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"What one man calls God, another calls the laws of physics."

-Nikola Tesla

TOPIC 20: MAGNETISM







CHAPTER ANALYSIS



• Straight forward topic

- Tested in MCQ mainly
- Closely linked to chapter like 'Electromagnetism'



Constitute to around 2% of marks for past 5 year papers



KEY CONCEPT

LAW OF MAGNETISM MAGNETISATION METHODS MAGNETIC FIELD





LAW OF MAGNETISM

MAGNETS

Like poles repel, unlike poles attract.

Only 2 magnets can repel each other. (true test for magnets)







EARTH'S MAGNETIC FIELD

The earth has a magnetic field, with its magnetic south pole at the geographic north pole.

North pole (red) of a compass will be attracted to the geographic north pole and point there.

A freely suspended magnet will point in the north-south direction.



Hard & soft magnetic materials

Soft magnetic materials are easy to magnetise and demagnetise and are thus used as temporary magnets. (eg: iron)

Hard magnetic materials are difficult to magnetise and demagnetise are used as permanent magnets. (eg: steel)

MAGNETISATION

INDUCED MAGNETISM

When a piece of unmagnetised magnetic material touches or is brought near to the pole of a permanent magnet, it becomes a magnet itself.



This explains why a magnet can attract an unmagnetised magnetic material as the material becomes an induced magnet.

The end nearer the original magnet has an opposite polarity to the magnet and possesses induced magnetism to attract magnetic objects.

The strength of magnetism decreases as distance from the magnet increases.

*Demagnetism methods:

- Alternating current in a solenoid
- Heating
- Hammering

MAGNETISM BY STROKING

Magnetic material is stroked several times in the same direction along its length.



MAGNETISM BY DIRECT CURRENT

When the current passes through the solenoid, it creates a strong magnetic field, causing the magnetic domains to align and eventually creating a new magnet.

The strength of the electromagnet depends on the current & the number of coils.



MAGNETIC FIELD

MAGNETIC FIELD

Magnetic field is a region where a magnet will experience a magnetic force.











Magnetic field lines of a bar magnet

Magnetic field lines between unlike poles

Magnetic field lines between like poles



Tips:

- Magnetic field lines must never intersect or originate from the same point

- Closer magnetic field lines means the region's magnetic field strength is stronger

For more notes & learning materials, visit: <u>www.overmugged.com</u>

'O' levels crash course program

III

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Darrell Er (Private tutor with **8 years** of experience)

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