6 **(a)** Define *magnetic flux*.

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.....[2]

(b) A uniform conducting bar XY is pulled horizontally across long parallel frictionless conducting guide rails by a light inextensible string. The string passes over a frictionless pulley and is attached to a hanging block. The guide rails are placed in a vertical magnetic field of uniform magnetic flux density as shown in Fig. 6.1.

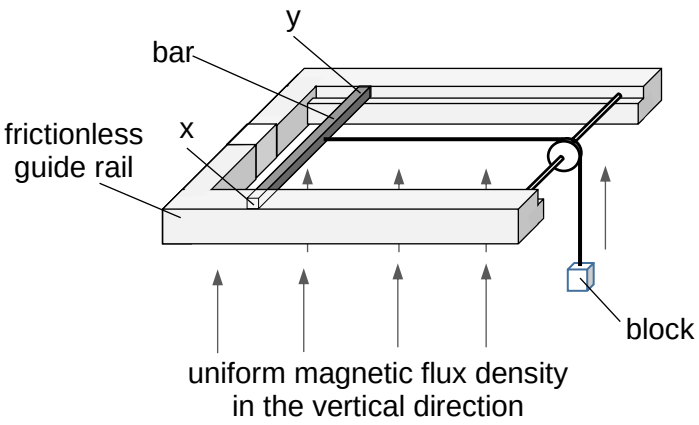

Fig. 6.1

The block is released from rest at time t = 0 s, and the bar starts to move.

(i) An e.m.f. is induced in the bar. State which end X or Y of the bar is at a higher potential.

.....[1]

(ii) Use Faraday's law and Lenz's law to explain the subsequent motion of the bar.

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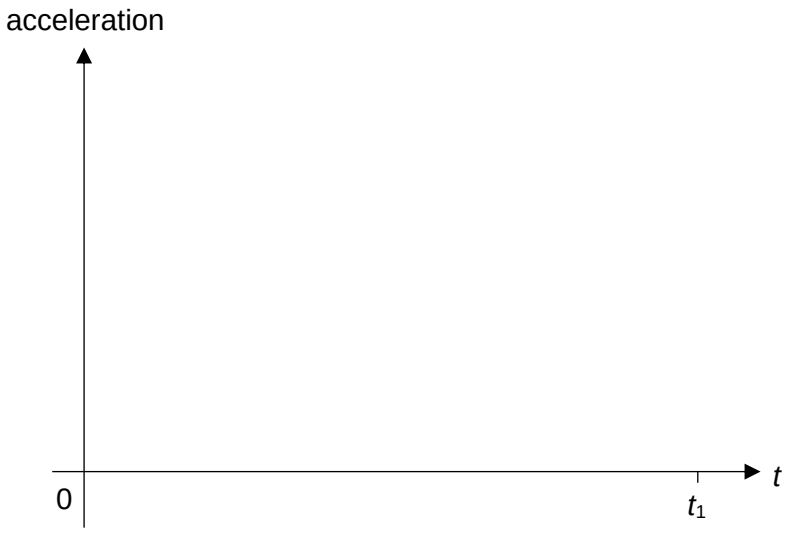
.....[4]

(iii) In time t_1, the bar slides along the length of the guide rails until it reaches a position just before the pulley.

On Fig. 6.2, sketch a graph to show the variation with time t of the acceleration of the rod from $t = 0$ to time $t = t_1$. Label clearly the acceleration at $t = 0$ as a.



[2]

[Total: 9]