Name of the Student:_____

Max. Marks : 19 Marks **Time : 19 Minutes**

Q1.

Figure 11 shows a wind turbine.

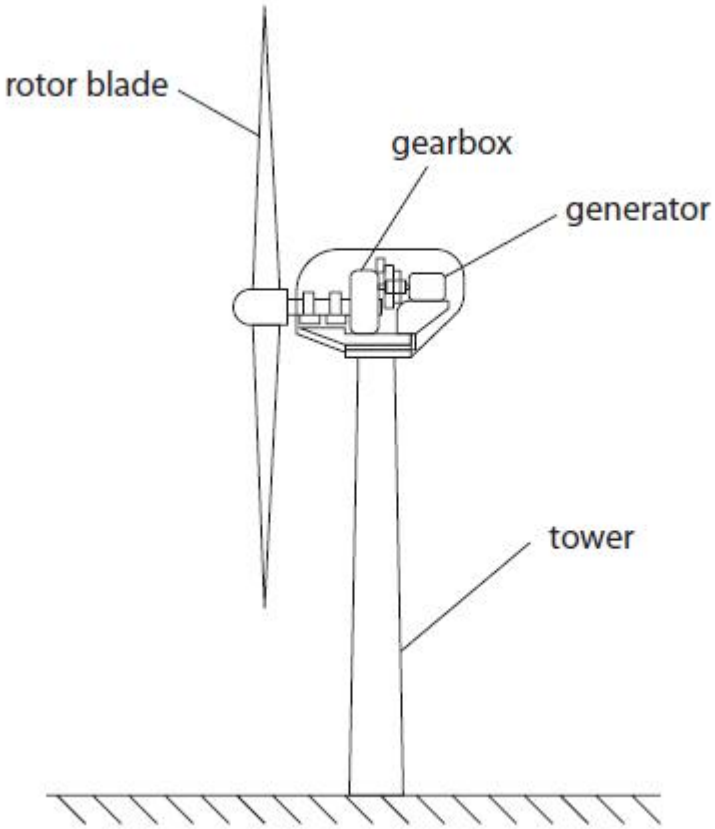

Figure 11

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

(2)

.....

.....

.....

.....

(Total for question = 2 marks)

Q2.

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 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

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

(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)

Q3.

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.

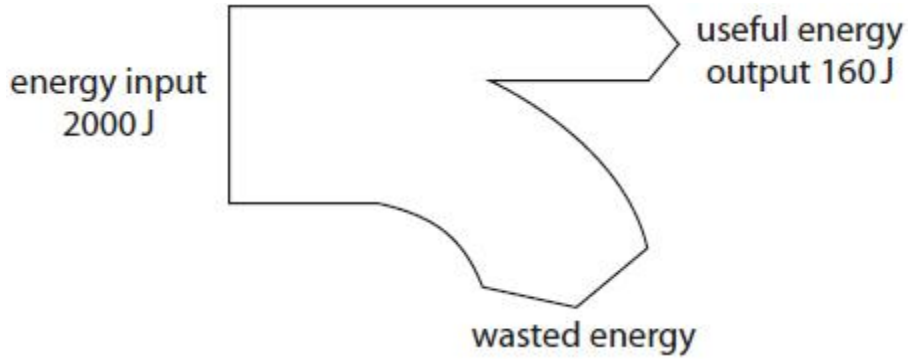

Figure 2

(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)

.....

.....

(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 .....

.....

(Total for question = 6 marks)

Q4.

Shot-put is an Olympic event.
The shot is a heavy ball.
An athlete throws the shot as far as possible.

A sports scientist analyses an athlete's throw to help improve performance.

In one throw, the shot continues to rise by another 1.3 m after it leaves the athlete's hand.
The mass of the shot is 7.26 kg.

(i) Calculate the amount of gravitational potential energy gained by the shot.

(2)

gravitational potential energy gained = ... J

(ii) Explain how the total energy stored in the shot changes between leaving the athlete's hand and hitting the ground.

(2)

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(Total for question = 4 marks)