Mark schemes

Q1.

(a) 400 000

*allow **1** mark for correct substitution ie*

$$\frac{25000}{?} = \frac{800}{12800}$$

or

$$\frac{25}{?} = \frac{800}{12800}$$

2

[2]

Q2.

(a) 10 500

*allow **1** mark for 75 × 32 200 ÷ 230*

2

[2]

Q3.

60

*allow **1** mark for correct transformation*

2

[2]

Q4.

(a) (i) $\frac{\text{voltage across primary}}{\text{voltage across secondary}} = \frac{\text{no of turns in primary}}{\text{no of turns in secondary}}$

accept $\frac{VP}{VS} = \frac{NP}{NS}$

or $\frac{Vin}{Vout} = \frac{Nin}{Nout}$

1

(ii) Np = 4000

$\frac{25(000)}{275(000)} = \frac{NP}{44000}$ *for **1** mark*

2

(b) (i) resistance of cable decreases

1

(ii) convection (to the air)
or
conduction (to the air)
not radiation

1

[11]

Q5.

(i) iron

for 1 mark

1

(ii) 20

gains 2 marks

else working

gains 1 mark

2

(iii) reverse input/output

for 1 mark

or increase secondary turns

1

[4]

Q6.

(a) (i) Iron

for 1 mark

1

(ii) V/240 = 2000/10 000

V = 48

V

for 1 mark each

3

[4]

Q7.

(a)

$$\frac{1.5}{5.0} = \frac{150}{N_s}$$

1

$$N_s = \frac{150}{0.3}$$

1

$N_s = 500$

1

[3]

Q8.

(a) **A** primary coil
and
B secondary coil

1

C iron core

1

(b) $\frac{230}{V_s} = \frac{200}{1200}$

1

$$V_s = \frac{1200 \times 230}{200}$$

1

$V_s = 1380$ (V)

1

[5]

Q9.

(a) 80 (turns)

or *credit (1) for any equation which* *if correctly evaluated* *would give 80 example*

example

$$\frac{230}{5.75} = \frac{3200}{number\ of\ turns}$$

2

[7]

Q10.

(a) (i) step-down (transformer) because fewer turns on the output/secondary (coil)

no credit for just 'step-down transformer'

accept '…less turns…'
do ***not*** *credit '…fewer coils…'*

or *'the p.d. across the input / primary will be greater than the p.d. across the output / secondary'*

1

(b) 2250

correct substitution

eg $\frac{150}{p.d.across secondary} = \frac{500}{7500}$ *gains* ***1*** *mark*

or *appropriate transformation*

eg (p.d. across secondary =) $\frac{number\ of\ turns\ on\ secondary}{number\ of\ turns\ on\ primary}$

× p.d. across primary gains ***1*** *mark*

2

[3]

Q11.

(a) step-down

1

(b) (i) 1.6

correct order only

1

12.8

1

[3]

Q12.

(a) 18

*allow **1** mark for correct substitution, ie*

$$\frac{230}{7.2} = \frac{575}{n_s}$$

2

[2]

Q13.

(a) (i) Iron

1

(ii) 50

ignore references to current

reason only scores if 50 chosen

1

there are more turns on the secondary coil (than the primary coil)

accept it is a step-up transformer

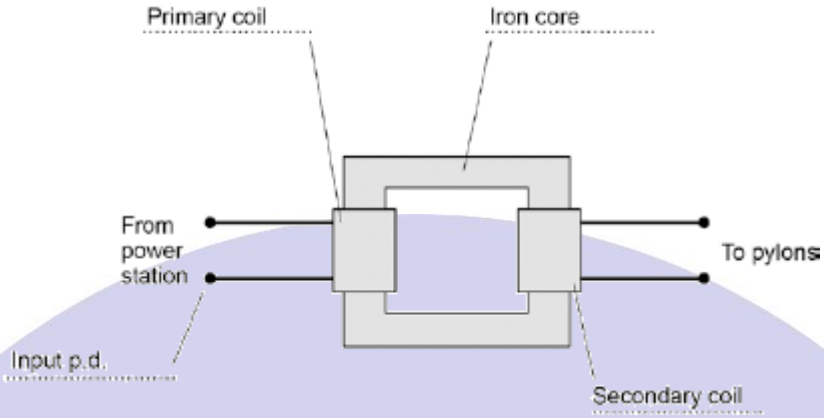
not more coils

1

[3]

Q14.

(a) (i)



1
1
1
1

(ii) 16 000

allow 1 mark for correct substitution
ie 400 ÷ 25 = n ÷ 1000

2

[6]

Q15.

(a) a magnetic field

accept electromagnetic field
heat is insufficient

1

that is alternating / changing

1

(b) 20

*allow **1** mark for correct substitution, ie*

$\frac{230}{11.5}$

provided no subsequent step

2

[4]

Q16.

$$\frac{230}{V_s} = \frac{690}{57}$$

1

$$V_s = \frac{230 \times 57}{690}$$

1

V_s = 19 (V)

*an answer of 19 (V) scores **3** marks*

1

[3]

Q17.

(a) It is easily magnetised.

1

(b) p.d. across the secondary coil is smaller (than p.d. across the primary coil)

1

(c) ratio $\frac{V_p}{V_s} = \frac{6}{12}$

accept any other correct ratio taken from the graph

1

$\frac{6}{12} = \frac{50}{N_p}$

use of the correct turns ratio and substitution or correct transformation and substitution

1

N_p = 100

*allow 100 with no working shown for **3** marks*

1

[5]

Q18.

(a) 10

*allow **1** mark for correct substitution ie* $\frac{230}{V_s} = \frac{4600}{200}$

2

[2]

Q19.

5.75 or 5.8 or 6(.0)

*allow for **1** mark **either***

$$\frac{230}{p.d.} = \frac{20\,000}{500}$$

or

p.d. = 230 ÷ 40

2

V / volt(s)

1

[5]

Q20.

3067 (V)

*allow all **3** marks for 3060 to 3070 (V)*

$$V = \frac{230 \times 4000}{300}$$ *gains **2** marks*

$$\frac{230}{V} = \frac{300}{4000}$$ *gains **1** mark*

3

[3]

Q21.

(a) 400 000

*allow **1** mark for correct substitution ie*

$$\frac{25000}{?} = \frac{800}{12800}$$

or

$$\frac{25}{?} = \frac{800}{12800}$$

2

volt(s) / V

*an answer 400 gains **2** marks*

*an answer 400 kilovolts / kV gains **3** marks*

*although the unit mark is independent to gain **3** marks it must be consistent with the numerical value*

1

[3]

Q22.

(a) (i) step-up

both parts required

more turns on the secondary / output (coil)

*do **not** accept coils for turns*

'secondary output is greater than primary input' is insufficient

1

(ii) (easily) magnetised (and demagnetised)

accept (it's) magnetic

it's a conductor negates answer

1

(b) 60

*allow **1** mark for correct substitution, ie* $\frac{230}{15} = \frac{720}{N_s}$

2

[4]

Q23.

$$\frac{230}{V_s} = \frac{2000}{40}$$

1

$$V_s = \frac{40}{2000} \times 230$$

subsequent marks can only be awarded if the first equation is correct and has been used

1

$V_s = 4.6$ (V)

1

$V_s = 4.6 \times I_s = 6.9$

this mark may be awarded if the pd is incorrectly calculated

1

$I_s = 1.5$ A

allow a correctly calculated I_s using an incorrectly calculated pd

1

OR

$6.9 = I_p \times 230$ (1)

$I_p = \frac{6.9}{230}$ (1)

subsequent marks can only be awarded if the first equation is correct and has been used

$I_p = 0.03$ (A) (1)

$I_s = 0.03 \times \frac{2000}{40}$ (1)

this mark may be awarded if I_p is incorrectly calculated

$I_s = 1.5$ (A) (1)

allow a correctly calculated I_s using an incorrectly calculated I_p

1

[5]