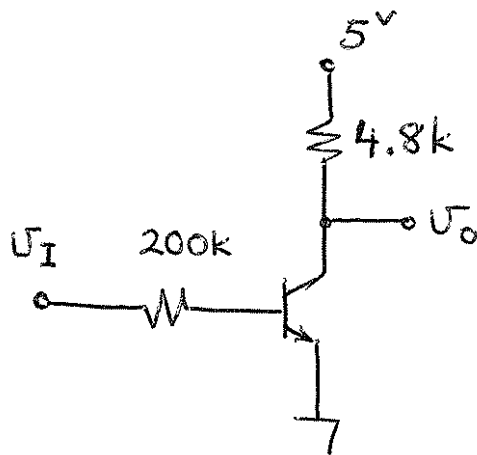Problem Set 4
Not graded

1.

$\beta = 100$

$V_{BE(ON)} = 0.6^V$

$V_{CE(SAT)} = 0.2^V$

plot U_o vs U_I

for $0 \leq U_I \leq 5^V$

2. Draw the energy band diagram of a pnp bipolar junction transistor that is in active state. Show the flow of electrons and holes. Show the base-emitter and base-collector voltages.
3. Problem 5.5
4. Problem 5.7
5. Problem 5.15 (a)
6. Problem 5.15 (b)
7. For the following circuits, determine the state of each diode and transistors. Calculate all voltages and currents given in the figures.

BJT parameters β=100, βR=2,
$$V_{BE(ON)} = 0.7V \quad V_{CE(SAT)} = 0.2V$$
$$V_{EB(ON)} = 0.7V \quad V_{EC(SAT)} = 0.2V$$

Diode parameters Vγ=0.7V

(a)

(b)

(c)

+10V

$V_z = 7.2^V$

10k

I_E

+

V_{EC}

−

I_B

T1

5k

I_c

5.6k

(d)

+6V

30k

5k

I_B

I_c

+

V_{CE}

−

T1

2mA

−6V

(e)

+10V

1k

D2

160k

D1

I_{C1}

+

V_{CE1}

−

T1

V_{EC2}

−

T2

I_{C2}

$V_z = 4.8^V$

+3V

(f)

+10V

2k

I_c

+

V_{CE}

−

T1

20μA

1k

(g)

D1 I_E

V_{EC}

I_c

1.8k

+5V

1.8k

−5V

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