10 (a) State Faraday's law of electromagnetic induction.

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....

....[2]

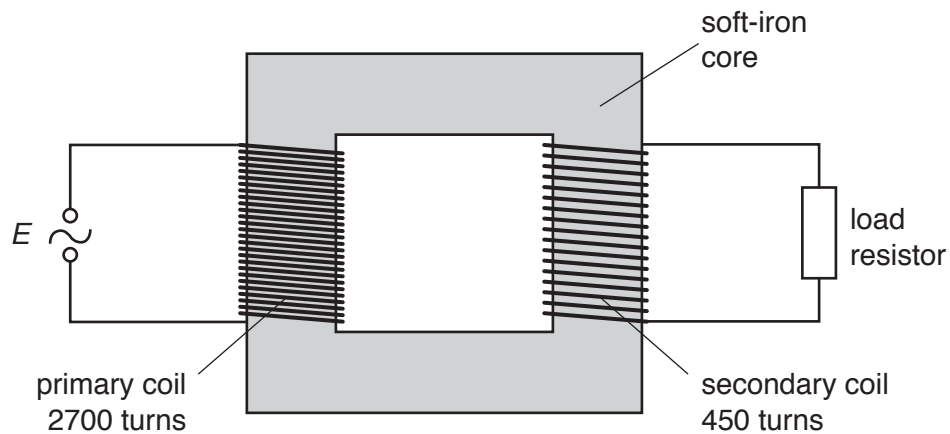(b) An ideal transformer is illustrated in Fig. 10.1.

Fig. 10.1

Explain why, when there is an alternating current in the primary coil, there is a current in the load resistor.

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....[3]

(c) The primary coil in **(b)** has 2700 turns. The secondary coil has 450 turns.

The e.m.f. E applied across the primary coil is given by the expression

$$E = 220\sin(100\pi t)$$

where E is measured in volts and t is the time in seconds.

Calculate the root-mean-square (r.m.s.) e.m.f. induced in the secondary coil.

r.m.s. e.m.f. = ... V [3]

[Total: 8]