Questions

Q1.

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

(1)

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Q2.

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.

(6)

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(Total for question = 6 marks)

Q3.

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

(1)

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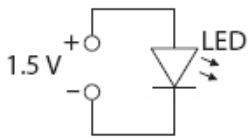
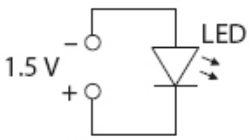
(b) A light emitting diode (LED) can only emit light when connected correctly to a potential difference.



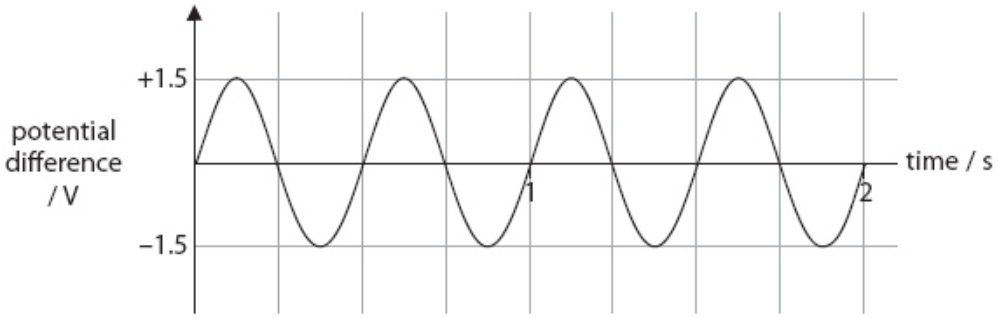
LED emits light



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)