4.6 PHYSICS (232)

4.6.1 Physics Paper 1 (232/1)

SECTION A (25 MARKS)

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1.	- The patch was monolayer. ✓	(2 marks)
	- The patch was a perfect cylinder. ✓	
	- Molecular diameter is uniform.	
	- The patch is a perfect circle.	
	(Any two correct)	
2.	Relative density = $\frac{70-55}{80-55}$ = 0.6	(3 marks)
	Density = 0.6×1000 = $600 \text{ kgm}^{-3} \checkmark$	
	OR Volume of water = $\frac{25}{1} = 25 \text{cm}^3$	
	= Volume of R. = $25 \text{cm}^3 \checkmark$	
	Mass of $R = 70 - 55 = 15g$	
	$\rho = \frac{m}{v} = \frac{15}{25} = 0.6 g cm^{-3} \checkmark$	
3.	Spaces between the water molecules are occupied by the alcohol molecules.	(1 mark)
4.	The flask expands first before ✓ the liquid. Then the liquid expands more. ✓	(2 marks)
5.	The wooden bar remains in equilibrium. ✓ the weight remains the same on both sides. Hence turning effect is the same ✓ to the edge causing a bigger turning effect (moments). ✓	(2marks)
6.	To conserve mass $-(A_1V_1 = A_2V_2)\checkmark$ / ensure the volume flux is constant.	(1 mark)
7.	P.E.	(1 mark)
	Curve	
	Time	

8.	Impulse = (Ft) = change in momentum	(3 marks)
	$Ft = mv - mu. \checkmark$	
	$F = \frac{mv - mu}{t} = \frac{m(v - u)}{t} \checkmark$	
	but $\frac{v-u}{t} = a$	
	F = m a. ✓	
9.	The drop first rises ✓ then falls ✓.	(2 mark)
10.	The gas is ideal gas	(1 mark)
11.	Heat lost by hot water = heat gained by cold water ✓	(3 marks)
	$mc\Delta\theta$ (hot) = $mc\Delta\theta$ (cold)	
	$4 \times C \times (80 - t) = 6 \times C \times (t-20)$	
	10t = 440	
	t = 44°C ✓	
12.	$20\times30=10\times50+x\times10\checkmark$	(3 marks)
A CALL CALL CALL CALL CALL CALL CALL CA	$\mathbf{x} = \frac{600 - 500}{10} \checkmark$	
	= 10	
	= 60cm mark. ✓	
13.	The weight of the body is such that the net position of the center	(1 mark)
	of gravity in B is lower than in A, hence B is more stable.	

SECTION B (55 MARKS)

14. (a)	(i) (I) $V_a = \frac{d}{t} \checkmark$, $t = \frac{1}{50} = 0.02 \sec \checkmark$	(4 marks)
	$=\frac{0.5}{0.02}$	
	= 25cms ⁻¹ ✓	
	(II) $V_b = \frac{d}{t}$	(2 marks)
	$=\frac{1.5}{0.02}$	(2 marks)
	$=75\mathrm{cms}^{-1}$	
	(ii) $a = \frac{v_b - v_a}{t}$	
	$=\frac{75-25}{8\times.02}$	(3 marks)
	$=312.5cms^{-2}$	
(b)	- The spacing reduces ✓ with time.	(2 marks)
	- The trolley decelerates with time on a horizontal surface. ✓	
15.	- Hung the spring on the stand and note the position of the	(5 marks)
	pointer using the metre rule.	
	- Suspend a mass on the spring and note the new position of	
	the pointer.	
	- Increase the load in steps and record the position of the	
	pointer for each load.	
	- Draw a table of weight against extension.	
	- Plot a graph of force against extension.	
	(Correct steps 5 x 1)	
(b)	From the graph	
	(i) $K = \text{gradient}\checkmark$ $= \frac{\Delta F}{\Delta e} = \frac{0.9 - 0.5}{7 - 4} = \frac{0.4}{(3 \times 10^{-2})}\checkmark$ $K = 1.33 \times 10^2 \text{ Nm}^{-1}\checkmark$	(3 marks)
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	(ii) Load = 0.38N ✓	(1 mark)
(c)	$e = \frac{F}{K} = \frac{5}{100} = 0.05 \text{m}$ for each spring.	(3 marks)
	∴ lower spring = 0.05m	
	Upper springs = $\frac{0.05}{2}$ = 0.025 \checkmark	
	Total = 0.05 + 0.025	
	= 0.075 m ✓	
16. (a)	(i) - Oil doesn't mix with water. ✓	(2 marks)
	- Oil is less dense hence floats on the water surface. ✓	
	(ii) To show boundary of the oil patch clearly, for	(1 mark)
	measurements to be taken. ✓	
	(iii) - The oil drops is a perfect sphere.	(2 marks)
	- The patch is monolayer.	
	- The patch is a perfect circle.	
	- Molecular diameter is uniform.	
	(any two correct)	
	(iv) - The oil breaks the surface tension ✓ making the patch	(2 marks)
	to form a perfect circle. ✓	
(b)	Volume of 1 drop = $\frac{15}{100}$ = 0.15 mm^2 <	(3 marks)
,	Volume of drops = Volume of oil patch.	
	$\frac{4}{3}\pi r^3 = \pi r^2 h = 15.0 \text{ mm}^3 \checkmark$	
	Thickness of molecule $h = \frac{0.15}{8.0 \times 10^4}$	
	$= 1.875 \times 10^{-6} \text{ mm}$	
	≅1.9 × 10 ⁻⁶ mm✓	
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17. (a)	Afloating body displaces its own weight of the fluid in which it	(1 montes)
	floats.	(1 marks)
(b)	(i)X✓	
	 It has a larger volume. ✓/Displaces a larger volume of water. 	(2 marks)
	(ii)Relative density = <u>Upthrust in liquid</u> ✓ Upthrust in water	
	$= \frac{12-4}{12-2} = \frac{8}{10} \checkmark$ = 0.8 kgm ⁻³ \(\square \) (i) Tension in M = 3.2 - 2 \(\square \)	(3 marks)
(d)	(i) Tension in $M = 3.2 - 2$	(2 marks)
	= 1.2N ✓	
	(ii) Tension in $N = (3.2 - 2) + 1.2$	
	= 1.2 + 1.2	(2 marks)
	=2.4N	
(e)	Measuirng the relative density of liquids ✓	(1 mark)
18. (a)	(i) .	(5 marks)
	- The driver applies a force on the pedal.✓	
	- This force transmits pressure to the master cylinder fluid. ✓	
	- Equal pressure is transmitted to the wheel cylinder causing	
•	the pistons of the wheel cylinder to push brake shoe hence	
	- Pressing the brake pads that in turn press the wheel reducing	
	its rotation. ✓	
	- When the applied force is removed, the return spring pulls	
	back the shoe and pistons to the original position. ✓	
(b)	- Higher friction (wider tyres, rougher road)	(3 marks)
	- Lower radius	(5 marks)
	- Higher mass	
(c)	- U is observed to crush.✓	(3 marks)
	- It has more steam which when cooled creates a greater ✓	
	vacuum hence pressure causes ✓ collapsing.	