Name of the Student:_____
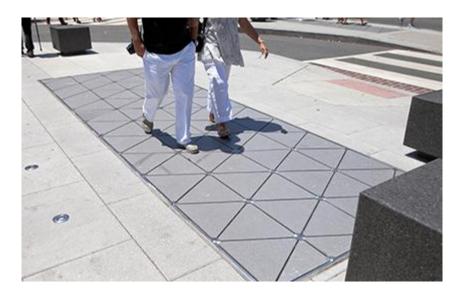
Max. **Marks : 17 Marks**   **Time : 17 Minutes**

Q1.

The figure below shows a large wind farm off the coast of the UK.

The mean power output of the wind farm is 696 MW, which is enough power for 580 000 homes.

(a)   Calculate the mean power needed for 1 home.

Give your answer in watts.

_____

_____

_____

_____

_____

Mean power needed for 1 home = _____W

(2)

(b)   On one day the demand for electricity in the UK was 34 000 MW.

Suggest **two** reasons why wind power was not able to meet this demand.

1. _____

_____

_____

    2. _____

_____

_____

(2)

(c)   Some of the energy from the wind used to rotate a wind turbine is wasted.

An engineer oils the mechanical parts of a wind turbine.

Explain how oiling would affect the efficiency of the wind turbine.

_____

_____

_____

_____

_____

(3)

(d)   In most homes in the UK there are many different electrical devices.

Explain why people should be encouraged to use energy efficient electrical devices.

_____

_____

_____

_____

_____

(2)
(Total 9 marks)

Q2.

An engineering company has invented pavement tiles that generate electricity as people walk on them.

The figure below shows someone walking on the pavement tiles.

Use the Physics Equations Sheet to answer parts (a) and (b).

(a)   What equation links current (I), potential difference (V) and power (P)?

Tick (✓) **one** box.

$P = \dfrac{V}{I}$ ☐

$P = V \times I$ ☐

$I = P \times V$ ☐

$V = I^2 \times P$ ☐

(1)

(b)   When a person walks on a tile, a potential difference of 40 V is induced across the tile.

The power output of the tile is 4.4 W.

Calculate the current in the tile.

_____

_____

_____

_____

_____

Current = _____ A

(3)

Use the Physics Equations Sheet to answer parts (c) and (d).

(c) What equation links efficiency, total power input and useful power output?

Tick (✓) **one** box.

$$\text{Efficiency} = \frac{\text{useful power output}}{\text{total power input}}$$ ☐

$$\text{Efficiency} = \frac{\text{total power input}}{\text{useful power output}}$$ ☐

Efficiency = useful power output × total power input ☐

(1)

(d) The tiles are used to power LED lights in the pavement.

An LED light has a total power input of 4.0 W.

The efficiency of the LED light is 0.85

Calculate the useful power output of the LED light.

_____

_____

_____

_____

_____

Useful power output = _____ W

(3)

(Total 8 marks)