

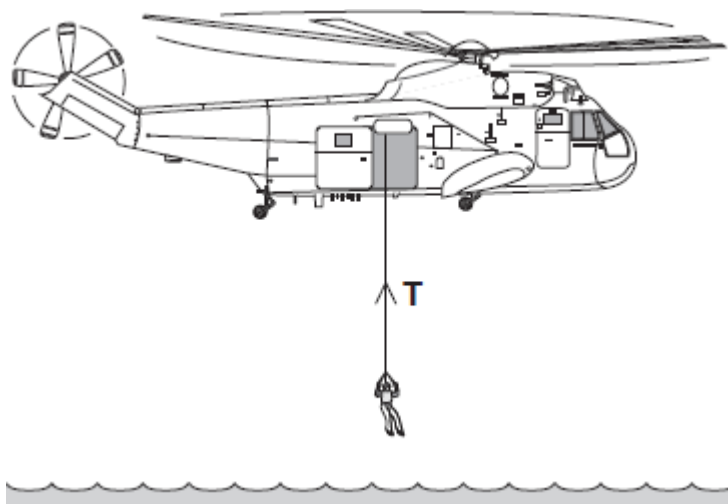
Name of the Student: _____

Max. Marks : 17 Marks

Time : 17 Minutes

Q1.

The diagram shows a helicopter being used to rescue a person from the sea.



- (a) (i) The mass of the rescued person is 72 kg.

Use the equation in the box to calculate the weight of the rescued person.

$\text{weight} = \text{mass} \times \text{gravitational field strength}$
--

gravitational field strength = 10 N/kg

Show clearly how you work out your answer.

Weight = _____ N
(2)

- (ii) An electric motor is used to lift the person up to the helicopter.
The motor lifts the person at a constant speed.

State the size of the force, **T**, in the cable.

Force **T** = _____ N
(1)

- (b) To lift the person up to the helicopter, the electric motor transformed 21 600 joules of energy

usefully.

- (i) Use a form of energy from the box to complete the following sentence.

gravitational potential	heat	sound
-------------------------	------	-------

The electric motor transforms electrical energy to kinetic energy. The kinetic energy is then transformed into useful _____ energy.

(1)

- (ii) It takes 50 seconds for the electric motor to lift the person up to the helicopter.

Use the equation in the box to calculate the power of the electric motor.

$\text{power} = \frac{\text{energy transformed}}{\text{time}}$
--

Show clearly how you work out your answer and give the unit.

Choose the unit from the list below.

coulomb (C)

hertz (Hz)

watt (W)

Power = _____

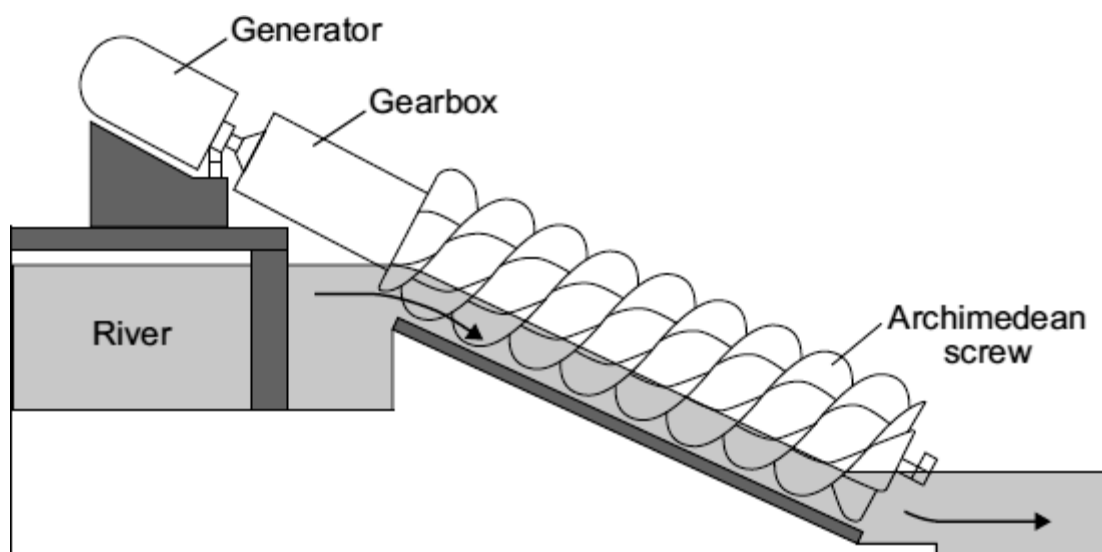
(3)

(Total 7 marks)

Q2.

The diagram shows a small-scale, *micro-hydroelectricity* generator which uses the energy of falling river water to generate electricity. The water causes a device, called an Archimedeian screw, to rotate.

The Archimedeian screw is linked to the generator by a gearbox.



- (a) Complete the following sentence by drawing a ring around the correct word in the box.

The gravitational potential energy of the falling water is transformed

into the

chemical
electrical
kinetic

energy of the Archimedean screw.

(1)

- (b) A micro-hydroelectric system generates about 60 kW of electricity, enough for 50 homes. A conventional large-scale hydroelectric power station may generate more than 5 000 000 kW of electricity.

- (i) Give **one** advantage of a conventional large-scale hydroelectric power station compared to a micro-hydroelectric system.

(1)

- (ii) Which **one** of the following statements gives a **disadvantage** of a conventional large-scale hydroelectric power station compared to a micro-hydroelectric system?

Put a tick (✓) in the box next to your answer.

Energy is wasted as heat and sound.

☐

Large areas of land are flooded.

☐

A constant flow of water is needed.

☐

(1)

- (c) The electricity generated by the micro-hydroelectric system is transferred directly to local homes. The electricity generated by a conventional large-scale hydroelectric power station is transferred to homes anywhere in the country through a system of cables and transformers.

- (i) What name is given to the system of cables and transformers used to transfer electricity to homes anywhere in the country?

(1)

- (ii) Using short cables to transfer electricity to local homes is much more efficient than using very long cables to transfer electricity to homes anywhere in the country.

Why?

(1)

- (d) Nepal is a mountainous country with over 6000 rivers. In Nepal, 9000 kW of electricity are generated using micro-hydroelectric generators.

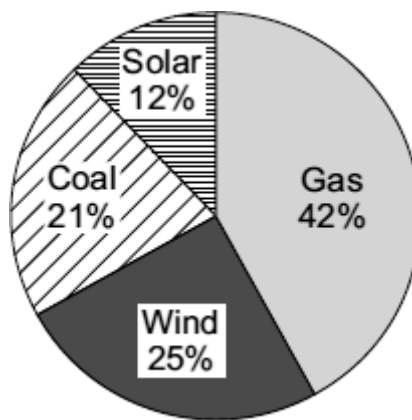
Suggest **one** reason why in the UK much less electricity is generated using micro-hydroelectric generators, than in Nepal.

(1)

(Total 6 marks)

Q3.

- (a) The pie chart shows the energy sources used by one company to generate electricity.



- (i) Which two energy sources used by the company do **not** produce any polluting gases?

_____ and _____

(1)

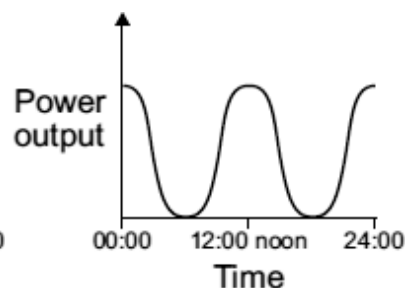
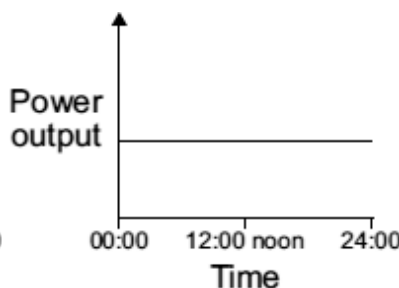
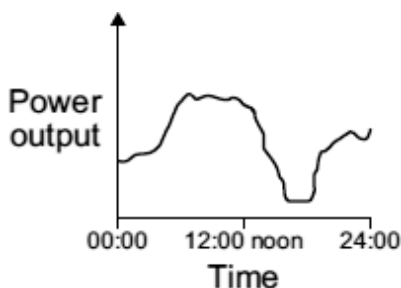
- (ii) Calculate the percentage (%) of electricity that is generated using energy sources that do **not** produce any polluting gases.

Percentage = _____

(1)

- (b) Which graph, **A**, **B** or **C**, is most likely to show the electrical power output from a wind turbine over one day?

Write your answer, **A**, **B** or **C**, in the box.



Graph A

Graph B

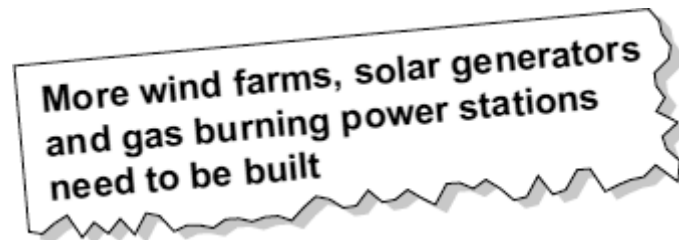
Graph C

Graph



(1)

- (c) The government has said that more electricity must be generated from renewable energy sources. A newspaper reported that:



Why is the statement in the newspaper incorrect?

(1)

(Total 4 marks)