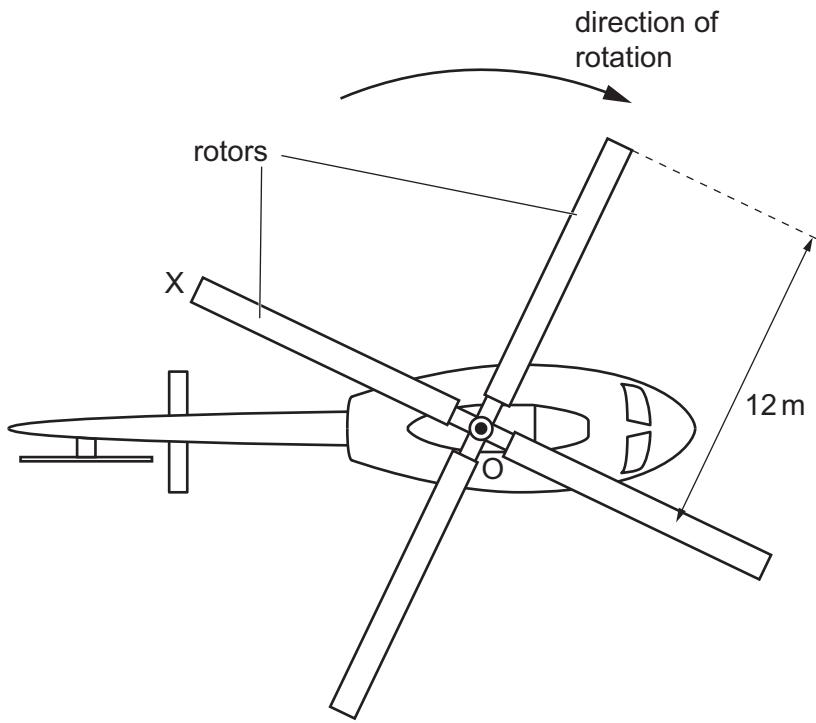


- 7 (a) State Lenz's law of electromagnetic induction.
- ..... [2]

- (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  $\Phi$  cut by rotor OX during one complete rotation. Give a unit with your answer.

$$\Phi = \dots \text{ unit} \dots [3]$$





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

$$\text{e.m.f.} = \dots \text{V} [2]$$

- (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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.....

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..... [2]

[Total: 9]