5 Fig. 5.1 shows four diodes and a load resistor of resistance 1.2 kΩ, connected in a circuit that is used to produce rectification of an alternating voltage.

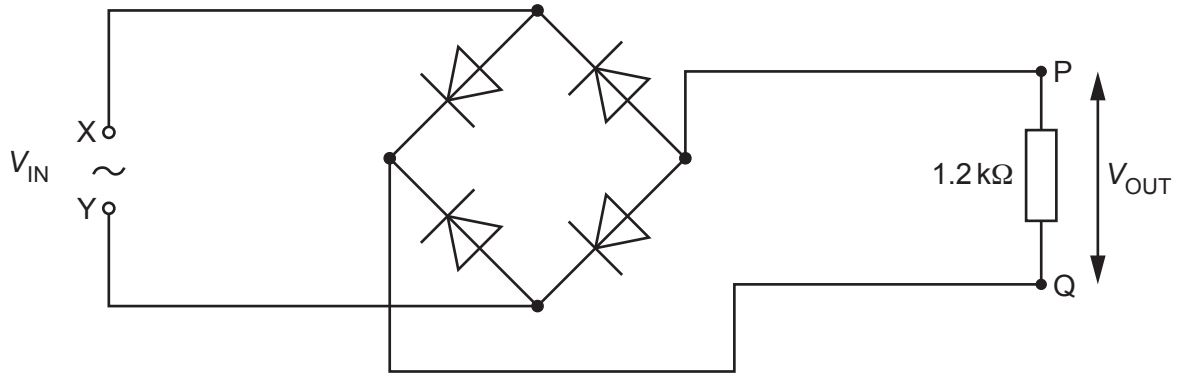

Fig. 5.1

(a) (i) State what is meant by rectification.

.....

..... [1]

(ii) State the type of rectification produced by the circuit in Fig. 5.1.

..... [1]

(b) A sinusoidal alternating voltage V_{IN} is applied across the input terminals X and Y. The variation with time t of V_{IN} is given by the equation

$$V_{IN} = 6.0 \sin 25\pi t$$

where V_{IN} is in volts and t is in seconds.

(i) On Fig. 5.1, label the output terminals P and Q with the appropriate symbols to indicate the polarity of the output voltage V_{OUT}. [1]

(ii) The magnitude of the output voltage V_{OUT} varies with t as shown in Fig. 5.2.

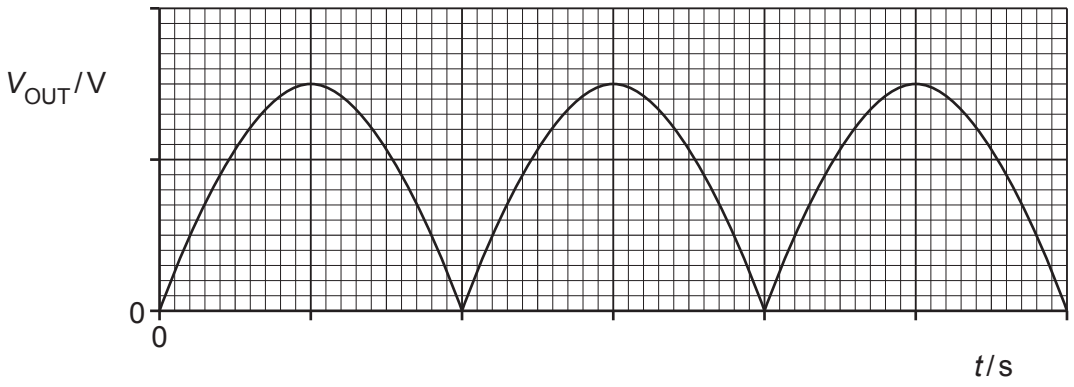

Fig. 5.2

On Fig. 5.2, label both of the axes with the correct scales. Use the space below for any working that you need.

[3]

(c) The output voltage in **(b)** is smoothed by adding a capacitor to the circuit in Fig. 5.1.
The difference between the maximum and minimum values of the smoothed output voltage is 10% of the peak voltage.

(i) On Fig. 5.1, draw the circuit symbol for a capacitor showing the capacitor correctly connected into the circuit. [1]

(ii) On Fig. 5.2, sketch the variation with t of the smoothed output voltage. [2]

(iii) Calculate the capacitance C of the capacitor.

C = ... F [3]

[Total: 12]