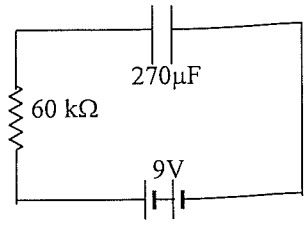
**The Open University of Sri Lanka**
**B.Sc. Degree Programme -Level 05- 2016/2017**
**No Book Test-1**
**Electronics for Biology Students- PCU3170**
**Duration : One hour**

**Date : 30th April 2017** **Time: 1.00 p.m to 2.00 p.m**

**Answer any two (2) questions**

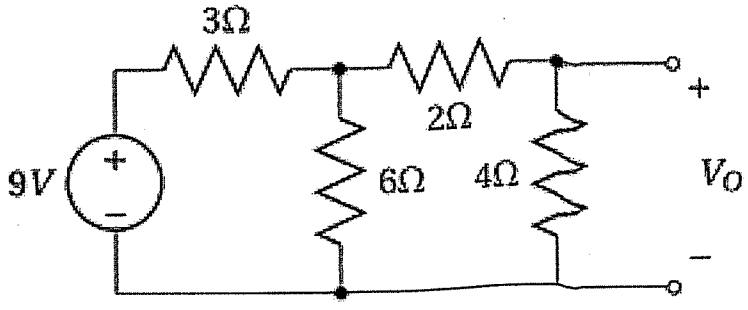
(1). (a) Find the equivalent capacitance when the capacitors 150 μF , 100 μF and 50 μF are connected
(i) in series
(ii) in parallel.

(b) The following diagram shows the circuit to charge a capacitor.

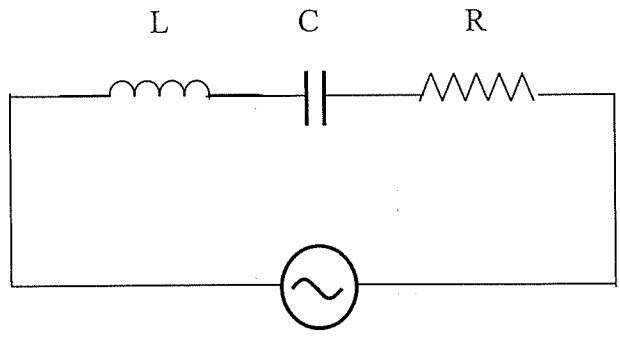



(i) Modify the above circuit to charge and discharge the capacitor using a two way switch.
(ii) Sketch the charging and discharging curves (Voltage vs time) for the capacitor.

(c). The output of the following circuit is given by $V_0$. With the help of Thevenin's theorem find the equivalent circuit ( the battery and the resistor).



(2) The following figure shows an alternative current circuit consisted of ac voltage source (V) , an inductor (inductance -L) , a capacitor (capacitance –C ) and a resistor (resistance -R) .




$V = 800 \sin(1500\, t)$ mV

(i) Draw the phasor diagram for voltages across the components.

(ii) Write down an expression for the resultant impedance.

(iii) If $L = 0.02$ H , $C = 0.1\ \mu$F and $R = 240\ \Omega$ , find the impedance of each component (consider the angular frequency , given in the source voltage)

(iii) Calculate the total impedance of the circuit.

(iv) Considering the peak voltage of the source, find the peak current through the circuit, hence find the peak voltage across each component.

(vi) Draw the voltage pattern with the time for each component comparing the peak voltages and phase differences.

(3) (i).Name three different types of semiconductor diodes and draw their symbols.

(ii).Give two properties of a diode which are not similar in a resistor.

(iii).Compare the V-I characteristics of a resistor and a forward biased diode.

(iv).Draw the circuit diagram of a negative peak clipping circuit and explain its working principle.

(v) A typical LED operates at 2 V/ 30 mA . How do you light up this LED using a 12 V dc power supply ?

(vi) A 6.2 V /0.5W Zener diode is used to obtain a fixed voltage($V_Z$) from a variable DC power source which changes from 9V to 14V. Find the suitable resistor which should be connected with the zener diode in series?

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