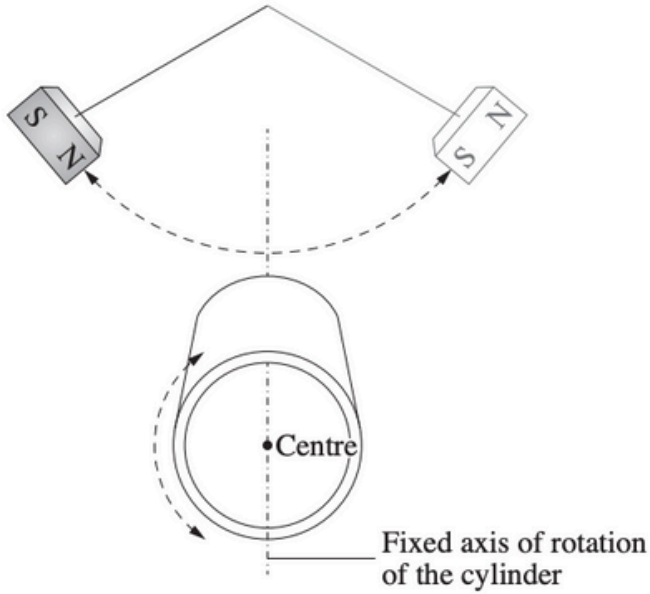
A magnet is swinging as a pendulum. Close below it is an aluminium (non-ferromagnetic) can. The can is free to spin around a fixed axis as shown.



Analyse the motion and energy transformations of both the can and the magnet.

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Tips

Understand Energy Transformations: Recognise how the gravitational potential energy of the magnet transforms into kinetic energy as it swings downward, and later into thermal energy due to eddy currents in the can.
Consider Magnetic Flux and Induced Currents: Remember that the relative motion between the magnet and the aluminium can changes the magnetic flux through the can, inducing eddy currents according to Faraday's law of electromagnetic induction.
Apply Lenz's Law: Eddy currents generate a magnetic field that opposes the motion of the magnet. This leads to resistive forces on the magnet and a rotational motion in the can.
Examine the Long-term Motion: As energy is dissipated as heat, describe how the amplitude of the magnet's swing and the can's rotation diminishes over time, showing the system eventually coming to rest.

Eddy Currents: Circular currents induced in a conductor when it is exposed to a changing magnetic field, producing resistive forces and thermal energy.

Lenz's Law: A rule stating that the direction of an induced current is such that it opposes the change in magnetic flux that caused it.

Analyse

- Identify components and the relationship between them.
- Draw out and relate implications.

[Link to NESA Marking Guidelines and Sample Answer]