6 **(a)** Two flat metal plates are held a small distance apart by means of insulating pads, as shown in Fig. 6.1.

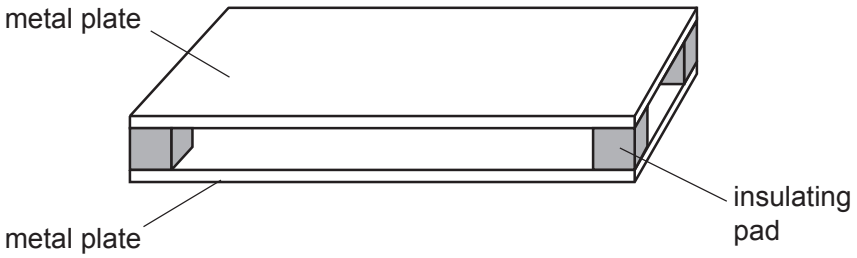

Fig. 6.1

Explain how the plates could act as a capacitor.

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.....

..... [2]

(b) The arrangement in Fig. 6.1 has capacitance *C*.
The arrangement is connected into the circuit of Fig. 6.2.

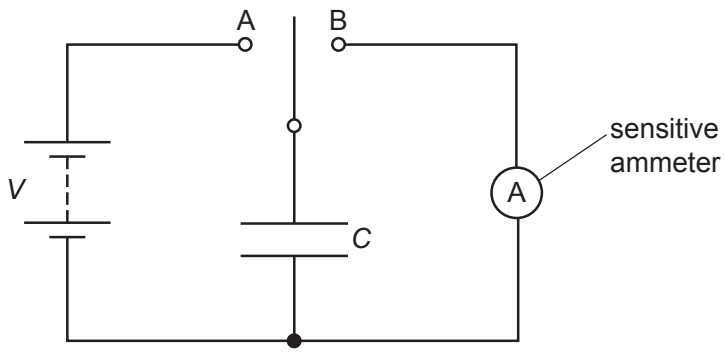

Fig. 6.2

When the two-way switch is moved to position A, the capacitor is charged so that the potential difference across it is *V*. When the switch moves to position B, the capacitor fully discharges through the sensitive ammeter.

The switch moves repeatedly between A and B so that the capacitor charges and then discharges with frequency *f*.

(i) Show that the average current I in the ammeter is given by

$$I = CVf.$$

[2]

(ii) For a potential difference V of 180 V and a frequency f of switching of 50 Hz, the average current I in the ammeter is 2.5 μA.

Calculate the capacitance, in pF, of the parallel plates.

capacitance = ... pF [2]

(c) A second capacitor is connected into the circuit of Fig. 6.2.
The two capacitors are connected in parallel.

State and explain the change, if any, in the average current in the ammeter.

.....

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..... [2]

[Total: 8]