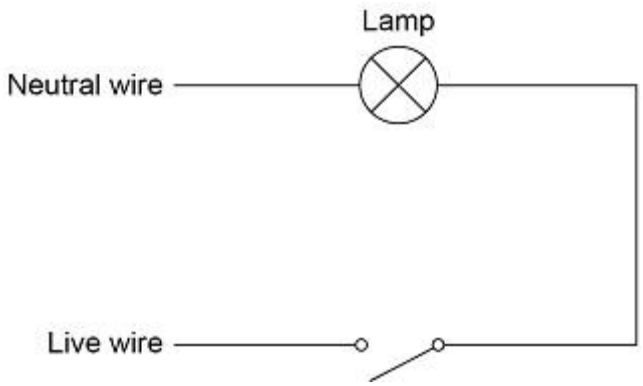
Name of the Student:_____
Max. Marks : 20 Marks **Time : 20 Minutes**

Q1.

The diagram below shows part of a mains electricity lighting circuit in a house.



(a) A fault in the switch caused a householder to receive a mild electric shock before a safety device switched the circuit off.

The mean power transfer to the person was 5.75 W.

The potential difference across the person was 230 V.

Calculate the resistance of the person.

_____

_____

_____

_____

_____

_____

_____

_____

_____

Resistance = _____Ω

(5)

(b) An electrician replaced the switch.

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The electrician would have received an electric shock unless the circuit was disconnected from the mains supply.

Explain why.

_____

_____

_____

_____

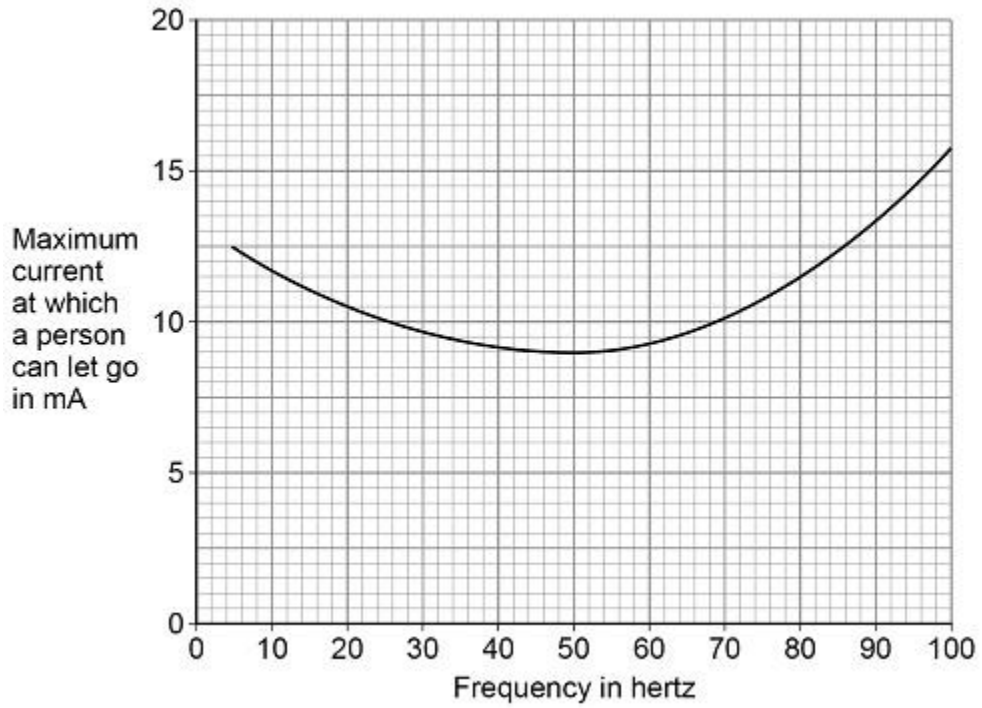
_____

_____

(3)

(c) The current from an electric shock causes a person's muscles to contract. The person cannot let go of the electrical circuit if the current is too high.

The graph below shows how the maximum current at which a person can let go depends on the frequency of the electricity supply.



The UK mains frequency is 50 Hz.

Explain why it would be safer if the UK mains frequency was **not** 50 Hz.

_____

_____

_____

_____

_____

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_____

(2)

(Total 10 marks)

Q2.

Figure 1 shows a person using an electric lawn mower.

Figure 1

(a) The lawn mower is connected to the mains electricity supply.

What is the frequency of the mains electricity supply in the UK?

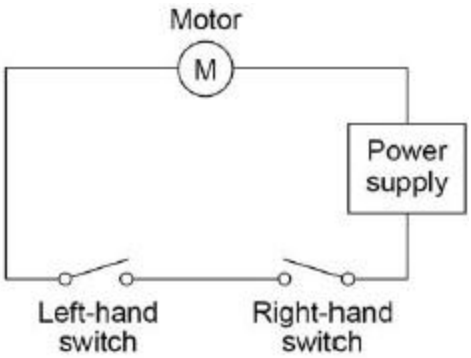
Frequency = _____ Unit _____

(2)

The lawn mower has a switch on each side of the handle.

Figure 2 shows the circuit diagram for the lawn mower.

Figure 2



(b) The motor in the lawn mower can only be turned on when the person using it holds the handle of the lawn mower with both hands.

Explain why.

_____

_____

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_____

_____

(2)

(c) The power input to the motor is 1.8 kW

The resistance of the motor is 32 Ω

Calculate the current in the motor.

_____

_____

_____

_____

Current = _____ A

(3)

(d) The useful power output from the motor is 1.5 kW

Calculate the time it takes for the motor to transfer 450 000 J of useful energy.

_____

_____

_____

Time = _____ seconds

(3)

(Total 10 marks)

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