Name of the Student:_____
Max. Marks : 23 Marks **Time : 23 Minutes**

Q1.

A capacitor of capacitance 330 μF is charged to a potential difference of 9.0 V. It is then discharged through a resistor of resistance 470 kΩ.

Calculate

(a) the energy stored by the capacitor when it is fully charged,

_____

_____

_____

_____

(2)

(b) the time constant of the discharging circuit,

_____

_____

(1)

(c) the p.d. across the capacitor 60 s after the discharge has begun.

_____

_____

_____

_____

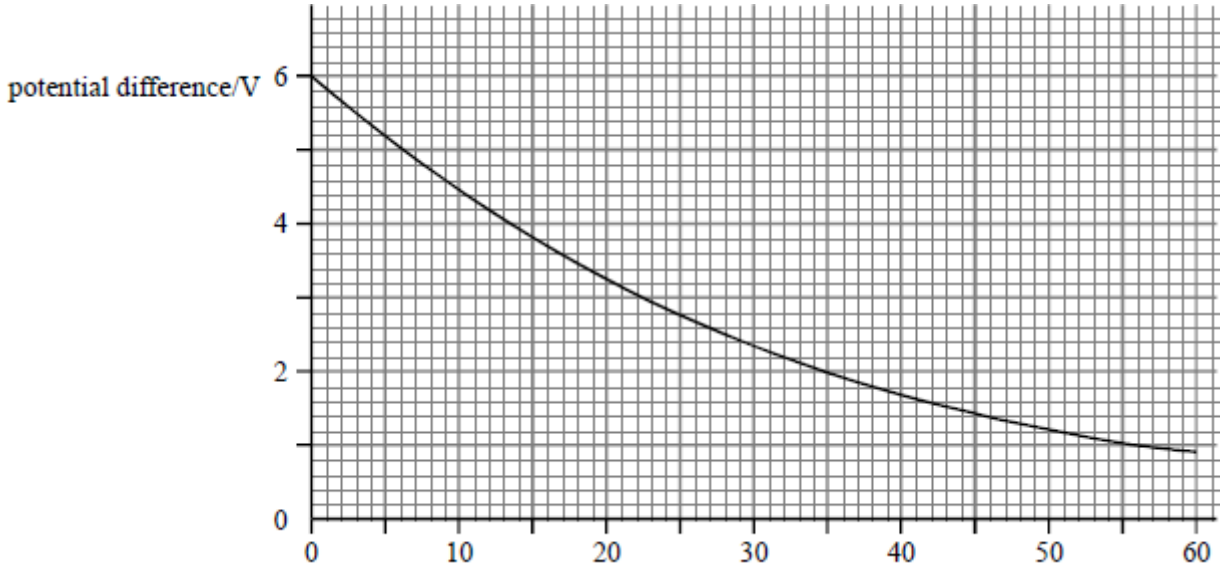
_____

_____

(3)
(Total 6 marks)

Q2.

A student used a voltage sensor connected to a datalogger to plot the discharge curve for a 4.7 μF capacitor. She obtained the following graph.



Use data from the graph to calculate

(a) the initial charge stored,

_____

(2)

(b) the energy stored when the capacitor had been discharging for 35 ms,

_____

_____

(3)

(c) the time constant for the circuit,

_____

_____

_____

_____

(3)

(d) the resistance of the circuit through which the capacitor was discharging.

_____

_____

_____

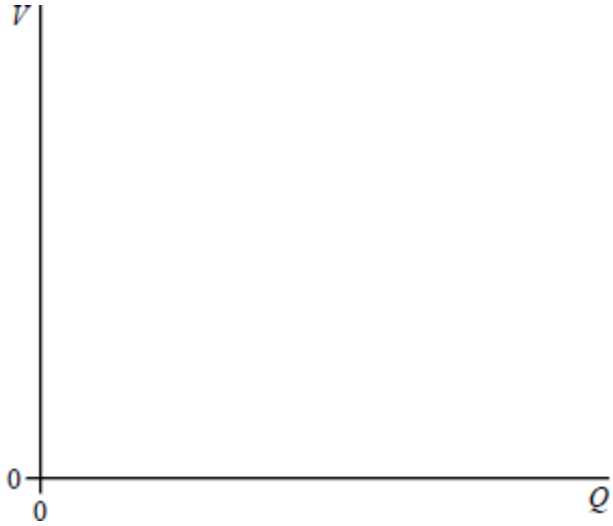
(2)

(Total 10 marks)

Q3.

(a) A 2.0 μF capacitor is charged through a resistor from a battery of emf 4.5 V. Sketch a graph on the axes below to show how the charge stored, Q, varies with the potential difference, V, across the capacitor during the charging process. Mark appropriate values on the axes of the

graph.



(2)

(b) (i) Show that the energy stored by a charged capacitor is given by $E = \frac{1}{2}QV$.

(ii) Calculate the energy stored by the capacitor in part (a) when the potential difference across it is 1.5 V.

(5)

(Total 7 marks)