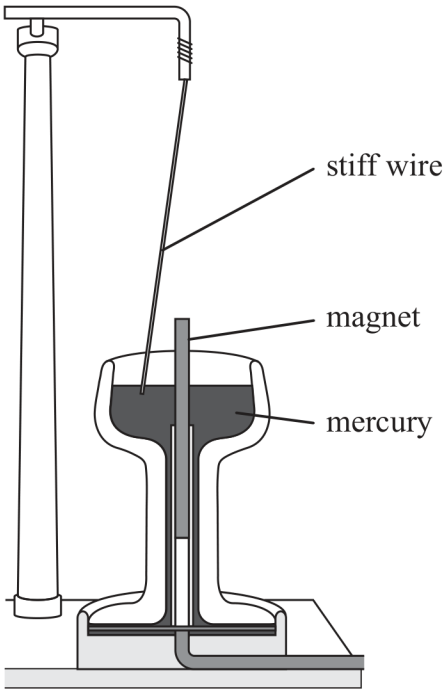
SECTION B

Answer ALL questions. Write your answers in the spaces provided.

11 In 1821, Michael Faraday made what is believed to be the first electric motor.



The stiff wire was suspended freely from a stand. The mercury completed an electrical circuit, which included the wire. When there was a current in the wire, the wire moved around the magnet.

(a) The wire made 10 complete revolutions around the magnet in a time of 8.3 s.

Calculate the angular velocity of the wire.

(3)

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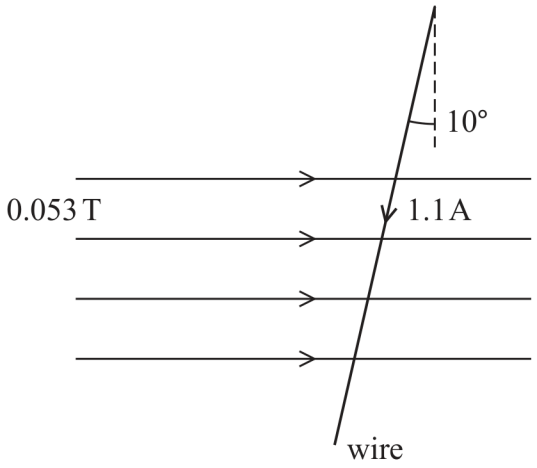
Angular velocity = ...

(b) When the current in the wire is 1.1 A, the wire is at an angle of 10° to the vertical. The length of the wire in the horizontal magnetic field is 3.5 cm.



Determine the force on the wire.

magnetic flux density = 0.053 T

(3)

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Magnitude of force on wire = ...

Direction of force on wire = ...

(Total for Question 11 = 6 marks)