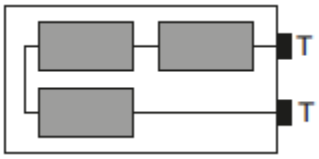
Name of the Student:_____

Max. Marks : 18 Marks **Time : 18 Minutes**

Q1.

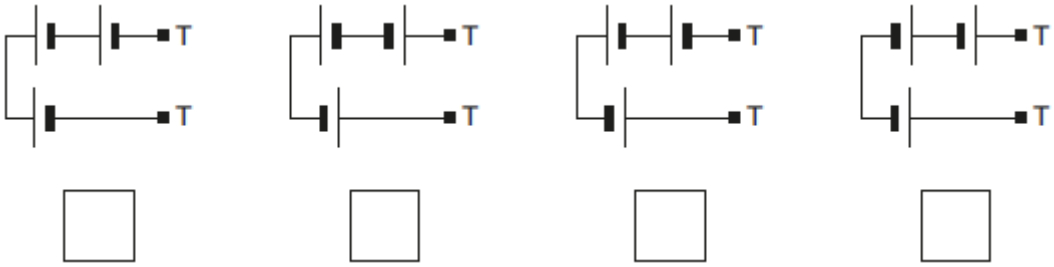
(a) **Figure 1** shows the inside of a battery pack designed to hold three identical 1.5 V cells.

Figure 1



Which **one** of the arrangements shown in **Figure 2** would give a 4.5 V output across the battery pack terminals **T**?

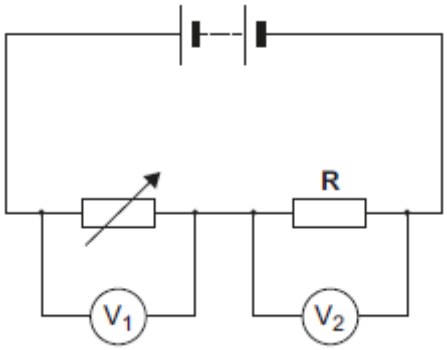
Figure 2



(1)

(b) **Figure 3** shows a variable resistor and a fixed value resistor connected in series in a circuit.

Figure 3



Complete **Figure 3** to show how an ammeter would be connected to measure the current through the circuit.

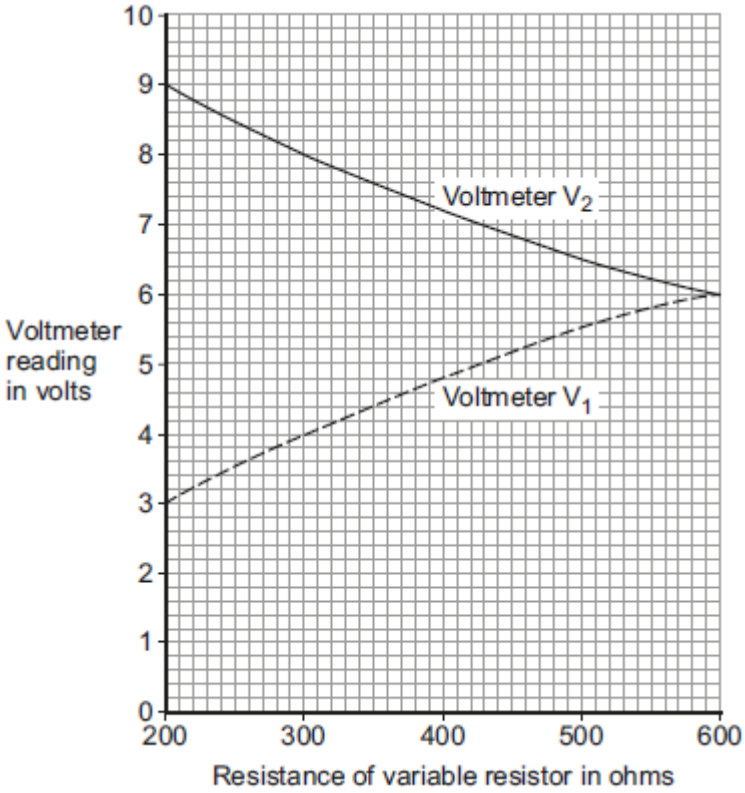
Use the correct circuit symbol for an ammeter.

(1)

(c) The variable resistor can be adjusted to have any value from 200 ohms to 600 ohms.

Figure 4 shows how the reading on voltmeter V_1 and the reading on voltmeter V_2 change as the resistance of the variable resistor changes.

Figure 4



(i) How could the potential difference of the battery be calculated from **Figure 4**?

Tick (✔) **one** box.

9 + 3 = 12 V ☐

9 – 3 = 6 V ☐

9 ÷ 3 = 3 V ☐

Give the reason for your answer.

_____

_____

(2)

(ii) Use **Figure 4** to determine the resistance of the fixed resistor, **R**.

Resistance of R = _____ Ω

Give the reason for your answer.

_____

_____

(2)

(iii) Calculate the current through the circuit when the resistance of the variable resistor equals 200 Ω.

_____

_____

_____

Current = _____ A

(3)

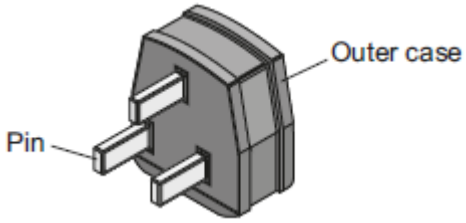
(Total 9 marks)

Q2.

(a) A washing machine is connected to the mains electricity supply using a cable and three-pin plug.

Figure 1 shows a three-pin plug.

Figure 1



Name the materials used in the structure of a plug. Give the reason why each material is used.

Pin _____

_____

Outer case _____

_____

(1)

(b) The three-pin plug contains a fuse. The fuse is connected to one of the wires inside the cable.

(i) Which **one** of the wires inside the cable is the fuse connected to?

_____

(1)

(ii) The fuse is a thin wire inside a closed glass tube. The wire acts as a resistor.

What effect does a current through a wire have on the wire?

_____

(1)

(iii) The power of the washing machine varies between 0.7 kW and 2 kW depending on

which part of the wash cycle is operating.

Calculate the maximum current drawn from the mains electricity supply by the washing machine.

The mains electricity supply is at a potential difference of 230 V.

_____

_____

_____

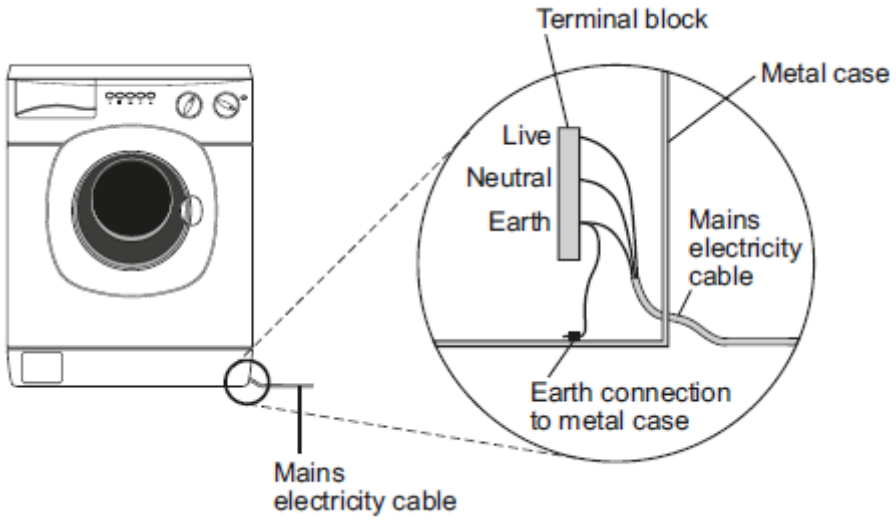
Current = _____ A

(2)

(c) **Figure 2** shows how the mains electricity cable is connected to the washing machine.

The earth wire is connected to the metal case of the washing machine.

Figure 2



If a fault makes the metal case live, the earth wire and fuse inside the plug prevent the mains cable from overheating and causing a fire.

Explain how.

_____

_____

_____

_____

(2)

(d) New research has shown that many people underestimate the hazards of using mains electricity.

It is important that people do understand the hazards of using mains electricity.

Suggest why.

_____

_____

_____

(1)
(Total 9 marks)