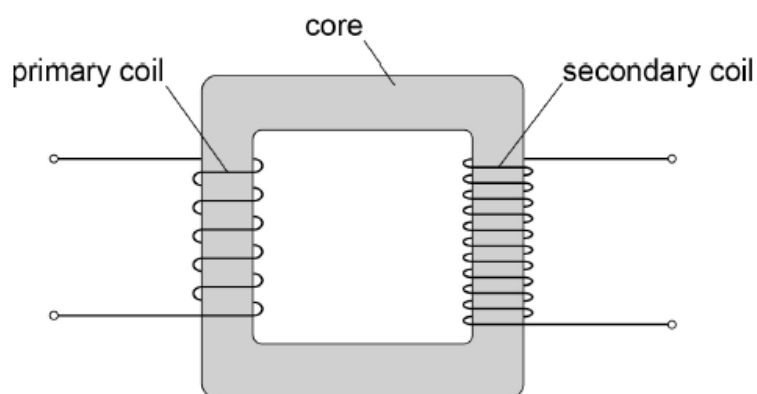


Magnetic fields – A2 Physics P2

1. No.5

0	5
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Figure 7 shows a transformer.

Figure 7

0	5
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. 1

Explain the functions of the core and the secondary coil.

[3 marks]

core _____

secondary coil _____

0 5 . 2

Figure 8 shows a cross-section through the transformer core. Thin iron sheets are separated by material **M**.

Explain how the efficiency of the transformer is increased by constructing the core in this way.

[3 marks]

Figure 8

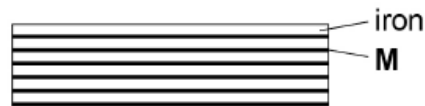
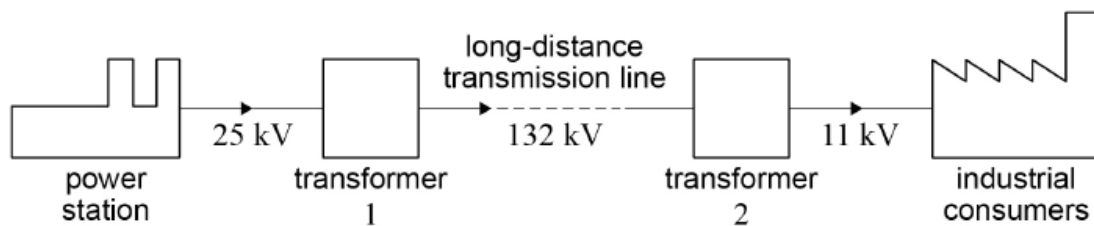


Figure 9 shows a schematic diagram of a power transmission system.

Figure 9



0 5 . 3

Voltages between 33 kV and 400 kV are used for long-distance transmission.

Suggest why engineers have chosen 132 kV for this system.

[2 marks]

0	5	.	4
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The industrial consumers use 72 MW of power.
Transformers 1 and 2 each have an efficiency of 98% and the transmission line has an efficiency of 94%.

Calculate the current in the 25 kV line from the power station.

[3 marks]

current = _____ A

2. No.14

When an electron moves at a speed v perpendicular to a uniform magnetic field of flux density B , the radius of its path is R .

A second electron moves at a speed $\frac{v}{2}$ perpendicular to a uniform magnetic field of flux density $4B$.

What is the radius of the path of the second electron?

[1 mark]

A $\frac{R}{8}$

☐

B $\frac{R}{4}$

☐

C $2R$

☐

D $8R$

☐

3. No.22

A horizontal wire of length 0.25 m carrying a current of 3.0 A is perpendicular to a magnetic field. The mass of the wire is $3.0 \times 10^{-3}\text{ kg}$ and the weight of the wire is supported in equilibrium by the magnetic field.

What is the flux density of the magnetic field?

[1 mark]

A 2.6 T

☐

B $3.9 \times 10^{-2}\text{ T}$

☐

C $2.2 \times 10^{-2}\text{ T}$

☐

D $4.0 \times 10^{-3}\text{ T}$

☐

4. No.23

A coil is rotated at frequency f in a uniform magnetic field.

The magnetic flux linking the coil is a maximum at time t_1 and the emf induced in the coil is a maximum at time t_2 .

What is the smallest value of $t_1 - t_2$?

[1 mark]

A 0

☐B $\frac{1}{4f}$ ☐C $\frac{1}{2f}$ ☐D $\frac{3}{4f}$ ☐

5. No.24

Power P is dissipated in a resistor of resistance R carrying a direct current I .

A second resistor of resistance $2R$ carries an alternating current with peak value I .

What is the power dissipated in the second resistor?

[1 mark]

A $\sqrt{2}P$ ☐B P ☐C $2P$ ☐D $4P$ ☐