

Name of the Student: _____

Max. Marks : 21 Marks

Time : 21 Minutes

Q1.

Figure 11 shows a wind turbine.

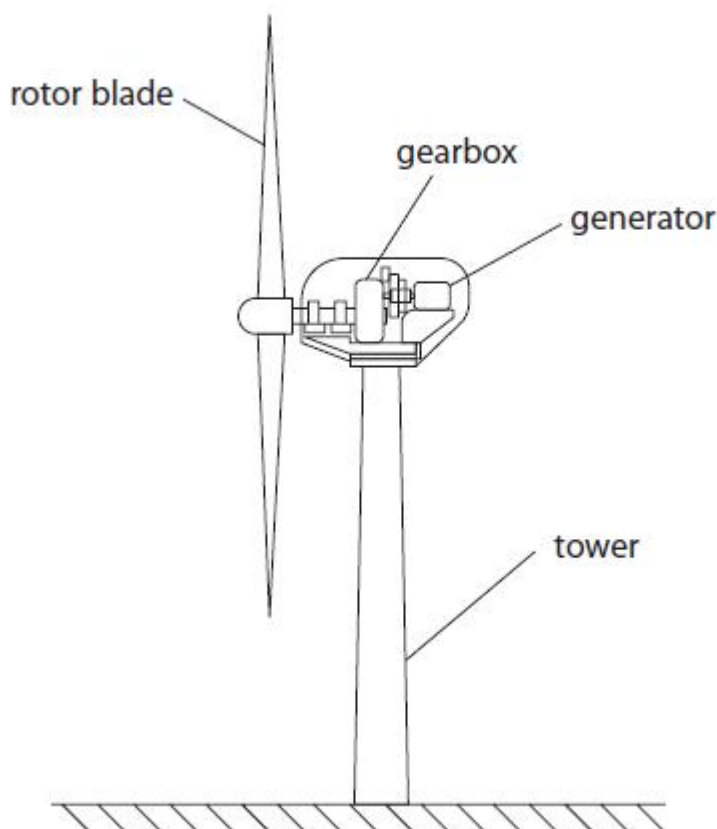


Figure 11

Explain how unwanted energy transfers could be reduced in the gear box.

(2)

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(Total for question = 2 marks)

Q2.

A house has a boiler to provide hot water.

One type of boiler burns natural gas.

Natural gas is a non-renewable source of energy.

(i) State a renewable source of energy that could be used to heat water in a house.

(1)

.....
Figure 14 shows some information in a booklet supplied with a gas boiler.

fuel	natural gas
temperature of hot water	65°C
energy supplied to the boiler in one second	7500 J
efficiency of boiler	96%

Figure 14

(ii) Calculate the energy transferred to the water by the boiler in one second.

(2)

energy transferred to water = J

(Total for question = 3 marks)

Q3.

A different cyclist uses a motorised bicycle.

The motorised bicycle is powered by an electric motor.

Figure 3 is an energy diagram for the motor.

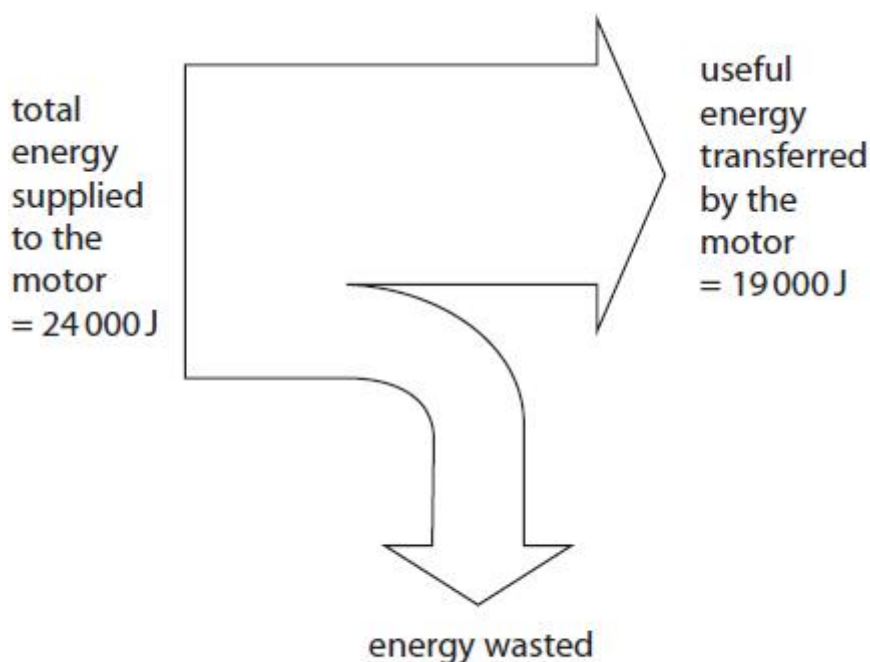


Figure 3

(i) Calculate how much energy is wasted.

(1)

energy wasted = J

(ii) Calculate the efficiency of the electric motor.

(2)

Use the equation:

$$\text{efficiency} = \frac{(\text{useful energy transferred by the device})}{(\text{total energy supplied to the device})}$$

efficiency of electric motor =

(Total for question = 3 marks)

Q4.

Figure 2 shows an energy transfer diagram for a steam engine.
The diagram shows the amounts of energy transferred each second by the steam engine.

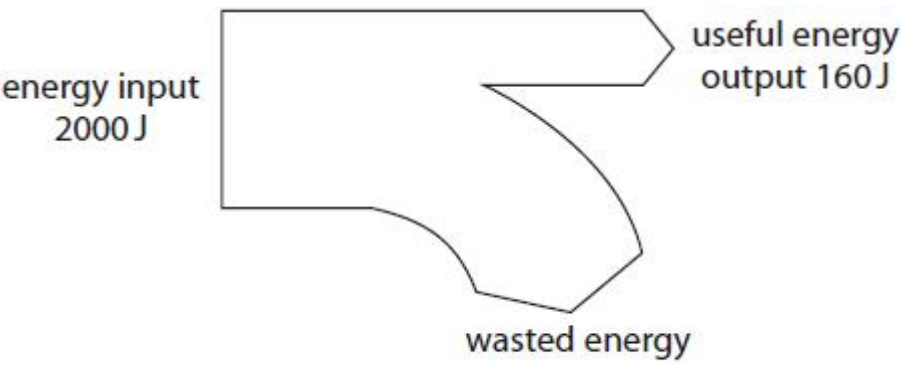


Figure 2

(i) Calculate the amount of wasted energy. (1)

wasted energy = J

(ii) Calculate the efficiency of the steam engine.
Use the equation

$$\text{efficiency} = \frac{\text{(useful energy transferred by the steam engine)}}{\text{(total energy supplied to the steam engine)}}$$
 (2)

efficiency =

(iii) State what happens to the wasted energy. (1)

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.....

(iv) Coal is a fossil fuel that is burnt in some steam engines.
State **two** ways that the use of coal might be harmful to the environment. (2)

- 1
-
- 2
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(Total for question = 6 marks)

Q5.

A cyclist has a mass of 64 kg.

(i) The cyclist rides from a flat road to the top of a hill.

The top of the hill is 24 m above the flat road.
Calculate the gain in gravitational potential energy, ΔGPE , of the cyclist.
Use $g = 10 \text{ N/kg}$
Use the equation

$$\Delta GPE = m \times g \times \Delta h$$

(2)

gain in gravitational potential energy = J

(ii) The cyclist returns to the flat road.

The mass of the cyclist is 64 kg.
Calculate the kinetic energy of the cyclist when the cyclist is travelling at 6.0 m/s.
Use the equation

$$KE = \frac{1}{2} \times m \times v^2$$

(3)

kinetic energy = J

(iii) The cyclist then uses the brakes on the bicycle to stop.

Explain what happens to the kinetic energy of the cyclist.

(2)

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(Total for question = 7 marks)