Practice Question Set For A-Level
Subject : Physics
Paper-2 Topic: Fields And Their Consequences (Capacitance)

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Name of the Student:_____
Max. Marks : 21 Marks **Time : 21 Minutes**

Q1.

(a) For a capacitor of capacitance C, sketch graphs of charge, Q, and energy stored, E, against potential difference, V.



graph A



graph b

What is represented by the slope of graph A?

_____

(3)

(b) A capacitor of capacitance 0.68 F is charged to 6.0 V. Calculate

(i) the charge stored by the capacitor,

_____

_____

(ii) the energy stored by the capacitor.

_____

_____

(2)
(Total 5 marks)

Q2.

(a) A capacitor is made from two parallel metal plates of the same area, separated by an air gap. It is connected across a battery of constant e.m.f.

The plates are moved further apart, maintaining the same area of overlap, whilst the battery remains connected. State and explain what change, if any, occurs to

(i) the potential difference across the plates,

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(ii) the capacitance of the capacitor,

(iii) the charge on each plate of the capacitor,

(iv) the energy stored by the capacitor.

(4)

(b) A thunder cloud and the earth beneath it can be considered to form a parallel plate capacitor. The area of the cloud is 8.0 km^2 and it is 0.75 km above the earth.

(i) Calculate the energy stored if the potential difference between the cloud and the earth is 200 kV.

(ii) The air suddenly conducts, allowing all the charge to flow to earth in 120 μs. Calculate the mean current flowing between the cloud and the earth when this happens.

(6)

(Total 10 marks)

Q3.

A 10μF capacitor is connected across the terminals of a 100 V d.c. power supply and allowed to charge fully.

(a) Calculate

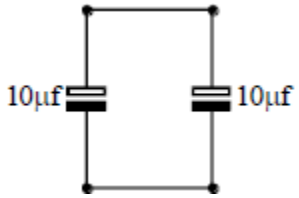
(i) the charge on the capacitor,

(ii) the energy stored by the capacitor.

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(2)

(b) The fully-charged capacitor is disconnected from the power supply and connected via two wires across the terminals of an uncharged 10 μF capacitor as shown.



The charge on the original 10 μF capacitor is shared equally between the capacitors in the parallel combination.

(i) Calculate the potential difference across the terminals of each capacitor.

_____

_____

(ii) Calculate the total energy stored by the two capacitors.

_____

_____

(iii) Account for the difference between the energy stored by the two capacitors in parallel and that stored by the original single 10 μF capacitor.

_____

_____

_____

_____

(4)

(Total 6 marks)

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