Physics Paper 1 (232/1)

1. 5.0×10^{-6} kg.
(1 mark)

2. Since $\rho = \frac{m}{v}$ $V = \frac{m}{\rho}$

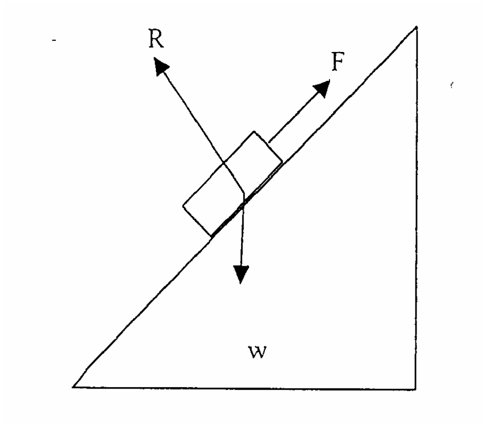
For water $v = \frac{mw}{1}$

For liquid $v = \frac{ml}{p}$

$$\frac{mw}{1} = \frac{ml}{p} \therefore p = \frac{ml}{mw}$$

(2 marks)

3. (a) R = Reaction force Iar to surface
F = Friction parallel to surface



(b) When θ reduces, R increases (approaches w) while F reduces. ***(2 marks)***

4.
- Atmospheric pressure is higher than normal.
- Presence of impurities in water/Addition of impurities. ***(2 marks)***

5. When flask is cooled it contracts / (volume reduces), but due to poor conductivity the material of glass; subsequently as both cool the contraction of water is greater than that of glass.

(3 marks)

6.
- Heat conductivity/rates of conduction. ***(1 mark)***
- Thermal conductivity.

7. Cross-sectional area of the metal rods. ***(1 mark)***

8. Pressure in liquids = ρgh

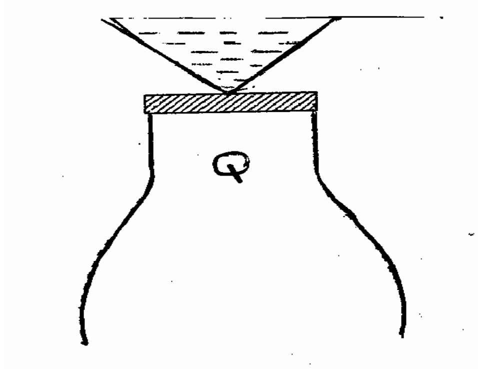
$= 1200 \times 10 \times 15 \times 10^{-2}$

$= 1800$ Pa

Total pressure = $(8.4 + 0.18) \times 10^4$ Pa = 8.58×10^4 Pa ***(3 marks)***

9. Intermolecular distances are greater/ larger in gas than in liquids. Forces of attraction in liquids are higher/stronger/larger/greater than in gases.
(2 marks)

10.



(1 mark)

11. ***Stable equilibrium***: When it is slightly tilted. C.O.G rises/is raised. When released it recovers. /comes to its original position ***(2 marks)***

12. Fast stream of air reduces pressure inside the tube. Pressure from outside is greater than inside, hence collapse.
(2 marks)

13.
- Diameter of the coils different.
- Wires have different thicknesses. no. of turns per unit length.
- Length of spring differs.

(1 mark)

14. Heated water has lower density, hence lower upthrust. ***(2 marks)***

15. (a) The rate of change of momentum of a body is (directly) proportional to the(resultant external)force producing the change, and takes place in the direction of the force.
(1 mark)

or $F \propto m\frac{(v-u)}{t}$

(b) (i) $S = ut + \frac{1}{2}at^2$

$49 = 0 + \frac{1}{2}ax7$

$a = 2ms^{-2}$

(3 marks)

(ii) V = u + at

= 0 + 2 x 7 = 14 ms^{-1}. ***(2 marks)***

(c) (i) Vertical motion

$$S = ut + \frac{1}{2}gt^2$$

$$1.2 = 0 + \frac{1}{2}x10xt^2$$

$$t = \sqrt{\frac{1.2}{5}} = 0.49\text{seconds}$$

(2 marks)

(ii) Horizontal velocity

$$V = \frac{s}{t} = \frac{2.5}{0.49}$$

(2 marks)

$= 5.1ms^{-1}$

16. (a) Heat capacity of a body is the energy required to raise the temperature of the body by 1 degree centigrade or 1 Kelvin. ***(1 mark)***

(b) Measurements:

Initial mass of water +calorimeter $=M_i$
Final mass of water + calorimeter = M_f

Time taken to evaporate $(M_i – M_f)$ mass of steam = t
----------t.
Mass of calorimeter ----------M_c
Heat given out by heater = heat of vaporization

$Pt = (M_i- M_f) L$

$$l = \frac{Pt}{m_i - m_f}$$ ***(6 marks)***

(c) (i) ***Heat gained by the calorimeter***
Heat capacity × ΔT

(2 marks)

= 40 (34 – 25) = 40 × 9 = 360J

(ii) ***Heat gained by water***
$M_w x C_w \times \Delta T$
$= 100 \times 10^{-3} \times 4.2 \times 10^3 (34 – 25)$
= 3780 J

(1 mark)

(iii) ***Heat lost by metal block***
$Mm\ C_m$ (100-34) ***(1 mark)***

(iv) $150 \times 10^{-3} \times C_m$ (100-34)
= 360 + 3780
= 4140

$$Cm = \frac{4140}{150 \times 10^{-3} \times 66}$$

$= 418 \quad JKg^{-1}K^{-1}$

(3 marks)

17. (a) Absolute zero temperature is the lowest temperature theoretically possible.

(1 mark)

(b)

- Mass of the gas
- Pressure of the gas ***(2 marks)***

(c) (i) 4.0×10^{-5} m^3
(1 mark)

(ii) -277°C
(1 mark)

(iii) A real gas liquefies and finally solidifies since molecules lose Kinetic energy with more cooling.
(2 marks)

(d)

$$\frac{P_1V_1}{T_1} = \frac{P_2V_2}{T_2}; \text{but} V_1 = V_2$$

$$P_2 = \frac{P_1}{T_1} \times T_2 = 95\text{x}10^3 \times \frac{283}{298}$$

$$= 90.2 \times 10^3 \text{Pa}$$

(4 marks)

18. (a)

$$\text{Velocity ratio} = \frac{\text{distance effort moves}}{\text{distance load moves}}$$

(1 mark)

(b) (i) Pressure in liquid is transmitted equally through out the liquid. ***(1 mark)***

(ii) When plunger is moved through d' volume of oil = d x a
When ram piston is displaced by dist D
Volume of oil displaced = D × A
Since no compression occurs

$$\text{dxa} = \text{DxA} \Rightarrow \frac{\text{d}}{\text{D}} = \frac{\text{A}}{\text{a}}$$

$$\text{V.R} = \frac{\text{d}}{\text{D}} = \frac{\text{A}}{\text{a}}$$

(4 marks)

(c) (i) M.A $= \frac{\text{Load}}{\text{Effort}}$

$$= \frac{4.5\times10^3}{135} = 33.3$$

(2 marks)

(ii) Efficiency = $\frac{M.A}{V.R}\times100 = \frac{33.3}{45}\times100\%$

= 74%

(2 marks)

(iii) Work to overcome friction

= 100% - 74% = 26% ***(1 mark)***

19. (a) When an object is in equilibrium, the sum of the anti clockwise moments about any point is equal to the sum of the clockwise moments about that point. ***(1 mark)***

(b) (i) Volume = 100 × 3.0 × 0.6

= 180 cm^3

Mass = volume x density

= 180 × 2.7 = 486g

Weight = mg = $\frac{486}{1000}$ × 10 = 4.86N

(3 marks)

(ii) 20F = 15 × 4.86

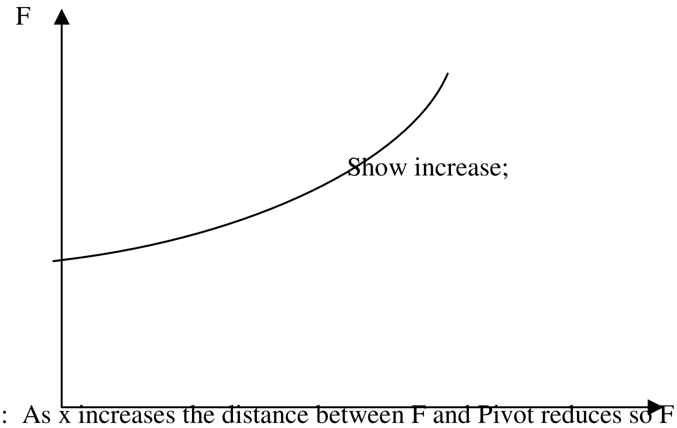
F = $\frac{15 \times 4.86}{20}$ = 3.645N

F = 3.65N

R = F + W = 8.51N

(3 marks)

(iii)



(iv) ***Reason***: As x increases the distance between F and Pivot reduces so F has to increase to maintain equilibrium. ***(2 marks)***