M1. (a) (i) secondary(coil) / output (coil)

*do **not** accept just coil*

1

(ii) core

*do **not** accept for either mark it is made out of iron ore*

1

(laminated soft) iron

*allow **1** mark for 'it is made out of iron core'*

1

(iii) magnetic field

accept magnetism / magnetic force

1

(which is) changing / alternating

direction (of field) changes / strength (of field) varies

scoring second mark is dependent on first mark

1

(b) ...step-up .... step-down ...

both in the correct order

1

(c) Do not build new houses ....

1

Build new power lines away ....

*deduct **1** mark for any other(s) to a minimum total of (0)*

1

[8]

M2. (a) (it is) magnetic

or *will carry (an alternating) magnetic field*

or *magnetises and demagnetises (easily)*

reference to conduction negates the mark

1

(b) so the current / electricity does not flow through the iron / core

accept 'so the current / electricity / wires do not short (circuit)'

responses in terms of heat insulation negate the mark

ignore references to safety

1

(c) 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]

M3. (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]

M4. (a) (i) (quickly) becomes magnetized

or *(quickly) loses its magnetism*

or *'it's (a) magnetic (material)'*

any reference to conduction of electricity/heat nullifies the mark

1

(ii) any **four** from:

- insulation prevents electricity/current flowing through the iron/core

  or *'insulation so electricity/current only flows in the wires/turns/coils'*

- alternating current/a.c. in the primary (coil)
- produces a changing magnetic field (in the iron/core)
- (and hence magnetic) field in the secondary (coil)
- induces/generates/produces an alternating potential difference/p.d./voltage across the secondary (coil)
- (and hence) alternating current/a.c. in the secondary (coil)

4

(b) 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]

M5.(a) step-down

1

(b) (i) 1.6

correct order only

1

12.8

1

(ii) values of p.d. are smaller than 230 V

1

(c) (i) a.c. is constantly changing direction

accept a.c. flows in two / both directions

accept a.c. changes direction(s)

a.c. travels in different directions is insufficient

1

d.c. flows in one direction only

1

(ii) an alternating current / p.d. in the primary creates a changing / alternating magnetic field

1

(magnetic field) in the (iron) core

current in the core negates this mark

accept voltage for p.d.

1

(and so) an alternating p.d.

1

(p.d.) is induced across secondary coil

1

[10]

M6. (a) 10

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

2

(b) any **one** from:

- to prevent short circuiting
- to ensure that the current flows / goes round the coil
- to prevent the current 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

(ii) can be magnetised

because it is magnetic

answers including it's a conductor negate mark

1

[5]

M7. (a) aluminium cannot be magnetised

accept aluminium is not magnetic
"it" refers to aluminium
*do **not** accept aluminium is not easily magnetised*
reference to conduction and aluminium negates mark
iron can be magnetised is insufficient

1

(b) (i) 10 to 50

either order

1

(ii) (data is) anomalous

*accept does **not** fit the pattern*
it is an error is insufficient

1

(iii) 21

accept 22
*do **not** accept any fraction of a turn ie 20.1*

1

secondary p.d. (just) larger than primary p.d.

accept output (just) larger than input/2V

orthere must be more turns on the secondary coil than primary coil

*do **not** accept coil for turns*

1

(c) to reduce/step-down the (input) p.d./voltage

mains p.d. is too high is insufficient
step-down transformer is insufficient
*answers in terms of changing/ stepping-up current **or** fuse blowing **or** not working with 230 volts are insufficient*
any mention of step-up negates mark
*stepping down both voltage/p.d. **and** current negates mark*

1

[6]

M8. (a) (i) live

1

(ii) react faster

1

(iii) live and neutral

1

(b) (i) ammeter

1

to measure current

accept to measure amps

1

plus any **one** from:

- *<u>variable</u> resistor* (1)
  to vary current (1)
  accept variable power supply
  accept change or control
- *switch* (1)
  to stop apparatus getting hot / protect battery
  or
  to reset equipment (1)
- fuse (1)
  to break circuit if current is too big (1)

2

(ii) any **two** from:

- use smaller mass(es)
- move mass closer to pivot
- reduce gap between coil and rocker

- more turns (on coil)*coil / loop*
- iron core in coil

  accept use smaller weight(s)

2

[9]