PEARSON EDEXCEL GCSE COMBINED SCIENCE (HIGHER) · 1SC0

PHYSICS



EXAM QUESTION PACK

TOPIC 13: ELECTROMAGNETIC INDUCTION (PAPER 2)

SCORE	PERCENTAGE
/31	%

STEMUP

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Q1.

The transformer in another battery charger has a primary coil and a secondary coil.

The voltage across the primary coil = 230 V.

The voltage across the secondary coil = 15 V.

The current in the secondary coil is 3.1 A.

Calculate the current in the primary coil.

Use the equation

$$\text{primary current} = \frac{\text{secondary voltage} \times \text{secondary current}}{\text{primary voltage}}$$

(2)

current = ... A

(Total for question = 2 marks)

(**Q01c 1SC0/2PF, Nov 2020**)

Q2.

A transformer is used to connect a laptop computer to the mains electricity supply.
The input voltage to the transformer is 230 V.
The output current from the transformer is 2.37 A.
The transformer has an output voltage of 19.0 V.
The transformer used is 100% efficient.

Calculate the input current to the transformer.

Use the equation

input current × input voltage = output current × output voltage

(3)

input current = ... A

(Total for question = 3 marks)

(**Q03c 1SC0/2PF, Nov 2021**)

Q3.

Figure 7 shows details of a transformer.

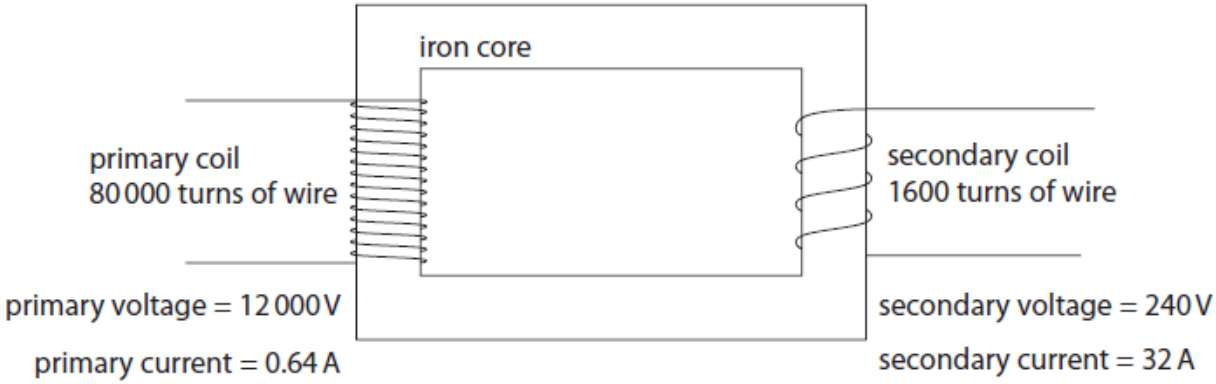


Figure 7

(i) Calculate the power in the primary coil.

Use the equation

$$P = V \times I$$

(2)

power in the primary coil = ... W

(ii) Calculate the following for the transformer in Figure 7.

$$\frac{\text{number of turns in secondary coil}}{\text{number of turns in primary coil}}$$

(2)

.....

(iii) For the transformer in Figure 7, evaluate, in its simplest form, the ratio

secondary voltage : primary voltage

(2)

..... : .....

(Total for question = 6 marks)

(**QU03c 1SC0/2PF, June 2023**)

Q4.

What is the name of the device used to change the size of an alternating voltage?

(1)

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(**Q01 1SC0/2PH, June 2013**)

Q5.

* Figure 10 is a diagram showing a part of the National Grid, used to supply electrical power to homes.

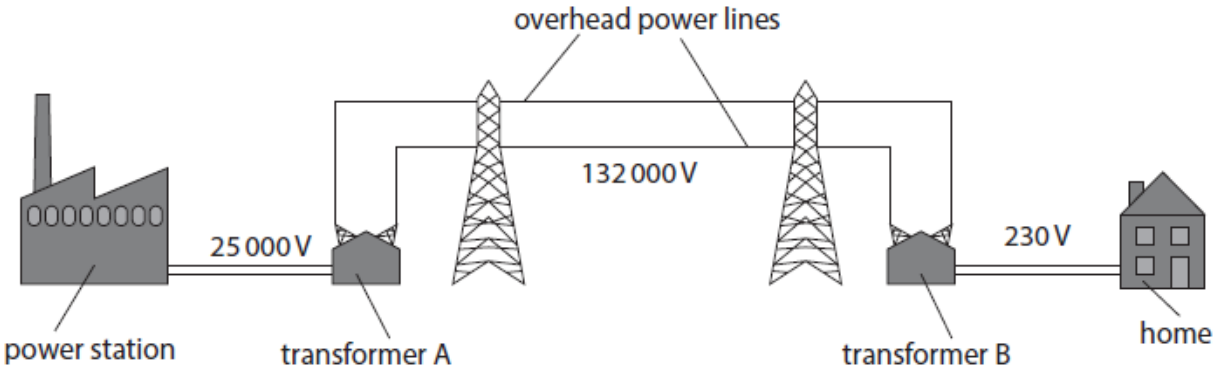


Figure 10

Using information from Figure 10, explain how electrical power is distributed from power stations to homes.

Your answer should refer to

- the role of the transformers
- the different voltages
- how energy losses are reduced

(6)

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(Total for question = 6 marks)

(**QU06d 1SC0/2PF, June 2025**)

Q6.

Figure 23 shows an electric car connected to a battery charger.



(Source: © Danil Roudenko/123RF)

Figure 23

* The battery charger shown in Figure 23 is connected to the 230 V a.c. domestic mains supply.

The output voltage of the charger is 335 V and it provides a d.c. charging current. Charging stops if the charging current exceeds 15 A.

Explain how electrical components in the charger can be connected together to give this type of output.

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(Total for question = 6 marks)

(**Q08c 1SC0/2PH, SAM 2016**)

Q7.

Figure 6 shows part of the UK National Grid system for the supply of electricity to homes.

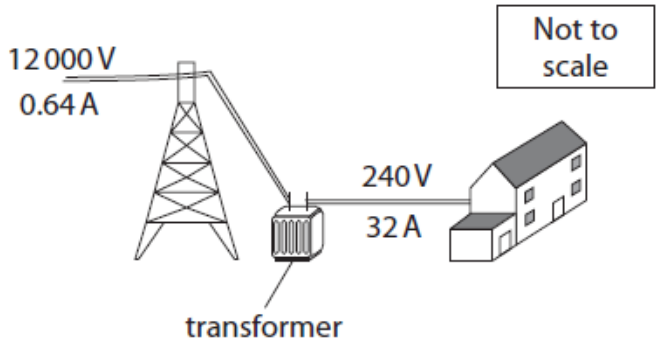


Figure 6

Explain why the National Grid uses high voltages with small currents to transfer electricity from power stations.

(2)

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(Total for question = 2 marks)

(**QU03b 1SC0/2PF, June 2023**)

Q8.

Complete the following sentences using one of the phrases from the box below.

efficiency is reduced the national grid a power station heat loss is reduced a transformer

(i) Electrical power is generated at

(1)

.....

(ii) Electricity is transmitted over long distances by transmission lines that are part of

(1)

.....

(iii) Electricity is transmitted at high voltages so that

(1)

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(Total for question = 3 marks)

(**Q01 1SC0/2PF, June 2018**)

Q9.

In a small transformer

- the primary voltage is 230 V
- the primary current is 0.020 A
- the secondary voltage is 5.0 V

Calculate the secondary current.

Use the equation

$$I_s = \frac{V_p \times I_p}{V_s}$$

(2)

secondary current = ... A

(Total for question = 2 marks)

(**Q03 1SC0/2PF, June 2018**)

Q10.

* The first public power station was built in the centre of New York.

It used generators to supply direct current at 110 V. The cables had to go underground and they could only supply
nearby shops and offices.

The electricity was mainly used for electric light.

The development of alternating current generators led to major changes in the way electricity is transmitted and used.

Compare the modern National Grid system with the early system in New York.

(6)

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(**Q08 1SC0/2PF, Mar 2013**)

Q11.

Which statement is true for transformers?

(1)

☒ **A** Transformers can only step-up voltages.

☒ **B** Transformers can only step-down voltages.

☒ **C** Transformers can work with direct current.

☒ **D** Transformers have primary and secondary coils.

(Total for question = 1 mark)

(**Q02 1SC0/2PF, June 2018**)

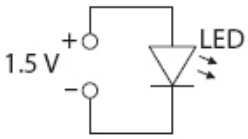
Q12.

(a) What is the name of the device used to change the size of an alternating voltage?

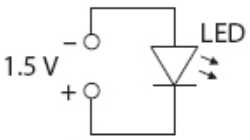
(1)

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(b) A light emitting diode (LED) can only emit light when connected correctly to a potential difference.

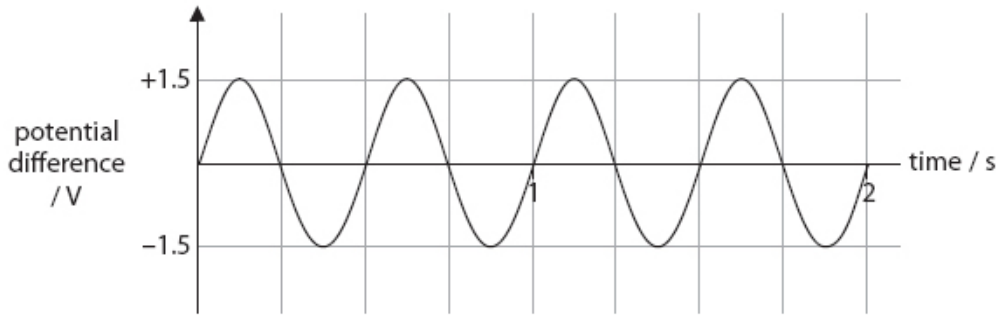


LED emits light



LED does **not** emit light

Use this information to suggest what happens when this alternating voltage is connected across the LED.



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(c) A LED lamp has a power rating of 3 W.
The voltage across the lamp is 12 V.
Calculate the current in the lamp.

(3)

current in the lamp =.....A

*(d) Some research has been carried out into replacing fluorescent lamp fittings with LED fittings.



photo of stairwell
with fluorescent fitting



photo of stairwell
with LED fitting

The data in the table is taken from the report of a trial using LEDs to light stairwells and corridors in a large building.

total energy saved each year by using LEDs	3 000 kW h
LED fitting cost	£2 000
CO_2 saving each year by using LEDs	1.6 tonnes
change in lighting levels by using LEDs	200%
average price of electrical energy	14 p / kW h
average lifetime of LED fittings	50 000 hours
average lifetime of fluorescent fittings	10 000 hours

Use the information to discuss the benefits of replacing fluorescent fittings with LED fittings.

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(Total for Question = 12 marks)

(**Q02 1SC0/2PH, June 2013**)