

- 1 (a) (i) (magnetic) field (lines) of magnet cut by turns / coil / wire
OR (magnetic) field linked with coil changes B1
- (ii) 1 (needle of meter) deflects to the left (and returns to zero) B1
- 2 (needle of meter) deflects to right and left (alternately)
OR to and fro B1
- (b) (i) $N_p/N_s = V_p/V_s$ in any form OR $(N_s =) N_p V_s/V_p$ OR $8000 \times 6/240$ C1
OR $(V_p/V_s =) 40$
 $(N_s =) 200$ A1
- (ii) 1 $(P = IV = 0.050 \times 240 =) 12\text{ W}$ B1
- 2 0.9×12 OR 10.8 OR $I_s V_s = 0.9 I_p V_p$ OR $I_s = 0.9 I_p V_p / V_s$ C1
OR $0.9 \times 0.05 \times 240/6$
 $(I_s =) 1.8\text{ A}$ ecf 1. A1
- [Total: 8]**

- 2 (a) (i) electromagnetic induction OR mutual induction B1
- (ii) copper B1
- good conductivity OR good conductor B1
- (b) (i) $N_p \div N_s = V_p \div V_s$ in any form OR $N_p V_s \div V_p$ C1
accept in ratio format
400 A1
- (ii) (current in secondary =) 4×1.5 OR 6.0 (A)
- $I_p V_p = I_s V_s$ in any form OR $I_s V_s \div V_p$ C1
- 0.30 OR 0.3A A1

- 3 (a) (magnetic) field (lines) of magnet cuts coils (of solenoid)
OR (magnetic) field in solenoid changes B1
- (b) meter deflects in opposite direction B1
- deflection is greater (than initially) OR for shorter time B1
- magnet moving faster B1
- more field lines cut per second OR
opposite pole **and** direction **and** end of solenoid B1
- (c) any two from: max. B2
- stronger magnet
 - use a solenoid (of same length) with more turns
 - use a more sensitive meter
 - use wires of smaller resistance for solenoid or connecting wires
 - drop from further up

[Total: 7]

- 4 (a) (step-down) transformer B1
- (b) (alternating current causes) magnetic field in core/iron
magnetic field changes/alternates
field cuts/links with secondary coil OR secondary coil cuts field B1
e.m.f. /voltage **induced** (and current flows in lamp)
OR **induced** current (in lamp) B1
- (c) $V_1/V_2 = N_1/N_2$ in any form OR $(N_1 =) N_2 \times V_1/V_2$ OR $450 \times 240/12$
= 9000 A1
- (ii) tick 4th box B1

[Total: 8]

- 5 (a) ≥ 3 horizontal lines in gap by eye B1
 ≥ 4 evenly spaced horizontal lines filling $\frac{3}{4}$ of width of gap AND arrows L to R B1
- (b) (i) ammeter deflects/gives a reading OR registers a current B1
 wire cuts the field lines o.w.t.t.e. M1
 e.m.f./voltage/current induced/produced/generated A1
- (ii) 1 reading/deflection/current increased B1
 2 reading/deflection/current reversed ignore magnitude B1
- [Total: 7]**

- 6 (a) less power/energy lost OR heat generated (in cables) B1
 smaller current B1
 $P = VI$ OR $P = I^2R$ B1
- (b) (i) (laminated) iron core B1
- (ii) (connected to) primary (coil) B1
- (iii) $(N_S =) N_P V_S / V_P$ OR $400 \times 115\,000 / 5\,000$
 9200 (turns) A1
- (c) less insulation needed OR safer OR devices designed for 230 V B1
- [Total: 8]**