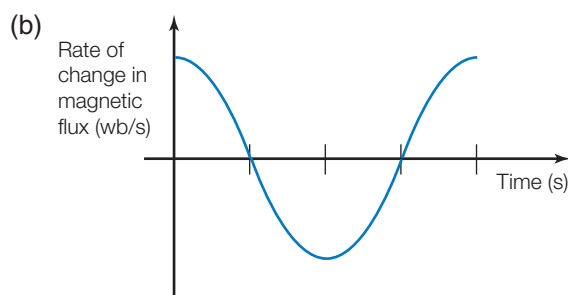
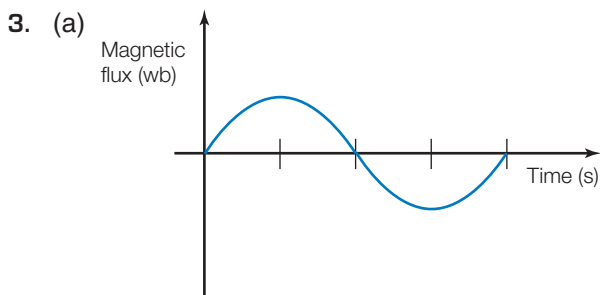


CHAPTER 7

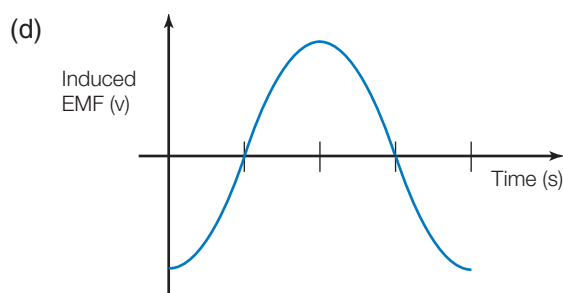
Generators

Answers to revision questions

1. (a) See Chapter 7.
- (b) Both the armature of a DC generator and a DC motor are coils mounted on soft iron cores. However, in a DC generator, the current is produced by electromagnetic induction and flows out of the coil, whereas in a DC motor, the current is fed into the coil by a power source.
2. The detail of the explanation is found in the text of Chapter 7. Note that during the course of rotation of the coil, the nature of the induced EMF inside the coil is one that reverses direction every half cycle. Having a DC split ring commutator allows the contact between the terminals of the coil and the brushes to reverse every half cycle, hence the direction of the current reverses at the point of the output every half cycle. This reverses the reversed current, making the current always positive in the external circuit.



- (c) The similarity is that the two curves both have the same maximum and minimum. The difference is that different scales are used, the two graphs are out of phase and have different magnitudes.

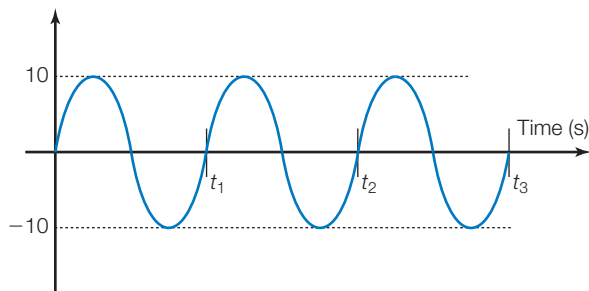


When there are 20 turns, the amplitude of the graph will increase by 20 times

(e) To produce DC currents, one needs to change a slip ring commutator to a split ring commutator.

4. (a) The new graph should have an amplitude that is twice as large.

(b) Voltage (V)



5. (a) The advantage of this design is that it avoids the use of a commutator and brushes, which often complicate the design. Also, the contact between the commutator and brushes causes a lot of wear and tear, therefore increasing the effort of maintenance. Furthermore, the avoidance of the commutator avoids sparks which are otherwise produced in commutators.

(b) It is an AC, since no split commutator is used.

(c) See the text for detail. Basically, instead of using one set of coils, three sets of coils are used, with each mounted at 120° to each other. Hence, three currents are induced simultaneously and are all out of phase by 120° to each other.

6. (a) The infrastructures used to deliver electricity are power lines mounted on metal towers. They are extensive and run all the way from a power station to households.

(b) A lightning wire is used.

7. (a) AC generators are used more commonly than DC generators because of the advantages they have over DC generators. For detail, see text.

(b) One drawback of AC generators is the need to synchronise their frequencies.

8. This has already been addressed in the chapter. Note that the question emphasises AC generators so be careful not to spend too much time describing transformers, which is a separate topic.

With the *assess* questions, come up with a conclusion. The arguments in your answer also need to be supported by real evidence and statistics.

See the *Higher verb questions* on this CD for support in constructing your answer.

9. When the circuit is switched on, the current will flow continuously, and according to Lenz's law will oppose the movement of the handle, which makes it harder to turn. Whereas when the light bulb is switched off, the current will not continue to flow, hence Lenz's law will not apply.