Oxford Cambridge and RSA Examinations

General Certificate of Secondary Education

PHYSICS   **1982/4**
PAPER 4
HIGHER TIER

MARK SCHEME

Specimen Paper 2003

Qn	Expected answer	Marks	Additional guidance
1 (a) (i)	resonance (1)	1	
(ii)	(frequency of) note matches natural frequency (of glass)	1	
(b)	lower pitch note (1) glass has a bigger mass, has a lower natural frequency (1)	2 **(4)**	

2 (a)	present/communicate scientific evidence for use of renewable energy sources (1) saves using other resources (1) limitless supply (1) no pollution / clean environmental issues (1) arguments based on use of non-renewable sources. **QWC = 1**. This mark should only be awarded if the answer attempts to address the question and the quality of the description makes the meaning clear	3 1 **(4)**	accept any **three** points

3 (a) (i)	45min or ¾ hour (1)	1	
(ii)	12 ^{o}C (1)	1	
(b)	10 x 4000 x 20 = 800 000 (1) J (1)	2	
(c)	heat is lost to surroundings	1	

(d)	oil temperature drops more quickly (1)
	oil SHC is less (1)
	oil has less energy to lose (per ^{o}C drop) (1)
	<u>calculations</u> water/oil temp drop is 22:33 (1)
	                    water/oil SHC is 4000: 2000 (1)
	                    water loses 880 kJ (1)
	                    oil loses 660 kJ (1)
		3
		
		(8)
			accept any **three** points

Qn	Expected answer	Marks	Additional guidance
4 (a)	similar amplitude (1) same wavelength, opposite phase (1)	2	
(b)	starts louder then gets softer OR softer then louder (1) twice as loud when in phase/ after 0.5s or 1.0s (1) silent when out of phase(again) / after 0.25 or 0.75s (1) alternates louder/softer or idea of beats (1) in phase every 0.5 seconds (1) 'beat' frequency of 2 Hz (1) **QWC = 1**. This mark should only be awarded if the answer attempts to address the question and the quality of the description makes the meaning clear	3 1 **(6)**	any **three** points

Qn	Expected answer	Marks	Additional guidance
5 (a)	line curved and close to boy (1)	1	
(b) (i)	Correct substitution into eqn. (1) t = 0.7 (0.7)s or √0.5 (1)	2	
(ii)	uses speed = distance/time (1) correct substitution (1) (distance = 5m, ecf on time) height = 2.5m	2	
(c) (i)	momentum of life-belt (before) same as combined momentum after (2) idea of conservation of momentum (1) so boy and belt move to right afterwards (1) moves more slowly as (combined) mass larger/some momentum of belt is given to boy (1)	2	any **two** points
(ii)	2 x 7m/s (1) = 14 (kgm/s) (1)	2	
(iii)	14 kgm/s = (26 + 2) kg x v (1) v = 0.5 (m/s) (1)	2 **(11)**	e.c.f. from part (ii)

Qn	Expected answer	Marks	Additional guidance
6 (a)	**high** resistance in dark and **low** resistance in light (1) **high** resistance gives **low** voltage/ 0V and vice-versa (1)	2	
(b)	Q falls and rises sharply as A passes 2.0 V (1) Q = 4.5 V when A less than 2.0 V (1) Q = 0.5 V when A greater than 2.0 V (1)	3	by eye for all Q reversed = 1
(c) (i)	LOW (1) HIGH HIGH (1)	2	ACCEPT on/1/high, off/0/low
(ii)	OR gate	1	ecf truth table if wrong
		(8)	

Qn	Expected answer	Marks	Additional guidance
7 (a)	all four combinations of inputs (1) Q LOW if one or more inputs HIGH Q HIGH if both inputs LOW (1)	2	ACCEPT 1/+5V/high ACCEPT 0/0V/low REJECT ON/OFF
(b) (i)	when switch is closed, B connected directly to +5V(1)	1	
(ii)	P goes LOW (1) because one input of gate 2 is HIGH (1) Q goes HIGH (1) because both inputs of gate 1 are LOW (1)	4	
(c)	gate 2 now has one input (Q) HIGH so P stays LOW (1) so gate 1 has both inputs LOW keeping Q HIGH (1)	2 (9)	
	Total = 50		