Your notes

GCSE Physics: revision notes

Induction, generators and transformers

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The generator effect (Higher)

- If a conductor moves relative to a magnetic field, or the magnetic field around a conductor changes, a potential difference is induced across the ends of the conductor.
- If the conductor is part of a complete circuit, a current is induced.
- The induced current makes its own magnetic field, which opposes the original change (the movement of the conductor or the change in the field).

Increasing the induced potential difference (Higher)

- Move the wire or magnet faster.
- Use a stronger magnetic field.
- Use a coil with more turns.
- Reversing the direction of motion, or the poles of the magnet, reverses the **induced potential difference**.

Uses of the generator effect (Higher)

- An **alternator** is a coil rotating in a magnetic field; it produces alternating current (ac) and uses slip rings.
- A **dynamo** produces direct current (dc) and uses a split-ring commutator.
- A **microphone** uses the **generator effect**: sound waves make a diaphragm and coil vibrate in a magnetic field, producing a changing current that matches the sound.

Transformers (Higher)

- A **transformer** has a **primary coil** and a **secondary coil** wound on an iron core. An alternating current in the primary coil makes a changing magnetic field in the core, which induces an alternating pd in the secondary coil.
- Vp ÷ Vs = np ÷ ns: the ratio of the potential differences equals the ratio of the numbers of turns.
- Step-up **transformers** have more turns on the **secondary coil**; step-down **transformers** have fewer.
- If a **transformer** is 100% efficient, the power in equals the power out: Vp × Ip = Vs × Is.

Key terms

Generator effect	Inducing a potential difference by moving a conductor in a magnetic field or changing the field around it.
Induced potential difference	A pd produced across a conductor by the generator effect.
Alternator	A generator that produces alternating current.
Dynamo	A generator that produces direct current.
Microphone	A device that uses the generator effect to turn sound into a changing current.
Transformer	A device with two coils on an iron core that changes the size of an alternating pd.
Primary coil	The input coil of a transformer.
Secondary coil	The output coil of a transformer.

Quick questions

Cover the answers and test yourself: remembering is what makes it stick.

1. What is the generator effect? (Higher)
2. How can the induced pd be increased? (Higher)
3. What does the magnetic field of an induced current do? (Higher)
4. What type of current does an alternator produce? (Higher)
5. What type of current does a dynamo produce? (Higher)
6. How does a microphone work? (Higher)
7. A transformer has 100 turns on the primary coil and 500 on the secondary. Is it step-up or step-down? (Higher)
8. A transformer has 200 primary turns and 50 secondary turns. The primary pd is 240 V. What is the secondary pd? (Higher)

Your notes

Answers

1. Inducing a pd by moving a conductor in a magnetic field
2. Move the magnet faster
3. Opposes the change that caused it
4. Alternating current
5. Direct current
6. Sound makes a coil vibrate in a magnetic field, inducing a current
7. Step-up
8. 60 V

What to do next

Practise 10 questions on this topic

Try 7 exam questions, with mark schemes

Read the lesson, one step at a time

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