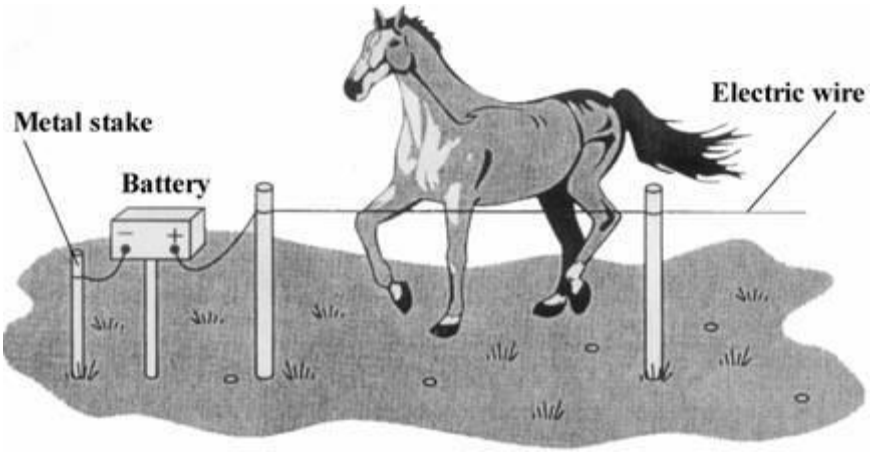
Name of the Student:_____
Max. Marks : 25 Marks **Time : 25 Minutes**

Q1.

(a) The diagram shows an electric fence, designed to keep horses in a field.



When a horse touches the wire the horse receives a mild electric shock. Explain how.

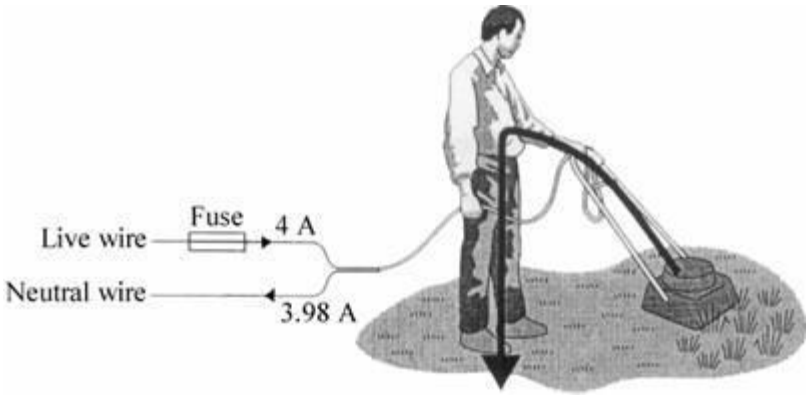
_____

_____

_____

(2)

(b) The diagram shows how a person could receive an electric shock from a faulty electrical appliance. Using a residual circuit breaker (RCB) can help to protect the person against receiving a serious shock.



(i) Compare the action of an RCB to that of a fuse.

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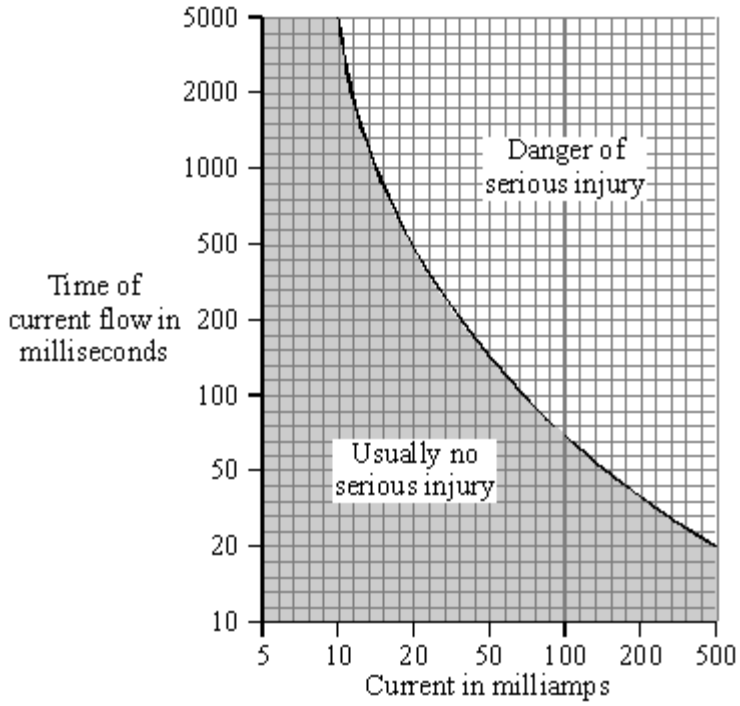
_____

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(2)

(ii) The graph illustrates how the severity of an electric shock depends upon both the size of the current and the time for which the current flows through the body.



Within how long must the RCB cut off the current if the person using the lawnmower is to be in no danger of serious injury?

_____

_____

Time = _____ milliseconds

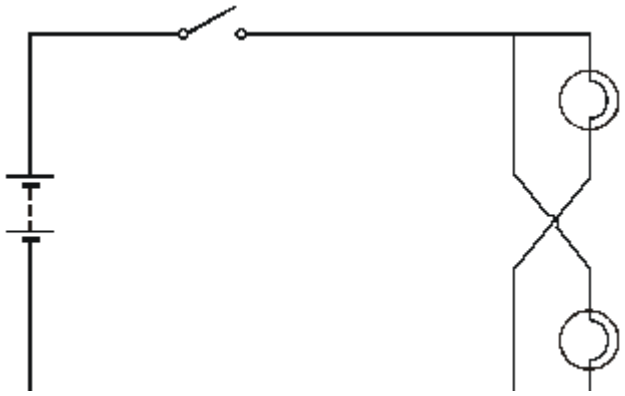
(2)

(Total 6 marks)

Q2.

The circuit diagram below shows a circuit used to supply electrical energy to the two headlights of a car.

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The current through the filament of one car headlight is 3.0 A. The potential difference across each of the two headlights is 12 V.

(a) Suggest a suitable fuse for the circuit. _____

(1)

(b) Calculate the resistance of the headlight filament when in use.

_____

_____

_____

_____

Answer _____ W

(2)

(c) Calculate the power supplied to the two headlights of the car.

_____

_____

_____

Answer _____ W

(2)

(d) The fully charged car battery can deliver 72 kJ of energy at 12 V. How long can the battery keep the headlights fully on?

_____

_____

_____

Answer _____ s

(2)

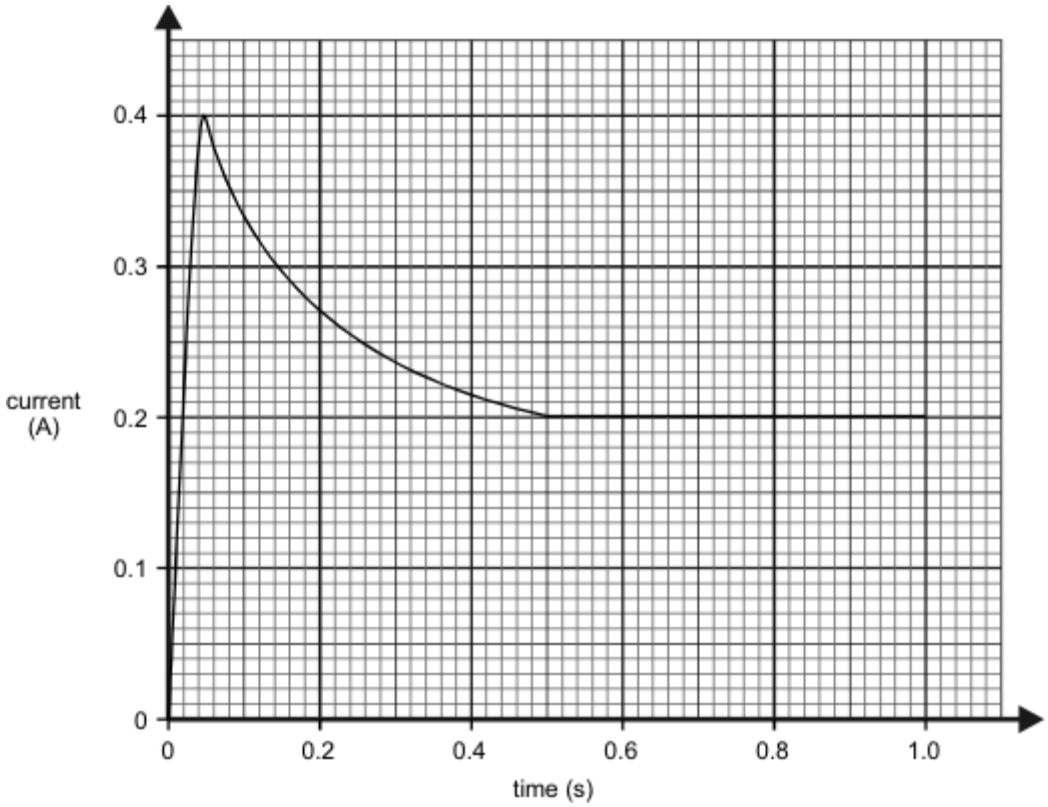
(Total 7 marks)

Q3.

When a mains lamp is switched on it takes 0.5 seconds for the filament to reach its normal operating

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temperature. The way in which the current changes during the first second after switching on is shown in the sketch graph below. Mains voltage is 240 V.



(a) Calculate the resistance of the filament whilst the lamp is drawing the **maximum** current.

(3)

(b) Describe how the resistance of the lamp changes after the current has reached its maximum value.

(2)

(c) Calculate the **maximum** power taken by the lamp.

(2)

(d) Calculate the power of the lamp in normal use.

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_____

(2)

(e) Calculate the energy used by the lamp in six hours of normal use.

_____

_____

_____

(3)
(Total 12 marks)

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