

FORM 5

CHAPTER 4

Paper 1

- 1 D 2 D 3 C 4 C 5 C
 6 A 7 B 8 B 9 D 10 C
 11 B 12 C 13 D

Paper 2

Structured Question

1 (a)

Transformer type	Primary coil	Secondary coil
Step up	<i>P</i>	<i>R</i>
Step down	<i>Q</i>	<i>Q</i>

(b) *PQ* or *PQ*

P primary coil, *Q* or *R* secondary coil

- (c) (i) Alternating current creates a changing magnetic flux on the iron core.
 An emf is produced on the secondary coil due to cutting the magnetic flux. The ratio of the primary coil to the secondary coil is 20:3.

$$\begin{aligned} \text{(ii) Efficiency} &= \frac{\text{Output power}}{\text{Input power}} \times 100\% \\ &= \frac{V_s I_s}{V_p I_p} \times 100\% \\ &= \frac{48}{240 \times 0.5} \times 100\% \\ &= 40\% \end{aligned}$$

$$\begin{aligned} \text{(iii) Efficiency} &= \frac{\text{Output power}}{\text{Input power}} \times 100\% \\ 50\% &= \frac{V_s I_s}{V_p I_p} \times 100\% \\ &= \frac{48}{240 \times I_p} \times 100\% \\ I_p &= 0.4 \text{ A} \end{aligned}$$

(iv) Using a laminated/layered iron core.
 To minimize the effects of eddy currents.

- 2 (a) Electrical energy → electromagnetic energy → elastic potential energy → kinetic energy

- (b) (i) Focusing magnetic flux.
 (ii) The steel iron core takes a long time to touch the magnet.
 (c) South
 (d) (i) Increase
 (ii) Remains the same due to constant spring compression.
 (e) For the safety of children.

- 3 (a) Potential difference is the work done to move a unit charge from one point to another in an electric field.

- (b) (i) • The number of turns of the primary coil, N_p is large and the number of turns of the secondary coil, N_s is small.
 • The transformer chosen is a step-down transformer.
 • The ratio of the number of turns of the primary coil, N_p to the number of turns of the secondary coil N_s is 10.
 • So that the output potential difference is 24 V when supplied with an input potential difference of 240 V.
 • High transformer efficiency.
 • This is so that energy lost in the form of heat can be reduced.
 • A soft iron core is used.
 • This facilitates the magnetization and demagnetization process and prevents the flow of eddy currents.

(ii) Transformer *P* is selected.

This is because the transformer *P* has a large number of turns of the primary coil N_p and a small number of turns of the secondary coil N_s , the ratio of the number of turns of the primary coil N_p to the number of turns of the secondary coil N_s is 10, the efficiency of the transformer is high, the iron core is soft and layered.

- (c) • Use thick copper wire with low resistance.
 • Reduces the heating effect of the current.
 • Use an iron core that is coated and thickened with enamel paint.
 • Reduces the effect of eddy current heating induced in the iron core.

(d) (i) The number of turns of the secondary coil,

$$\begin{aligned} N_s &= \frac{V_s}{V_p} \times N_p \\ &= \frac{72}{240} \times 2400 \\ &= 720 \end{aligned}$$

(ii) 0.5A