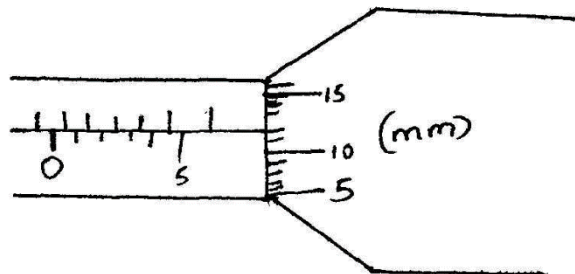


SECTION A (25MKS)

1. The diagram below shows a portion of a micrometer screw gauge used to measure the diameter of a metal pipe. The reading on the gauge when the jaws were fully closed without the pipe was 0.012cm.



What is the diameter of the pipe?

(2mks)

2. Given that the length of pipe is 1.40cm, find the volume.

(2mks)

- 3 a) What is surface tension?
b) Figure 2 shows a funnel dipped into soap solution.

(1mk)

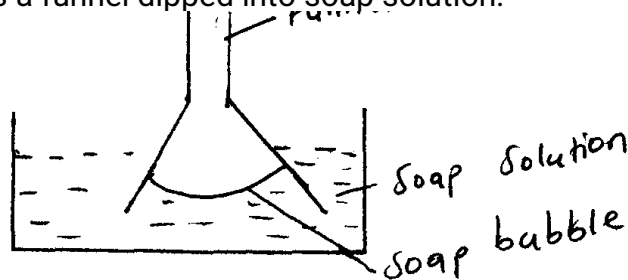


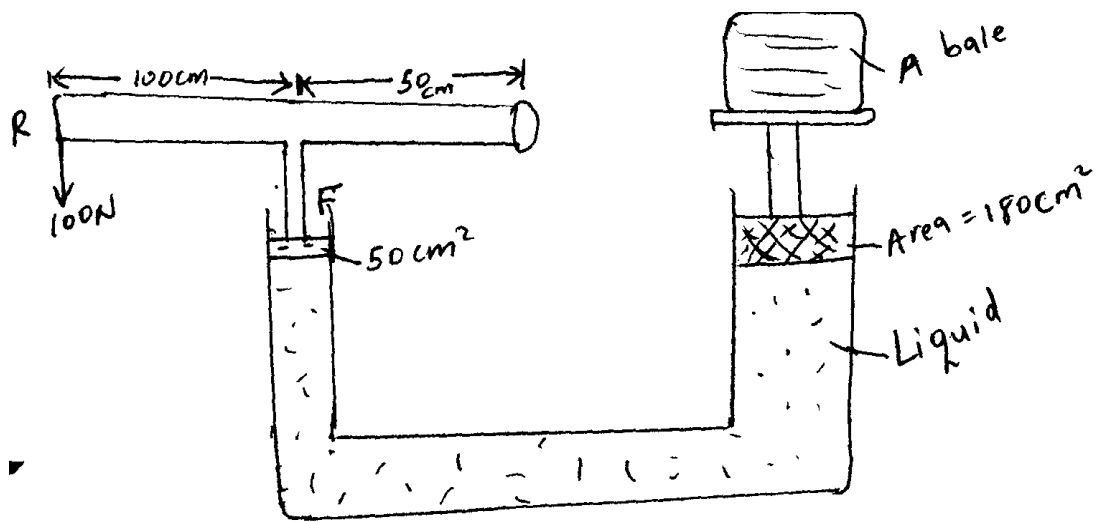
Figure 2

Explain what happens to the soap bubble when the funnel is removed

(1mk)

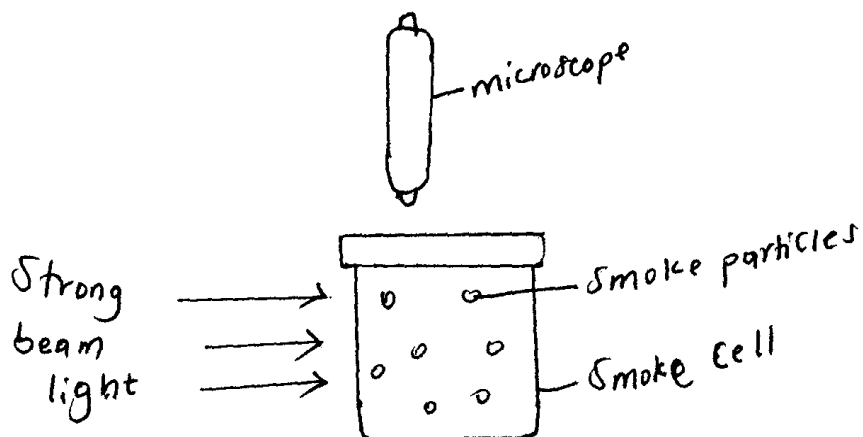
Fig3 shows a hydraulic press system using a lever of negligible mass on the side of small

piston pivoted at point P. A force of 100N is applied at R

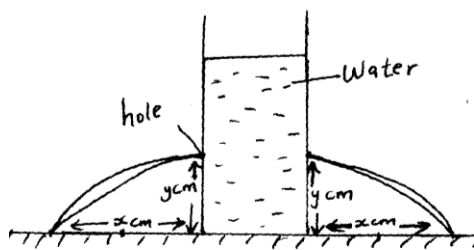


Use this information to answer question 4 and 5

4. Calculate the force F exerted by small piston on the liquid. (2mks)
5. Find the weight of the Bale supported by the piston on the liquid. (2mks)
6. The fig 3 shows apparatus used to observe the behaviour of smoke particles in smoke cell.



- a) Explain what is observed. (1mk)
- b) Explain what happens if the temperature was raised (1mk)
- 7 Explain why a glass container with thick glass walls is more likely to crack than one with a thin wall when a very hot liquid is poured into them. (2mks)
8. Explain two facts which shows that heat from the sun does not reach the earth surface by convection (2mks)
9. Water jets out through small holes in a tall can on the same height as shown in the fig 4 below. Fig.4.



a) State one conclusion that can be made from this observation.

(1 mk)

b) Explain two adjustments that can be made to increase the distance x without changing the type of liquid or the position of the can.

(2mks)

10. The figure 5a below shows spherical balls placed at different positions on a surface.

Fig,5a.



Describe the state of equilibrium of the ball in each position.

(3mks)

11. a) Write down the relationship between mechanical advantage M.A, velocity ratio V.R and

efficiency E of a machine.

b)

A machine of efficiency 80% is used to lift a load of 480N with an effort of 60N

Calculate the velocity ratio of this machine

SECTION B(55MKS)

1 a) Differentiate between speed and velocity.

(1

2 b) mk)

A body of mass 200g is moving in a circular path of radius 0.5m with a speed of 4m/s.

Calculate:

i)

(2mks)

Angular velocity.

ii) The tension in the string at the highest and lowest position of the body.

(3mks)

c) A block of wood of mass 4kg is suspended from a tree by a long light string. A bullet of mass 10g is fired with a velocity of 100m/s and embeds itself in the target.

i) At what velocity does the target begin to move after the impact?

(2mks)

ii)

How high does the target move?

(2mks)

iii) State the energy change on impact up to the highest point.

(2mks)

13. a) Define specific latent heat of vaporization.
(1 mk)

b) In an experiment to determine the specific latent heat of vaporization of a liquid using an

electrical method, the amount of heat, Q , required to vaporise a given mass of, M of liquid were recorded as shown in the table,

$Q(s) \times 10^3$	3.0	4.0	5.0	6.0	7.0	8.0
$M(Kg)$	4.0	6.4	8.8	11.2	13.6	16.0

i) On the grid provided plot a graph of Q (y-axis) against M . (5mks)

ermine the specific latent heat of vaporization of the liquid. (3mks)

iii) Suggest the reason why the graph does not pass through the origin. (1 mk)

iv) Write a possible equation of this graph. (1mk)

c) Calculate the amount of heat required to melt 30g of ice at $0^\circ C$ (Specific latent heat of ice is $3.34 \times 10^5 J/kg$). Give your answer correct to two decimal places. (3mks)

1 a

State the law of floatation

4

b

A rectangular block of cross section area $0.08m^2$ is immersed in a liquid of density $1200kg/cm^3$. The top and lower surfaces are 200cm and 80cm below the surface of the liquid respectively.

i) What is the downward force on the top of the block? (2 mks)

ii) Calculate the up thrust on the block. (2 mks)

c) A block of glass of mass 0.25kg floats in mercury of density $1.36 \times 10^4 kg/cm^3$. What volume of the glass lies under the surface of Mercury? (3mks)

d) The weight of a cube in air is 0.5N When immersed in water, it weighs 0.44N and when in oil weighs 0.46N. Calculate the relative density of the oil. (3mks)

15. a) Explain why a glass exerts increased pressure when it is compressed in to a small space. (2mks)

b) State the law that relates the volume of a gas to the temperature of the gas. (2mks)

c) A balloon is filled with air to a volume of $200m^3$ at a temperature 293K. Determine the volume when the temperature rises to 353K at the same pressure. (3mks)

- d. i) Explain why Boyles law would not hold for gases such as methane.
(1 mk)
- ii) Sketch the graph of pressure against volume for an ideal gas.

- 1 a State Hooke's Law. (
- b Define the term spring constant. (
-) State two factors that determine spring constant. (2m)

d) The pointer of unloaded mass of 120g is applied to the spring and the pointer reads

38cm. A pan, in which a mass of 210g is placed, is now suspended from the spring and the pointer reads 48cm. Determine the mass of the pan. (4mks)