7 **(a)** State Lenz's law of electromagnetic induction.

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..... [2]

(b) A helicopter hovering in stationary equilibrium has four rotors, each of length 12 m, as shown in the view from above in Fig. 7.1.

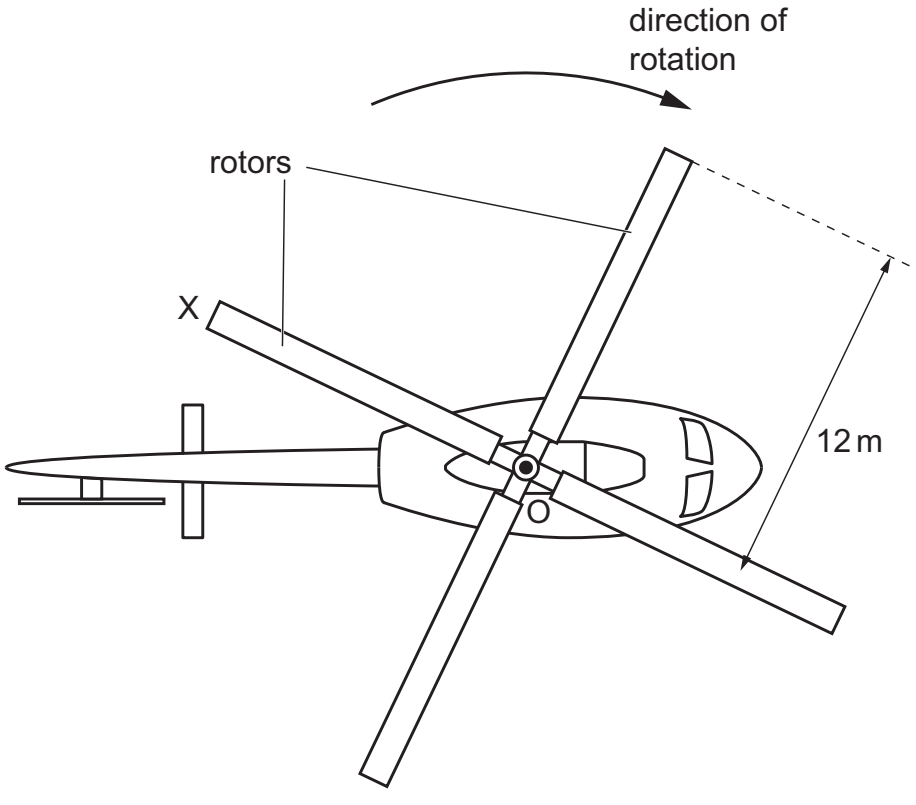

Fig. 7.1

The vertical component of the Earth's magnetic field at the helicopter is downwards with a flux density of 0.047 mT.

The rotors each rotate in a horizontal plane in the direction shown with a frequency of 85 Hz.

(i) Calculate the magnetic flux Φ cut by rotor OX during one complete rotation. Give a unit with your answer.

Φ = ... unit ..... [3]

(ii) Determine the magnitude of the electromotive force (e.m.f.) induced across the length of rotor OX.

e.m.f. = ... V [2]

(iii) Use Lenz's law to explain whether end O or end X of the rotor is at the higher potential.

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..... [2]

[Total: 9]