Name of the Student:_____
Max. Marks : 22 Marks **Time : 22 Minutes**

Mark Schemes

Q1.

(a) minimum distance between wind turbines is at least 500 m in all directions

turbines can rotate to face into wind and still maintain the minimum distance

1

(b) density = mass/volume

allow ρ = m / V

1

(c) $1.2 = \frac{51000}{V}$

1

$V = \frac{51000}{1.2}$

1

V = 42 500

1

V = 43 000

1

m^3

*an answer of 43 000 scores **4** marks*
*an answer of 42 500 scores **3** marks*

1

(d) $2.4 \times 10^9 / 1.6 \times 10^6$

1

1500

*an answer of 1500 scores **2** marks*

1

(e) wind power is unreliable

1

(very) large numbers of wind turbines would need to be constructed

allow calculation of this (15 625)

1

[11]

Downloaded from www.merit-minds.com

Q2.

(a) apparatus diagram to show:

- aluminium block (surrounded by insulation)

1

- thermometer and immersion heater inside (or in contact with) aluminium

1

- joulemeter connected to immersion heater
  or
  ammeter and voltmeter connected correctly around immersion heater

  full credit can be given for a correct alternative method

  ignore position or absence of stopclock

  ignore position or absence of electric balance

1

(b)

Level 3: The design/plan would lead to the production of a valid outcome. All key steps are identified and logically sequenced.	5-6
Level 2: The design/plan would not necessarily lead to a valid outcome. Most steps are identified, but the plan is not fully logically sequenced.	3-4
Level 1: The design/plan would not lead to a valid outcome. Some relevant steps are identified, but links are not made clear.	1-2
No relevant content	0
Indicative content **measurements:** • energy (transferred) using joulemeter **or** ammeter, voltmeter and stopclock • mass using electric balance • temperature change using thermometer **SHC calculation:** E = mcθ **or** $c = \frac{E}{m\theta}$ **valid results:** • repeat practical and calculate a mean • plot a graph of temperature against time and use linear section of graph for temperature change • small (eg 10 °C) temperature change (so cylinder isn't significantly hotter than surroundings) **safety:** immersion heater gets very hot so avoid touching (heating element) with bare hand	

6

(c) some thermal energy

Downloaded from www.merit-minds.com

transferred to the surroundings
(not to the metal block)

allow not all of the energy (as measured by the joulemeter) is transferred to the block

1

(so) temperature increase not as high as it should be for the total energy transferred

allow justification using the equation: $C = \frac{E}{m\theta}$

1

[11]

Downloaded from www.merit-minds.com