

(3 Hours)

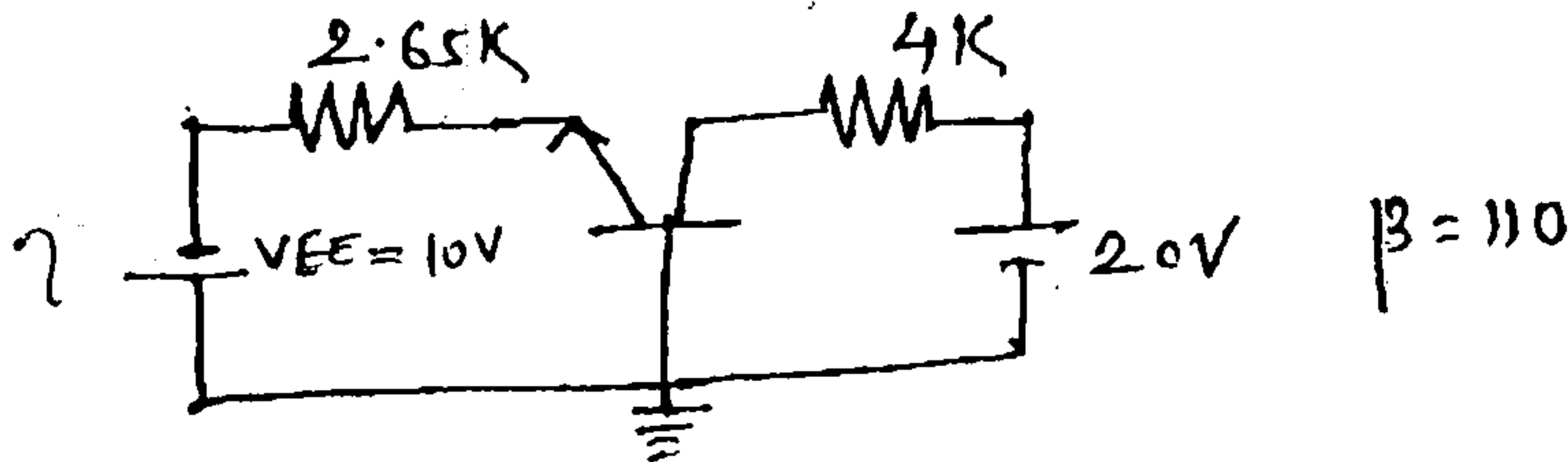
[Total Marks : 80

- N.B. :** (1) Question No. 1 is **Compulsory**.
 (2) Attempt any **three** questions out of remaining **five**.
 (3) **Figures** to the **right** indicate **full marks**.

1. Solve any **five**:-

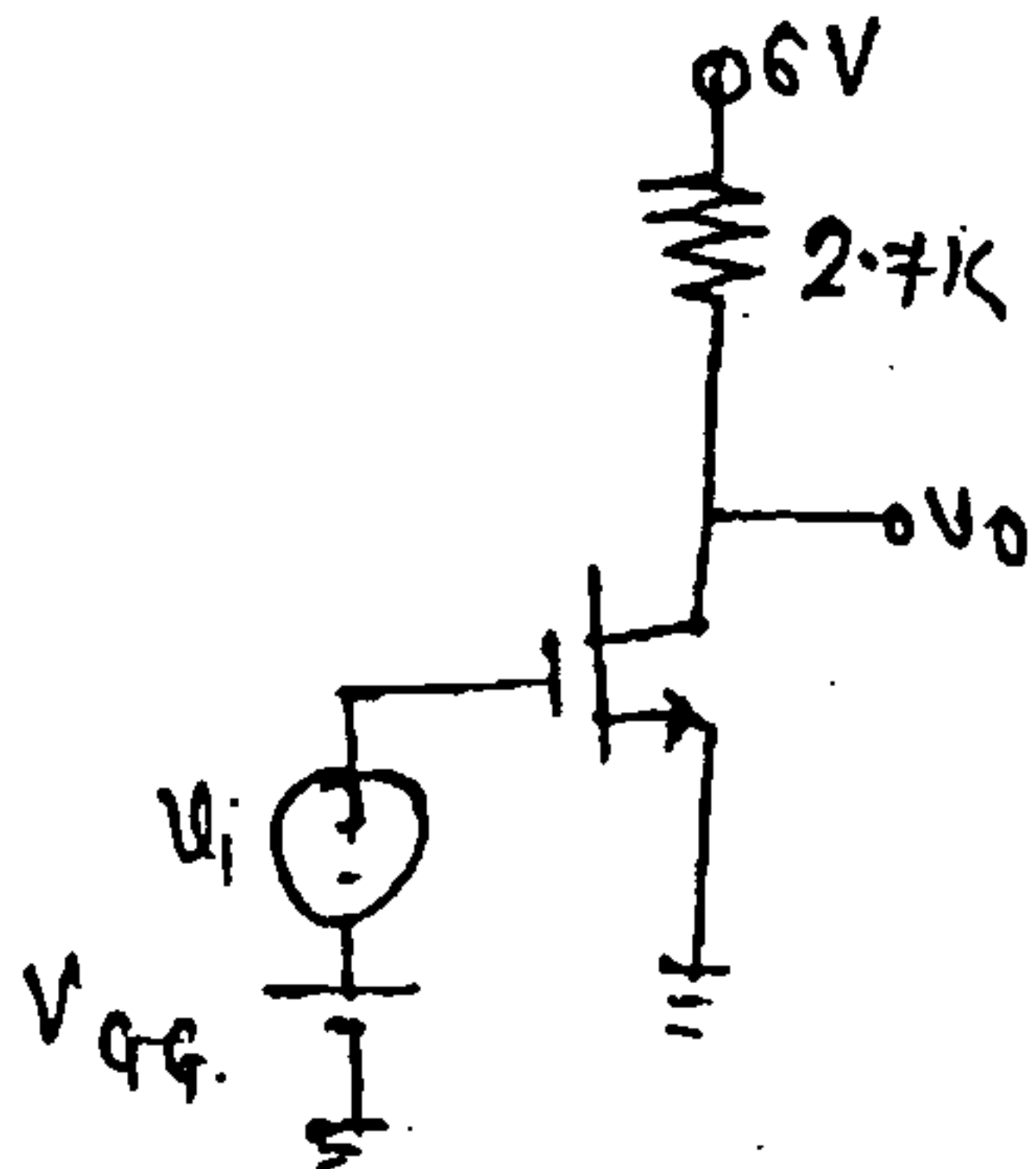
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- (i) Draw switching characteristics of a diode and explain reverse recovery time.
 (ii) Draw energy band diagram of MOS capacitor in accumulation, depletion and inversion region for P-substrate.
 (iii)



Draw the dc load line for above circuit.

- (iv) Compare CE, CB and CC configuration.
 (v)



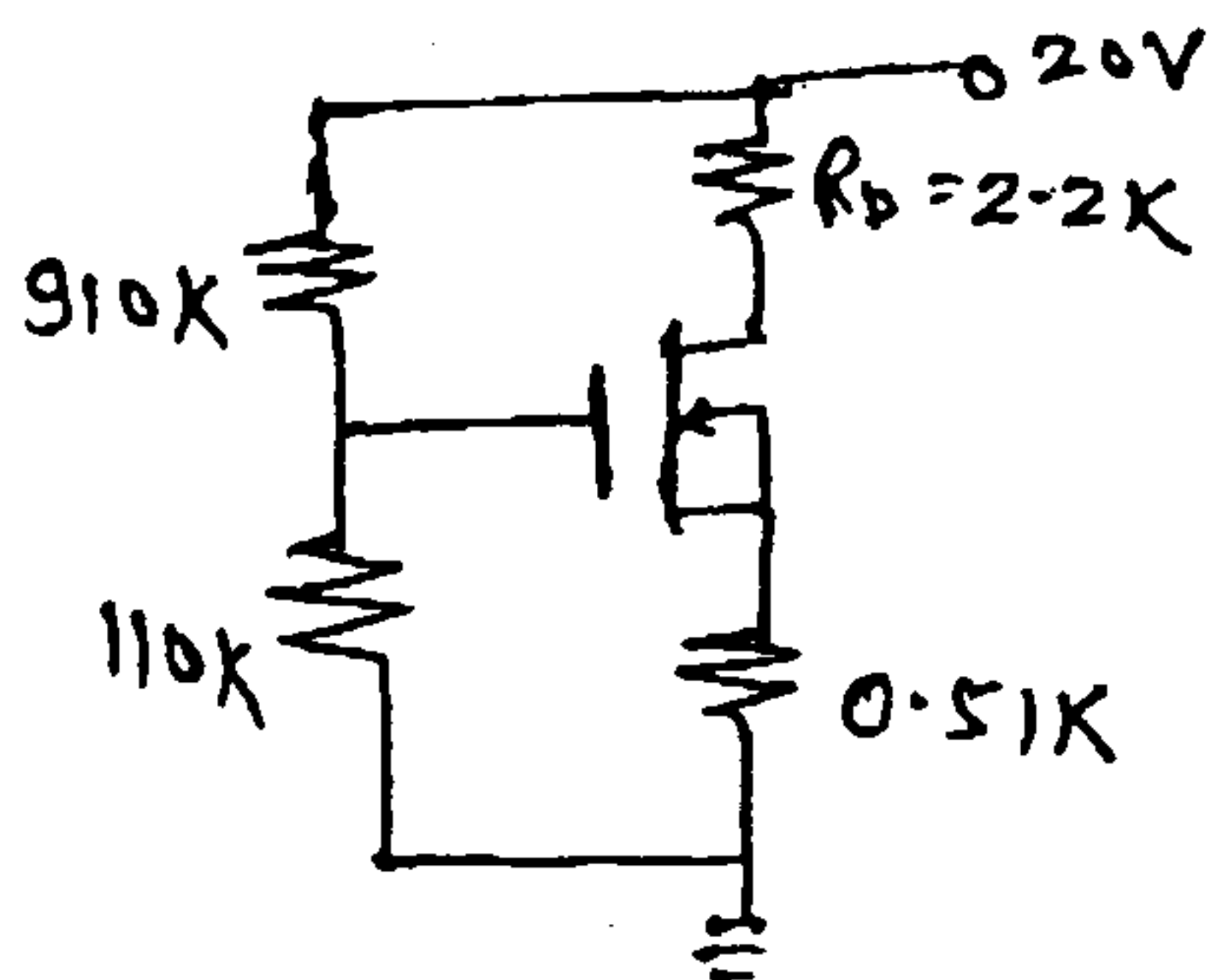
$V_{GSQ} = 3V$
 $V_{TN} = 1V$
 $K_n = 0.8mA/V^2$
 $\lambda = 0.018V^{-1}$

Obtain g_m , r_o and A_v for the amplifier circuit shown in figure. In which region the device is operating? Justify.

- (vi) State and explain Barkhausen's Criteria for oscillation.

2. (a) Obtain I_{DQ} , V_{DSQ} , V_{GSQ} graphically.

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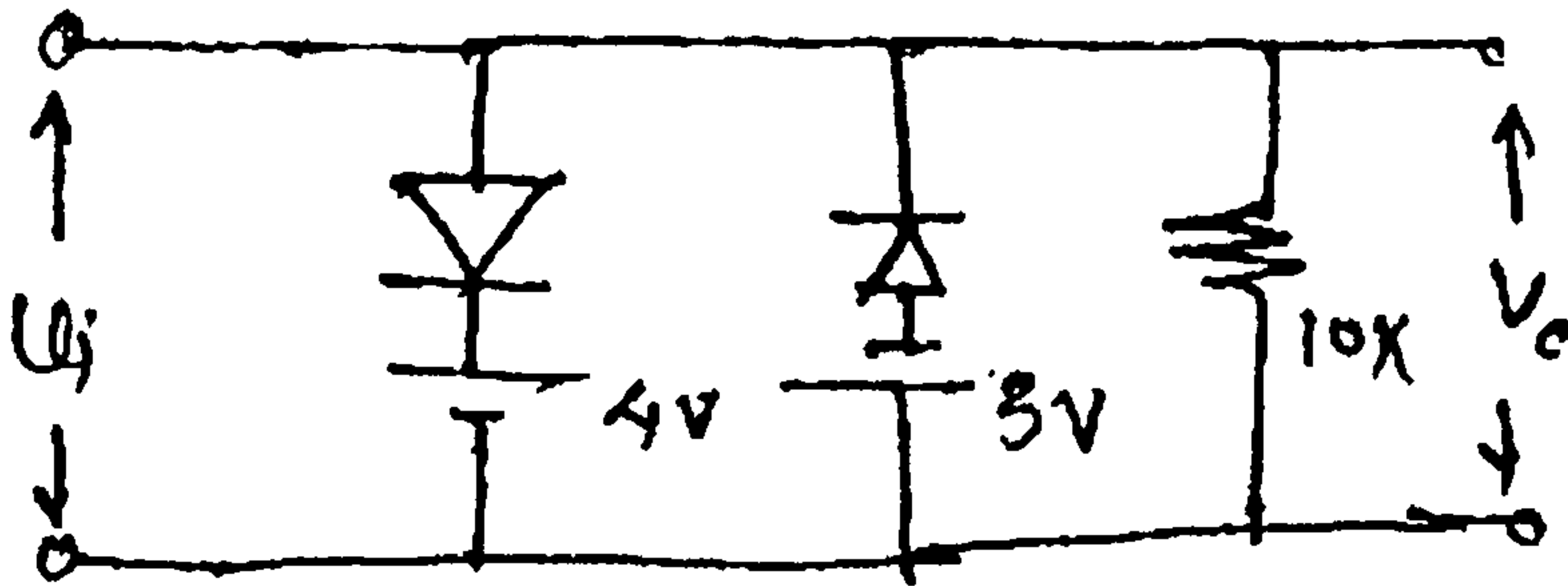


$I_{DSS} = 10mA$
 $V_p = -3.5V$

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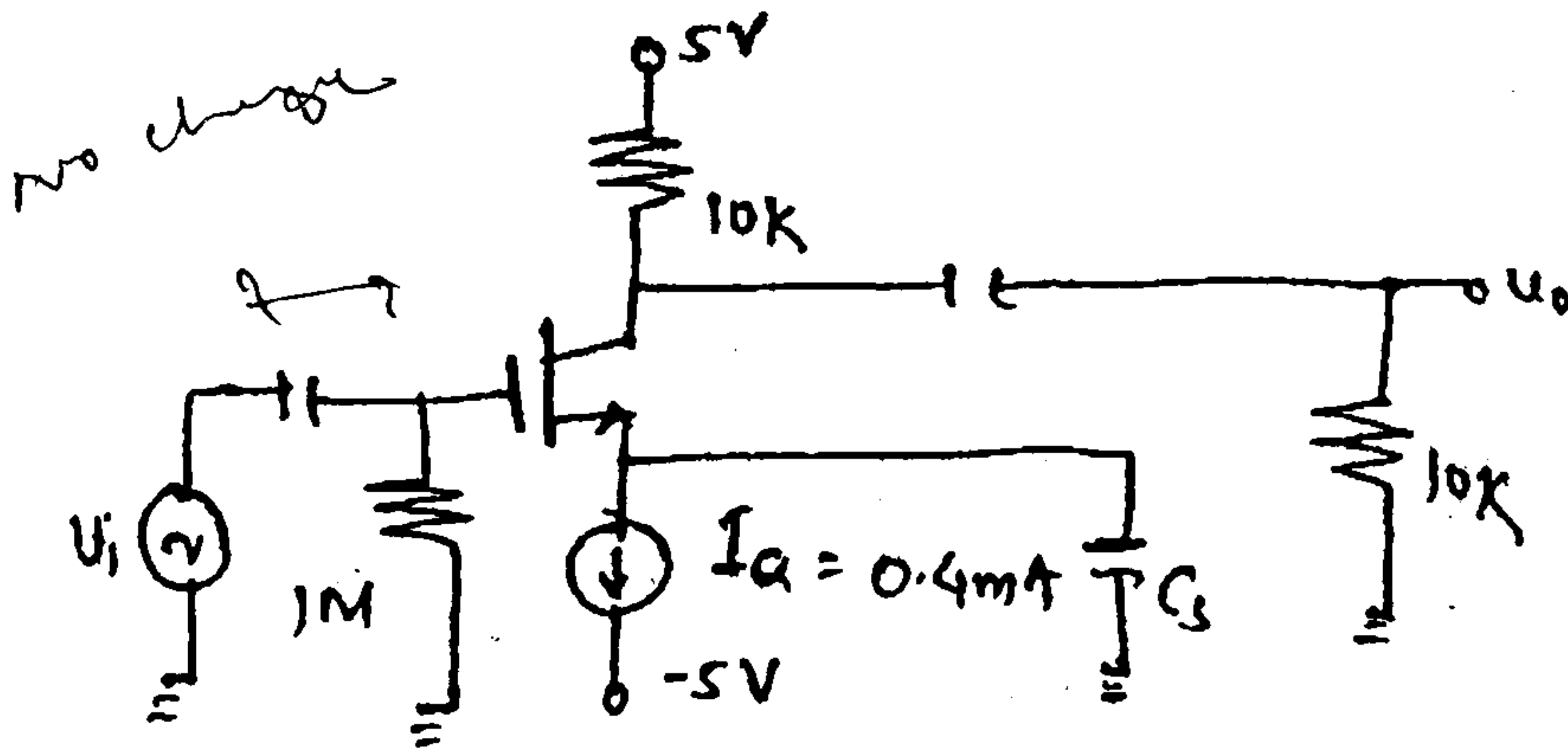
(b) Derive the expression for frequency of oscillation for a transistorized (BJT) RC phase shift oscillator. 8

(c) 4



Obtain output for the clipper circuit shown in fig. If a sine wave of $15 \sin \omega t$ is applied as an input. Assume practical diode with suitable cut in voltage.

3. (a) 10

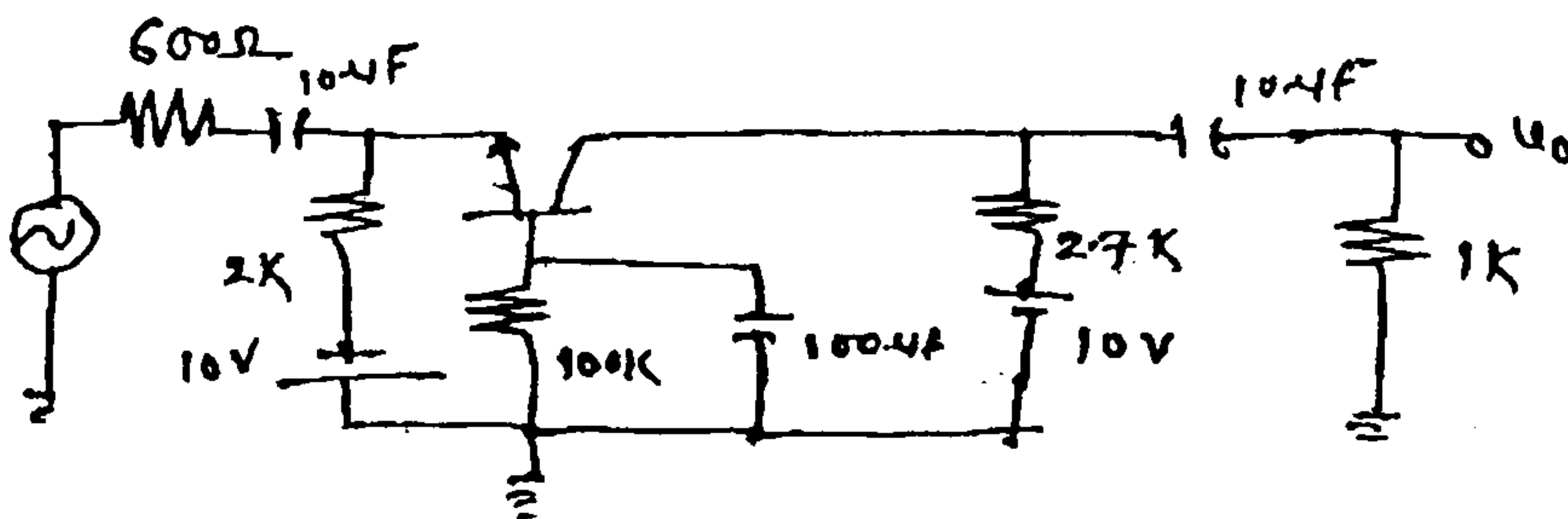


$V_{TN} = 1V, K_n = 0.5 \text{ mA/V}^2, \lambda = 0.01 \text{ V}^{-1}$

Determine V_{GSQ} and V_{DSQ} .

Also calculate voltage gain, input and output resistance.

(b) Determine R_i, R_o, A_v and g_m for amplifier circuit shown in figure. 10

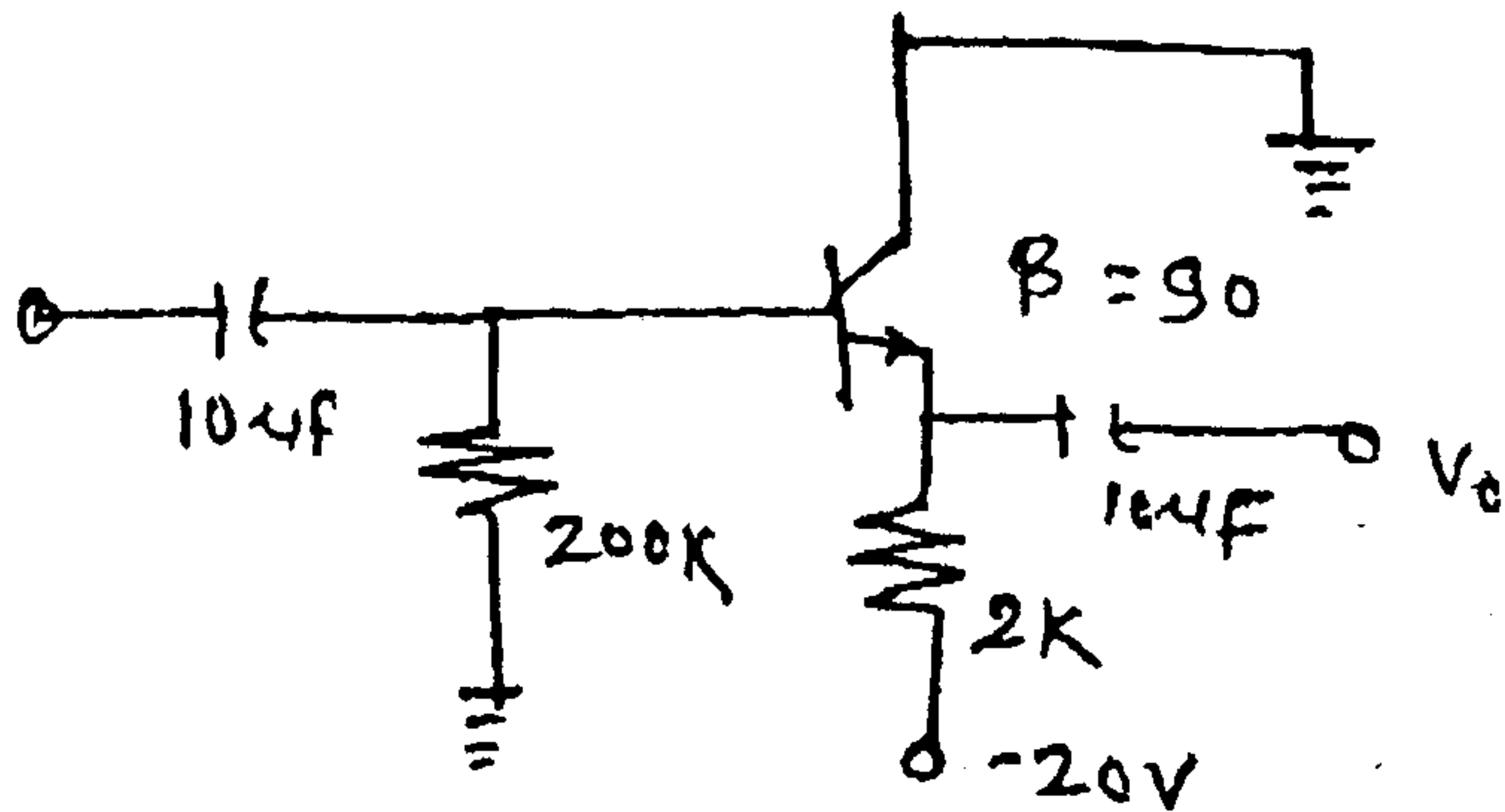


$V_{BE(ON)} = 0.7V, \beta = 100, V_A = \infty$

4. (a) Derive the expression for Threshold Voltage for Enhancement type N-channel MOSFET. 10

(b)

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Determine I_B , I_C , V_{CE} , V_E and V_B and also S_{ICO} for the biasing circuit shown in figure.

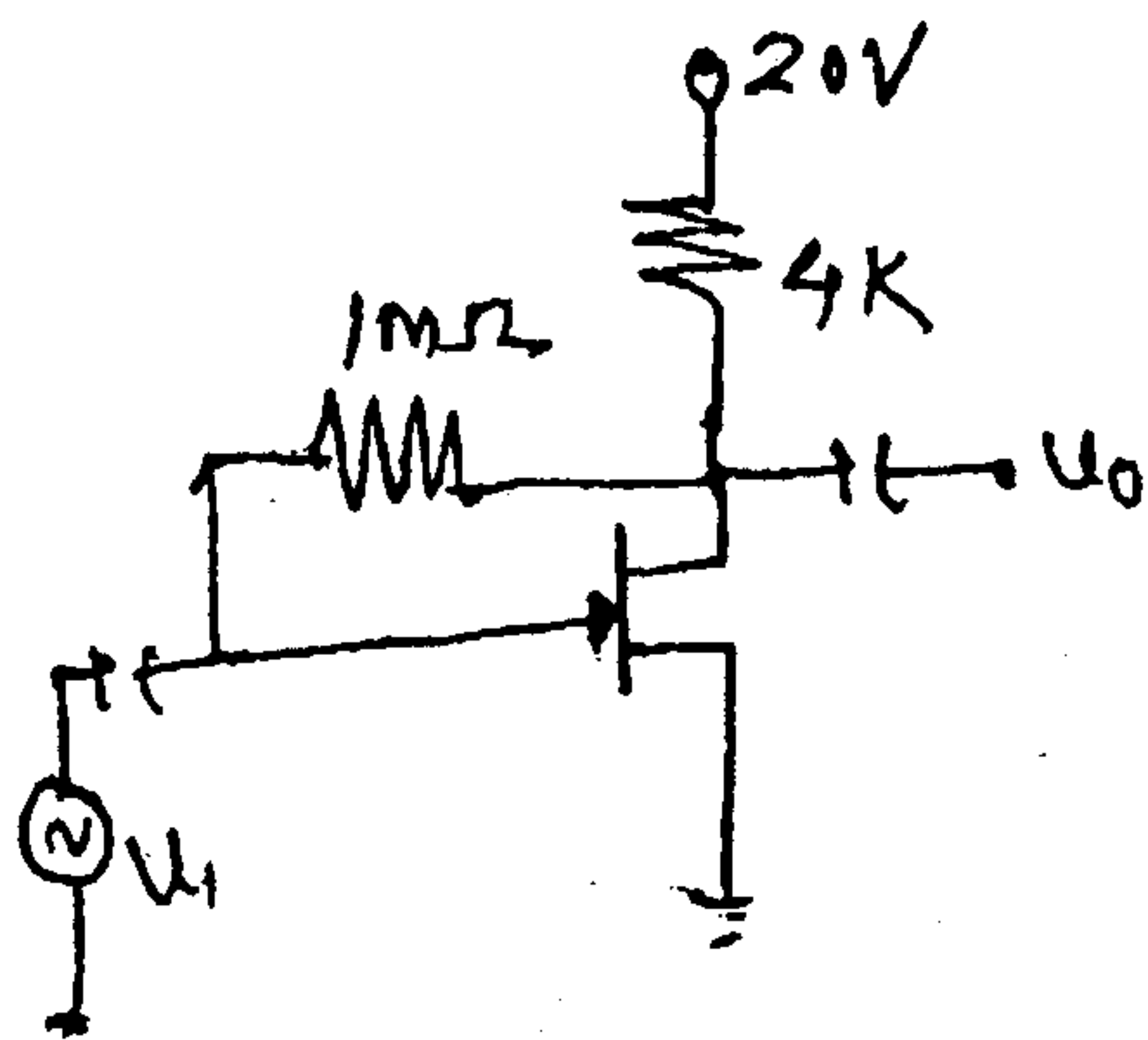
5. (a) Explain graphical method to obtain parameters of CE configuration.

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(b)

5



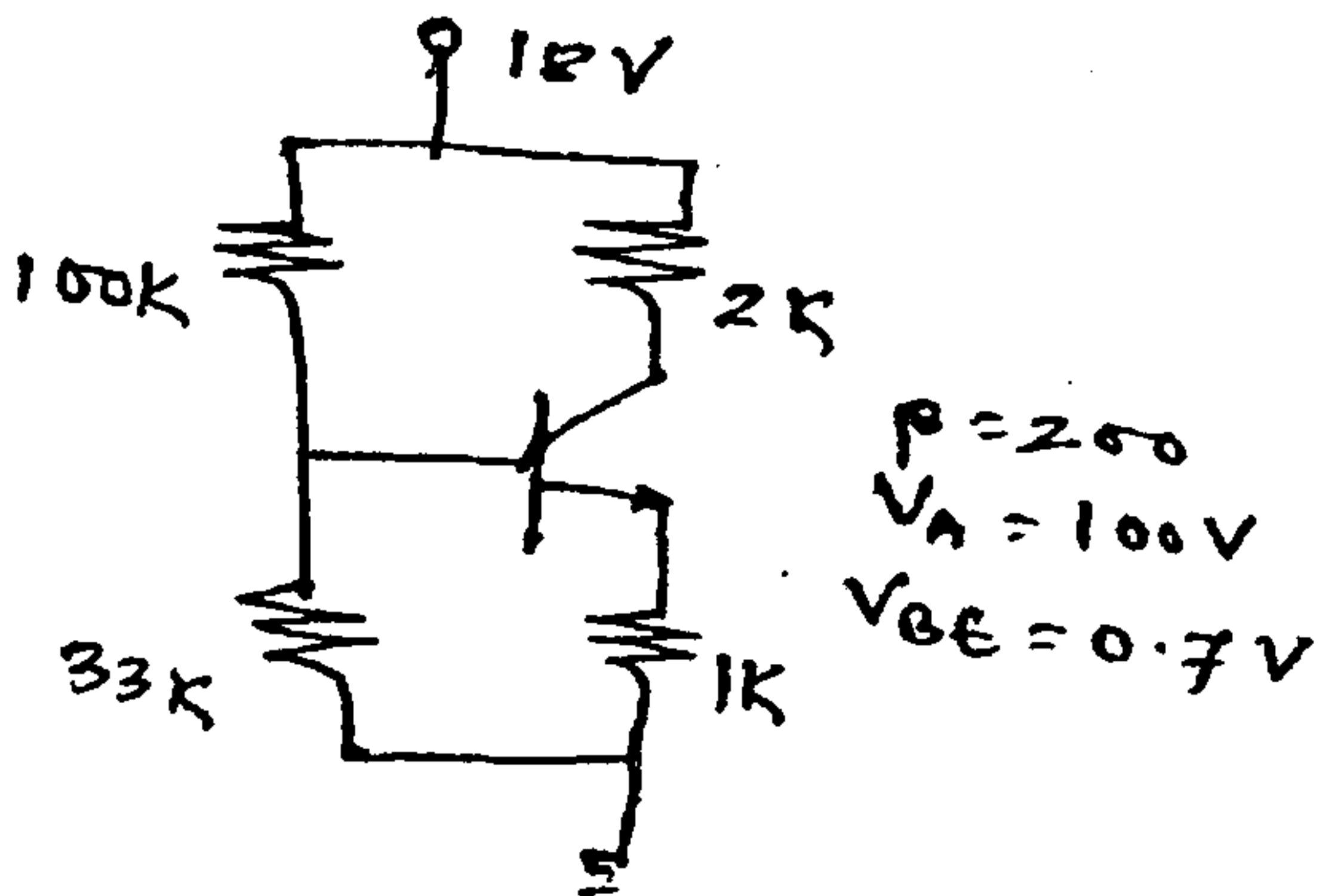
$I_{DSS} = 8 \text{ mA}$

$V_p = -4 \text{ V}$

Calculate I_{DQ} , V_{GSQ} and V_{DSQ}

(c)

5



Determine hybrid - Π parameters.

6. Write short note (any four):-

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- (i) Small signal model of a diode
- (ii) Hybrid pi model of BJT
- (iii) Regions of operation of FET
- (iv) Crystal oscillator
- (v) Construction and operation of schottkey diode.