

Electric circuits

Question Paper 6

Level	IGCSE
Subject	Physics
ExamBoard	CIE
Topic	Electricity and Magnetism
Sub-Topic	Electric circuits
Paper Type	(Extended) Theory Paper
Booklet	Question Paper 6

Time Allowed: 47 minutes

Score: /39

Percentage: /100

1 Fig. 8.1 shows a car battery being charged from a 200V a.c. mains supply.

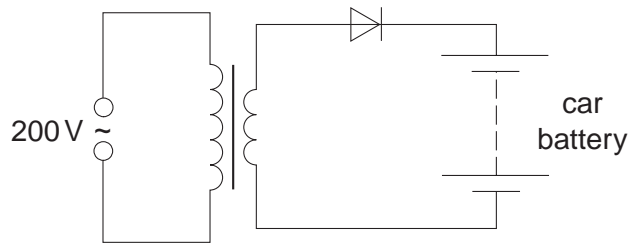


Fig. 8.1

(a) State the function of the diode.

.....
..... [1]

(b) The average charging current is 2.0 A and the battery takes 12 hours to charge fully.
Calculate the charge that the battery stores when fully charged.

charge stored [2]

(c) The battery has an electromotive force (e.m.f.) of 12 V and, when connected to a circuit, supplies energy to the circuit components.

State what is meant by an *electromotive force of 12 V*.

.....
.....
..... [2]

(d) (i) In the space below, draw a circuit diagram to show how two 6.0V lamps should be connected to a 12V battery so that both lamps glow with normal brightness. [1]

(ii) The power of each lamp is 8.0W. Calculate the current in the circuit.

current = [2]

(iii) Calculate the energy used by the two lamps when both are lit for one hour.

energy = [2]

[Total: 10]

- 2 Fig. 8.1 shows part of a low-voltage lighting circuit containing five identical lamps.

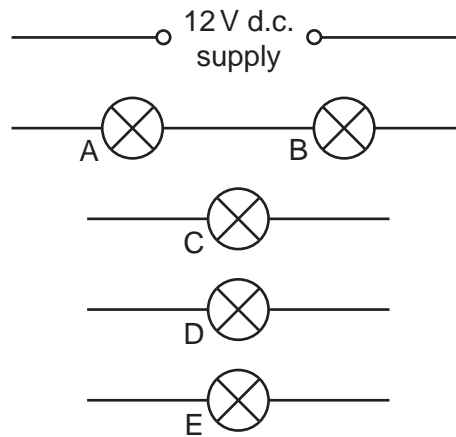


Fig. 8.1

- (a) Complete the circuit, by the addition of components as necessary, so that
- (i) the total current from the supply can be measured,
 - (ii) the brightness of lamp E only can be varied,
 - (iii) lamps C and D may be switched on and off together whilst lamps A, B and E remain on. [4]
- (b) All five lamps are marked 12V, 36W. Assume that the resistance of each lamp is the same fixed value regardless of how it is connected in the circuit.

Calculate

- (i) the current in one lamp when operating at normal brightness,

current = [1]

(ii) the resistance of one lamp when operating at normal brightness,

resistance = [1]

(iii) the combined resistance of two lamps connected in parallel with the 12V supply,

resistance = [1]

(iv) the energy used by one lamp in 30s when operating at normal brightness.

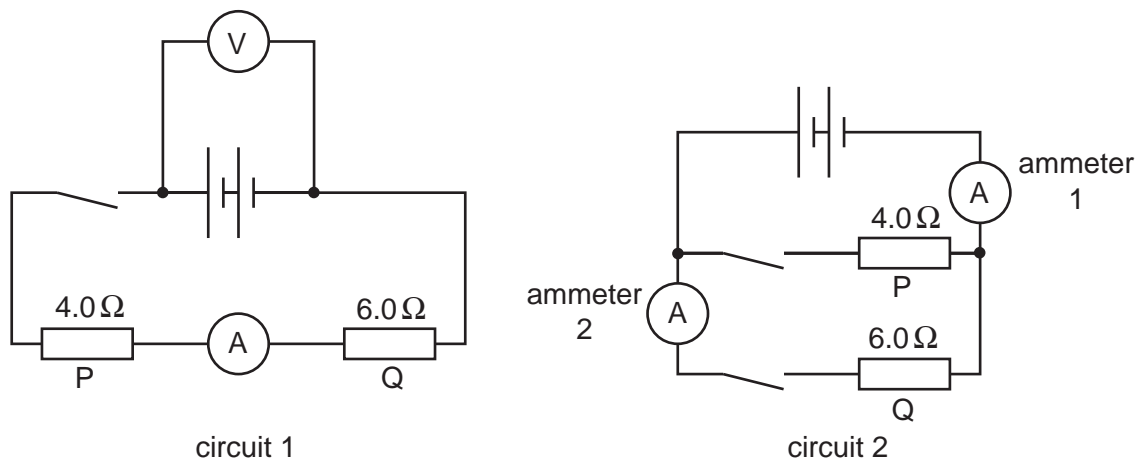
energy = [1]

(c) The whole circuit is switched on. Explain why the brightness of lamps A and B is much less than that of one lamp operating at normal brightness.

.....
.....
..... [2]

[Total: 10]

3 Fig. 8.1 shows two electrical circuits.



The batteries in circuit 1 and circuit 2 are identical.

Fig. 8.1

(a) Put ticks in the table below to describe the connections of the two resistors P and Q.

	series	parallel
circuit 1		
circuit 2		

[1]

(b) The resistors P and Q are used as small electrical heaters.

State two advantages of connecting them as shown in circuit 2.

advantage 1

advantage 2 [2]

- (c) In circuit 1, the ammeter reads 1.2 A when the switch is closed.

Calculate the reading of the voltmeter in this circuit.

voltmeter reading = [2]

- (d) The two switches in circuit 2 are closed. Calculate the combined resistance of the two resistors in this circuit.

combined resistance = [2]

- (e) When the switches are closed in circuit 2, ammeter 1 reads 5 A and ammeter 2 reads 2 A.

Calculate

- (i) the current in resistor P,

current = [1]

- (ii) the power supplied to resistor Q,

power = [1]

- (iii) the energy transformed in resistor Q in 300 s.

energy = [1]

[Total: 10]

4 Fig. 8.1 shows an electrical circuit.

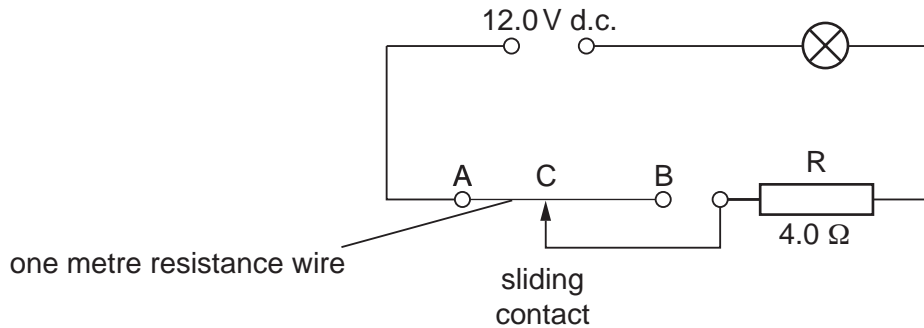


Fig. 8.1

The resistance of the lamp is 4.0Ω when it is at its normal brightness.

- (a) The lamp is rated at 6.0V, 9.0W.
Calculate the current in the lamp when it is at its normal brightness.

current =[2]

- (b) The sliding contact C is moved to A. The lamp lights at its normal brightness.
Calculate

- (i) the total circuit resistance,

resistance =[1]

- (ii) the potential difference across the 4.0Ω resistor R.

potential difference =[1]

- (c) The sliding contact C is moved from A to B.

- (i) Describe any change that occurs in the brightness of the lamp.

.....[1]

- (ii) Explain your answer to (i).

.....
.....[2]

(d) The 1 m wire between A and B, as shown in Fig. 8.1, has a resistance of $2.0\ \Omega$. Calculate the resistance between A and B when

(i) the 1 m length is replaced by a 2 m length of the same wire,

resistance =[1]

(ii) the 1 m length is replaced by a 1 m length of a wire of the same material but of only half the cross-sectional area.

resistance =[1]

[Total : 9]