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Durée : 2 heures

OFFICE DU BACCALAUREAT

Séries : T1-T2 – Coef. 2

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Epreuve du 1er groupe

Why the wind blows

(*Energy: Wind power has established itself as an important source of renewable energy in the past three decades*).

When sunlight heats the Earth, it also heats the atmosphere. As hot air rises, cooler, heavier air rushes in to fill its place—thus creating wind. For more than 2,000 years people have captured this energy with windmills and used it to do useful things, such as grind grain or pump water. By the late 19th century, windmills were also being used to produce electricity, mostly in rural areas.

Compared with traditional windmills, however, modern wind turbines are far more efficient. Their rotors are pointed into the wind under computer control, and their blades exploit the phenomenon of aerodynamic "lift" that keeps aeroplanes in the air. Turbine blades are shaped like aerofoils, with one side curved and the other almost flat. This shape causes the air to flow more quickly over the curved side than the flat side, and the fast-moving air results in an area of low pressure on the curved side of the blade, which causes the blade to move and the rotor to turn. The blades are attached to a rotor hub, which is in turn connected to a drive shaft. But this shaft spins quite slowly, so a gearbox is used to get the drive shaft to turn a second shaft at a much higher speed, suitable for spinning a generator to produce electricity. In a wind farm, the electricity from multiple turbines is collected and fed into the grid.

Modern wind power got started after the first oil crisis in 1973, when countries began to look for ways to generate energy from sources other than fossil fuels. Denmark, which was almost entirely dependent on foreign oil for its electricity, was hit particularly hard. But it had one abundant potential energy resource: wind. So, in the mid-1970s, the country embarked upon an ambitious research project to develop the technology.

America also began research on wind turbines. With funding from the government, large organisations such as Boeing, an aerospace giant, and NASA, America's space agency, began designing large, multi-megawatt machines. Because bigger machines with larger rotors sweep a larger area, they can collect more energy from the wind. But many of these big turbines were expensive to operate and maintain.

'Wind of change' From The Economist print edition Dec 4th 2008

I. COMPREHENSION QUESTIONS (10 marks)

A – **Find in the text what the following words refer to**. **(2 marks)**

1. 'its'_____
2. 'This shape'_____
3. 'which'_____
4. 'it'_____

B – **Read the text and *use the correct words in bold to complete the sentences***. **(2.5 marks)**

5. The natural process of generating wind requires _____.(gravity – contrast in temperature – speed – clouds)
6. _____ (creating – utilizing – receiving) the energy from the wind is _____ (a(n) new – old – difficult) process.
7. The _____ (facility – efficiency – productivity) of modern wind turbines is _____ _____ (used by – assured by – due to) the shape of the blades.

C – **True** / **False** : *If* **true**, *write* **T**. *If* **false**, **F**. ***Justify* by *quoting from the text***. **(3 marks)**

8. Traditional windmills are less efficient than modern ones and so are not used to produce energy.
9. The turbine blades are comparable to aeroplanes.
10. The rotors of windmills are positioned against the wind.

D – **Read the text and match the functions and the components**. **(2.5 marks)**

Increases the rotation per minute – capture wind energy – cause the rotor to turn – spins the generator at a high speed – causes the drive shaft to rotate

COMPONENTS	FUNCTIONS
Rotors	11 _____
Blades	12 _____
Rotor hub	13 _____
Gearbox	14 _____
Second drive shaft	15 _____

II. LINGUISTIC COMPETENCE (05 marks)

E – Reformulate the sentence using the prompt given you. **(1 marks)**

16. The gearbox mechanism gets the second shaft to spin at a high speed.
The second shaft _____

F – **Fill in the blanks with the appropriate words**. **(1.5 marks)**

17. The production of electricity in most African countries relies heavily on _____ (petrol engines – factories – power plants – oil industries) using fossil fuels.

18. In our country now, there are frequent power _____ (stop- failures- arrest- cutter) at peak hours.

19. The mill's machinery is _____ (generated, produced, powered) by waterwheels.

G – Put the verbs in brackets in the correct tenses to complete the passage. **(1.5 marks)**

Investing in renewable sources of energy _____ 20 (to preserve) our country from the impact of the energy crisis we went through these past months. Although the price of oil has gone down, it _____ 21 (to increase) in the near future according to analysts. We _____ 22 (to follow the example of Denmark by initiating research projects in alternative sources of energy.

H – **Complete the sentences as suggested and meaningfully**. **(1 mark)**

Solar energy is certainly _____ 23 (harm) to humans and the environment than nuclear energy _____ 24.

III. WRITING (05 marks)

Topic One: After the recent rises in the price of oil which alternative source or sources of energy should your country try to capture in order to generate electricity? And why ? (about 100 words).

Topic Two: Imagine you are an adviser to the government of your country. Which of the following would you suggest as a priority ?

a) promoting telecommunications , or
b) improving and building new roads through the country ? State your reasons in about 100 words.

A N S W E R S H E E T

I. READING COMPREHENSION (10 marks)

A. 2 marks : 0.5 x 4

1. hot air
2. aerofoil shape (one side curved and the other almost flat)
3. the fact that fast – moving air results in an area of low pressure on the curvel side of the blade
4. Denmark

B. 2.5 marks : 0.5 x 5

5. contrast in temperature
6. utilizing – old
7. due to

C. TRUE – FALSE : 3 marks : 1 x 3

8. F. windmills were also being used to produce electricity
9. F. Turbine blades are shaped like aerofoils
10. T. Their rotors are pointed into the coind (under computer control)

D. 2.5 marks : 0.5 x 5

11. captures wind energy
12. cause the rotor to turn
13. causes the drive shaft to rotate
14. increases the rotation per minute
15. spins a generator at a high speed

II. LINGUISTIC COMPEENCE

E. 1 mark

16. The second shaft spinning at high speed results from the gearbox mechanism

F.

17. power plants
18. failures
19. powered

G.

20. could have preserved
21. will increase/could increase
22. should follow

H.

23. less harmful
24. is