Exercise 29: Page 447

1.1 $$\frac{V_P}{N_P} = \frac{V_S}{N_S}$$
$$\frac{110}{1\,350} = \frac{V_S}{540}$$
$$V_S = 44\ V$$

1.2 $$I = \frac{V}{R}$$
$$I = \frac{44}{106}$$
$$I = 0{,}42\ A$$

1.3 $$V_P I_P = V_S I_S$$
$$(110)I_P = 44(0{,}42)$$
$$I_P = 0{,}168\ A$$

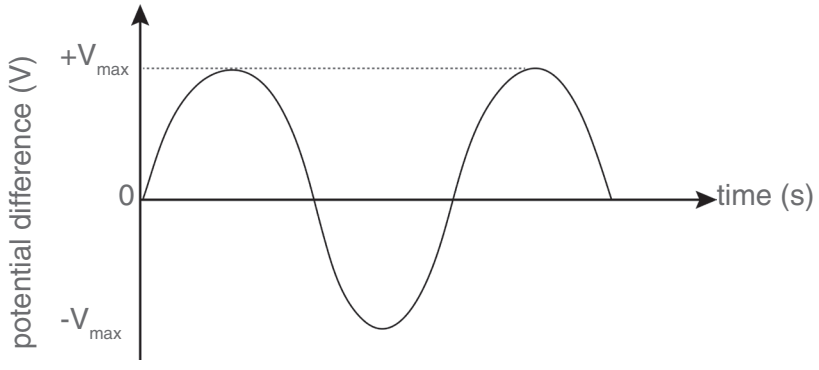
1.4 $$P = V_S I_S$$
$$P = 44(0{,}42)$$
$$P = 18{,}48\ W$$

2. $$\frac{V_P}{N_P} = \frac{V_S}{N_S}$$
$$\frac{330}{1\,050} = \frac{160}{N_S}$$
$$N_S = 509{,}09 \therefore 510 \text{ windings}$$

3. $$\frac{V_P}{N_P} = \frac{V_S}{N_S}$$
$$\frac{V_P}{10\ N} = \frac{230}{200\ N}$$
$$V_P = 11{,}5\ V$$

4.1 The induced emf is directly proportional to the rate of change in the magnetic flux.

4.2



4.3 Increases emf.
Increases frequency of emf.

4.4 The rate of change in magnetic flux linkage increases.
OR
Magnetic field lines cut coil faster.

5.1 AC generator
There are slip rings.

5.2 Decreasing
When the coil is in the horizontal position, the magnetic flux is a minimum, but the rate of change in magnetic flux is a maximum and the emf is a maximum. In the vertical position the magnetic flux is a maximum, but the rate at which it changes is a minimum, therefore the emf is a minimum in the vertical position. The emf therefore decreases when the coil turns from horizontal to vertical.

5.3 More turns on coil, stronger magnet, faster rotation

6.1 X = brushes
Y = slip rings

6.2 More turns on coil
Stronger external magnet
Soft iron core inside coil (Any 2)

6.3 Use commutator instead of slip rings.

7.1 Vertical

7.2 $f = \frac{1}{T}$

$= \frac{1}{0,1}$

$= 10$ Hz

7.3 Easier to generate and transfer from place to place. Voltage can be increased or decreased to save electrical energy, while it is transferred from one place to another.

8.1 The (total) number of magnetic field lines that go through the cross-section of a coil/are connected to a coil.

8.2 Move the magnet in and out of the coil or move the coil closer to and further from the magnet (relative motion of magnet and coil). Change the magnetic field strength (only possible if it is an electromagnet).

8.3 No (conductor moves parallel to magnetic field).