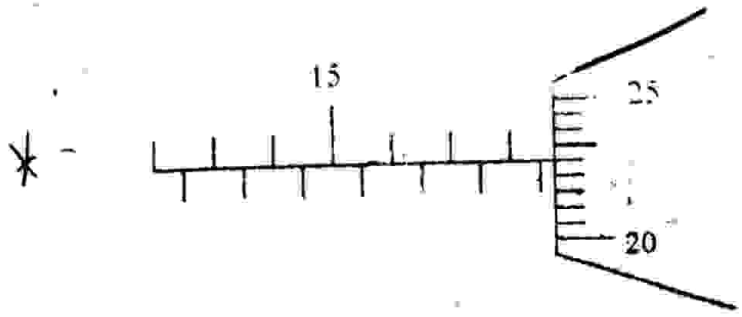
SECTION A (25 MARKS)

Answer ALL questions in this section in the spaces provided.

1. What is the micrometer reading shown in the figure below in which the scale is in mm, with an error of -O.04mm . (2mks)



2. A uniform rod of mass 5kg and length 1.6m is placed horizontally across smooth supports at P and Q. If P is 10cm from one end and Q is 50cm from the other end. determine the forces at P and Q. (take g = 10ms^{-2}) (2mks)

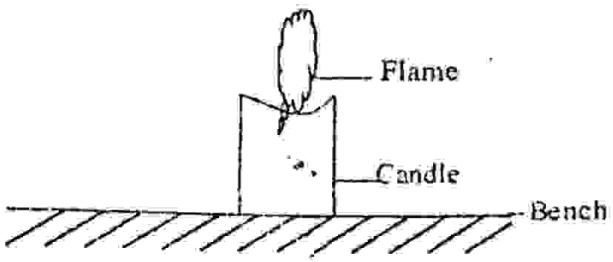
3. A mercury barometer in an aeroplane at the runway reads 75cmHg and when flying high up it reads 60cmHg. If the average density of air is 1.25kgm^{-3}, standard atmospheric pressure is 76cmHg and density of water is 1000kgm^{-3}, calculate the altitude of the airport. (3mks)

4. In which physical state does Brownian motion occur? (1 mk)

5. State any two characteristics of a good thermometric liquid. **(1 mk)**

6. The windows of many modern buildings are 'double glazed' (have two thickness of glass with a small air space between). Explain the purpose for double-glazing **(2mks)**

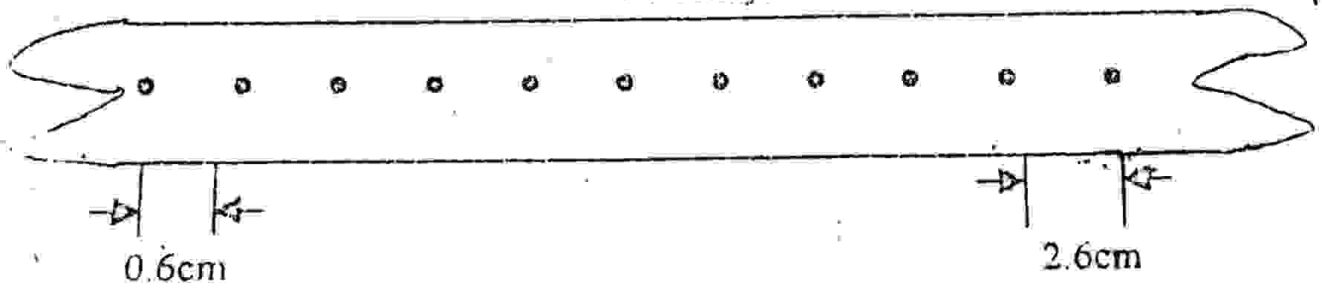
7. The figure below represents a burning candle.



Explain how the stability of the candle changes as it continues to burn. **(1 mk)**

8. Water flows steadily in a pipe whose diameter is 30mm at $20ms^{-1}$. The pipe narrows at some point to 20mm in diameter. What is the speed of water flow at this point? **(3mks)**

9. The figure below represents part of a tape pulled through a ticker-timer by a trolley moving down an inclined plane. If the frequency of the thicker-timer is 50Hz. calculate the acceleration of the trolley. **(3mks)**



10. A block of wood of mass 5kg lies on a rough slope inclined at 40^0 to the horizontal and is prevented from sliding down the slope by a force of 80N acting horizontally. Draw a diagram showing all the forces acting on the block of wood. (2mks)

11. An air bubble of volume $2.5cm^3$ is released at the bottom of the pond. At the surface of the pond its volume is found to he $50cm^3$ (Temperature kept constant).
(i) Explain why the bubble rises up. (1 mk)

(ii) Why did the volume of the bubble change. (1 mk)

12. A Mr. Kiptindinyo whose mass is 80kg walks up a flight of 10 steps each of 20cm high in 5 seconds. Calculate the power he develops in watts. **(1 mk)**

13. Distinguish between elastic and in-elastic collisions. **(1 mk)**

SECTION B (55 MARKS)

Answer all the questions in this section in the spaces provided

14. (a) Define the following terms as used in linear motion.

(i) Displacement **(1mk)**

(ii) Velocity **(1mk)**

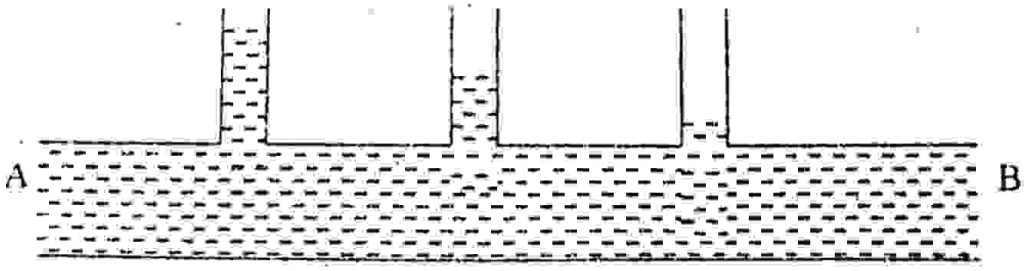
(b) Derive the following linear equations of motion

(i) $v = u + at$ **(2 mks)**

(ii) $s = ut + \frac{1}{2} at^2$ **(2 mks)**

(iii) $v^2 = u^2 + 2as$ **(2 mks)**

(c) The figure below shows water flowing through a pipe with three similar vertical columns.



(i) Indicate the direction of the flow in the main pipe. **(1 mk)**

(ii) Explain why the levels in the columns are not the same. **(1 mk)**