

Practice Question Set For A-Level
Subject : Physics
Paper-1 Topic : 7_ Magnetic Field 2

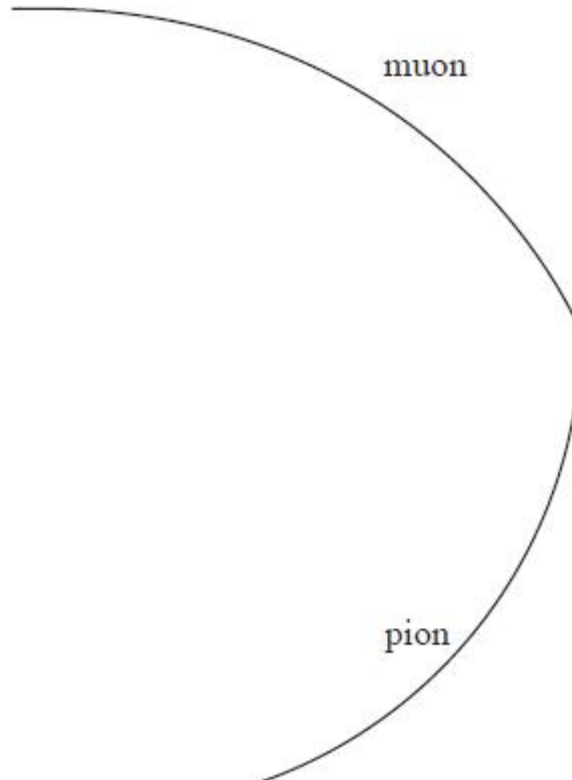
Student: _____

Max. Marks : 20 Marks

Time : 20 Minutes

Q1.

A negatively charged pion decays into a muon and an antineutrino. The diagram shows tracks in a particle detector formed in such an event.



The momentum of the pion just before it decays is $9.1 \times 10^{-20} \text{ N s}$.

Determine the magnetic flux density of the magnetic field which acts in the detector and state its direction.

Scale of diagram 1 cm represents 10 cm

pion charge = $-1.6 \times 10^{-19} \text{ C}$

(4)

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Magnetic flux density =

Direction of magnetic field =

(Total for question = 4 marks)

Q2.

The magnetic force F that acts on a current-carrying conductor in a magnetic field is given by the equation

$$F = BIl.$$

(a) State the condition under which this equation applies.

(1)

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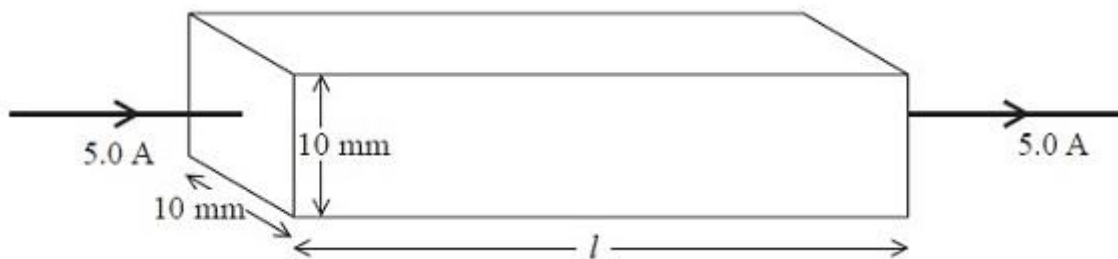
(b) The unit for magnetic flux density B is the tesla.

Express the tesla in base units.

(2)

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(c) The diagram shows a rectangular bar of aluminium which has a current of 5.0 A through it.



The bar is placed in a magnetic field so that its weight is supported by the magnetic field.

Calculate the minimum value of the magnetic flux density B needed for this to occur.

density of aluminium = $2.7 \times 10^3 \text{ kg m}^{-3}$

(3)

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Minimum $B =$

(d) State the direction of the magnetic field.

(1)

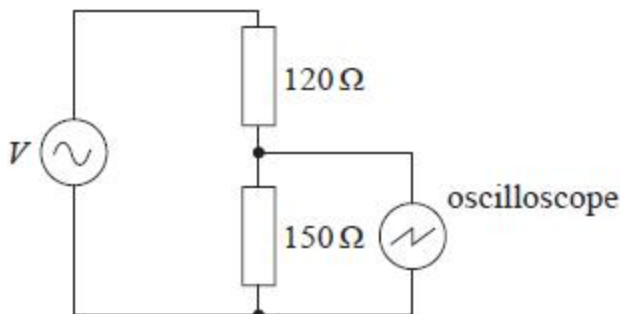
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(Total for Question = 7 marks)

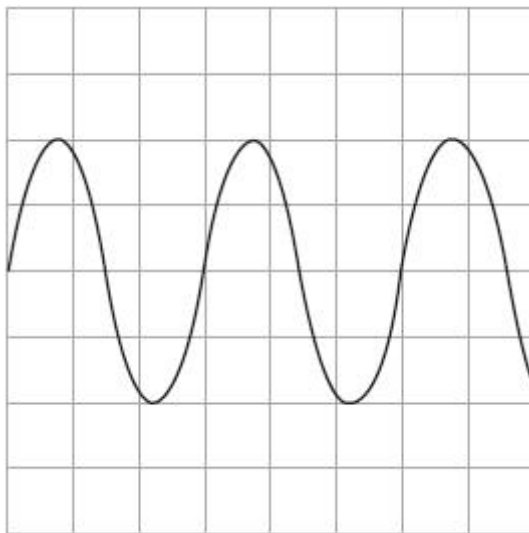
Q3.

A student connected the output from a source of alternating potential difference (p.d.) to a series resistor combination.

She connected an oscilloscope across the $150\ \Omega$ resistor as shown.



The trace obtained on the oscilloscope is shown below.



(i) Determine the peak p.d. across the $150\ \Omega$ resistor.

y-sensitivity of oscilloscope = $2.0\ \text{V}$ per division

(2)

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Peak p.d. across $150\ \Omega$ resistor =

(ii) Calculate the root mean square (r.m.s.) value of the current in the circuit.

(3)

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r.m.s. value of current =

(iii) Calculate the power dissipated in the circuit.

(3)

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Power dissipated in circuit =

(Total for question = 8 marks)

Q4.

A conductor of length 50 mm carries a current of 3.0 A at 30° to a magnetic field of magnetic flux density 0.40 T.

The magnitude of the magnetic force acting on the conductor is

- A** 0.030 N
- B** 0.050 N
- C** 30 N
- D** 52 N

(Total for question = 1 mark)