

Sir Syed University of Engineering & Technology (SSUET)

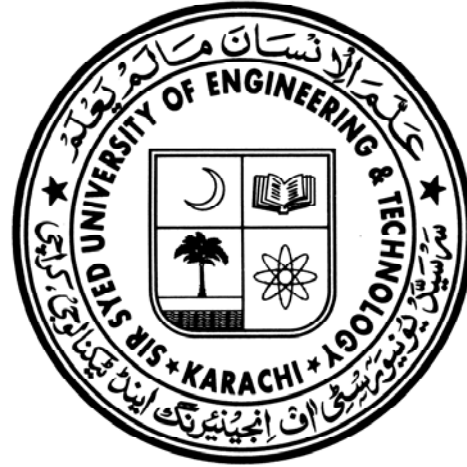
Computer Engineering Department

Course Name: Basic Electronics

Semester: Spring 2011, 3rd

Batch: 2010(Sections: A,B)

Assignments # 1



Course Responsible

Syed Hassan Raza Naqvi

Assistant Professor,

Computer Engineering Department

Office: STI,

SIR SYED UNIVERSITY OF ENGINEERING AND TECHNOLOGY
COMPUTER ENGINEERING DEPARTMENT
BASIC ELECTRONICS
2010 BATCH (Sections: A, B)
Last Submission Date: 3rd MARCH, 2011, 4PM.

Assignment #1

1. Load Line Analysis: Q1 – to – Q4

Q1.

1. The load line will intersect at $I_D = \frac{E}{R} = \frac{8V}{330\Omega} = 24.24mA$ and $V_D = 8V$.

(a) $V_{D\phi} \approx \underline{0.92V}$

$I_{D\phi} \approx \underline{21.5mA}$

$V_R = E - V_{D\phi} = 8V - 0.92V = \underline{7.08V}$

(b) $V_{D\phi} = \underline{0.7V}$

$I_{D\phi} \hat{=} \underline{22.2mA}$

$V_R = E - V_{D\phi} = 8V - 0.7V = \underline{7.3V}$

(c) $V_{D\phi} = \underline{0V}$

$I_{D\phi} = \underline{24.24mA}$

$V_R = E - V_{D\phi} = 8V - 0V = \underline{8V}$

For (a) + (b) levels of $V_{D\phi}$ and $I_{D\phi}$ are quite close. Levels of part (c) are reasonably close but as expected due to level of applied voltage E.

Q2.

$$2. (a) I_D = \frac{E}{R} = \frac{5V}{2.2k\Omega} = 2.27mA$$

The load line extends from $I_D = 2.27mA$ to $V_D = 5V$.

$$V_{DQ} \approx \underline{0.7V}, I_{DQ} \approx \underline{2mA}$$

$$(b) I_D = \frac{E}{R} = \frac{5V}{0.47k\Omega} = 10.64mA$$

The load line extends from $I_D = 10.64mA$ to $V_D = 5V$.

$$V_{DQ} \approx \underline{0.8V}, I_{DQ} \approx \underline{9mA}$$

$$(c) I_D = \frac{E}{R} = \frac{5V}{0.18k\Omega} = 27.78mA$$

The load line extends from $I_D = 27.78mA$ to $V_D = 5V$.

$$V_{DQ} \approx \underline{0.93V}, I_{DQ} \approx \underline{22.5mA}$$

The resulting values of V_{DQ} are quite close while I_{DQ} extends from 2mA to 22.5mA.

Q3.

3. Load line through $I_{DQ} = 10mA$ of characteristics and $V_D = 7V$ will intersect I_D axis at 11.25mA.

$$I_D = 11.25mA = \frac{E}{R} = \frac{7V}{R}$$

$$\text{with } R = \frac{7V}{11.25mA} = \underline{0.62k\Omega}$$

Q4.

$$4. (a) I_D = I_R = \frac{E - V_D}{R} = \frac{30V - 0.7V}{2.2k\Omega} = \underline{13.32mA}$$

$$V_D = \underline{0.7V}, V_R = E - V_D = 30V - 0.7V = \underline{29.3V}$$

$$(b) I_D = \frac{E - V_D}{R} = \frac{30V - 0V}{2.2k\Omega} = \underline{13.64mA}$$

$$V_D = \underline{0V}, V_R = \underline{30V}$$

Yes, since $E \gg V_T$ the levels of I_D and V_R are quite close.