6 **(a)** Define *magnetic flux density* of a magnetic field.

……

……

……

……[2]

(b) Fig. 6.1 shows a solenoid of length 50.0 cm and 1000 turns. It is connected in a circuit in series with a horizontal rectangular loop ABCD, where $AB = 20.0$ cm and $BC = 4.0$ cm. The loop is freely pivoted about the axis XY.

When there is no current, the loop is balanced without the use of any rider. When a current of 3.0 A flows as shown in Fig. 6.1, a rider of mass 0.40 g is needed to restore balance.

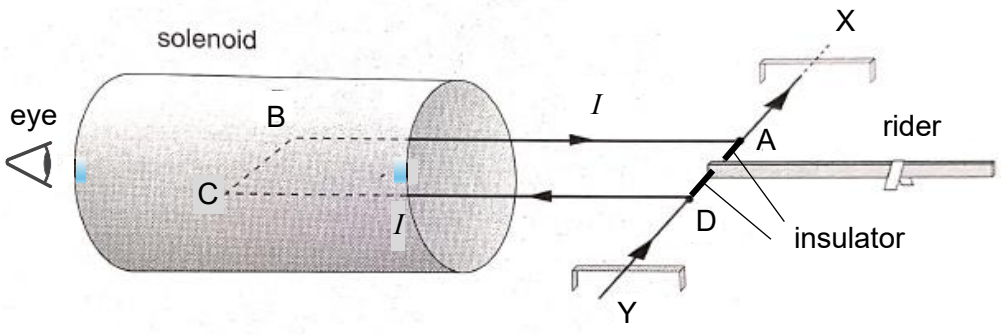

Fig. 6.1

(i) State and explain whether the direction of the current in the solenoid is clockwise or anticlockwise as viewed by the eye.

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……..……..……

...……..……..……[2]

(ii) Calculate the magnetic flux density in the solenoid.

magnetic flux density = ……. T [2]

(iii) Determine the magnetic force acting on side BC.

force = …….. N [1]

(iv) Determine the distance of the rider from the axis XY when balance is restored.

distance = …..…… cm [2]