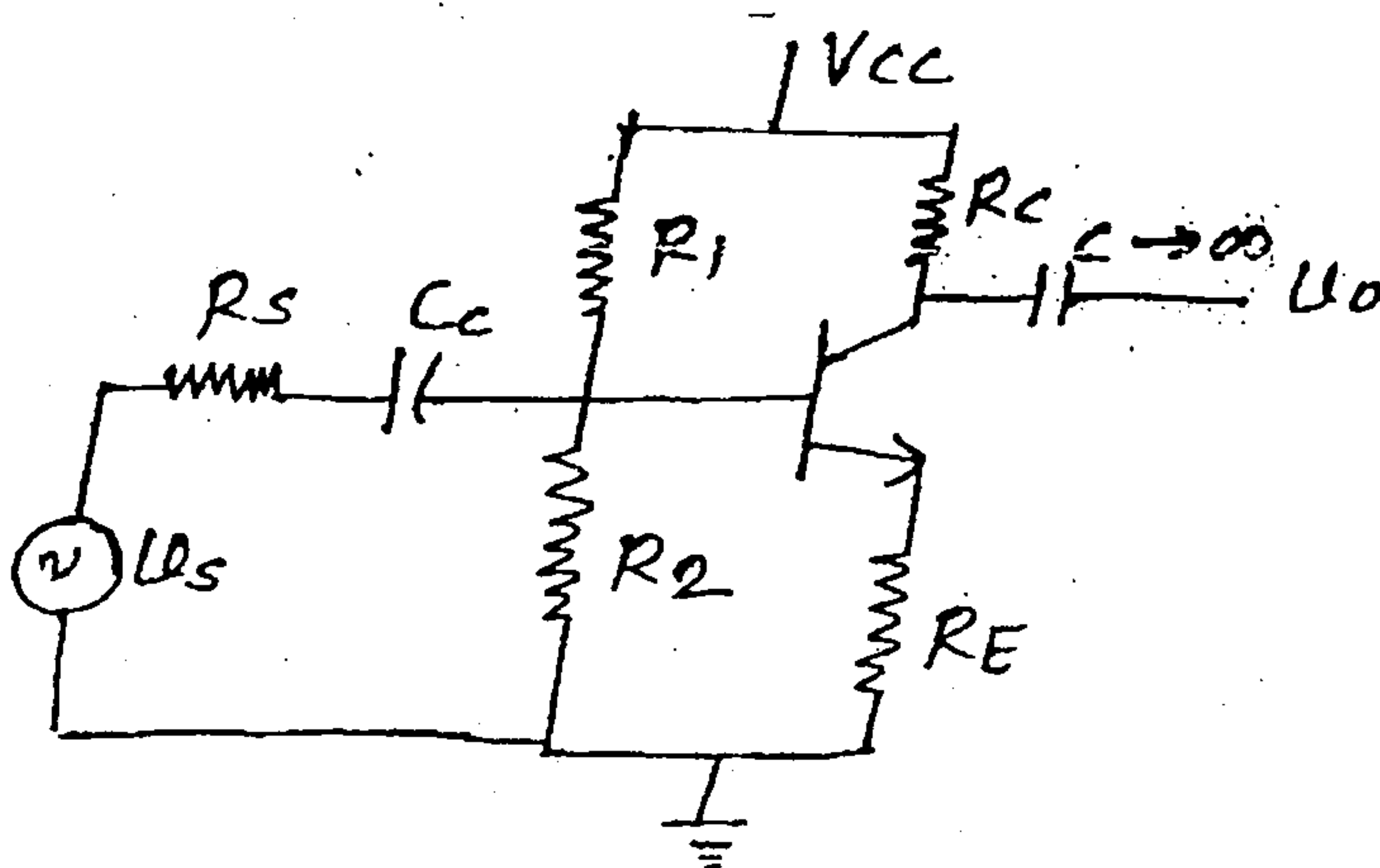


Fig 2a

2. (b) For the circuit shown Fig.2b, the transistor parameters are : $K_n = 1\text{mA/V}^2$, $V_{TN} = 0.8\text{V}$, $\lambda = 0$, $C_{gs} = 2\text{pF}$, and $c_{gd} = 0.2\text{pF}$. Determine
- Miller capacitance
 - The upper 3dB (high cut-off) frequency
 - The mid band voltage gain

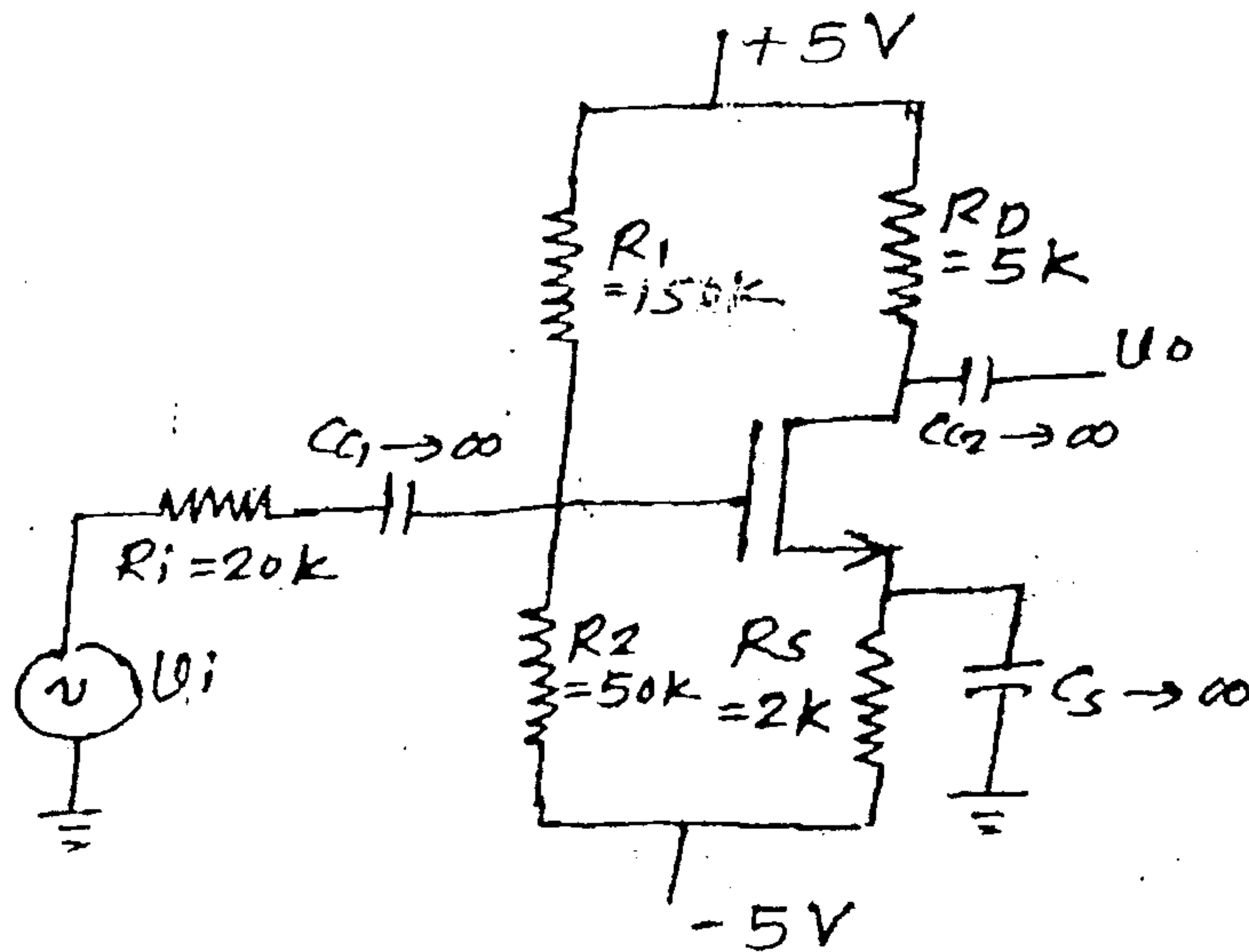


Fig. 2b

3. (a) For the circuit shown in Fig.3a, find overall midband voltage gain and capacitors C_{c1} and C_{c2} such that the 3dB frequencies associated with each stage are equal. Assume BJT have parameters : $V_{BE(ON)} = 0.7\text{V}$, $\beta = 200$, and $V_A = \infty$.

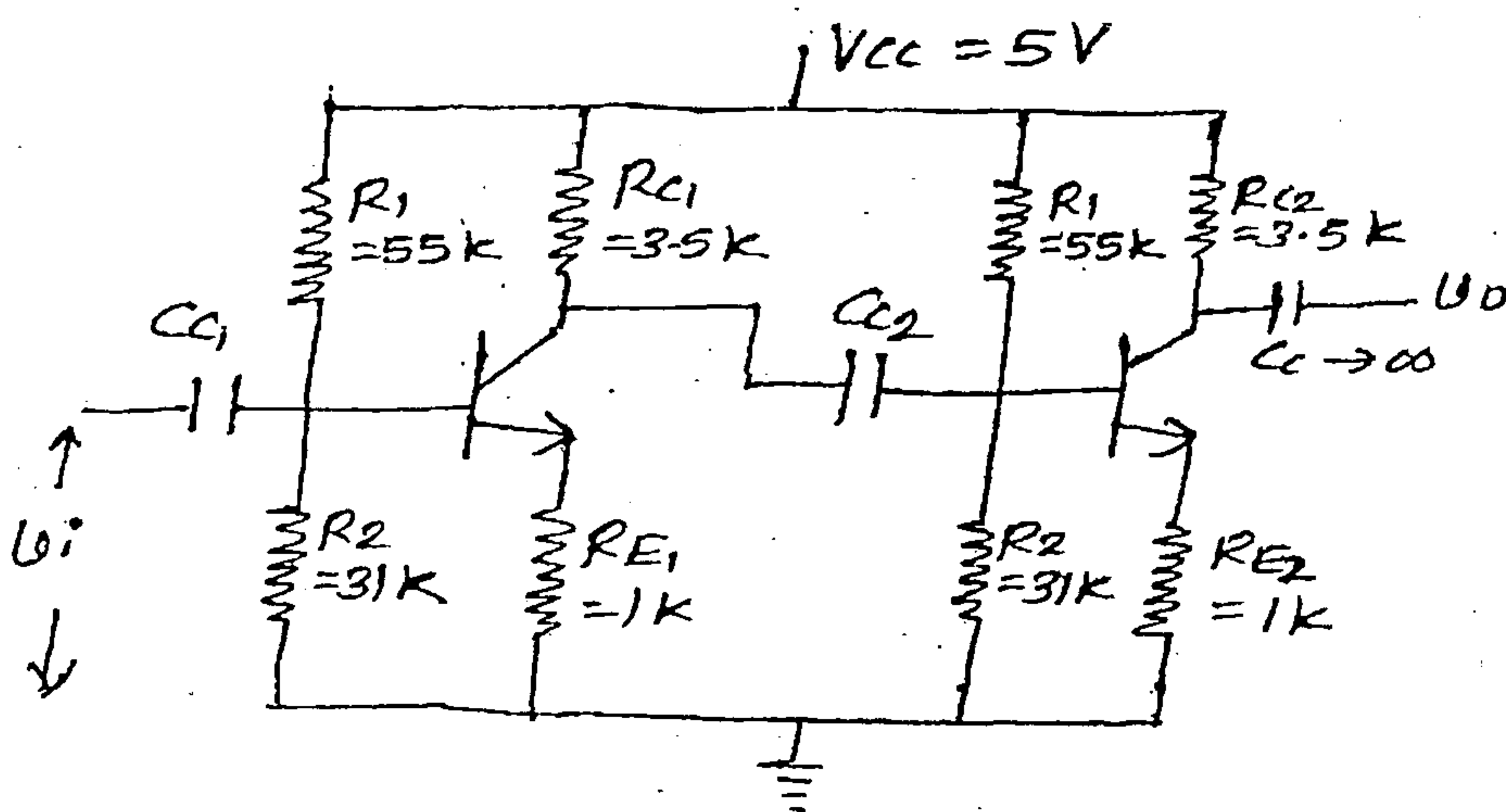


Fig. 3a

3. (b) For the differential amplifier shown in Fig 3b, derive expression for differential voltage gain, common-mode voltage gain and CMRR. 10

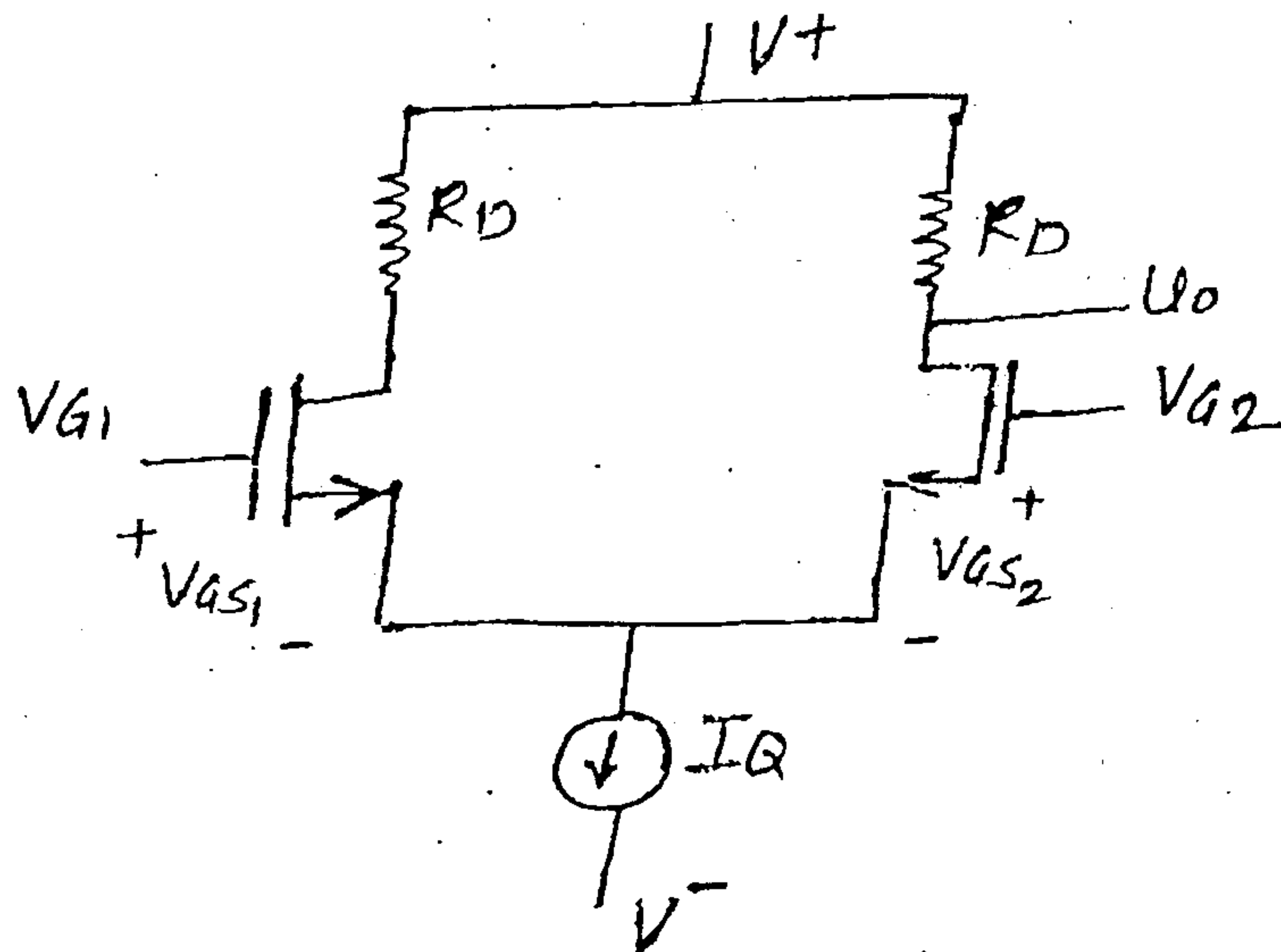


Fig 3b

4. (a) The transistor parameters for the circuit shown in Fig 4a are $\beta = 100$, $V_{BE(ON)} = 0.7V$, and $V_A = \infty$. 10
- (i) Determine R_E such that $I_E = 150 \mu A$.
 - (ii) Find A_d , A_{cm} and CMRR for one sided output at v_{o2} .
 - (iii) Determine the differential and common-mode input resistances.

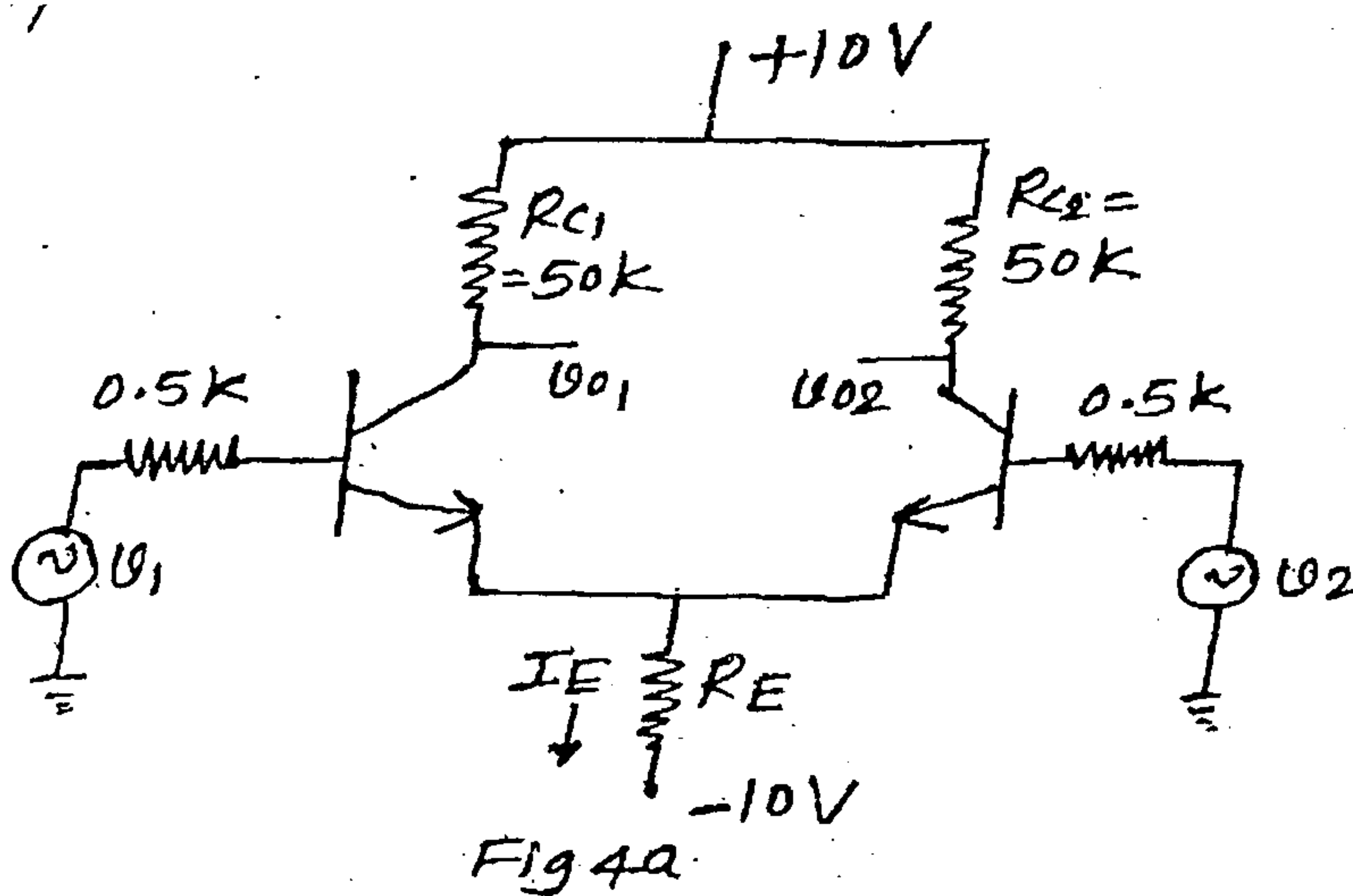


Fig 4a

4. (b) Explain the working of two transistor (BJT) current source with the help of necessary current relationships. Also explain the effect of finite output resistance on current source performance and the techniques to improve the same. 10
5. (a) Draw a circuit diagram of a transformer couple class A power amplifier. Also draw ac and dc load lines for the same. Derive expression for the power conversion efficiency. 10
5. (b) Explain working of basic differentiator with the help of input and output waveforms. Also derive expression for output voltage of the same. What are the limitations of basic differentiator and how to overcome these limitations. 10
6. Write short notes on any **Four** :— 20
- (a) Transistorized series regulator
 - (b) High pass and Low pass filters
 - (c) Power MOSFET
 - (d) Wilson Current source
 - (e) Darlington pair.
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