# King Fahd University of Petroleum and Minerals
# Electrical Engineering Department

**EE203 Electronics I**
**Exam # 1**

| Name: | I.D# | No. | Sec.#01 |
|---|---|---|---|

**Question No.1**

(a) For the circuit shown in Fig. 1(a), what is the minimum value of $v_I$ that makes the diode conducting. Use 0.7V constant voltage drop model.

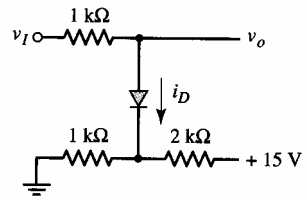


**Fig. 1(a)**

(b) For the circuit shown in Fig. 1(b), explain the operation of the circuit for different values of $v_I$. Then, draw the voltage transfer characteristics of the circuit for the range of $v_I$ from -10V to 10V.

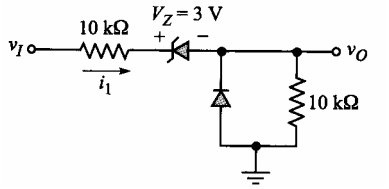


**Fig.1 (b)**

**Question No. 2**

Fig. 2 shows a rectifier using center-tap transformer. Assume that the diode needs 0.7V to conduct and the sinusoidal input signal has amplitude of 110V and frequency of 60Hz.

(a) Is this a full-wave or half-wave rectifier.
(b) Calculate the ripple and DC values at the output terminal TP1.
(c) Sketch the output waveform at TP1.
(d) If it were required to reduce the ripple further, what circuit would you use?
i) a limiter ii) a regulator iii) a clipper iv) an amplifier

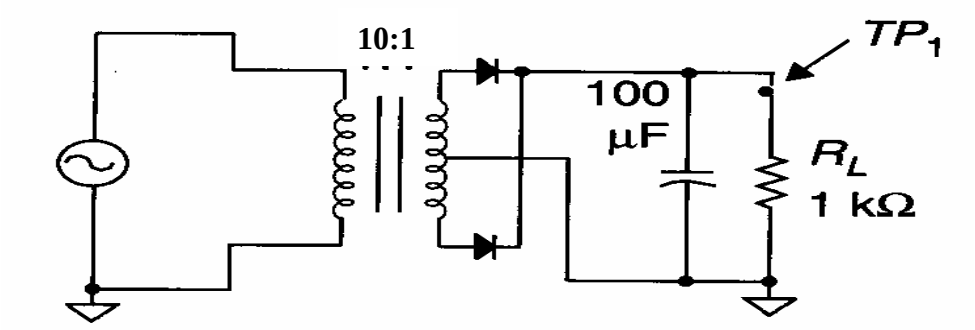


**Fig. 2**

**Question No. 3**

(a) The PMOS in the circuit of Fig. 3(a) has $V_t$=-0.7 V, $\mu C_{ox}$=60 $\mu A/V^2$, L=0.8 μm and W=4.8 μm, and λ=0. If R=30.4 kΩ, find the drain current and voltage.

(b) The NMOS transistors in Fig. 3(b) have $V_t$=-0.7 V, $\mu C_{ox}$=120 $\mu A/V^2$, L1=L2=1 μm, find the values of the gate width for each of Q1 and Q2 and the value of R, to obtain the current values indicated.