

- 1 (a) (nuclear) fusion B1
- (b) (i) charges are moving (and current is the (rate of) flow of charge) B1
- (ii)  $Q = It$  AND  $t$  is time B1
- (c) (i) 1. (they are) perpendicular OR at right angles OR at  $90^\circ$  B1
2. (they are) perpendicular OR at right angles OR at  $90^\circ$  B1
- (ii) arrow (labelled  $F$ ) perpendicular to direction AND pointing towards the bottom right of the page B1

**[Total: 6]**

- 2 (a) (i) changing magnetic field (in coil) **or** field lines cut coil (**or vice versa**)  
e.m.f./current induced B  
B1
- (ii) smaller deflection/current/reading/voltage **or** deflection lasts longer (ignore slower) B1  
rate of cutting field lines/change of magnetic field reduced B1
- (iii) deflection/current in opposite direction B1
- (b) alternating/changing current (in primary coil) B1  
alternating/changing magnetic field clearly in core B1  
field channelled from primary to secondary by core (somehow expressed) **or** core increases effect B1  
induced e.m.f. in secondary B1 [9]
- 3 (a) magnetic flux changes / rod cuts magnetic field B1  
emf / voltage induced ignore current induced B1 [2]
- (b) Mark (i) & (ii) together
- deflection increases/to R in (i) B1  
deflection increases/to R in (ii) B1  
correct reason in (i) or (ii) **AND** consistent with deflection:  
in (i) or (ii) rate of change of flux (linkage) increases  
in (i) more (magnetic) field lines cut/stronger (magnetic) field cut  
in (ii) rod moves faster/field lines cut faster B1
- (iii) no deflection **AND** no (magnetic) field lines cut/no change of flux (linkage) B1 [4]

- 4 (a) first finger – field / magnetism / flux )  
 second finger – current / charge flow (NOT electron flow) ) both B1
- (b) brush OR contact OR sliding connector B1  
 split ring OR commutator NOT slip ring B1
- (ii) clockwise OR right side down OR left side up OR correct arrows  
 on figure NOT turn to the right B1
- (iii) more current / more voltage / “stronger battery” / more power )  
 more turns on coil / more coils )  
 stronger magnet Ignore bigger magnets )  
 closer magnet / magnetic poles ) any 2 B1, B1  
 more magnets )  
 iron core ) [6]
- 5 (a) (i) circular line of force around wire through P M1  
 arrow(s) on line anticlockwise - none wrong A1  
 (ii) arrow through Q to left A1 3
- (b) (i) none/stays same B1  
 (ii) direction reverses B1 2
- (c) at S - stronger B1  
 at T - same (strength) B1  
 at W - same (strength) B1 3  
 [8]