Practice Question Set For A-Level
Subject : Physics
Paper-1 Topic : 3_ElectricCircuits

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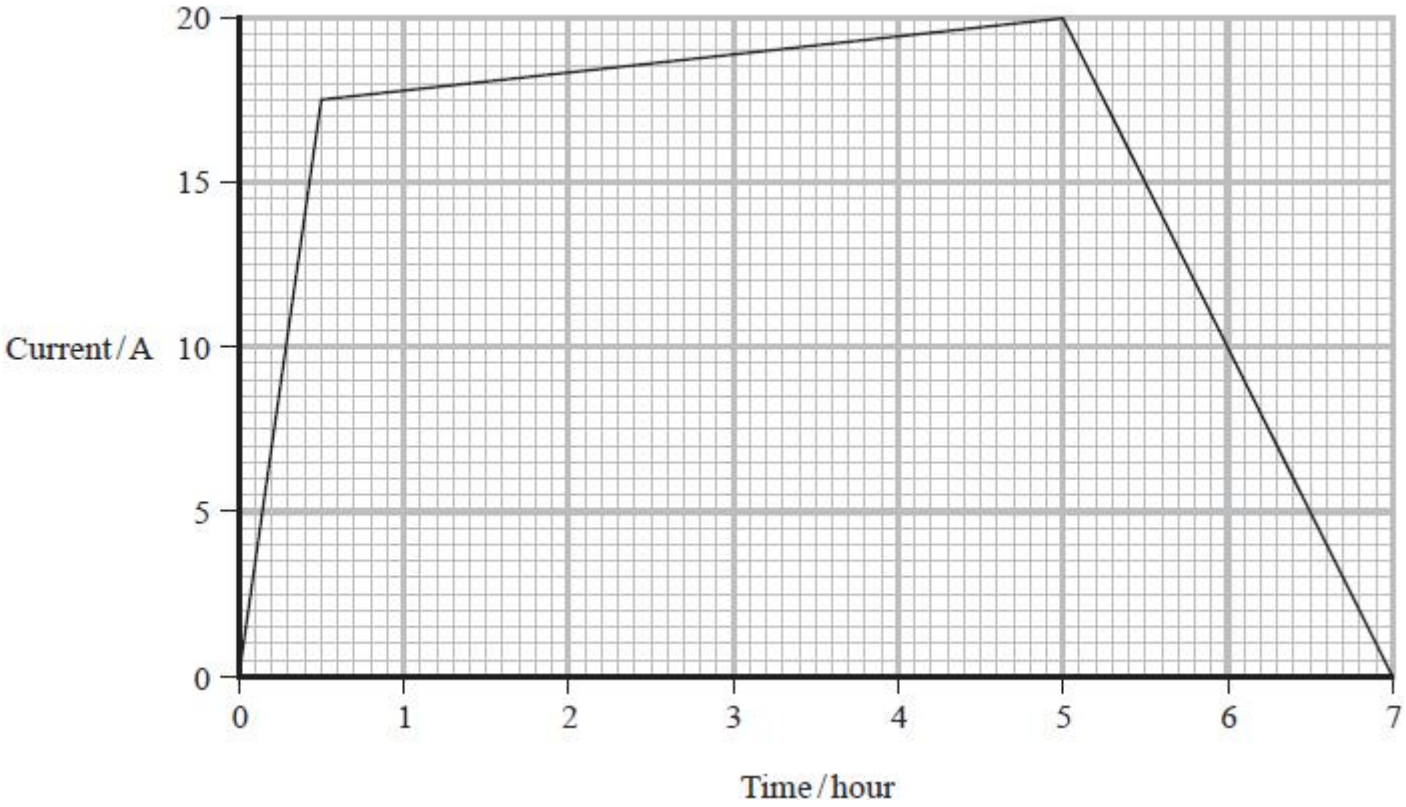
Name of the Student:_____
Max. Marks : 19 Marks **Time : 19 Minutes**

Q1.

Electric cars are powered by a large battery within the car.

(a) The manufacturer of an electric car states that the battery stores a maximum charge of 110 Ah.

The graph shows how the current through the battery varies with time as the battery is charged.



The manufacturer claims that it takes 5 hours to reach 90% of the maximum charge.
Criticise this statement.

(3)

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(b) The manufacturer tested the car by driving it at constant speed along a horizontal track. The manufacturer determined that the maximum range of the car was 160 km.

(i) Show that the average value for the resistive forces on the car was about 800 N.
efficiency of car = 85%

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energy stored when battery has maximum charge = 42 kW h

(3)

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(ii) The manufacturer repeated the test on a sloping track, as shown. This reduced the maximum range of the car. At the new maximum range, the car had moved upwards through a vertical height of 3.0 km.



Calculate the reduction in the maximum range of the car.
mass of car = 1300 kg

(3)

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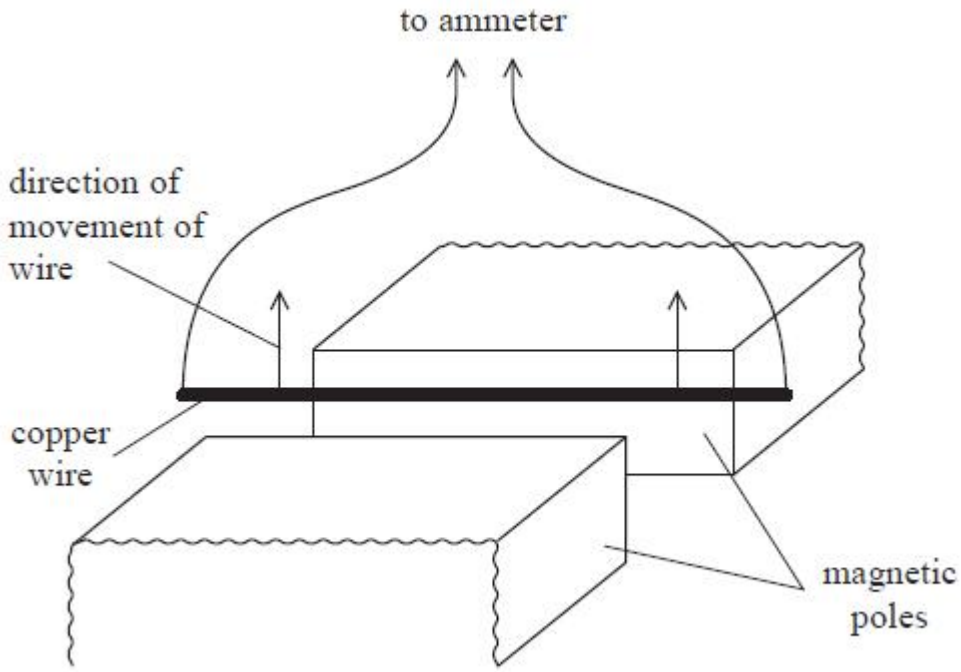
Reduction in maximum range = ...

(Total for question = 9 marks)

Q2.

A student is investigating electromagnetic induction using a U-shaped magnet. The magnetic flux density between the poles of the magnet is 74 mT. The magnetic field outside the region of the poles is negligible.
She places a stiff copper wire between the poles of the magnet as shown in the diagram.
The wire is connected to an ammeter of resistance 0.25 Ω

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(a) The rectangular poles measure 6.0 cm × 2.4 cm.

Show that the magnetic flux between the poles of the magnet is about 1×10^{-4} Wb.

(3)

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(b) The student holds the wire as shown in the diagram and moves it vertically upwards at a constant speed of 1.2 m s^{-1}

Calculate the e.m.f. induced in the wire when it is moving.

(3)

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Induced e.m.f. = ...

(c) According to Lenz's law, a force will act on the wire to oppose the motion of the wire.

Calculate the magnitude of the force that opposes the motion and comment on this value.

(4)

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Magnitude of force = ...

Comment

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(Total for question = 10 marks)

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