Final Exam
Physics 228 (lab)

Date: 13 Jan, 2006
Time: 4.30 PM – 5.45 PM

Name: ---------- **Section:** Monday----------
Tuesday ----------
Wednesday ----------
Thursday----------

Answer the following questions:

3 points

1- What are the units of the number displayed by the CTFM (Universal Counter)

a) in frequency Mode?---------- Resolution----------

b) in period mode? ---------- Resolution----------

For a 150 KHz signal, would a frequency or period measurement with the CTFM provide the greater resolution? **Explain**. [in other words find uncertainty in the frequency mode and period mode and compare.]

3 points

2- a) Can you obtain a 1.99 MHz square wave signal from your (Function Generator)?

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b) Can you obtain a 5 Volts sine wave signal from your (Function Generator) using TTL output?

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c) Can you obtain a triangular wave signal having a peak value of 20 volts from your (Function Generator)?

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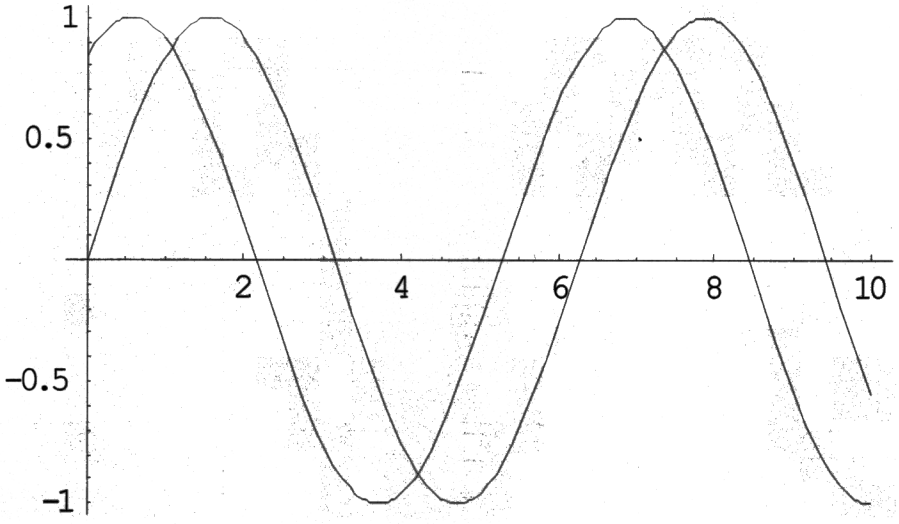
2 points

3- Calculate the phase difference between two voltages having the same amplitude and the same frequency. SHOW THE CALCULATION



the answer is:----------

2- points

4- If you are asked to measure the voltage of a 35 V battery with DMM (digital Multi-meter) with highest sensitivity.
Indicate which of the following statement is true.

a) Function switch on DCV, range 20 V, positive on com and negative on V/Ω.

b) Function switch on ACV, range 200 V, positive on V/Ω and negative on com.

c) Function switch on DCV, range 200 V, positive on V/Ω and negative on com.

d) Function switch on ACV, range 20 V, positive on V/Ω and negative on com.

e) Function switch on ACV, range 1000V, positive on V/Ω and negative on com

4 points

5-Develop the simplest diagram to implement the given logical equation using only NAND gates
XYZ + Y'Z' +Y Z'

5 points

6- Indicate whether the following statements are true or false:

a) The screen of the oscilloscope can provide a voltage against time display---

b) The screen of the oscilloscope can provide a voltage against another voltage-----

c) Any phenomenon that can be converted into a voltage can be measured with an oscilloscope-------

d) The screen of the oscilloscope can provide a lissajous figure if the two channels are connected to the voltage sources and the scope display is switched to X-Y mode ------

e) Output of a "NOR gate is "ONE" if all inputs are ϕ (ZERO) -----

5 points

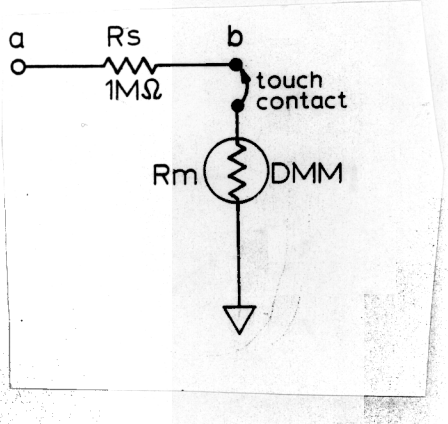
7 -To calculate internal resistance of the DMM in the voltage mode we used the circuit shown.

Assuming that when Rm is connected, the voltage at point a and point b (relative to common) are recorded below .

$Rs = 1.00\ M\Omega = 1.0 \times 10^6\ \Omega$

$Va = 5.55\ V$

$Vb = 4.65\ V$



why the internal resistance of the voltmeter is large

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5 points

8- Given the circuit below designed by a student.

Which figure gives the exact output across R ?

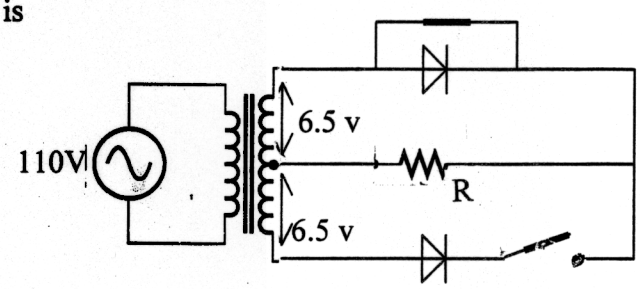
a) Figure a.

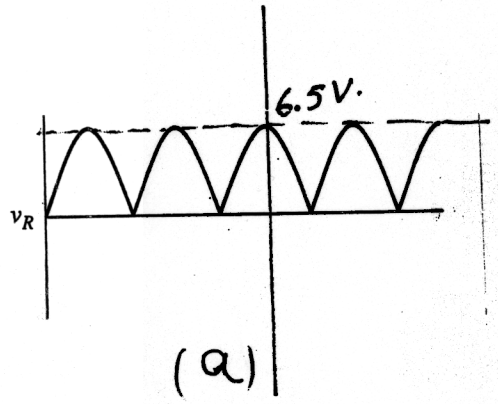
b) Figure b

c) Figure c

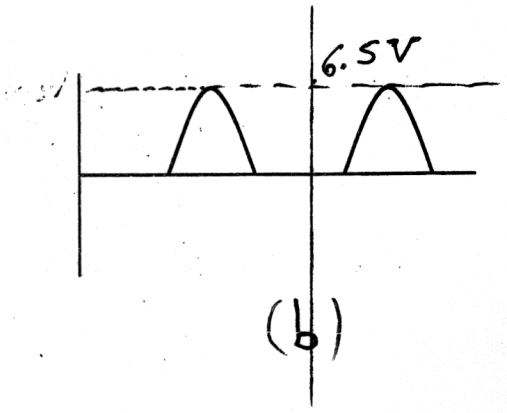
d) Figure d

The output across R is

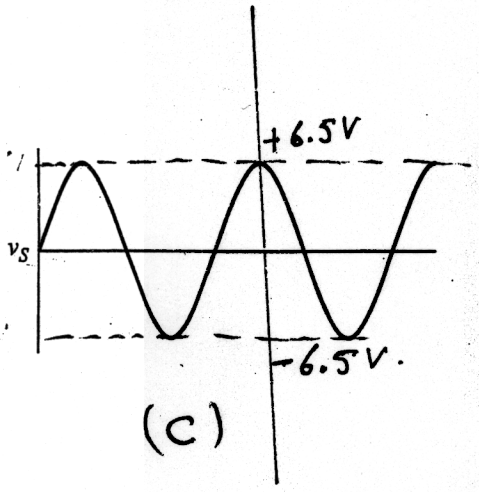




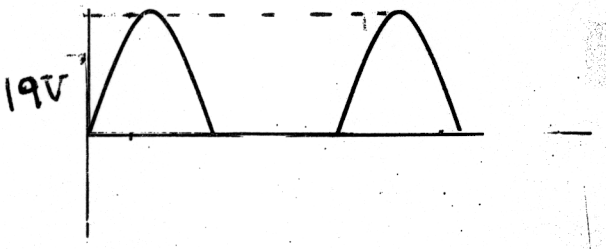
(a)



(b)



(c)

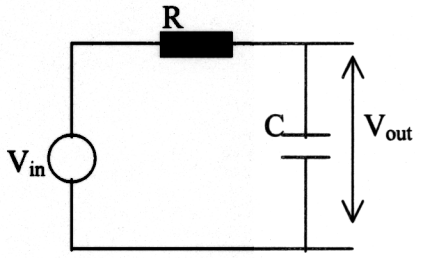


(d)

10 points

9- Given a low pass filter as shown in the figure . where C = 0.01 μF , R = 10 kΩ and FG amplitude V_{in} = 10 V

f) Calculate Xc at frequency 100 Hz
g) Give an expression for the output voltage
h) Fill in the table. Express the ratio V(out) / V(in) in Decibel (dB)
i) Plot the transfer ratio in dB vs log frequency. Determine the cut off frequency from your graph



Frequency	Log Frequency	Vin (v)	Vout (v)	dB
10 Hz		8.0	8 .0	
30		8.0	8 .0	
100		8.0	7.8	
300		8.0	7.5	
1000		8 .0	7.0	
3000		8.0	4.8	
10 kHz		8.0	1.5	