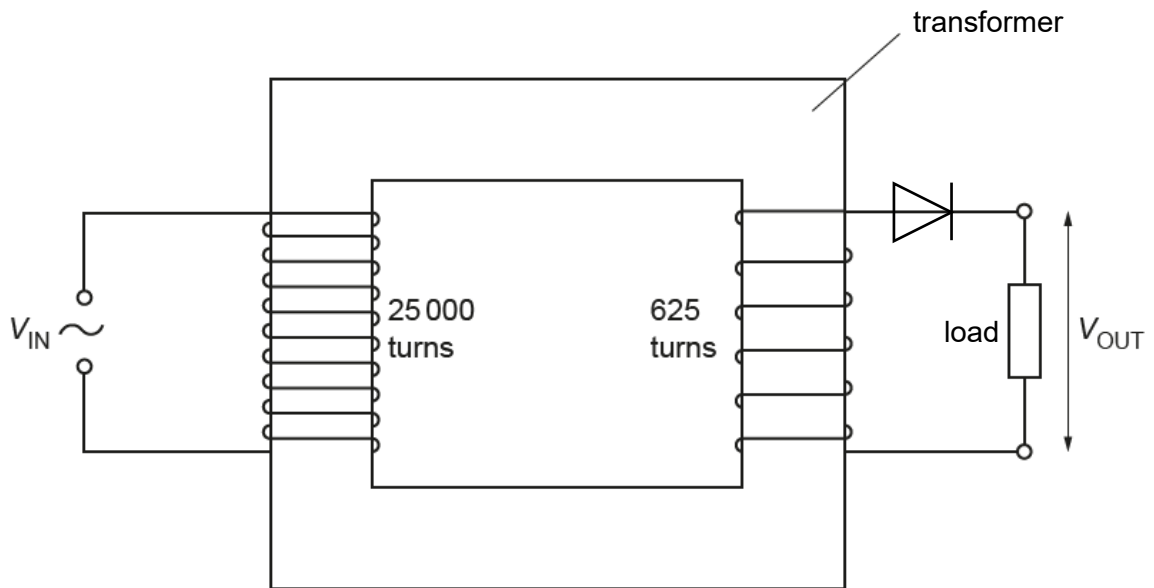**6** Fig. 6.1 shows a simple transformer consisting of a primary coil of 25000 turns and a secondary coil of 625 turns.

Fig. 6.1

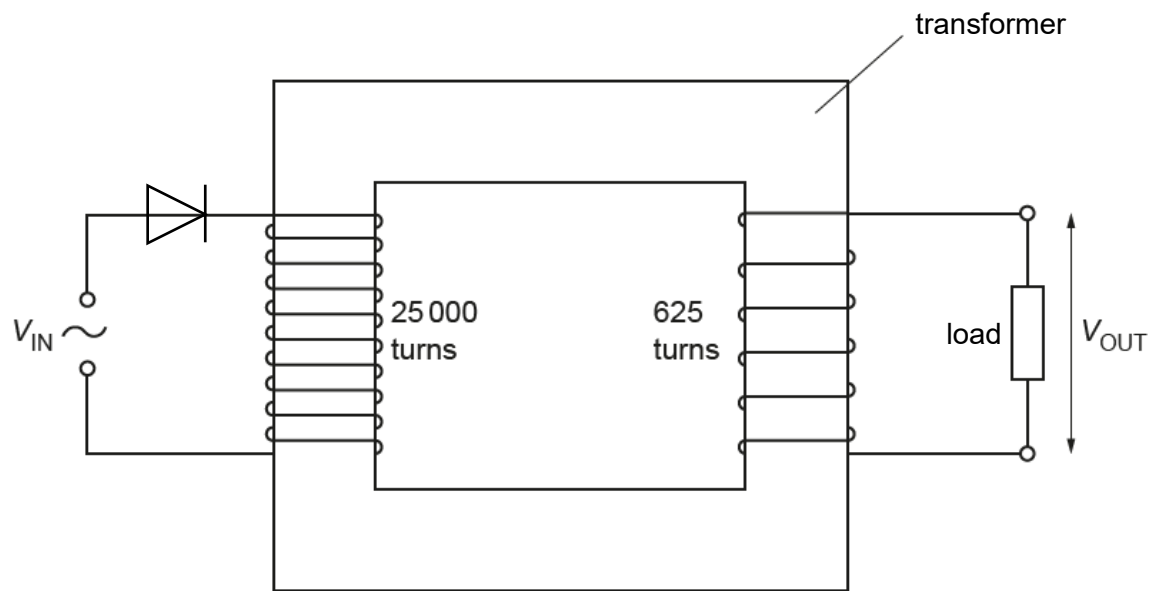The primary coil is connected to an alternating voltage V_{IN} which is represented by the equation

$$V_{IN} = 220 \sin(120\pi t)$$

The secondary coil is connected to a diode and a load in series. The voltage across the load is V_{OUT}.

(a) Calculate the r.m.s. value for V_{OUT}.

r.m.s. V_{OUT} = ... V   [3]

(b) An electrician mistakenly connected the diode to the primary circuit instead as shown in Fig. 6.2.

Fig. 6.2

The load requires a direct current to flow in it to operate properly. However, due to the mistake, an alternating current flow in it instead and the load fails to operate properly.

Use Lenz's Law to explain why an alternating current instead of a direct current would flow in the load.

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.... [3]