

SIMPLE AC GENERATOR

OCR A LEVEL PHYSICS H556

Module 6: Particles and medical physics

6.3 Electromagnetism

6.3.3 Electromagnetism

e) simple a.c. generator

Outline = moving a conductor in a magnetic field forces and emf

Apparatus = model ac generator

Text book reference = pages 193-199

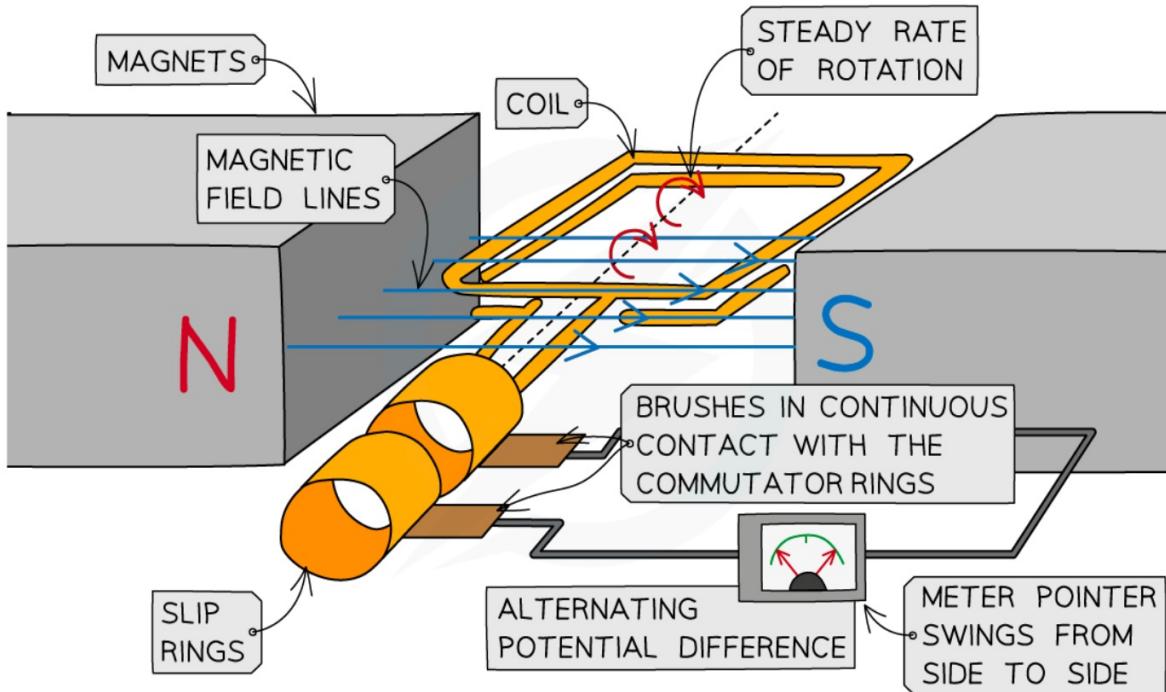
Independent study = page 199 questions

What is this lesson about?

- Design for a simple a.c. generator
- How does it work?
- The output shape
- Why?

SIMPLE AC GENERATOR

A simple a.c. generator



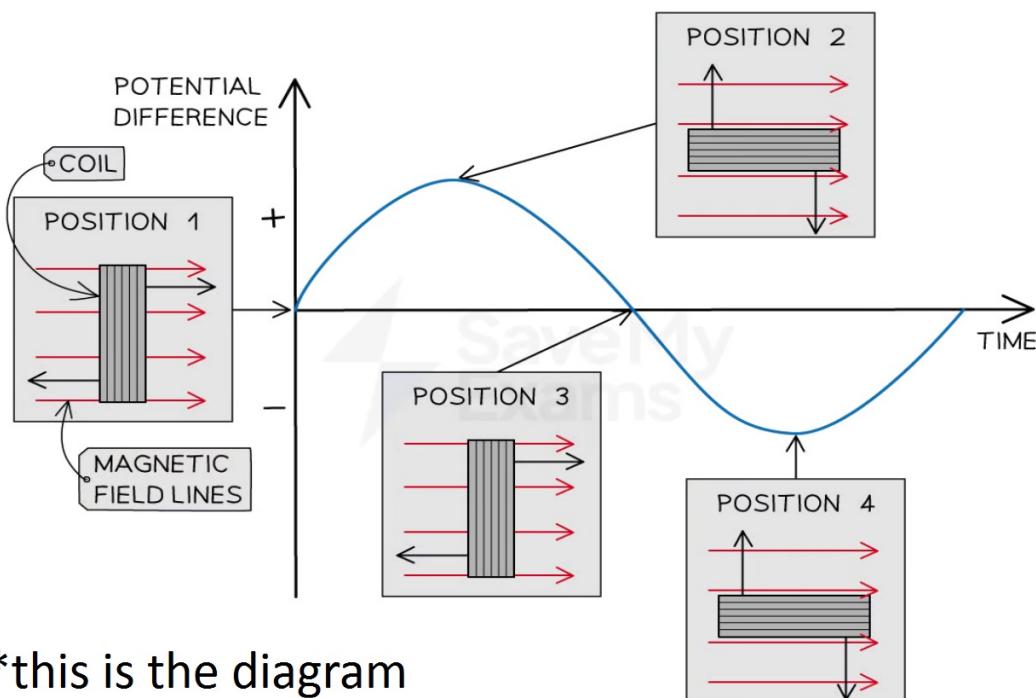
How does this work?

- As coil rotates, the flux linkage through it changes
- This induces an emf
- Equal to the rate of change in flux linkage
- Change is sinusoidal, due to rotation
- Max emf is produced when rate of change is max*
- Zero emf when rate of change is zero*
- Polarity changes each half turn
- Because direction of change relative to coil changes

*see diagram

SIMPLE AC GENERATOR

How does emf vary with time and position?



*this is the diagram

Formula

$$\mathcal{E} = -\Delta\Phi/\Delta t = \Delta B A N \cos\theta / \Delta t$$

Where:

\mathcal{E} = induced emf / V

B = magnetic flux density of field / T

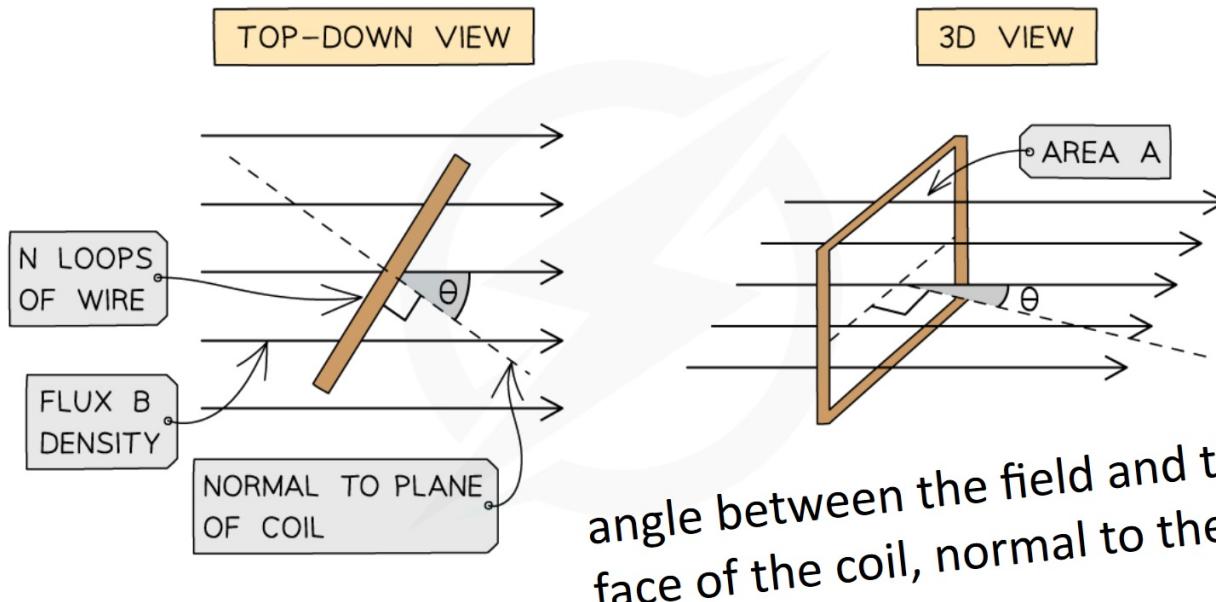
A = area of coil / m²

N = number of turns

t = time for change to occur / s

SIMPLE AC GENERATOR

How are we defining θ ?



Think

- How does flux linkage vary with time?
- Sketch a graph of flux linkage against time
- How does this relate to the emf induced?
- Sketch a graph of emf against time

Independent study

- Page 199 questions from your text book

Further thoughts?

Independent study

- Page 199 questions from your text book

Further thoughts?