

6 A wind turbine generates electricity for the National Grid.



(a) The useful energy transfer in the wind turbine is

(1)

- ☐ **A** chemical energy to electrical energy
- ☐ **B** gravitational potential energy to electrical energy
- ☐ **C** kinetic energy to electrical energy
- ☐ **D** sound energy to electrical energy



(b) The generator in the wind turbine transfers 39 MJ of energy in 1 minute.

The generator current is 490 A.

(i) Calculate the output voltage of the generator.

(3)

Voltage = ..... V

(ii) The generator output voltage is then increased to 132 kV for transmission.

Explain why electrical energy is transmitted using very high voltages.

(4)

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**QUESTION 6 CONTINUES ON THE NEXT PAGE**



(c) The generator provides a direct current (d.c.).

This d.c. is changed to an alternating current (a.c.).

The frequency of the alternating current is 50 Hz.

(i) Explain the meaning of **50 Hz alternating current**.

(2)

(ii) Explain why the d.c. from the generator must be changed to a.c. before it is transmitted.

(2)

(Total for Question 6 = 12 marks)

**TOTAL FOR PAPER = 60 MARKS**

