1 Fig. 8.1 shows a low-voltage lighting circuit.

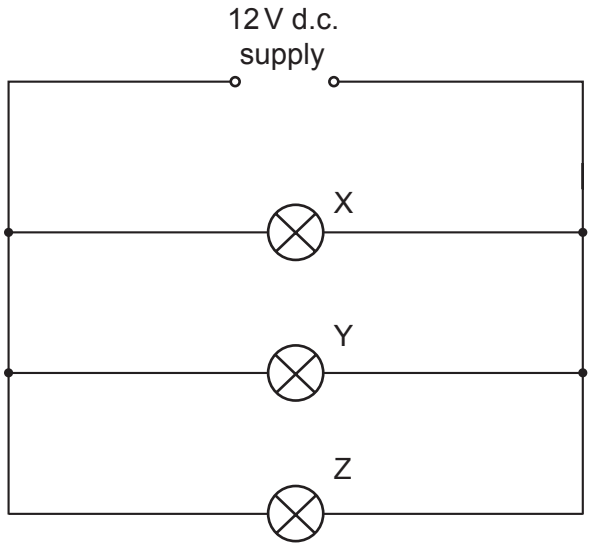

Fig. 8.1

(a) On Fig. 8.1, indicate with a dot and the letter S, a point in the circuit where a switch could be placed that would turn off lamps Y and Z at the same time but would leave lamp X still lit. [1]

(b) **(i)** In the space below, draw the circuit symbol for a component that would vary the brightness of lamp X.

(ii) On Fig. 8.1, mark with a dot and the letter R where this component should be placed.

[2]

(c) Calculate the current in lamp Y.

current = ...[2]

(d) The current in lamp Z is 3.0 A. Calculate the resistance of this lamp.

resistance = ...[2]

(e) The lamp Y is removed.

(i) Why do lamps X and Z still work normally?

.....

.....

(ii) The current in lamp X is 1.0 A. Calculate the current supplied by the battery with lamp Y removed.

current = ...
[2]

[Total : 9]

2 A student has a power supply, a resistor, a voltmeter, an ammeter and a variable resistor.

(a) The student obtains five sets of readings from which he determines an average value for the resistance of the resistor.

In the space below, draw a labelled diagram of a circuit that he could use.

[3]

(b) Describe how the circuit should be used to obtain the five sets of readings.

.....

.....

..... [2]

(c) Fig. 8.1 shows another circuit.

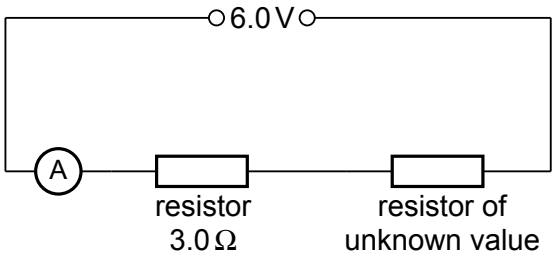

Fig. 8.1

When the circuit is switched on, the ammeter reads 0.50 A.

(i) Calculate the value of the unknown resistor.

resistance = ... [2]

(ii) Calculate the charge passing through the 3.0 Ω resistor in 120 s.

charge = ... [1]

(iii) Calculate the power dissipated in the 3.0 Ω resistor.

power = ... [2]

[Total : 10]

3 Fig. 8.1 shows a 240 V a.c. mains circuit to which a number of appliances are connected and switched on.

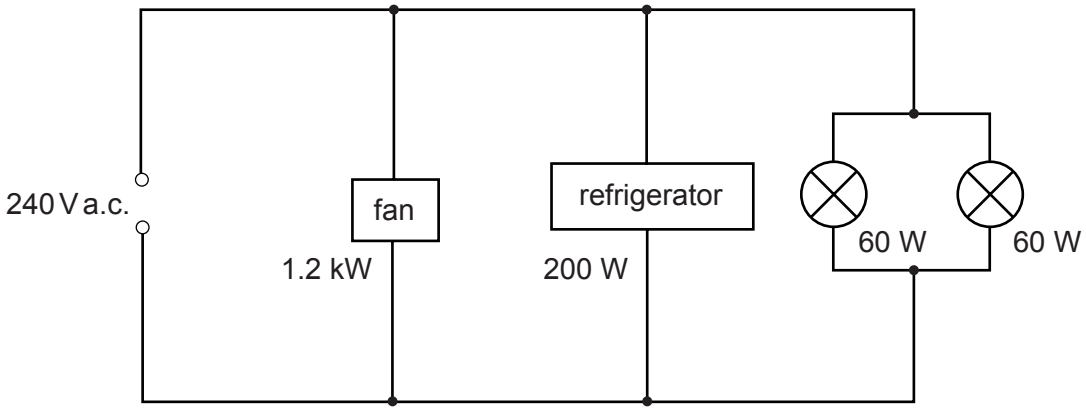

Fig. 8.1

(a) Calculate the power supplied to the circuit.

power = ……..[1]

(b) The appliances are connected in parallel.

(i) Explain what connected *in parallel* means.

.....

.....

(ii) State two advantages of connecting the appliances in parallel rather than in series.

advantage 1 .....

advantage 2 .....
[3]

(c) Calculate

(i) the current in the refrigerator,

current = ……..

(ii) the energy used by the fan in 3 hours,

energy = ……..

(iii) the resistance of the filament of one lamp.

resistance = ……..

[Total : 11]

4 Fig. 7.1 shows a 12 V battery connected to a number of resistors.

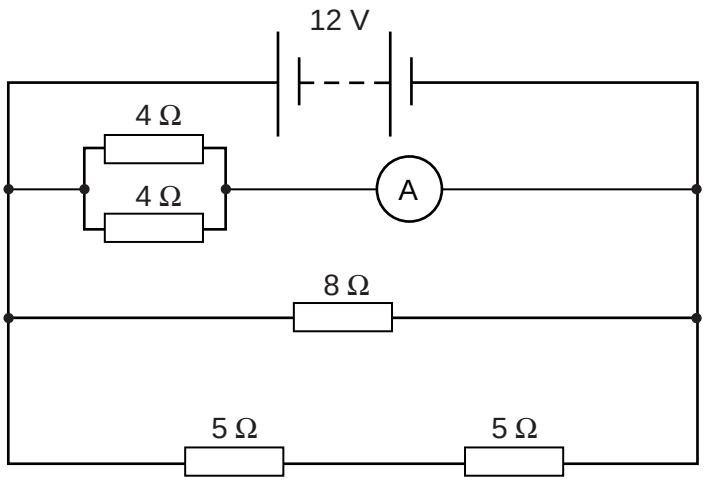

Fig. 7.1

(a) Calculate the current in the 8 Ω resistor.

current = ……..[2]

(b) Calculate, for the resistors connected in the circuit, the combined resistance of

(i) the two 5 Ω resistors,

resistance = ……..

(ii) the two 4 Ω resistors.

resistance = ……..
[2]

(c) The total current in the two 4 Ω resistors is 6 A.
Calculate the total power dissipated in the two resistors.

power = ……..[2]

(d) What will be the reading on a voltmeter connected across

(i) the two 4 Ω resistors,

reading = ……..

(ii) one 5 Ω resistor?

reading = ……..
[2]

(e) The 8 Ω resistor is made from a length of resistance wire of uniform cross-sectional area.
State the effect on the resistance of the wire of using

(i) the same length of the same material with a greater cross-sectional area,

.....

(ii) a smaller length of the same material with the same cross-sectional area.

.....
[2]

[Total : 10]

5 Fig. 8.1 shows a battery with a resistor connected across its terminals. The e.m.f. of the battery is 6.0 V.

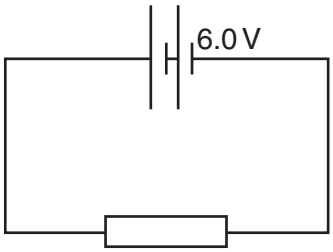

Fig. 8.1

The battery causes 90 C of charge to flow through the circuit in 45 s.

(a) Calculate

(i) the current in the circuit,

current = ...

(ii) the resistance of the circuit,

resistance = ...

(iii) the electrical energy transformed in the circuit in 45 s.

energy = ...
[6]

(b) Explain what is meant by the term *e.m.f. of the battery*.

.....

.....

.....[2]

[Total : 8]