NED UNIVERSITY OF ENGINEERING & TECHNOLOGY, KARACHI
FIRST YEAR (COMPUTER SCIENCE AND INFORMATION TECHNOLOGY)
ANNUAL EXAMINATION 2008
BATCH 2007-08

Time: 3 Hours **Dated: 01-11-2008**
Max. Marks: 75/80

BASIC ELECTRONICS - (EL-134)

Instructions:

1) Attempt five questions in all with Q.No.1 being the compulsory
2) Take valid assumptions whenever required

Q.1 (a) Fill in the blanks with the most appropriate answer. (8/8)

i) Two transistors, fabricated with the same technology but having different junction areas, when operated at base emitter voltage of 0.72V have collector currents of 0.2mA and 12mA. The ratio of their junction areas are _____

ii) For $V_{GS}>V_{th}$ and $V_{ds}<(V_{GS}-V_{th})$, NMOS is operating in _____ mode.

iii) The reverse current through a diode is 4mA at 50°C. If temperature drops to 10°C, the new value of reverse current will be _____.

iv) PIV for a full-wave rectifier is _____.

v) Zener diodes operate in _____ region.

vi) MOS performance can be approximated as a linear resistance in _____ region.

vii) Increasing the value of filter capacitor _____ the ripple amplitude.

viii) Loop gain in an RC feedback Oscillator is _____.

(b) Determine which of the following statements are either right or wrong. (7/8)

i) In a series connection of three amplifiers with the output of one being the input of other, the gain of the whole system is equivalent to that of the voltage with the maximum gain.

ii) A diode can be used as a voltage regulator if operated in breakdown region.

iii) Increasing the base current can drive a transistor in saturation.

iv) A student, mistakenly, connections the drain of an NMOS in place of its source and source in place of drain. His circuit will work properly.

v) If the base voltage of a BJT is higher than its collector and emitter, the transistor is operating in active region.

vi) If the base and collector of a BJT are shorted together, the BJT will act as a diode.

vii) Band gap of Silicon is lower than Germanium. (0.5/1)

viii) Gate of a MOSFET is insulated. (0.5/1)

Q.2 (a) Sketch the transfer characteristics V_o v/s V_i for the limiter circuit in Fig. (1). Assume ideal diode (5/5)

(b) Design limiter circuits using diode and 10KΩ resistor to provide an output signal limited to the range. (5/5)

i) -0.7V and above

ii) +2.1V and below

(c) Sketch the output for the input shown in Fig. (2). Assume ideal diode (5/6)

Q.3 (a) Find the labeled node voltages in Fig. (3) (8/8)

(b) Find value of R in the circuit given in Fig. (4) (7/8)

Q.4 (a) The diode in the Fig. (5) has V_D=0.7V at i_D=1mA. Use iterative analysis to calculate the diode current. (7/8)

(b) Find I and V in the circuit given in Fig. (6) (8/8)

Q.5 Calculate the voltage gain for the circuit given in Fig. (7) (15/16)

Q.6 (a) The circuit given in Fig. (8) is utilized in feedback circuitry of Wein-bridge oscillator. Prove that V_{out}/V_{in}=1/3 (8/8)

(b) Analyze the circuit in Fig. (9) to determine all node voltages and branch currents. (7/8)

Q.7 Find the missing node voltage and currents for the circuits given in Fig. (10) (15/16)

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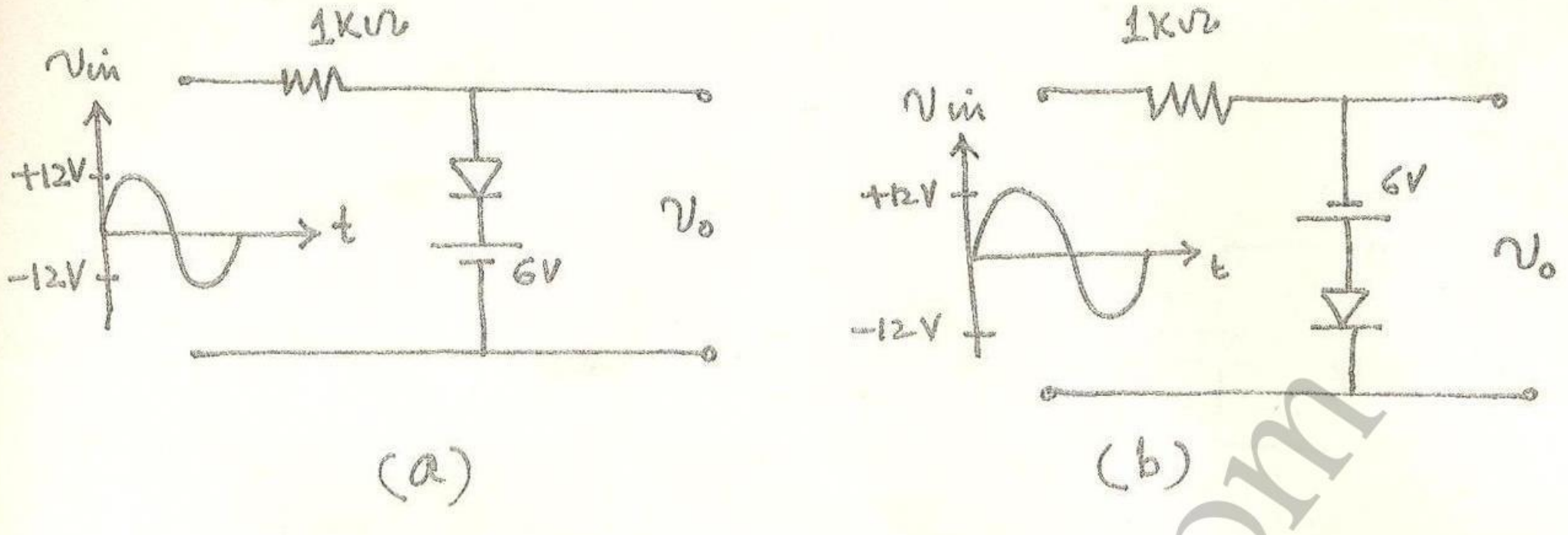
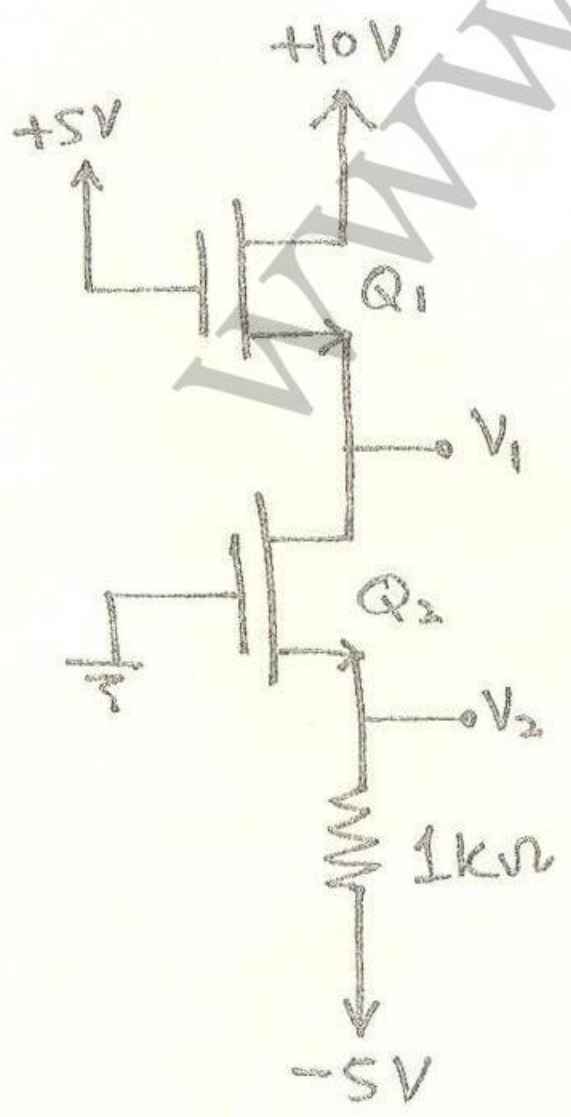


Fig. (1)

Fig. (2)

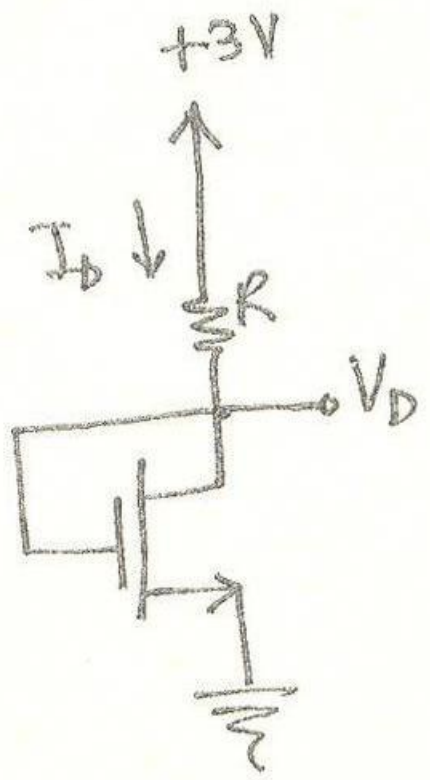


$Q_1 = Q_2$

$V_t = 1V$

$k_n' \frac{W}{L} = 2mA/V^2$

Fig. (3)



$I_D = 80\mu A$

$V_t = 0.6V$

$\mu_n C_{ox} = 200\ \mu A/V^2$

$L = 0.8\mu m$

$W = 4\mu m$

Fig. (4)

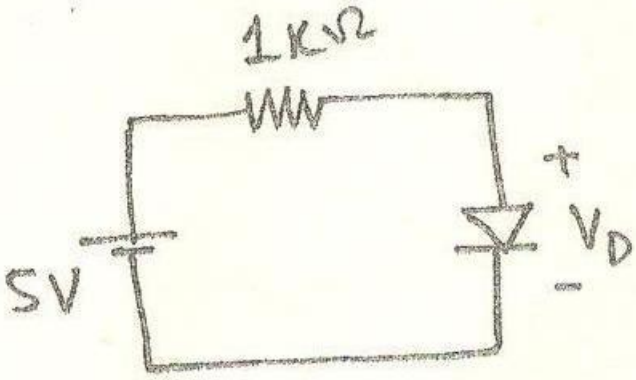


Fig. (5)

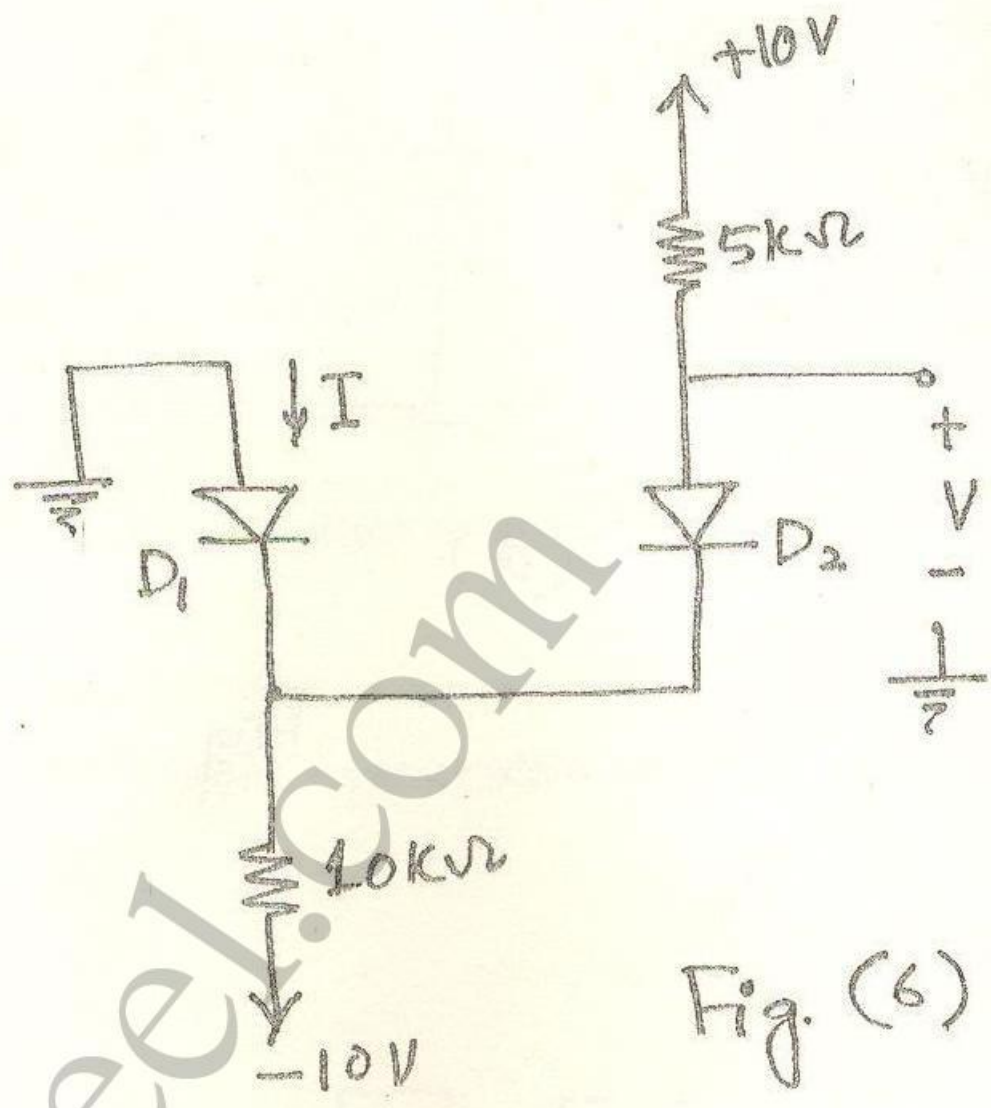


Fig. (6)

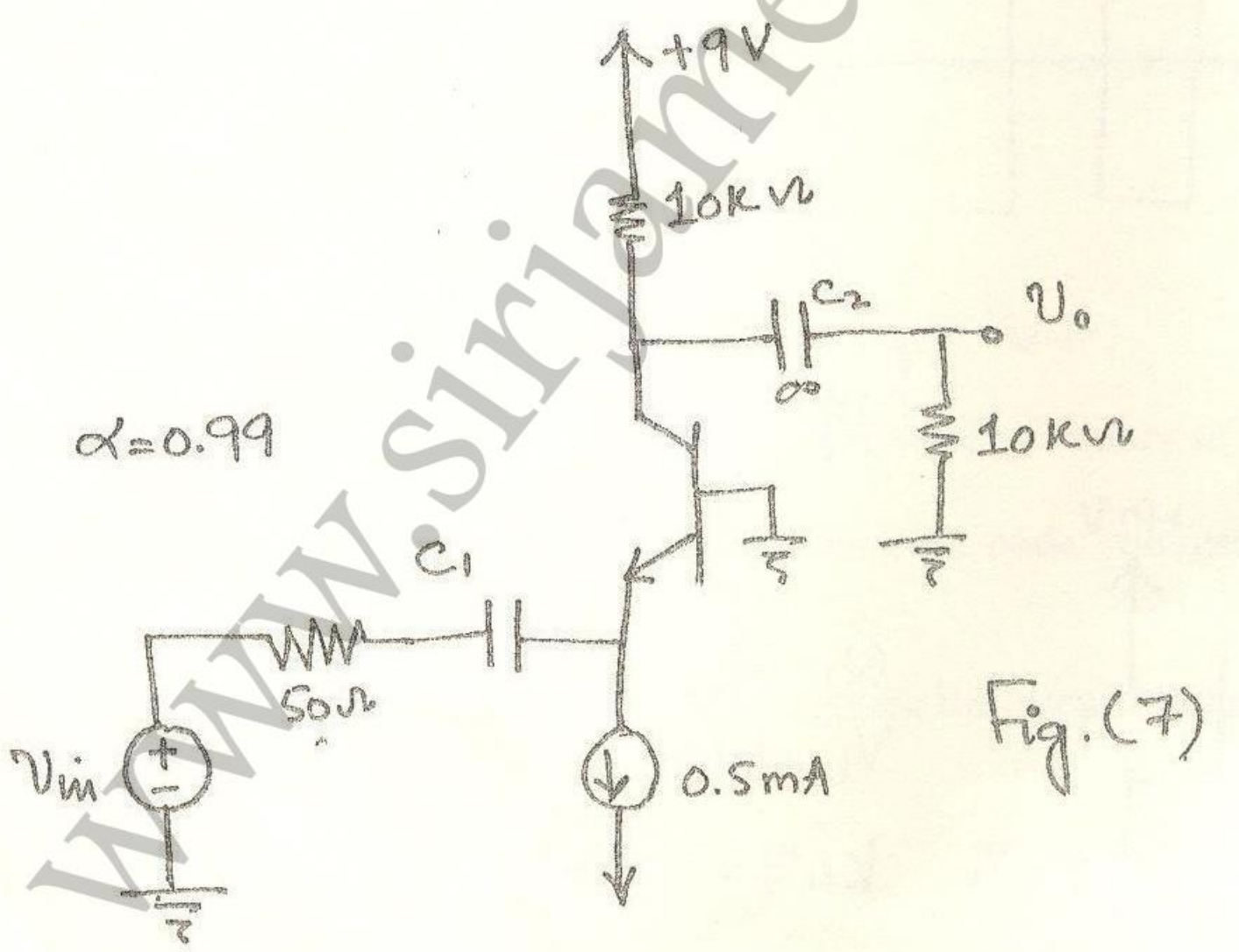


Fig. (7)

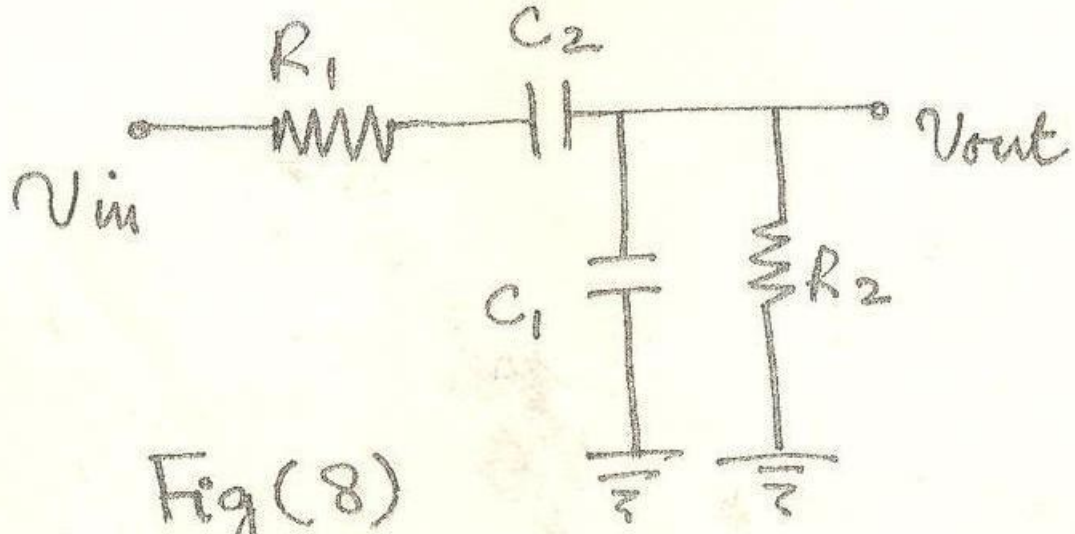


Fig (8)

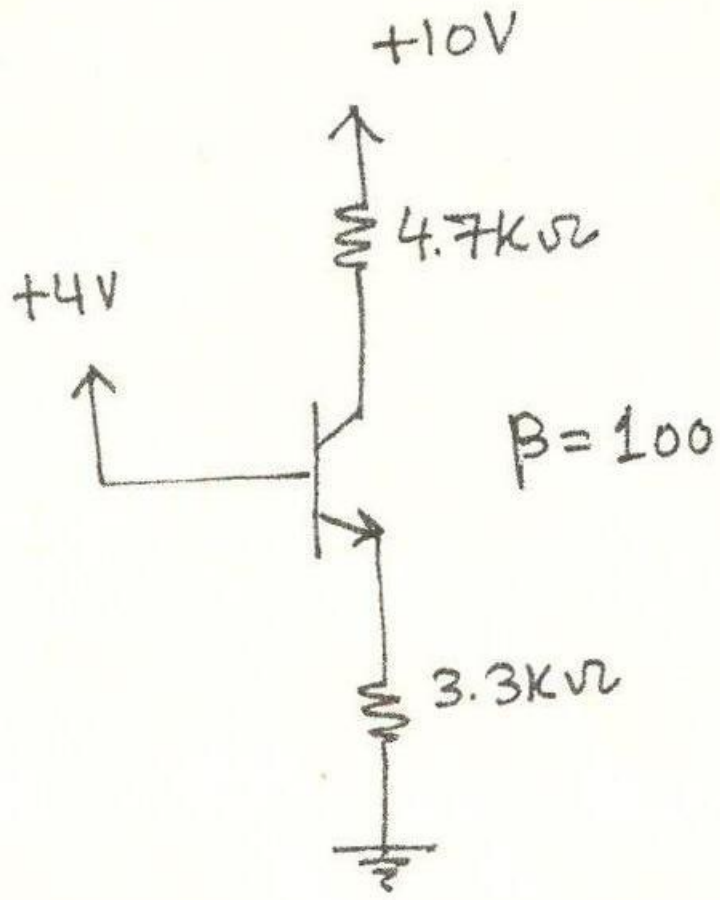
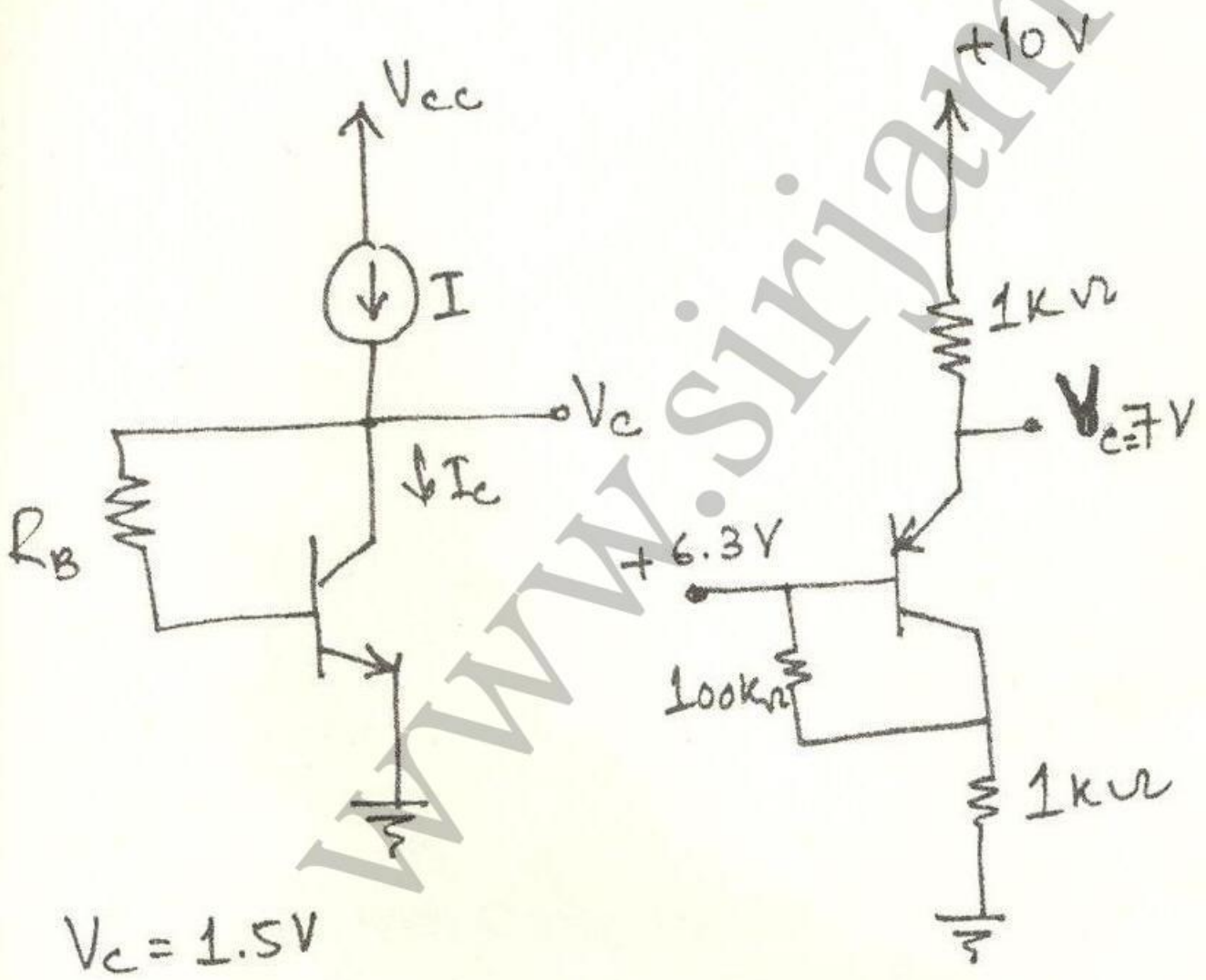


Fig. (9)



$V_c = 1.5V$

$I_c = 3mA$

$\beta = 90$

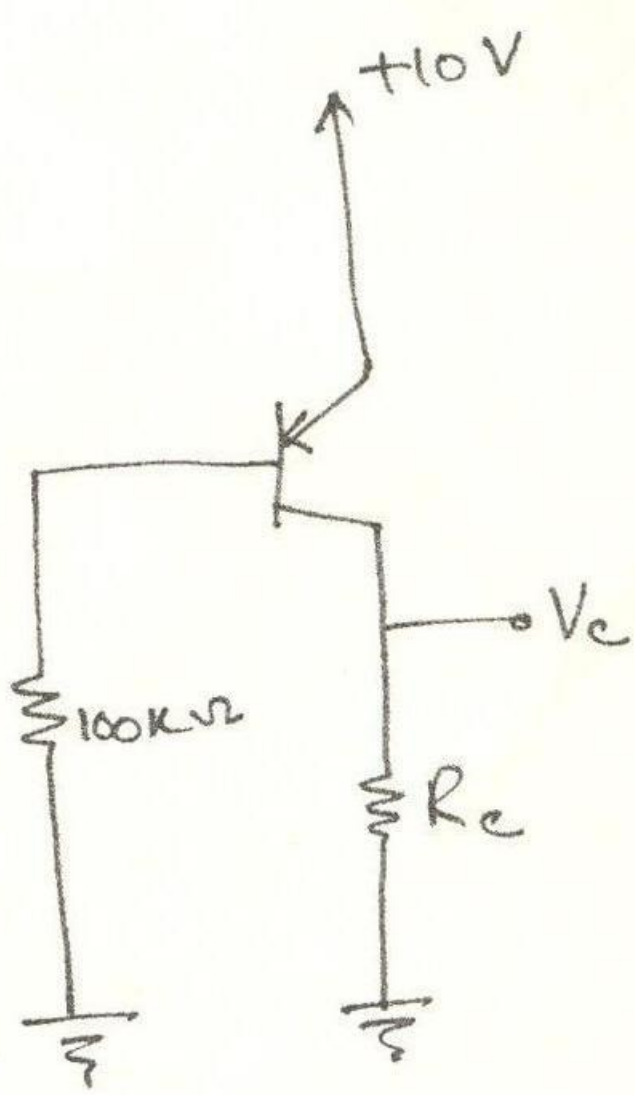
$R_B = ?$

$I = ?$

(a)

$\beta = ?$

(b)



$\beta = 50$

$V_c = +5V$

$R_c = ?$

(c)

Fig. (10)