

Motors and electromagnetic induction Answers

- 1) (a) (i) Fig. 10.1 B1
- (ii) Fig. 10.3 B1
- (b) 2 complete cycles, any shape (if full-wave rectified, must be 4 humps) B1
 cyclical and equal amplitude above & below axis B1
 uniform spacing B1
 intention of sinusoidal shape accept sinusoidal full-wave rectification B1 [6]
- 2) (a) transformer (ignore step-up/down) B1
- (b) 132,000/22,000 OR 240/132,000 C1
 X: 6 A1
 Y: 0.001818 to at least 4 dec. pl. OR 1/550 NOT 550 A1
- (c) less heat/energy loss }
 thinner/smaller cables }
 less copper used }
 less cable weight } any 2 use ✓ + x = 0 for incorrect extras B1+B1
 less massive pylons }
 cheaper }
 smaller current } [6]
- 3) (a) (i) needle inside coil B1
 current through coil OR connect battery/power supply M1
 direct current OR d.c. A1
 OR a.c. and switch off before removing needle/ magnet
- (ii) freely suspend/pivot and see which end points N (or equivalent) B1
 OR see which end is repelled by N pole of a magnet
- (b) 4+ smooth curves leaving one end and going to the other (ignore any arrows) B1
 no lines crossing or meeting, even at ends B1 [6]
- 4) (a) (i) 1. magnetised B1
 2. attracted OR magnetised B1
 3. deflects M1
 momentary OR then goes back to zero A1
- (ii) deflects other way B1
- 5) (a) (i) deflection (in one direction) M1
 idea of momentary OR goes back to zero again A1
- (ii) idea of same as (i) but opposite direction B1
- (b) larger B1
- (c) smaller B1
- (d) nothing OR small oscillations about zero position OR blurred light spot B1 [6]

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- 6) (a) coil clearly and unambiguously indicated B1
- (b) increase strength/power of magnet
 ignore increase magnetism/ignore add core
 ignore magnets closer/bigger
- increase current/voltage/energy from battery
 accept stronger/more powerful battery
- increase number of turns (in coil)
 ignore bigger coil ignore rotations
- } any 2 B1 + B1
- (c) reverse current OR reverse magnet/field however expressed B1
[Total: 4]
- 7) (a) moves/deflects M1
 momentary (or equivalent) OR goes back to zero/centre A1
- (b) moves/deflects in other direction B1
- (c) e.m.f./electromagnetic force/current/voltage/p.d.
 induced B1
B1
 (allow B1 for magnetic field is changed) [Total: 5]
- 8) (a) copper B1
- (b) core B1
- (c) $N_p / N_s = V_p / V_s$ in any form C1
 $8000 / N_s = 240 / 6$ OR $\frac{240}{8000} = \frac{6}{N_s}$ OR $\frac{N_s}{8000} = \frac{6}{240}$ C1
 200 A1
- (d) (i) lamp less bright/less than full brightness/wouldn't light
 (up properly)/ has less energy B1
- (ii) lamp blows/bursts OR lamp too bright OR lamp
 overheats/burns out OR much brighter/has more energy B1 [7]
- 9) (a) arrow down, close to or joined to wire B1
- (b) arrow up, close to or joined to wire B1
- (c) (i) moves/bends up B1
- (ii) motor/ammeter/voltmeter/galvanometer/multimeter B1