6 A capacitor of capacitance C and a resistor of resistance R are connected as shown in Fig. 6.1.

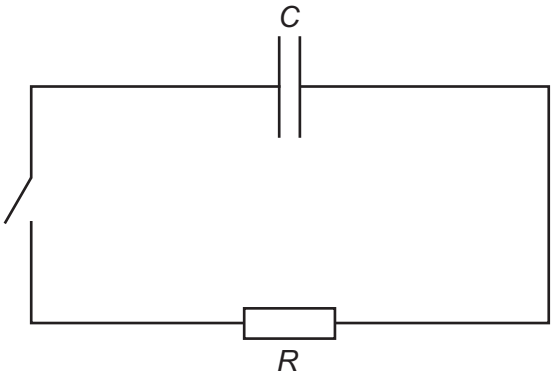

Fig. 6.1

Initially, the capacitor is charged and the switch is open.

The switch is closed at time $t = 0$.

Fig. 6.2 and Fig. 6.3 show, respectively, the variations with t of the charge Q on the capacitor and the potential difference (p.d.) V across the resistor.

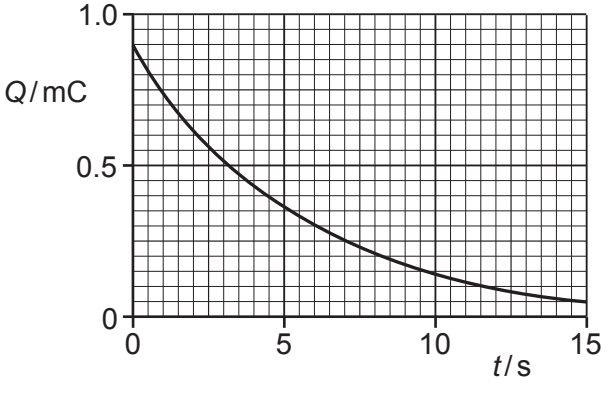

Fig. 6.2

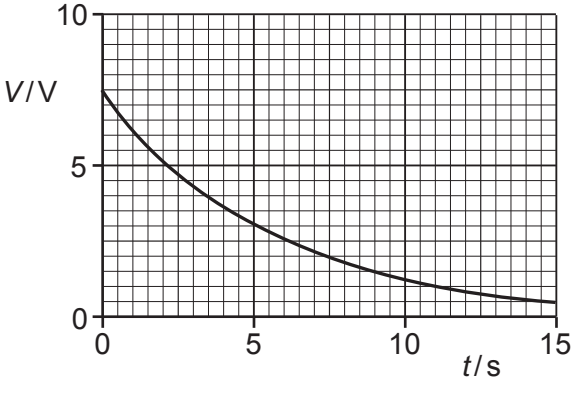

Fig. 6.3

(a) Explain the shape of the line in Fig. 6.3 representing the variation of V with t.

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.....

.....

.....

..... [3]

(b) Use Fig. 6.2 to show that the time constant of the circuit in Fig. 6.1 is 5.5 s.

[3]

(c) Use Fig. 6.2, Fig. 6.3 and the information in **(b)** to determine:

(i) capacitance C, in μF

C = ... μF [2]

(ii) resistance R, in kΩ.

R = ... kΩ [2]

[Total: 10]