Name.....MARKING SCHEME.....Adm No.....Class.....

KISII SCHOOL
FORM 4G PHYSICS RAT 5
TERM ONE 2020
Time: 30 minutes

ELECTROMAGNETIC INDUCTION

1. State **Faraday's law** of electromagnetic induction. (1 mark)

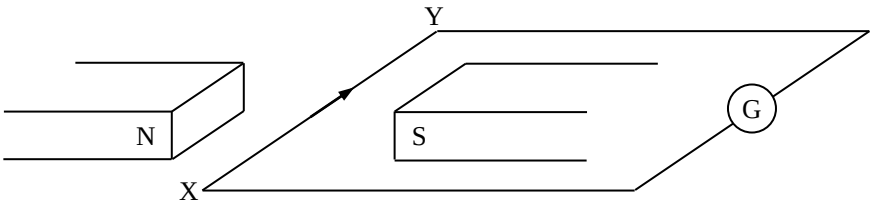
The magnitude of the induced e.m.f. is directly proportional to the rate of change of magnetic flux linkage. ✓

2. State **two** factors other than the speed of rotation of the coil that affect the magnitude of the e.m.f generated. (2 marks)

– The number of turns of the coil. ✓

– The strength of the magnetic field. ✓

3. The figure below shows a wire **XY** placed in a magnetic field.



State the direction in which the wire must be moved for the current to move in the direction shown. (1 mark)

Upwards direction ✓

4. State how eddy currents are reduced in a transformer. (1 mark)

– Eddy currents can be are reduced by laminating the core of the transformer. OR

– By making the core using thin sheets of insulated soft iron plates. ✓

5. An ideal transformer with **1200 turns** in the primary circuit and **120 turns** in the secondary circuit has its primary circuit connected to a **400 V** a.c. source. It is found that when a heater is connected to the secondary circuit, it produces heat at the rate of **600 W**. Determine the:

(i) Voltage in the secondary circuit. (3 marks)

$\frac{V_s}{V_p} = \frac{N_s}{N_p}$ ✓

$\frac{V_s}{400} = \frac{120}{1200}$ ✓

$V_s = \frac{120}{1200} \times 400$

$V_s = 40\ V$ ✓

(ii) Current in the secondary circuit. (2 marks)

$P_s = V_s I_s$

$600 = 40 \times I$ ✓

$I = 15\ A$ ✓

(iii) The current in the primary circuit (2 marks)

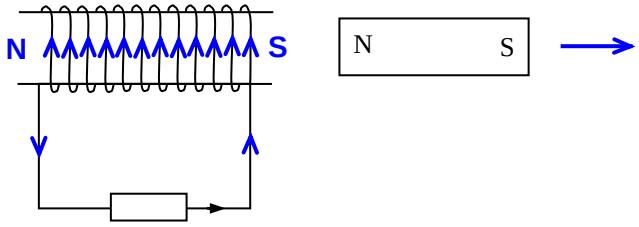
$\frac{I_p}{I_s} = \frac{V_s}{V_p}$ ✓ $\quad I_p = \frac{40}{400} \times 15$

$\frac{I_p}{15} = \frac{40}{400}$ ✓ $\quad I_p = 1.5\ A$ ✓

6. (a) State Lenz's Law of electromagnetic induction (1 mark)

The direction of the induced e.m.f. is such that the induced current which it causes to flow produces a magnetic effect that opposes the change producing it. ✓

7. The diagram shows a magnet being moved such that a current flows through the circuit in the direction shown.



(i) State the direction in which the magnet is being moved. (1 mark)

Away from the coil OR Towards the right hand side. ✓

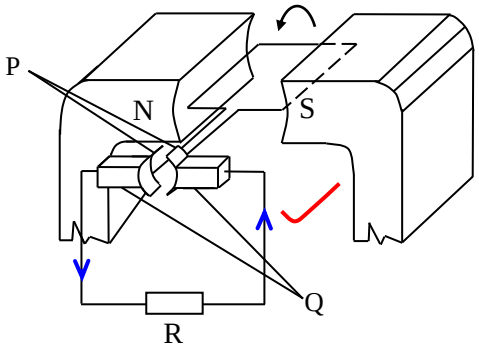
(ii) Explain how the current is produced. ✓ (3 marks)

– When the magnet is moved away the coil experiences a changing magnetic flux.

– This leads to e.m.f. being induced in the coil. ✓

– The induced e.m.f. causes induced current to flow in the coil. ✓

8. The diagram below shows a simple electric generator. The coil is rotated in the anticlockwise direction as shown.



(a) Name the parts labelled **P** and **Q**. (2 marks)

P – Split ring OR Commutator ✓ Q – Carbon brushes ✓

(b) Indicate on the diagram by using an arrow, the direction in which the current will flow through resistor **R**. (1 mark)