

NAME	INDEX NUMBER
SCHOOL	DATE

ELECTROMAGNETIC INDUCTION

1. 1995 Q5 P2

(a) (i) State the law of electromagnetic induction (2 marks)

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(ii) Describe an experiment to demonstrate Faraday’s law (4 marks)

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(b) (i) A researcher studying the behaviour of step- up transformer made the following observations:

“More joules per coulomb and fewer coulombs per second at the output than at the input terminals

Explain why the observation does not imply a violation of the principle of conservation of energy (4 marks)

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(ii) A transformer of 480 turns in the primary coil is used to connect a 9 volt a.c electric device to a 240 v.a.c mains power supply. Calculate the number of turns in the secondary coil. (3 marks)

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2. 1996 Q 31 P1

What causes electromagnetic damping in a moving coil galvanometer (1mark)

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3. 1998 Q8 P1

The primary coils of a transformer has 2000 turns and carries a current of 3A. If the secondary coil is designed to carry a current of 30A, calculate the maximum number of turns in the secondary coil.

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4. 1998 Q13 P1

State the reason why a voltmeter of high resistance is more accurate in measuring potential differences, that one of low resistance.

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5. 2000 Q33 P1

State the reason why soft iron is laminated.

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6. 2000 Q4a P2

(a) (i) State one property of soft iron that makes it suitable for use as a transformer core.

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(ii) Fig 6 represents a step-down transformer with 500 turns in the primary and 50 turns in the secondary. The turns are wound uniformly on the core. The lengths of PQ and QR are indicated. Determine the p.d across PQ.

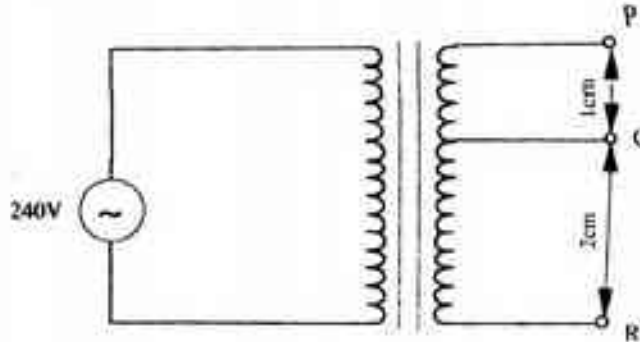


Figure 6

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7. 2001 Q31 P1

Fig. 22 shows an electric generator. The points P and Q are connected to a cathode ray oscilloscope (CRO).

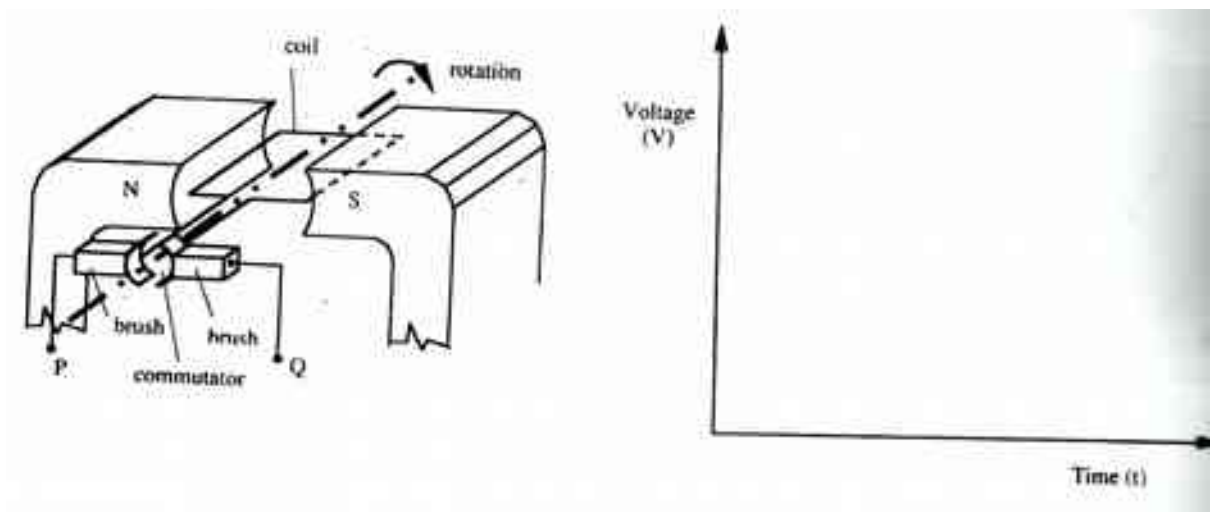
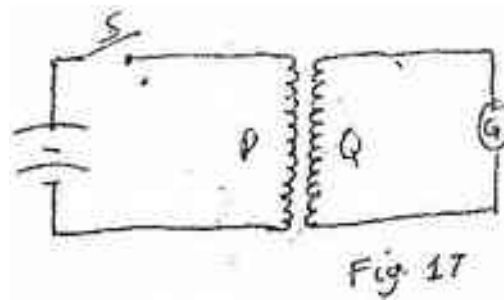


Figure 22

Sketch on the axes provided the graph of the voltage output as seen on the CRO
Given that when $t = 0$ the coil is at the position shown in the figure.

8. 2003 Q32,33 P1

Two identical copper coils p and Q are placed close to each other as shown in Figure 17. Coil P is connected to a D.C power supply and coil Q is connected to a galvanometer, G.



Use this information to answer questions 32 and 33.

32. State and explain what would be observed on the galvanometer immediately the switch S is closed.

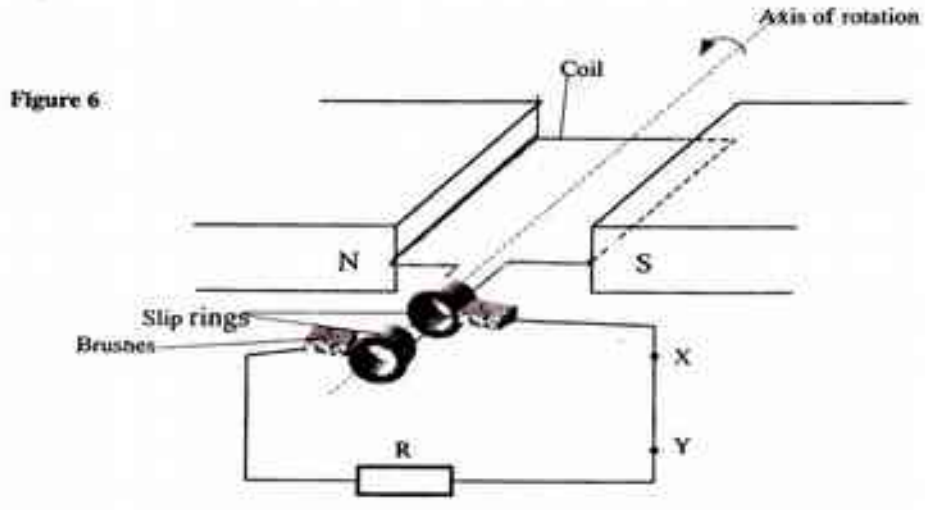
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33. State with reason the difference that would be noted in the observation made in question 32 if the number of turns in coils Q were doubled.

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9. 2004 Q5 P2

a) Fig 6 shows a simple generator. The coils are rotated in the anticlockwise direction as shown.



i) Indicate using an arrow on the figure, the direction of the induced current as the coil passes the position shown.

ii) State two ways of increasing the magnitude of the induced current in this type of generator.

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iii) On the axes provided, sketch the graph of the induced e.m.f with time.

Induced
e.m.f

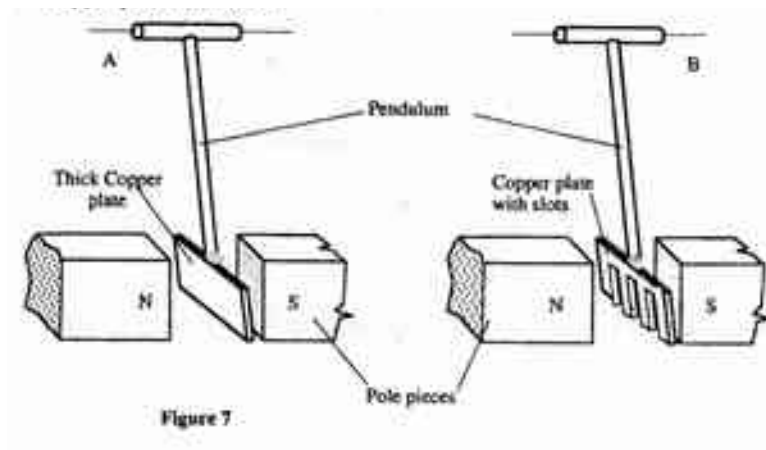
Time (t)

iv) The section marked XY is cut off and a diode inserted. On the axes provided, sketch the graph of p.d across the resistor R, against time.

p.d (v)

Time (t)

- b) Fig 7 shows pendulum A and pendulum B freely suspended between the poles of identical magnets. Pendulum a is made of thick copper plate while B is made a copper plate with slots



When the two are set to swing, it is observed that A slows down faster than B Explain this observation.

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- c) An alternating current source has a root-mean-square potential difference of 12,V, Determine the peak value of this potential difference.

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10. 2005 Q12, 13 P1

12. **Fig 9** shows a current carrying coil in a magnetic field. The direction of the current and the resulting force are shown. Study the figure and answer questions 12 and 13.

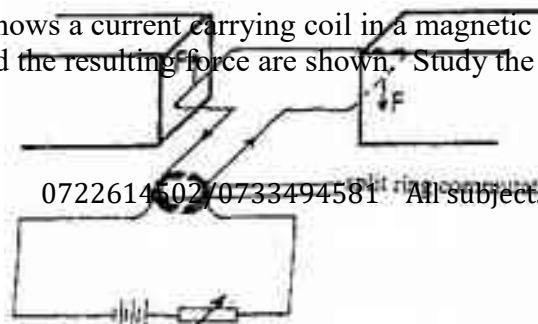


Fig 9

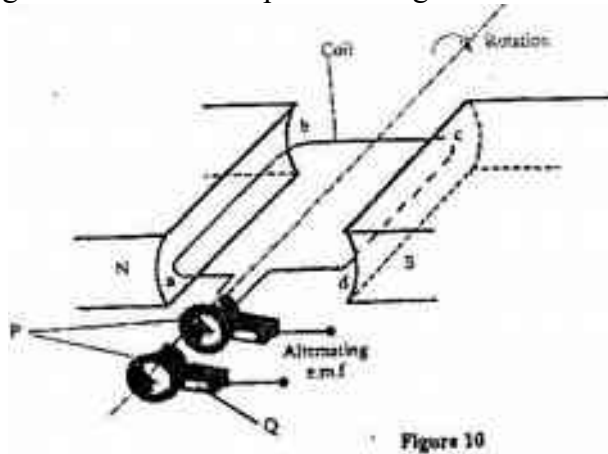
Label the poles of the magnets. (1mark)

13. Explain the purpose of the split ring commutator in the principle of the D.C motor shown in the diagram. (2marks)

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11. 2006 Q20 P1

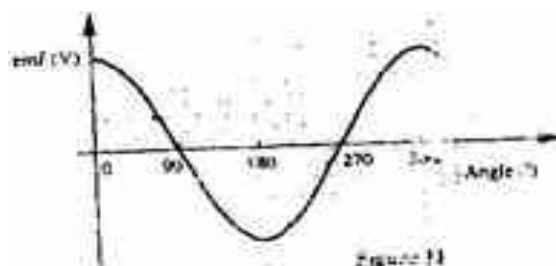
Figure 10 shows a simple electric generator



(a) (i) Name the parts labeled P and Q (2 marks)

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(ii) The e.m.f generated as the coil rotates is represented in the graph in figure



Give reasons for the changes in emf as the coil rotates from 0° to 90° and 90° to 180°

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(b) The primary coil of a transformer has 1200 turns and the secondary coil has 60 turns. The transformer is connected to a 240V. a.c source.

Determine

(i) The output voltage (2 marks)

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(ii) The output current when the primary coil has a current of 0.5A.
(Assume there are no energy losses.) (3 marks)

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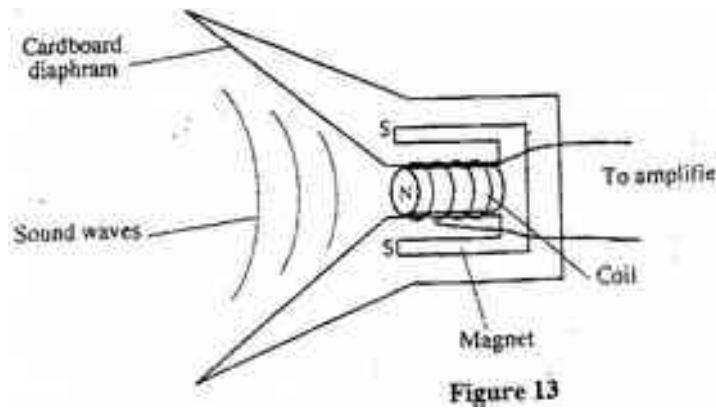
12. 2007 Q17 P2

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

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(b) **Figure 13** shows a simple microphone in which sound waves from the person

talking cause the cardboard diaphragm to vibrate



- (i) Explain how a varying current is induced in the coil when the diaphragm vibrates (3 marks)

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- (ii) State two ways in which the induced current in (i) above can be increased

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- (c) A transformer with 1200 turns in the primary circuit and 120 turns in the secondary circuit has its primary circuit connected to a 400V a.c source. It is found that when a heater is connected to the secondary circuit, it produces heat at the rate of 600w. Assuming 100% efficiency, determine the:

- (i) Voltage in the secondary circuit (2 marks)

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(ii) Current in the primary circuit

(2 marks)

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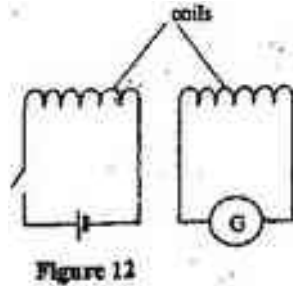
(iii) The current in the secondary circuit

(1 mark)

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13. 2008 Q18 P2

(a) Figure 12 shows two circuits close to each other



When the switch is closed, the galvanometer shows a reading and then returns to zero. When the switch is then opened, the galvanometer shows a reading in the opposite direction and then returns to zero. Explain these observation

(3 marks)

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(b) Explain how energy losses in a transformer are reduced by having:

(i) A soft- iron core

(2 marks)

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(ii) A laminated core

(2 marks)

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(c) An ideal transformer has 2000 turns in the primary circuit and 200 turns in the secondary circuit. When the primary circuit is connected to a 400V a.c. source, the power delivered to a resistor in the secondary circuit is found to be 800W. Determine the current in:

(i) The secondary circuit

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(ii) The primary circuit

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14. 2009 Q10 P2

Figure 5 shows magnet being moved towards a stationary solenoid. It is observed that a current flows through the circuit in a direction Q TO P.

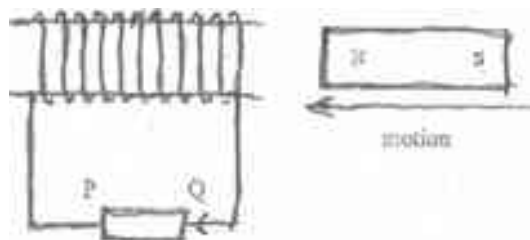


figure 5

Explain:

- (i) How the current is produced (2marks)

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- (ii) Why the current flows from Q to P (1mark)

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15. 2011 Q17a,c P2

- a. State what is meant by the term “electromagnetic induction” (1mark)

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(c) In a transformer, the ratio of primary turns to the secondary turns is 1:10. A current of 500mA flows through a 200Ω resistor in the secondary circuit.

Assuming that the transformer is 100% efficient, determine:

- (i) The secondary voltage (1mark)

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