5 **(a)** The variation of an alternating voltage V_P in volts with time t in seconds is given by

$$V_P = 170 \sin (314t)$$

Determine

(i) the r.m.s. potential difference $V_{r.m.s.}$

$V_{r.m.s.}$ = ... V [1]

(ii) the period, T of the voltage supply.

T = ... s [1]

(b) The alternating voltage V_P is connected to the primary coil of a transformer as shown in Fig. 5.1.

An electric heater with resistance 130 Ω is connected to the secondary coil of the transformer.

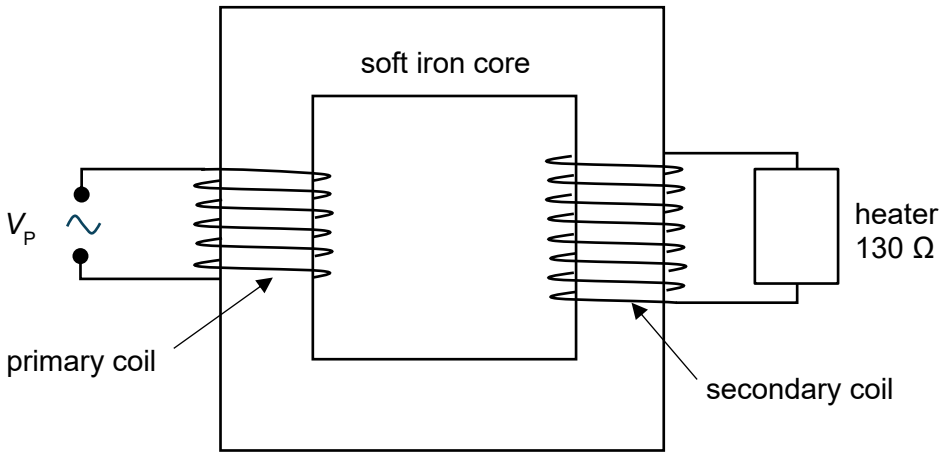

Fig. 5.1

The primary coil consists of 2000 turns and the secondary coil consists of 3500 turns.

(i) Determine peak potential difference, V_S of the secondary coil.

V_S = ... V [2]

(ii) Determine the peak current, I_P in the primary coil.

I_P = ... A [2]

(c) A diode and another identical heater are connected to the secondary coil as shown in Fig. 5.2.

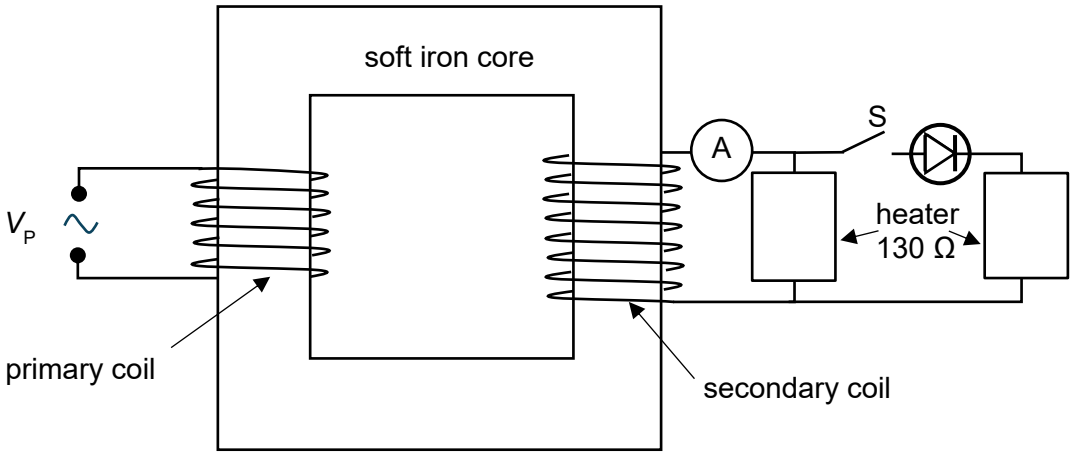

Fig. 5.2

Sketch on the axes of Fig. 5.3, the variation with time of the current I in the secondary coil when switch S is closed. Label the axes with appropriate values, Include on your graph a time equal to two periods of the alternating potential difference.

[2]

Fig. 5.3