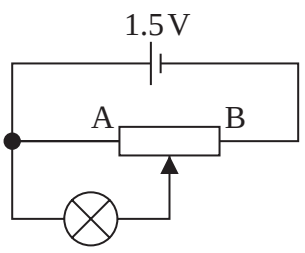
16 A student is investigating circuits that include a filament bulb. The filament bulb is labelled '1.5 V, 0.50 W'.

(a) Show that the resistance of the filament bulb when operating normally is about 5 Ω.

(2)

*(b) The student wishes to control the brightness of the filament bulb using a potentiometer. The student connects the circuit shown. The total resistance of the potentiometer is very much larger than the resistance of the filament bulb.

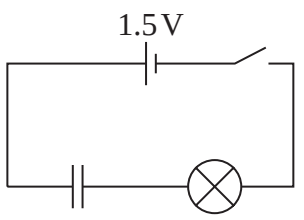


Explain how the brightness of the filament bulb changes as the potentiometer slider is moved from A to B.

(6)

(c) The student connects the filament bulb in the circuit shown below. The capacitor is initially uncharged and has a capacitance of 1.2 F.

The resistance of the filament bulb is 5 Ω.



Explain how the brightness of the filament bulb will vary as the switch is closed.

(4)

(Total for Question 16 = 12 marks)