Senior Physics Laboratory: Electronics Assignment: Semester 2, 2011.

This assignment is due Monday 15th August and is to be submitted to the Student Support Office.

***** Circle the most correct and concise answer *****

Question 1
Consider the voltage divider circuit below.

What is the voltage between terminals A and B?
(a) 0.286 V (b) 2.86 mA (c) 28.67 mV (d) 2.86 V

Question 2
Which circuit can be described as a “low pass filter”?

(a) None of the above

Question 3
For a given load resistance $r_{load}$ what output source resistance will result in the minimum power transferred to the load?

(a) $r_{out}/r_{load} = 10$
(b) $r_{out}/r_{load} = 20$
(c) $r_{out} = r_{load}$
(d) $r_{out} = r_{load}/2$

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**Question 4** An amplitude is increased by a factor of 10. In decibels this can be written as an increase of:

(a) 10 dB  
(b) 3 dB  
(c) 20 dB  
(d) 6 dB

**Question 5**
An expression for the impedance (reactance) of a inductor, $L$, as a function of frequency is:

(a) $\frac{1}{\omega L}$  
(b) $-\frac{1}{\omega L}$  
(c) $-j\frac{1}{\omega L}$  
(d) $j\omega L$

**Question 6**
Which group of components can be considered “open circuit” at dc?

(a) An inductor, apart from the wire resistance.  
(b) A capacitor, apart from the dielectric leakage.  
(c) An inductor and large resistor in series.  
(d) An inductor and capacitor in parallel.

**Question 7**
For a capacitor $C$, the ac voltage across it can be described as:

(a) Lagging the ac current  
(b) In-phase with the ac current  
(c) Lagging and leading, depending on frequency of the ac current  
(d) Leading the ac current

**Question 8**
A transformer comprises 2 coupled inductors. With no load connected to the secondary, which statement is the most correct:

(a) The transformer never absorbs power  
(b) The power absorbed by the transformer per cycle is zero  
(c) All power is reflected at the primary  
(d) All power is stored in the inductors

**Question 9**
An $RC$ low-pass filter has a roll-off with frequency of 40 dB per decade. How many $RC$ stages (or poles) does it contain?

(a) 4 $RC$ stage
(b) 2 $RC$ stages  
(c) An $RC$ stage, followed by a $CR$ stage  
(d) None of the above

**Question 10**

Consider a $LCR$ resonant circuit without loss. On resonance:

(a) A parallel $LC$ circuit approaches $R$ ohms.  
(b) A parallel $LC$ circuit approaches infinite impedance.  
(c) A parallel $LC$ circuit can be made to have any impedance.  
(d) None of the above.