1	**(a**	magnetic field and current at right angles causes force on wire which deflects it or field around wire (B1) interacts with the field of the magnet (B1)	B1 B1	**2**
	(b)	normal to/between poles, either way however expressed out of paper	C1 A1	**2**
	(c)	converts electrical energy to work/k.e./movement energy	B1	**1**
	(d)	split rings and brushes or equivalent (e.g. leaning wires)	B1	
	(ii)	every half turn current passes from one ring to the other so current flows opposite way around coil or commutates	B1 B1	**3** **[8]**

2	**(a (i)**	a.c. input causes constantly changing current through co magnetic field formed in or around coil constantly changing magnetic field	**B1** **B1** **B1**	**[M2]**
	(ii)	(changing) magnetic field transferred to secondary coil	**B1**	
	(iii)	(changing) magnetic field cuts secondary coil induces e.m.f.	**B1** **B1**	**[3]**
	(b)	more turns on secondary (than on primary)	**B1**	**[1]**
	(c)	no transfer of magnetic field from primary to secondary	**B1**	**[1]**
	(d)	Vp.Ip = Vs. Is or 100 x 0.4 = 200 x Is Is = 0.2 A	**C1** **A1**	**[2]** **Total [9]**

3	**(a)**		Solenoid ends connected to meter, both labelled	**B1**	
			One magnet in correct position to enter / leave solenoid, labelled	**B1**	**2**
	(b)		Push magnet into coil / pull out / move near end of coil	**B1**	**1**
	(c)		(magnet has / produces) magnetic lines of force / magnetic field	**B1**	
			lines cut (coils of) solenoid / coils / wires	**B1**	**2**
	(d)	**(i)**	Pull magnet out of coil / reverse effect to answer **(b)**	**B1**	
		(ii)	Move magnet faster or effect in **(a)** faster	**B1**	**2**
					[7]

4	**(a)**	**(i)**	two coils on continuous core (not allow coils joined)	**1**	
			primary coil to 240 V, secondary coil to 6 V	**1**	
			iron core, primary/input and secondary/output labelled	**1**	
		(ii)	any values with correct 40:1 ratio, accept here or on diagram	**1**	**4**
	(b)		power in = power out or 240 x I = 12	**1**	
			current = 0.05 A	**1**	**2**
	(c)		must be a changing magnetic field, only from a.c.	**1**	
			so that induction can take place	**1**	**(8**

5	**(a)**	**(i)**	power = VI or 24 X 2	**C1**		
			power is 48 W	**A1**		
		(ii)	voltage = power/current or 48/0.4	**C1**		
			voltage is 120 V	**A1**	**4**	
	(b)	**(i)**	no/very little energy/power lost or energy/power in = energy/power out	**B1**		
		(ii)	any mention of magnetic field	**B1**		
			changing magnetic field	**B1**		
			field passes through core or secondary coil	**B1**		
			induces voltage in secondary coil	**B1**		
			number of turns on secondary determines voltage output	**B1**	**max 4**	
					[8]	

6	**(a)**	**(i)**	0-6 (V) positive and negati	**A1**		
		(ii)	all waves roughly 6V amplitude	**B1**		
			3 waves approx. one wave every 0.1 s	**B1**	**3**	
	(b)		any mention of magnetic field	**B1**		
			coils (forced to) cut magnetic field	**B1**		
			<u>includes</u> e.m.f./voltage/current in the coils	**B1**		
			as in Fleming's R.H. rule	**B1**	**M3**	
	(c)		mechanical energy/work (in)/kinetic energy	**B1**		
			electrical (out) (+ heat) (ignore sound)	**B1**	**2**	
					[8]	