



QUESTION WORKBOOK

Magnetic flux and flux linkage

Magnetic fields · Year 13

AQA 3.7.5.3 · CIE 20.5 · OCR A 6.3.3

10 questions · 30 marks

NAVY SCREEN EDITION

SECTION A · Warm-up

A1 State the equation for magnetic flux through an area normal to a field, and its unit. [2]

A2 A field of flux density 0.20 T passes normally through an area of 0.05 m². Calculate the magnetic flux. [2]

A3 Define the flux linkage of a coil. [2]

SECTION B · Standard

B1 A coil of 200 turns and area 0.02 m² is placed with its plane normal to a 0.15 T field. Calculate the flux linkage. [3]

- B2** A coil of 100 turns and area 0.01 m^2 is in a 0.30 T field, with its normal at 60° to the field. Calculate the flux linkage, using $N\Phi = BAN \cos\theta$. [4]

- B3** A magnetic flux of $8.0 \times 10^{-3} \text{ Wb}$ passes normally through an area of 0.04 m^2 . Calculate the flux density. [3]

- B4** Explain how the flux linkage of a coil changes as it is rotated in a uniform field, and state the orientations giving maximum and zero flux linkage. [3]

SECTION C · Stretch

- C1** A coil of 50 turns and area 0.02 m^2 sits in a 0.40 T field. Calculate the flux linkage when the coil normal is (a) parallel to the field and (b) at 90° to it. [4]

- C2** A coil of 500 turns and area 0.008 m^2 lies with its plane normal to a field that increases from 0.10 T to 0.30 T . Calculate the change in flux linkage. [4]

- C3** Describe how a search coil can be used to investigate a magnetic field. [3]