

PURDUE UNIVERSITY NORTH CENTRAL

Electrical & Computer Engineering Technology Department

ECET 157 (Prof. Smith)

TEST #2

Spring, 2009

NAME: _____

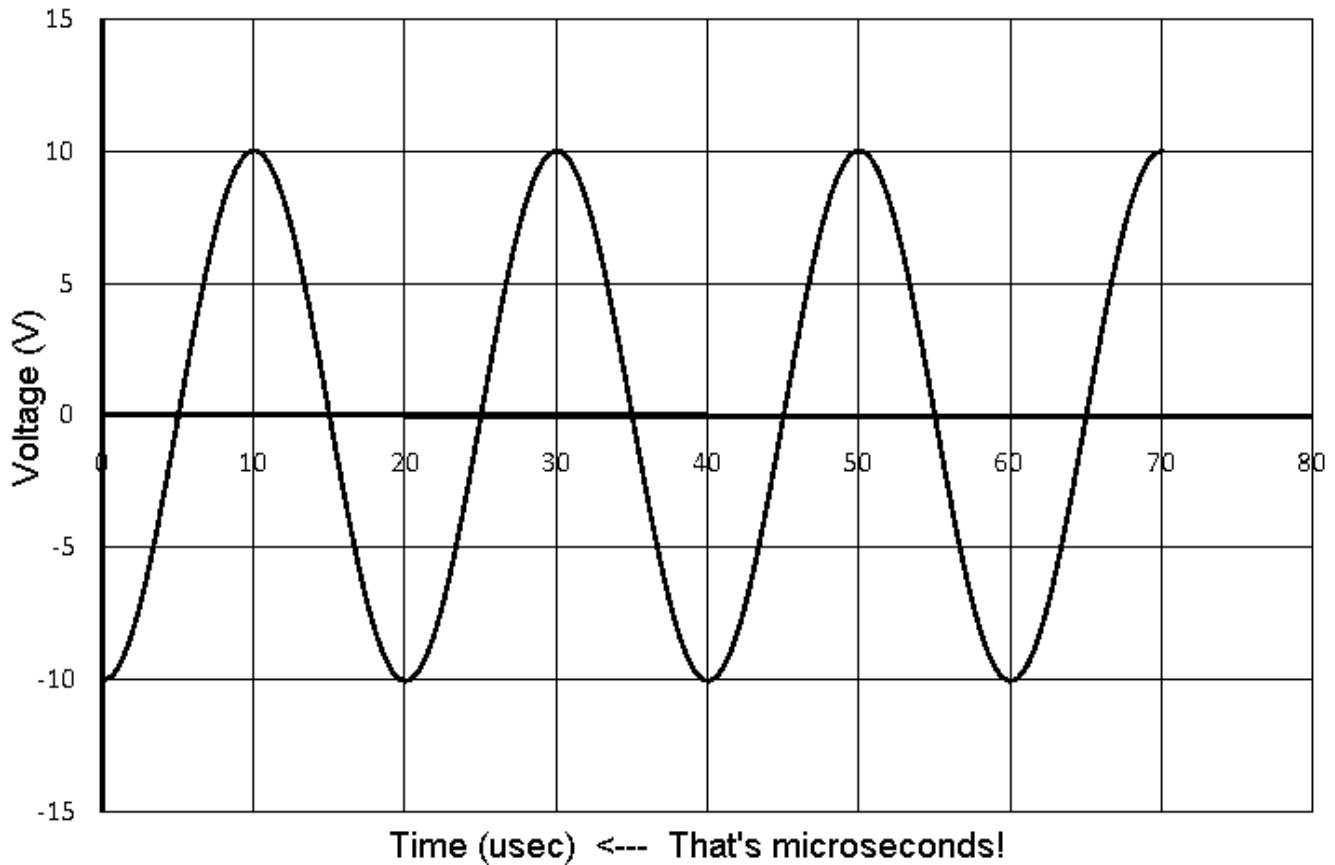
Part I - - Sinusoidal Waveforms.

(15 points)

1. For the signal below, determine the following. $V_{dc} =$ _____ $V_{ampl} =$ _____
offset
- $V_{rms} =$ _____ $V_{pk} =$ _____ $V_{p-p} =$ _____ $V_{ave} =$ _____
- $f =$ _____ Hz period = _____ phase shift = _____° $\omega =$ _____ rad/s

Write the time domain equation for the signal. $v(t) =$ _____

Write the phasor notation for the signal. $\bar{V} =$ _____ \angle _____°



Part II - - True-False and Write-In Questions.

(30 points)

2. T F The p-side of a diode is called the anode.
3. T F A BJT in saturation typically has 0.2 Volts or less across the collector-emitter junction.
4. T F As a semiconductor gets warmer, it conducts more current.
5. T F A Zener diode useful can be driven to the reverse breakdown point, then recover.
6. The three terminals of a bipolar junction transistor are called:
 - a. _____ .
 - b. _____ .
 - c. _____ .
8. The Q-point indicates the (name the current) _____ current and the (name the voltage) _____ voltage when the transistor's input is equal to (how many?) _____ Volts.
9. The three notable features that make op amps so useful are: (Also tell why each is important.)
 - a. _____ .
 - b. _____ .
 - c. _____ .
10. Looking at a schematic, you notice that the input v_{in} to an op amp circuit goes to the (-) input terminal through a resistor. You also notice that there is a feedback resistor connected from the output to the same (-) terminal. What type of amplifier is this? (Check best answer.)
____ a. Non-Inverting Amplifier. ____ b. Inverting Amplifier. ____ c. Voltage Follower.
11. Briefly describe how an op amp's Input Offset Voltage (V_{IO}) and Input Bias Current (I_B) can affect the circuit. (Is this something to be concerned about? If so, why?)

Part III - - BJT Amplifier Circuit.

(25 points)

12. Refer to the characteristic curve shown.
- (a) Use $V_{CC} = 8V$ and $I_{C(max)} = 40\text{ mA}$ and label these on the plot.
 - (b) Pick a Q-point & label it. (Clearly mark its I_C & V_{CE} !!!)
 - (c) Calculate the β .
 - (d) Calculate the α .
 - (e) Draw the universal-bias circuit.
 - (f) Calculate R_a , R_b , R_c and R_e and label these values on your circuit. (Use the approximate method.)
 - (g) Calculate I_B , I_C and I_E .
 - (h) Calculate the AC gain.

