

TRANSFORMER MARK SCHEMES

QUESTION 1

question	answers	extra information	mark
(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
(ii)	to prevent a short (circuit)(through the turns of wire or through the core	do not credit references to safety or heat (insulation)	1
(iii)	(easily) magnetised (and demagnetised)	accept (it s) magnetic do not accept because it s a conductor	1

(b)	<p>2250</p> <p>correct substitution eg $\frac{150}{\text{p.d. across secondary}} = \frac{500}{7500}$</p> <p>gains 1 mark or appropriate transformation eg (p.d. across secondary =) $\frac{\text{number of turns on secondary}}{\text{number of turns on primary}} = \frac{\text{p.d. across primary}}{\text{p.d. across secondary}}$ gains 1 mark</p>	2
(c)	<p>any two from:</p> <ul style="list-style-type: none"> • <u>to reduce the voltage</u> / p.d. (of the domestic supply) • higher voltage difficult to insulate • higher voltage (would) result in (fatal) electric shock • domestic appliances are not designed for (very) high voltage (input) / (are designed) for 230V <p>or to reduce to 230 V allow to reduce to 240 V do not credit reduce <u>current</u> to 230V</p> <p>not just less dangerous</p> <p>do not credit to increase efficiency / to save energy do not credit just it s safer</p>	2
(d)	<p>any two (1) each</p> <ul style="list-style-type: none"> • if the (local) power station breaks down / fails / demand / load exceeds supply • electricity / power can be switched from elsewhere in the system / from other power station(s) • electricity can be generated in places remote from customers <p>or words to that effect</p> <p>or words to that effect</p> <p>or words to that effect</p>	1 1

	<ul style="list-style-type: none"> • (in total) fewer power stations are needed • power available in rural / remote areas • National Grid allows for (better) control of supply and demand <p style="text-align: right;">do not credit just cheaper / more efficient / safer</p>	
total		9

question	answers	extra information	mark
1(a)	grid	accept any unambiguous indication	1
1(b)(i)	A (only)		1
1(b)(ii)	D (only)		1
1(c)	more than	accept any unambiguous indication	1
Total			4

QUESTION 3			
question	answers	extra information	mark
(a)(i)	(quickly) becomes magnetized	or (quickly) loses its magnetism or 'it's (a) magnetic (material)'	1

		any reference to conduction of electricity/heat nullifies the mark	
3(a)(ii)	<p>any four from:</p> <ul style="list-style-type: none"> • insulation prevents electricity/current flowing through the iron/core • <u>alternating</u> current/a.c. in the primary (coil) • produces a <u>changing</u> magnetic field (in the iron/core) • (and hence magnetic) field in the secondary (coil) • induces/generates/produces an <u>alternating</u> potential difference/p.d./voltage across the secondary (coil) • (and hence) <u>alternating</u> current/a.c. in the secondary (coil) 	or 'insulation so electricity/current only flows in the wires/turns/coils'	4

3(b)	80 (turns)	<p>or credit (1) for any equation which <u>if correctly evaluated</u> would give 80 example</p> $\frac{230}{5.75} = \frac{3200}{\text{number of turns}}$	2
Total			7
Question 5			
question	answers	extra information	mark
5(a)(i)	(laminated soft) iron	do not accept steel	1
5(a)(ii)	<p>produces a <u>magnetic field</u></p> <p>which is alternating / changing / varying</p> <p>and which induces / produces an alternating / changing potential difference across the <u>secondary</u> coil</p>	<p>accept <u>magnetic flux</u></p> <p>accept current / voltage</p>	3
5(b)	3067 (V)	<p>allow all 3 marks for 3060 to 3070 (V)</p> $V = \frac{230 \times 4000}{300}$ <p>gains 2 marks</p> $\frac{230}{V} = \frac{300}{4000}$ <p>gains 1 mark</p>	3
Total			7

Question 5			
(a)	10	allow 1 mark for correct substitution ie $\frac{230}{4600} = \frac{Vs}{200}$	2
(b)	any one from: <ul style="list-style-type: none"> to prevent short circuiting to ensure that the <u>current</u> flows / goes round the coil to prevent the <u>current</u> entering the core 	do not accept electrocution do not accept electricity for current answers including heat / energy loss negate mark	1
(c)(i)	(soft) iron	do not accept 'steel'	1
(c)(ii)	can be magnetised because it is magnetic	answers including it's a conductor negate mark	1
Total			5