TOPIC: ELECTRICAL ENERGY GENERATION AND TRANSMISSION

In this topic, students investigate about:

- Alternating current

- Electric motors

- Generators

- Transformers

Key terms

Alternating current (AC)	Dòng điện xoay chiều	Transformer	Máy biến thế
Direct current (DC)	Dòng điện một chiều	Primary coil	Cuộn dây sơ cấp
AC generator	Máy phát điện xoay chiều	Secondary coil	Cuộn dây thứ cấp
DC generator	Máy phát điện một chiều	Step-down transformer	Máy hạ thế (máy hạ áp)
Electric motor	Động cơ điện	Step-up transformer	Máy tăng thế (máy tăng áp)

References

- Physical Science (trang 642-647, phần 21.3 *Electrical energy generation and transmission*)
- Sách giáo khoa vật lý 11
- Video:

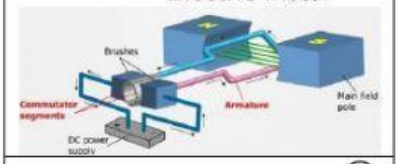
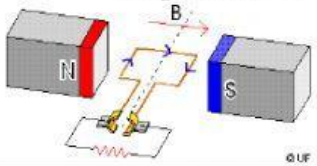
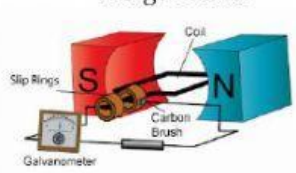
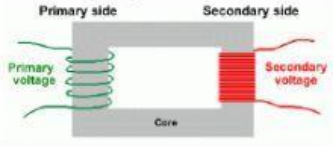
+ Electric generator (A.C. & D.C.): https://www.youtube.com/watch?v=Ylgb8FFMgd4

+ Electric motor: https://www.youtube.com/watch?v=43XAuU-515g

+ Transformer: https://www.youtube.com/watch?v=UchitHGF4n8

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1. Matching: ***Join the device with the corresponding description.***

Device	Description
Electric motor ☺ 	☻ The primary coil has **fewer** turns than the secondary. It is used to **increase the voltage** of two linked AC circuit.
DC generator ☺ 	☻ A device that **converts electrical energy to mechanical energy**
AC generator ☺ 	☻ The primary coil has **more** turns than the secondary. It is used to **decrease the voltage** of two linked AC circuit.
Step-up transformer ☺ 	☻ A device that **converts mechanical energy to electrical energy** The loop of wire is attached to **the slip rings** so when it rotates, **the current** that leaves the generator **changes direction periodically**.
Step-down transformer ☺ 	☻ A device that converts mechanical energy to electrical energy The loop of wire is attached to **a commutator** so when it rotates, **the current** that leaves the generator **flows in one direction.**

2. Multiple choice: ***Choose the best answer.***

- *Which is the working principle of a generator?*

A. An alternating current is induced in the secondary coil due to a changing magnetic field in the iron core of the primary coil.

B. When the loop of wire is rotated inside a magnetic field, a current is induced in the wire.

C. When current flows through a loop of wire, the magnetic force exerted by the permanent or electromagnet on the sides of loop rotates the loop.

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- *Which is the working principle of an electric motor?*

A. An alternating current is induced in the secondary coil due to a changing magnetic field in the iron core of the primary coil.

B. When the loop of wire is rotated inside a magnetic field, a current is induced in the wire.

C. When current flows through a loop of wire, the magnetic force exerted by the permanent or electromagnet on the sides of loop rotates the loop.

- *Which is the working principle of a transformer?*

A. An alternating current is induced in the secondary coil due to a changing magnetic field in the iron core of the primary coil.

B. When the loop of wire is rotated inside a magnetic field, a current is induced in the wire.

C. When current flows through a loop of wire, the magnetic force exerted by the permanent or electromagnet on the sides of loop rotates the loop.

- *In a DC generator, the commutator*

A. generates an electric current.

B. converts an alternating current to a direct current.

C. reduces the voltage.

D. reverses the direction of the direct current.

- *Which formula shows the correct relationship in transformer?*

A. $\frac{\text{The number of turns in primary coil}}{\text{The number of turns in secondary coil}} = \frac{\text{The input voltage}}{\text{The output voltage}}$

B. $\frac{\text{The number of turns in primary coil}}{\text{The number of turns in secondary coil}} = \frac{\text{The output voltage}}{\text{The input voltage}}$

C. $\frac{\text{The number of turns in primary coil}}{\text{The number of turns in secondary coil}} = \frac{\text{The input current}}{\text{The input voltage}}$

D. $\frac{\text{The number of turns in primary coil}}{\text{The number of turns in secondary coil}} = \frac{\text{The output current}}{\text{The output voltage}}$

- A transformer has 400 turns on the primary coil and 1600 turns on the secondary coil. What is the output voltage if the input is 1000 volts?

A. 250 V **B.** 500 V **C.** 2000 V **D.** 4000 V

- A transformer has 500 turns on the primary coil. If the input voltage is 220 V, the output voltage is 110 V. How many turns does the secondary coil have?

A. 220 turns **B.** 230 turns **C.** 240 turns **D.** 250 turns

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