Rewarding Learning

ADVANCED SUBSIDIARY (AS)
General Certificate of Education
2018

Centre Number

Candidate Number

Environmental Technology

Assessment Unit AS 1
assessing
The Earth's Capacity to Support Human Activity

SET11

[SET11]
WEDNESDAY 16 MAY, MORNING

TIME

1 hour 30 minutes.

INSTRUCTIONS TO CANDIDATES

Write your Centre Number and Candidate Number in the spaces provided at the top of this page.
Write your answers in the spaces provided in this question paper.
Answer **all** questions.

INFORMATION FOR CANDIDATES

The total mark for this paper is 75.
Figures in brackets printed down the right-hand side of pages indicate the marks awarded to each question or part question.
Quality of written communication will be assessed in Question **7**.

For Examiner's use only	
Question Number	**Marks**
1	
2	
3	
4	
5	
6	
7	
Total Marks	

Examiner Only	
Marks	Remark

1 **(a)** **Fig. 1** below shows the main phases in the generation of electricity from fossil fuels. Identify the forms of energy which have been labelled **A** and **B** in the diagram.

A: _____

B: _____ [2]

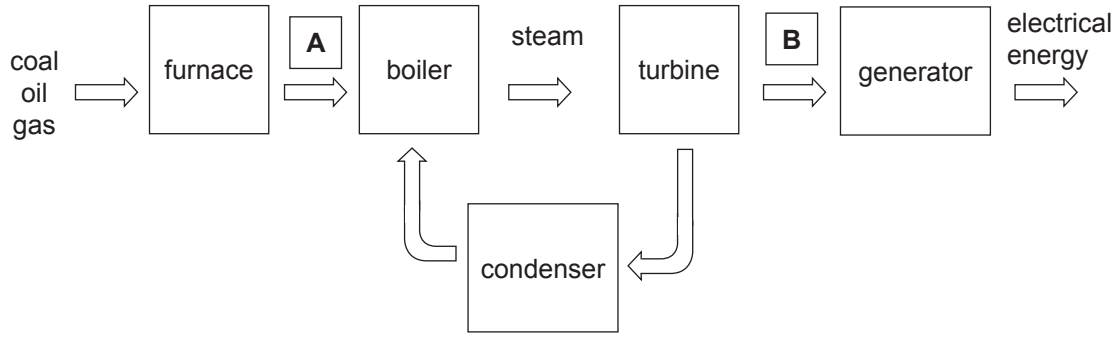

Fig. 1

(b) With reference to the diagram in **Fig. 1** outline the phases which happen between turbine, condenser and boiler.

_____

_____

_____

_____

_____

_____ [2]

(c) A householder has installed a ground source heat pump as a way of extracting useful heat from the ground.

The ground source heat pump has a Coefficient of Performance of 3.1 and uses up 6.0 MJ of energy in one hour. State clearly the formula for the Coefficient of Performance of the heat pump **and** calculate the amount of heat energy it will produce in one hour.

Formula:

Calculations: Candidates are encouraged to show their working out in the space below.

[5]

Examiner Only	
Marks	Remark

Examiner Only	
Marks	Remark

2 In 2015 delegates from more than 190 countries gathered in Paris to agree a new global pact on climate change aimed at altering greenhouse gas emissions. Many countries ratified the Paris agreement in 2016.

(a) Explain why countries will have to reduce their use of coal-fired electricity generators in order to alter their greenhouse gas emissions.

_____

_____

_____

_____ [2]

(b) Describe **two** ways in which the global use of fossil fuels impacts on the environment.

1. _____

_____

_____

_____ [2]

2. _____

_____

_____

_____ [2]

(c) Carbon trading is a policy used to alter greenhouse gas emissions.

Examiner Only	
Marks	Remark

(i) Explain what is meant by **carbon trading** and outline **three** aspects of how it works in practice.

[4]

(ii) State **one** reason why carbon trading policy may not alter greenhouse gas emissions.

[1]

Examiner Only	
Marks	Remark

3 **Fig. 2** below shows a section through a flat plate solar collector.

(a) Identify the components which have been labelled **A** and **B** in the diagram.

A: _____

B: _____ [2]

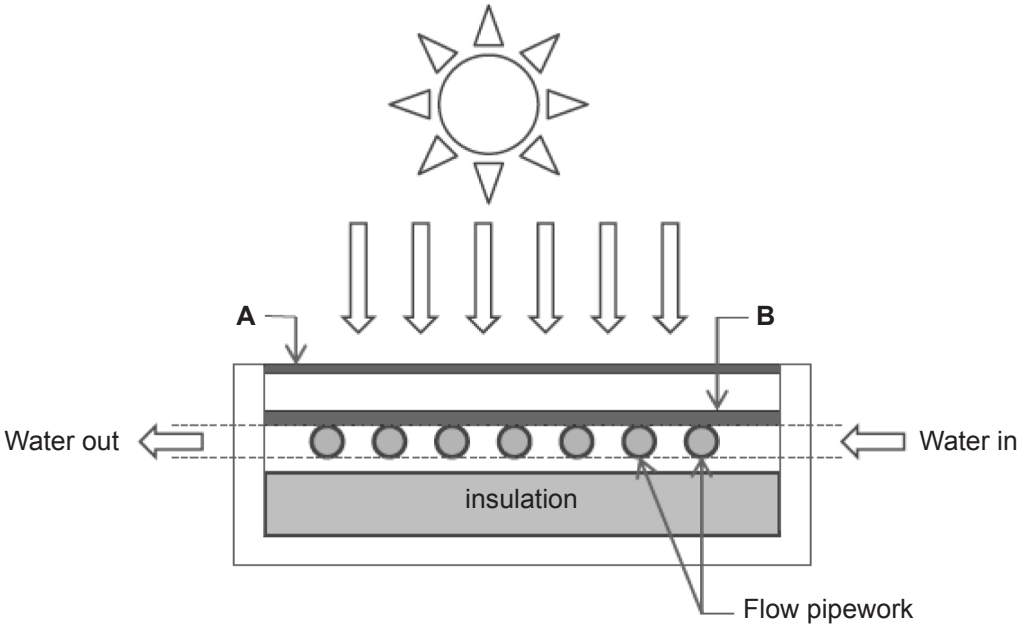

Fig. 2

(b) With reference to the diagram, explain the operation of a flat plate solar collector.

_____

_____

_____

_____ [2]

(c) Name one other type of solar thermal collector.

_____ [1]

(d) Identify the type of Concentrating Solar Power (CSP) system shown in **Fig. 3**.

_____ [1]

Fig. 3

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(e) Outline how Concentrating Solar Power (CSP) systems may be used in power plants to convert the Sun's energy into electricity.

_____

_____

_____

_____

_____

_____ [2]

Examiner Only	
Marks	Remark

(f) Describe any **two** passive solar design techniques that could be applied to the design of a new house.

Examiner Only	
Marks	Remark

1. _____

_____

_____

_____

_____ [2]

2. _____

_____

_____

_____

_____ [2]

Examiner Only	
Marks	Remark

4 Biomass can be used as a fuel.

(a) Explain what is meant by the term **biomass**.

_____

_____

_____

_____ [2]

(b) Woodchip is a specific example of a commercially available biomass from the wood category.

List **two** properties of woodchip which are important in determining its effectiveness as a fuel.

1. _____ [1]

2. _____ [1]

(c) Identify **another** category of biomass.

_____ [1]

(d) Biogas is a mixture of gases produced by the anaerobic digestion of certain types of biomass.

(i) Define the term **anaerobic digestion**.

_____

_____

_____

_____ [2]

(ii) List the **two** main gases that are present in biogas.

1. _____ [1]

2. _____ [1]

Examiner Only	
Marks	Remark

5 **(a)** There are significant wind energy resources available in and around Northern Ireland. State **one** main reason why we need good energy storage facilities if we are to make optimum use of the available wind energy resources.

_____

_____ [1]

(b) **Fig. 4** below shows a schematic diagram of an energy storage facility.

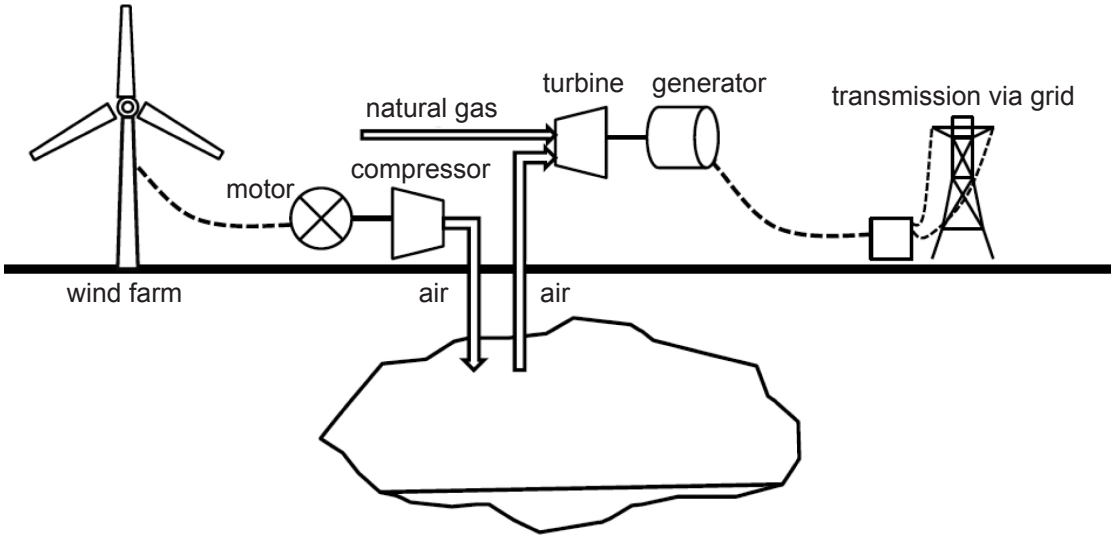

Fig. 4

(i) Name the type of energy storage facility shown in **Fig. 4** above.

_____ [1]

(ii) With reference to **Fig. 4** describe how the system operates.

_____

_____

_____

_____

_____

_____

_____

_____ [4]

(c) State **two** factors that would make a potential location both beneficial as well as cost effective for the type of energy storage facility shown in **Fig. 4**.

1. _____

_____

2. _____

_____ [2]

(d) Name **one** other type of energy storage facility.

_____ [1]

Examiner Only	
Marks	Remark

Examiner Only	
Marks	Remark

6 Traditional plastics are manufactured from crude oil. One method used to dispose of these plastics is incineration which can release toxic gases.

(a) List **two** toxic gases that may be released during the incineration of plastics.

1. _____

2. _____ [2]

(b) Assess the need for a global move towards the more sustainable manufacture and use of plastics. Your answer should include **three** different factors.

1. _____

_____

_____

_____ [2]

2. _____

_____

_____

_____ [2]

3. _____

_____

_____

_____ [2]

(c) Plastics can be manufactured to be compostable.

Describe **one** agricultural use for compostable plastics.

_____

_____

_____

_____ [2]

Examiner Only	
Marks	Remark

7 **Fig. 5** below shows a commercial wind farm.

Fig. 5

Discuss how commercial wind farm companies seek to optimise the location for their turbines.

Your answer should focus on each of the following:

- Energy output;
- Costs;
- Environmental and social issues.

The quality of written communication will be assessed in this question.

Examiner Only	
Marks	Remark

Examiner Only	
Marks	Remark

[15]

THIS IS THE END OF THE QUESTION PAPER