ECE 3040 Microelectronic Circuits Quiz 3
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Instructions. Print your name in the space above. The quiz is closed-book and closed-notes. The quiz consists of 2 problems. **Honor Code Statement:** *I have neither given nor received help on this quiz.* Initials ⎯⎯⎯⎯⎯⎯⎯⎯

1. (a) Draw the circuit diagram of a half-wave rectifier consisting of a transformer, a diode, and a load resistor R_L. `Covered in class notes.`
   (b) If the secondary voltage of the transformer is given by $v_S(t) = V_S \sin(\omega t)$ and the diode is modeled with its large-signal model with $R_D = 0$, sketch and label the waveforms of $v_S(t)$ and the load voltage $v_L(t)$. `Covered in class notes.`
   (c) What is the effect of adding a filter capacitor in parallel with R_L on the waveform for $v_L(t)$? `Covered in class notes.`
   (d) How can the circuit be modified to obtain a full-wave rectifier with both positive and negative output voltages, i.e. a full-wave bipolar power supply? Label the diodes and specify which diodes conduct for $v_S(t) > 0$ and which diodes conduct for $v_S(t) < 0$. `Covered in class notes.`

2. (a) Describe what is called an "ohmic contact." `Aluminum-n⁺ junction.`
   (b) What is another term for "Zener breakdown?" `Field emission.`
   (c) When a reverse biased diode is used as a variable capacitor in a circuit, what is the diode called? `Varactor.`
   (d) What is the basic reason that the Schottky barrier diode exhibits a faster switching speed than the pn-junction diode? `Less charge storage.`