Question number	Answer	Notes	Marks
4 (a) (i)	recall of equation: speed = frequency × wavelength; substitution or re-arrangement; correct evaluation; correct answer = 0.013 (m) e.g. speed = frequency × wavelength wavelength = speed ÷ frequency wavelength = 330 ÷ 25000 wavelength = 0.0132… (m)	allow use of standard symbols e.g. $v = f \times \lambda$ condone s for speed reject w for wavelength answer to 3sf is 0.0132 (m)	3
(ii)	amplitude corresponds to 2 squares; 2 squares gives 10 V for amplitude;	ecf incorrect number of squares for amplitude e.g. 4 squares giving 20V scores 1 mark	2
(b) (i)	field lines outside of coil appear to loop from end to end; arrow directions self-consistent; no overlapping field lines;	allow field lines approximately uniform through solenoid condone incorrect poles	3
(ii)	any THREE from: MP1. idea of force on coil from magnet; MP2. idea of alternating force on card; MP3. card vibrates; MP4. idea that card forces air to vibrate; MP5. longitudinal wave formed;	 allow idea of interaction between fields of bar magnet and coil allow idea of series of compressions and rarefactions	3
(iii)	idea that 25 kHz is outside the range of human hearing; upper limit of human hearing is 20 kHz;	 ignore reference to 20Hz or lower limit	2
(iv)	increase current (amplitude)/ increase strength of (bar) magnet/ increase number of turns on coil;	allow increase density of turns on coil condone change card for a different material allow change size or shape of card allow moving magnet closer to the coil allow higher order answers in terms of resonance	1

Total for Question 4: 14 marks