

Name of the Student: _____

Max. Marks : 17 Marks

Time : 17 Minutes

Q1.

- (a) In the National Grid, very large step-up transformers link power stations to the transmission cables.

A transformer used for this purpose has 800 turns on its primary coil and 12 800 turns on its secondary coil. The p.d. (potential difference) across its primary coil is 25 kV.

Use the equation in the box to calculate the p.d. across its secondary coil.

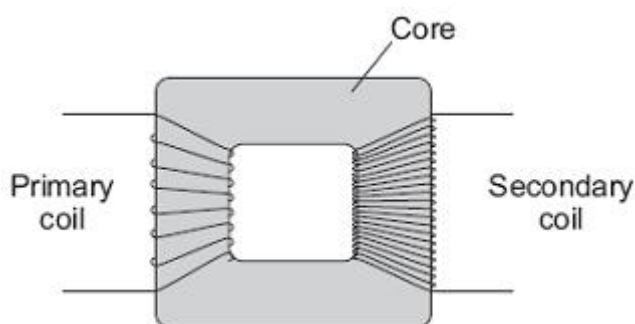
$\frac{\text{p.d. across primary}}{\text{p.d. across secondary}} = \frac{\text{number of turns on primary}}{\text{number of turns on secondary}}$

Show clearly how you work out your answer.

p.d. across secondary coil = _____ volts

(2)

- (b) The diagram shows the structure of a transformer.



- (i) The primary and secondary coils of a transformer are made of insulated wire.

Why is this insulation necessary?

(1)

- (ii) Why is the core made of iron?

(1)

(iii) Explain how the transformer works.

(3)

(c) Before 1926, large towns had their own local power stations. After 1926, these power stations were connected to form the National Grid.

Give **two** advantages of having a National Grid system.

1. _____

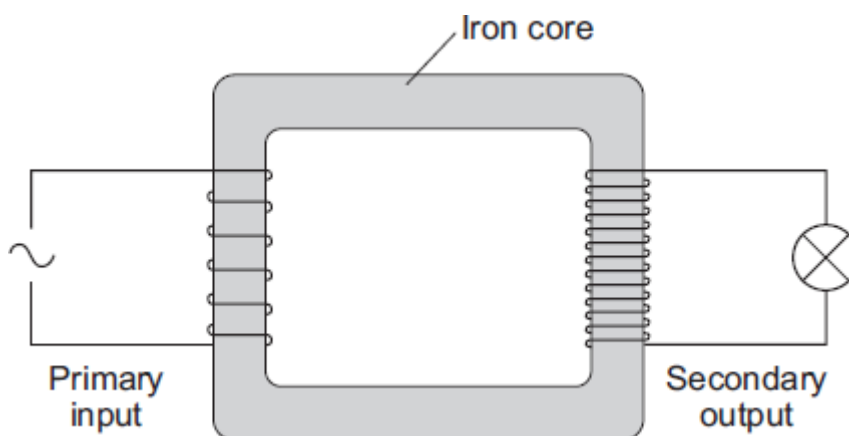
2. _____

(2)

(Total 9 marks)

Q2.

The diagram shows a transformer.



(a) (i) Is the transformer in the diagram being used as a step-up transformer or as a step-down transformer?

Put a tick (✓) in the box next to your answer.

a step-up transformer

☐

a step-down transformer

☐

Give a reason for your answer.

(1)

(ii) Why is the core made of iron?

(1)

- (b) The power supply to a laptop computer contains a transformer designed to change the 230 V mains input to a 15 V output. The transformer has 920 turns on its primary coil.

Use the equation in the box to calculate the number of turns on the secondary coil.

$\frac{\text{p.d. across primary}}{\text{p.d. across secondary}} = \frac{\text{number of turns on primary}}{\text{number of turns on secondary}}$

Show clearly how you work out your answer.

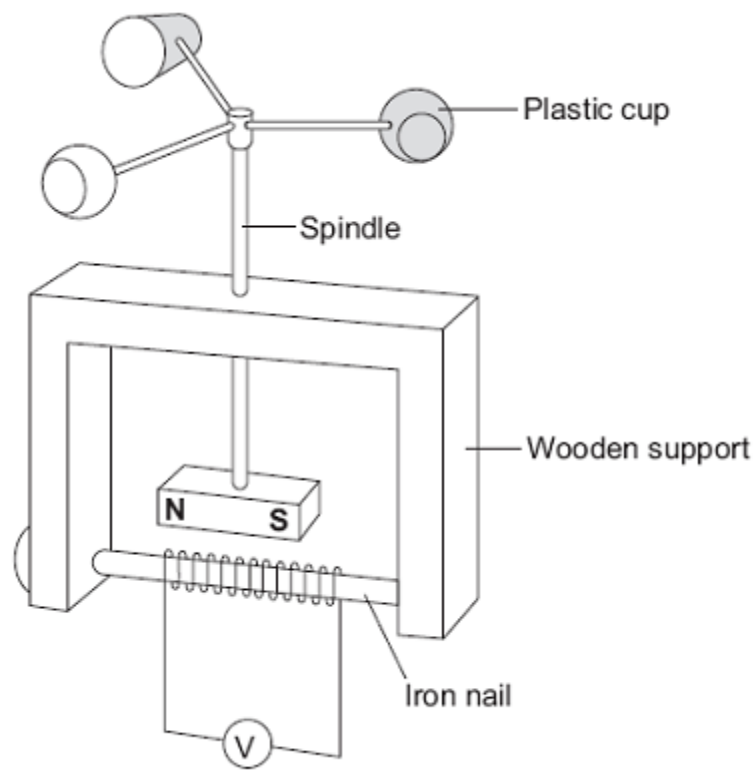
Number of turns on the secondary coil = _____

(2)

(Total 4 marks)

Q3.

The diagram shows a student's design for a simple wind speed gauge.



- (a) Explain why the wind causes the a.c. voltmeter to give a reading. The explanation has been started for you.

The wind causes the plastic cups to turn _____

(3)

- (b) The gauge is not sensitive enough to measure light winds.

Suggest **one** way that the design can be modified to make the gauge more sensitive.

(1)

(Total 4 marks)