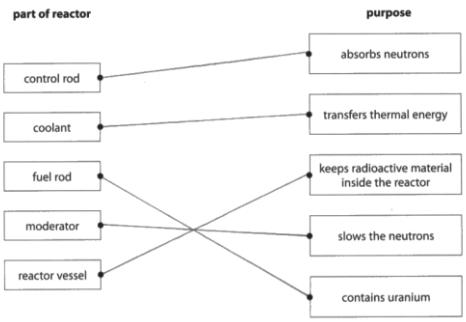
Question number	Answer	Notes	Marks
9 (a)	gravitational potential (energy);	GPE	1
b	any three of: MP1. turbine spins; MP2. (causes) coils of wire spin; MP3. between the poles of (large) magnets; MP4. current or voltage is **induced;** MP5. in or across the coils of wire;	allow turbines rotates magnets spin inside coils of wire	3
c	any one of: MP1. to keep voltage or current (value) constant; MP2. voltage (or current) produced depends on the speed of rotation (of coil);	allow frequency of voltage depends on the speed of rotation	1
d i	efficiency = $\frac{\text{useful energy output}}{\text{total energy input}}$		1
ii	substitution; rearrangement; evaluation of useful energy; subtraction from input energy; e.g. $\frac{36}{100} = \frac{\text{output energy}}{1050}$ gains 1 OP energy = $\frac{36 \times 1050}{100}$ gains 2 =378 (kJ) gains 3 wasted energy = 1050-378 = 672 (kJ) gains 4	allow alternative method by calc 64% of 1050 kJ POT error (often as 36 not seen as % or fraction) loses 1st mark	4
iii	any two suitable energy forms: e.g. thermal energy (of the water); frictional heating (along the pipe/in bearings); noise/sound;	 condone 'heat' not just 'friction'	2

Total 12 marks

Question number	Answer	Notes	Marks
12 (a)	5 correct lines score 4 marks;;;; 4 or 3 correct lines score 3 marks;;; 2 correct lines score 2 marks;; 1 correct line scores 1 mark;  		4
b	C neutrons;		1
c	any four from: MP1. neutron absorbed by; MP2. uranium(-235) **nucleus**; MP3. causing it to split; MP4. into 2 daughter **products /nuclei / isotopes**; MP5. releasing further neutrons /energy;	only accept precise terminology allow hits/collides/eq allow named products	4
d	any three comparisons from (however expressed): MP1. decay is random but fission is not; MP2. fission induced by input particle but decay occurs without an input particle; MP3. fission produces 2 daughter nuclei but decay produces only 1; MP4. α or β are emitted from decay but not from fission;		3

	MP5. decay rate can't be altered but rate of fission can; MP6. Number of fissionable isotopes much less than radioactive isotopes;		

Total 12 marks