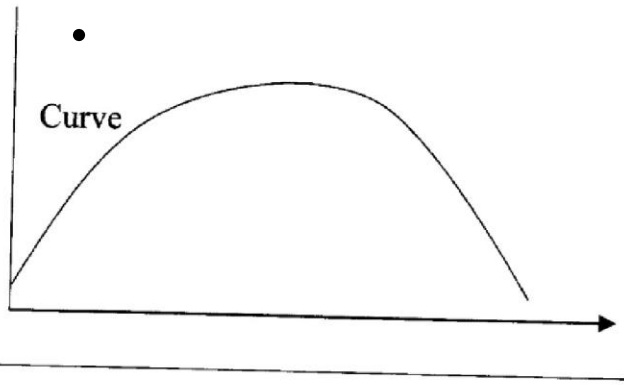
4.6 PHYSICS (232)

4.6.1 Physics Paper 1 (232/1)

SECTION A (25 MARKS)

1.	- The patch was monolayer. ✓ - The patch was a perfect cylinder. ✓ - Molecular diameter is uniform. - The patch is a perfect circle. **(Any two correct)**	(2 marks)
2.	Relative density $= \frac{70-55}{80-55}$ ✓ $= 0.6$ ✓ Density $= 0.6 \times 1000$ $= 600\ kgm^{-3}$ ✓ OR Volume of water $= \frac{25}{1} = 25cm^3$ = Volume of R. $= 25cm^3$ ✓ Mass of R $= 70 - 55 = 15g$ ✓ $\rho = \frac{m}{v} = \frac{15}{25} = 0.6gcm^{-3}$ ✓	(3 marks)
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 – $(A_1V_1 = A_2V_2)$ ✓ / ensure the volume flux is constant.	(1 mark)
7.	P.E. ✓  	(1 mark)

8.	Impulse = (Ft) = change in momentum $Ft = mv - mu$. ✓ $F = \frac{mv-mu}{t} = \frac{m(v-u)}{t}$ ✓ but $\frac{v-u}{t} = a$ $F = m\,a$. ✓	(3 marks)
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 ✓ $mc\Delta\theta$ (hot) = $mc\Delta\theta$ (cold) $4 \times C \times (80 - t) = 6 \times Cx\ (t-20)$ ✓ $10t = 440$ $t = 44°C$ ✓	(3 marks)
12.	$20 \times 30 = 10 \times 50 + x \times 10$ ✓ $x = \frac{600-500}{10}$ ✓ $= 10$ $= 60$cm mark. ✓	(3 marks)
13.	The weight of the body is such that the net position of the center of gravity in B is lower than in A, hence B is more stable✓.	(1 mark)

SECTION B (55 MARKS)

14. (a)	(i) (I) $V_a = \frac{d}{t}$ ✓, $t = \frac{1}{50} = 0.02\,\text{sec}$ ✓ $= \frac{0.5}{0.02}$ ✓ $= 25\text{cms}^{-1}$ ✓ (II) $V_b = \frac{d}{t}$ $= \frac{1.5}{0.02}$ $= 75\text{cms}^{-1}$ (ii) $a = \frac{v_b - v_a}{t}$ $= \frac{75-25}{8\times.02}$ $= 312.5 cms^{-2}$	(4 marks) (2 marks) (3 marks)
(b)	- The spacing reduces ✓ with time. - The trolley decelerates with time on a horizontal surface. ✓	(2 marks)
15.	- Hung the spring on the stand and note the position of the 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)**	(5 marks)
(b)	From the graph (i) K = gradient ✓ $= \frac{\Delta F}{\Delta e} = \frac{0.9-0.5}{7-4} = \frac{0.4}{(3\times10^{-2})}$ ✓ K = 1.33 x 10^2 Nm^{-1} ✓	(3 marks)

	(ii) Load = 0.38N ✓	(1 mark)
(c)	$e = \frac{F}{K} = \frac{5}{100} = 0.05\,\text{m}$ for each spring.✓ $\therefore$ lower spring = 0.05m Upper springs = $\frac{0.05}{2} = 0.025$ ✓ Total = 0.05 + 0.025 = 0.075 m ✓	(3 marks)
16. (a)	(i) - Oil doesn't mix with water. ✓ - Oil is less dense hence floats on the water surface. ✓	(2 marks)
	(ii) To show boundary of the oil patch clearly, for measurements to be taken. ✓	(1 mark)
	(iii) - The oil drops is a perfect sphere. - The patch is monolayer. - The patch is a perfect circle. - Molecular diameter is uniform. **(any two correct)**	(2 marks)
	(iv) - The oil breaks the surface tension ✓ making the patch to form a perfect circle. ✓	(2 marks)
(b)	Volume of 1 drop = $\frac{15}{100} = 0.15mm^2$ ✓ Volume of drops = Volume of oil patch. $\frac{4}{3}\pi r^3 = \pi r^2 h = 15.0\ \text{mm}^3$✓ Thickness of molecule $h = \frac{0.15}{8.0\times10^4}$ $= 1.875 \times 10^{-6}$ mm $\cong 1.9 \times 10^{-6}$ mm✓	(3 marks)

17. (a)	Afloating body displaces its own weight of the fluid in which it floats.	(1 marks)
(b)	(i)X✓ - It has a larger volume. ✓/Displaces a larger volume of water. (ii)Relative density = Upthrust in liquid ✓ Upthrust in water $= \frac{12-4}{12-2} = \frac{8}{10}$ ✓ $= 0.8\ kgm^{-3}$ ✓	(2 marks) (3 marks)
(d)	(i) Tension in M = 3.2 – 2 ✓ = 1.2N ✓ (ii) Tension in N = (3.2 – 2) + 1.2 = 1.2 + 1.2 = 2.4N	(2 marks) (2 marks)
(e)	Measuirng the relative density of liquids ✓	(1 mark)
18. (a)	(i) - 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. ✓	(5 marks)
(b)	- Higher friction (wider tyres, rougher road) - Lower radius - Higher mass	(3 marks)
(c)	- U is observed to crush.✓ - It has more steam which when cooled creates a greater ✓ vacuum hence pressure causes ✓ collapsing.	(3 marks)