

15. (a) Transformers are used in the large scale transmission and distribution of electricity.

(i) How are they used?

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.....

.....

.....

(2)

(ii) Why are they used?

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(3)

(b) A small transformer for a radio has an input voltage of 230 V and an output voltage of 6.0 V.

Calculate the input current in mA when the output current is 575 mA.
Assume that the transformer is 100% efficient.

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Input current = mA

(3)

(Total 8 marks)

Q15



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Q15



Question 14

- (a) any two, (1) each
- (i)
- fixed mass
 - temperature constant
 - (remains an) ideal gas
- 2
- (a) either $0.58 \text{ (m}^3\text{)}$ (2) or $0.576 \text{ (m}^3\text{)}$
- (ii) or (volume =)
 $120 \times 1.2 \div 250$ (1)
- 2
- (b) 0/zero (K)
- 1
- (i)
- (b) the particles are not moving or lowest possible temperature
- 1
- (ii) or it is absolute zero
- (c) any three, (1) each
- heat conducted through the cylinder
 - (average/kelvin) temperature of the gas/particles increases
 - (average) speed of the particles increases
 - more (energetic) collisions with the (inside of) the cylinder
 - pressure increases
- 3

Total 9 marks

Question 15

- (a) step-up transformer(s) used after
- (i) generation/at start of transmission
- (1)
- Either** allow 'some increase and some decrease the voltage/current' for (1) mark only
- step-down transformer used after transmission/during distribution (1)
- or** allow '(transformers used) at beginning and end' for (1) mark only
- 2
- (a) to increase voltage for transmission
- (ii) (1)
- points may be credited in either (a)(i) or (a)(ii)
- (so) energy losses are less/system more efficient/less energy lost as heat/transmission current is small
- (1)
- to decrease voltage to safe(r) value for use in homes etc.
- or high voltage not appropriate for domestic equipment (1)
- 3

(b) either 15 (mA) (3)

$$\text{or } V_p I_p = V_s I_s \text{ (1)}$$

$$I_p = V_s I_s \div V_p \text{ (1)}$$

$$\text{or } 230 \times I_p (\div 1000) = 6 \times 575 (\div 1000)$$

$$\text{or } I_p (\div 1000) = 6 \times 575 (\div 1000) \div 230$$

3

Total 8 marks

Question 16

(a) to ensure that the current flows through all of the coil

or to prevent a short circuit
do not credit references to electric shock or to heat insulation

1

(b) to the right/inwards

(i)

allow 'towards the magnet'
do not credit 'away from the cone'

1

(b) any two, (1) each

(ii)

- (use a) more powerful/stronger (permanent) magnet
- have more turns on the coil
- larger current

allow 'have more coils on the coil'
do not credit 'have a bigger coil'
allow 'larger voltage'

2

(c) 3.6 (kHz)

(i)

1

(c) kilohertz

(ii)

allow 'kiloHertz'
allow 'phonetic' spellings

1

Total 6 marks

Question 17

(a) Isotopes (1)

protons ... neutrons (1)

both in the correct order

2

(b) alpha/ α

(i)

1

(b) helium nucleus/ ${}^4_2\text{He}$ is an alpha/ α particle

(ii)

1

(c) neutron/n

(i)

1

(c) fission

(ii)

accept minor misspelling but not if it could be read as 'fusion'

1

(c) nuclei (1)

(iii)

accept 'nucleuses'

neutrons (1)

kinetic (1)

accept 'movement'

3