18 The photograph shows a demonstration a.c. generator used in a school.
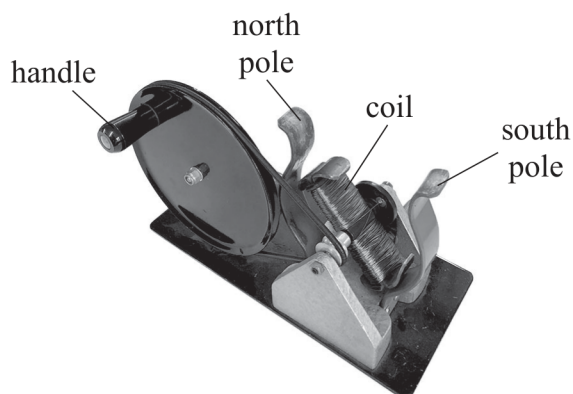

The handle is used to rotate the coil between the magnetic poles.
When a light emitting diode (LED) is connected across the coil, the LED flashes on and off as the coil rotates.
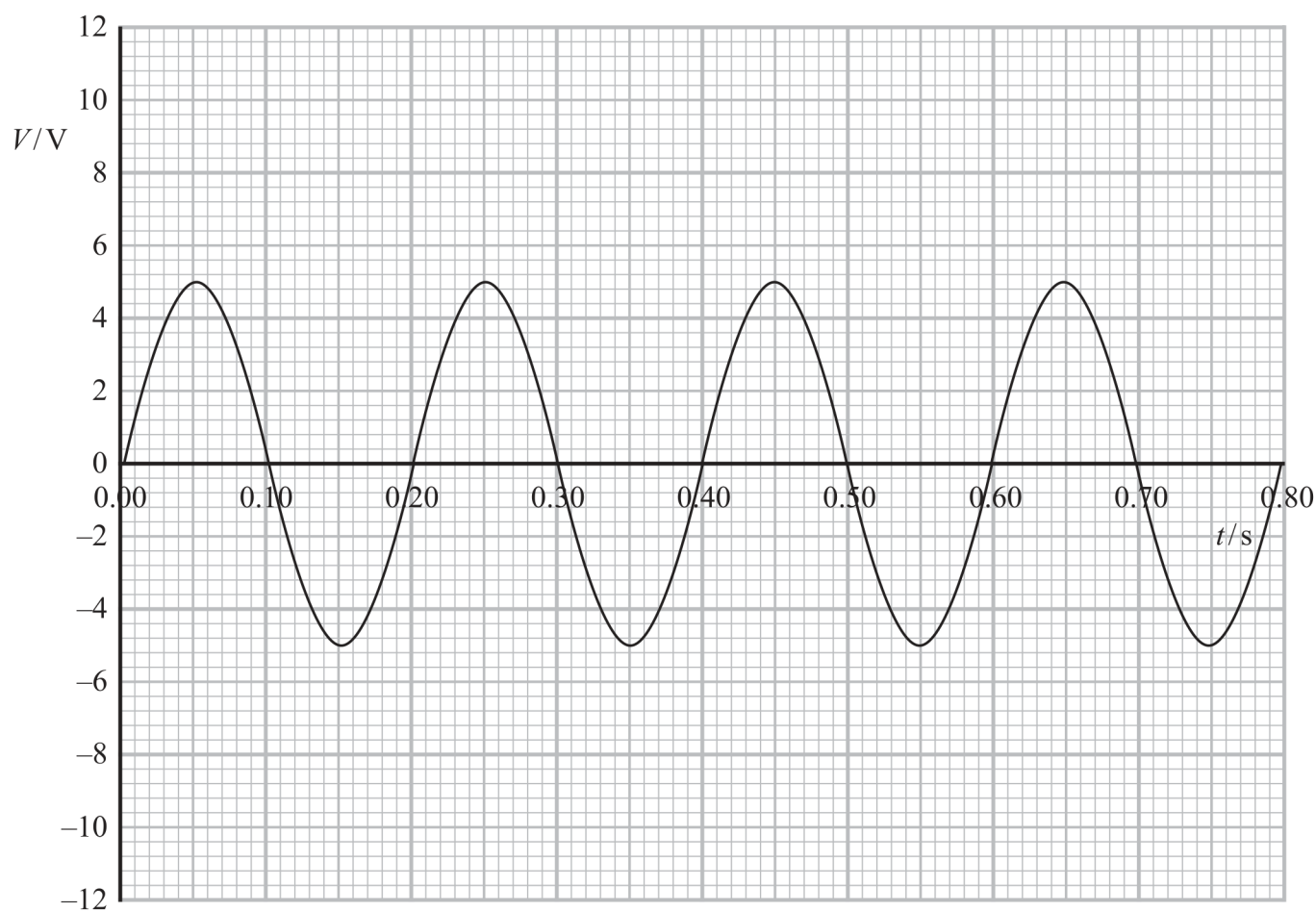
(a) Explain this observation.

(4)

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P 6 0 4 9 3 A 0 2 0 2 8

(b) The output potential difference V for the generator is recorded using a data logger and a graph is produced of V against time t.

(i) Add to the graph to show the output if the angular velocity of the generator coil is halved.

(2)

(ii) Explain the changes in the graph when the angular velocity of the coil is halved.

(2)

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(iii) The coil rotates in a uniform magnetic field at the original angular velocity. The average magnitude of V is 3.2 V.

Determine the number of turns in the coil.

magnetic flux density = 0.083 T

cross-sectional area of coil = 0.0048 m²

(4)

Number of turns = ...

(Total for Question 18 = 12 marks)