Name of the Student:_____

Max. Marks : 21 Marks **Time : 21 Minutes**

Q1.

Figure 9 shows an electric motor lifting a set of masses.

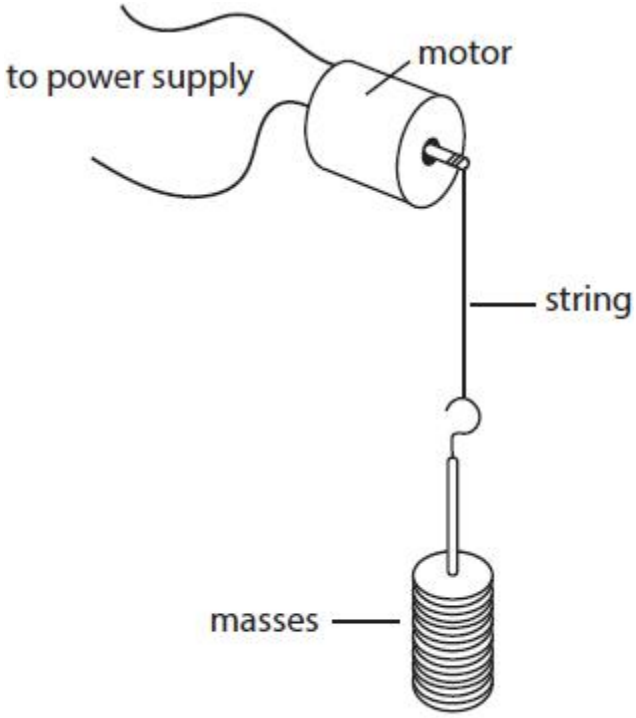

Figure 9

(i) Describe an experiment, using the apparatus in Figure 9, to determine the gravitational potential energy gained by the masses as they are lifted.

Your description should include any measuring devices to be used.
You may add to the diagram in Figure 9 if it helps your answer.

(4)

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(ii) In one experiment, the change in gravitational potential energy of the masses was 5.8 J.

The total mass lifted was 320 g.
Calculate the vertical height the masses travelled through.
Use g = 10 N/kg.

(2)

height = ... m

(iii) The efficiency of the motor was 59%.

State **one** reason why the motor was not 100% efficient.

(1)

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(Total for question = 7 marks)

Q2.

The area between the curve and the extension axis of a force/extension graph corresponds to work done or energy transferred.

Suggest what the shaded area of the graph in Figure 9 represents.

(2)

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(Total for question = 2 marks)

Q3.

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

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(1)

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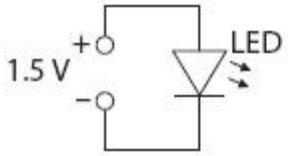
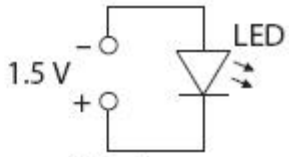
(b) A light emitting diode (LED) can only emit light when connected correctly to a potential difference.

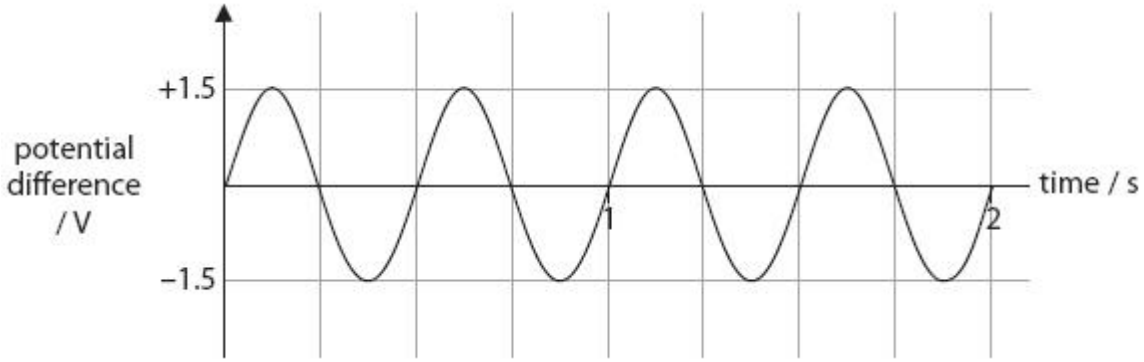


LED emits light



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.

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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.

(6)

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(Total for Question = 12 marks)

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