FORM 3 End of term

July 2025

Answer all the questions

1. Figure 1 shows part of the main scale and vernier scale of vernier calipers.

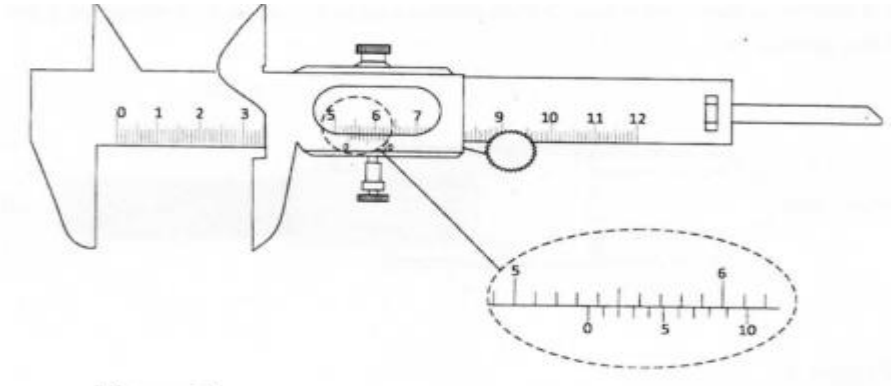


Figure 1

Record the reading indicated. (2 marks)

2. Figure 2 shows a magnified scale of a micrometer screw gauge.

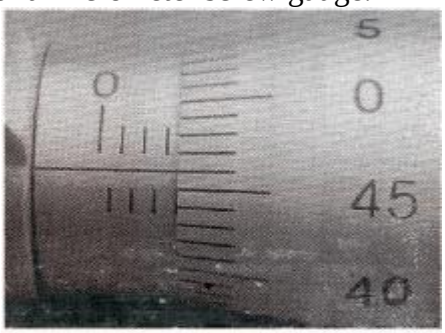


Figure 2

Record the reading indicated. (2 marks)

3. State two differences between electromagnetic waves and mechanical waves (2 marks)

4. Figure 3 show straight waves incident on a divergent lens placed in a ripple tank to reduce its depth.

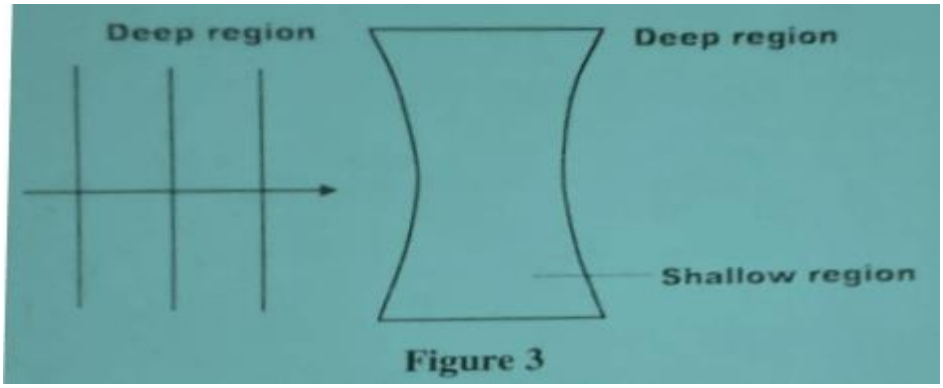


Figure 3

Complete the diagram to show the waves in both the shallow region and beyond the lens (2 marks)

5. (a) figure 5 shows a displacement-time graph for a progressive wave.

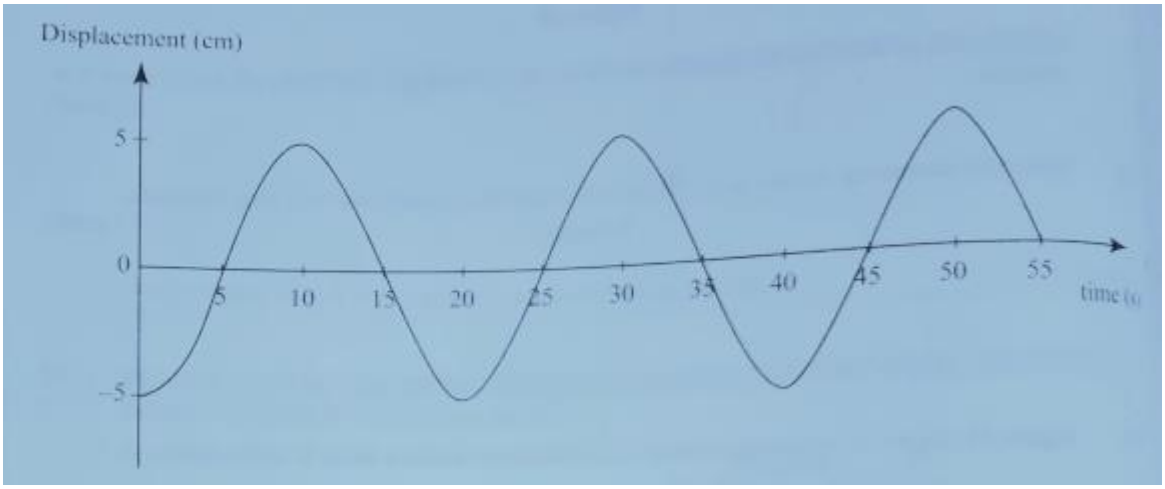


figure 5

I. State the amplitude of the wave (1 mark)

II. Determine the frequency of the wave (4 marks)

(iii) Given that the velocity of the wave is 20 ms^{-1}, determine its wavelength. (3 marks)

6. (a) Define Current stating its SI units(1mark)

(b) In a circuit, the ammeter reading is 3.2A. Determine number of electronics flowing per second. (Charge on an electron=$1.6*10^{-19}$ C) (3 marks)

7. Explain how unusual expansion of water favors aquatic life. (3mks)

(c) Figure 1 shows four identical bulbs connected to a 15 volt battery whose internal is negligible.

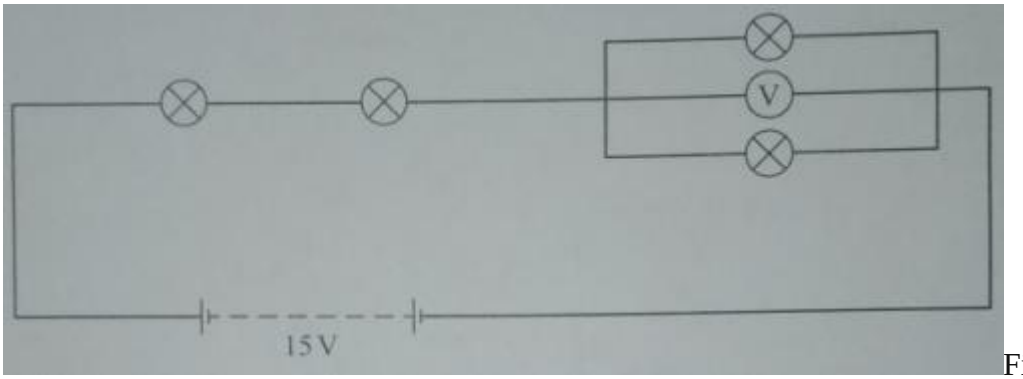


Figure 1

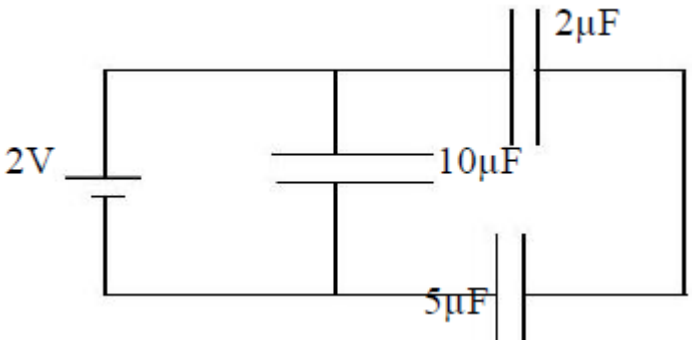
Determine the reading of the voltmeter V. (2 marks).

8. Three identical dry cells each of e.m.f 1.6 V are connected in series to a resistor of 11.4Ω. A current of 0.32A flows in the circuit. Determine:

(i) The total e.m.f of the cells (1 mark)

(ii) The internal resistance of each cell; (3 marks)

8. Figure 2 shows arrangement of three capacities of 10**μ**F, 2**μ**F and 5**μ**F.



Determine the effective capacitance. (3 marks)

9. Figure 8 shows the cross-section of a dry cell. Use the information on the figure to answer questions 9 (a) and (b).

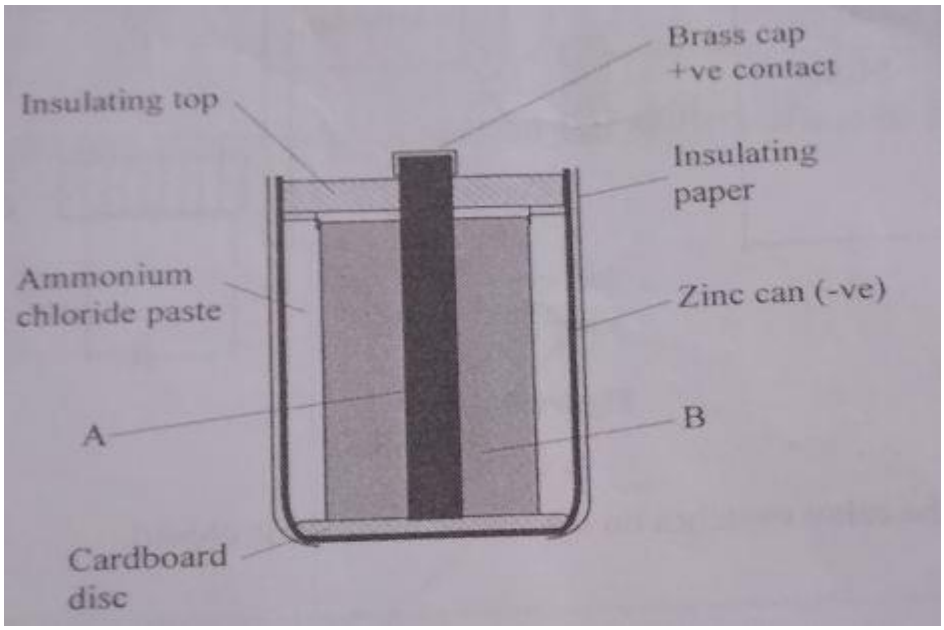


Figure 8

(a)Name the parts labeled A and B. (2 marks)

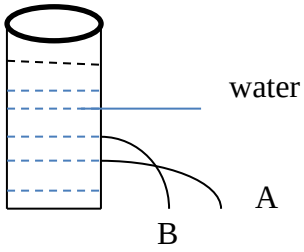
(b) State the use of the manganese (IV) oxide in the cell. (1 mark)

10. In a laboratory experiment, it was realized that two different gases of equal volume diffused across a chamber at different rates.
    (a) What may have caused the difference? (2mks)

    (b) State one physical change that affects the speed of sound in air. (1 mark)

11. (a) State the factors that determine pressure exerted by a wooden block resting on a table surface. (3mks)

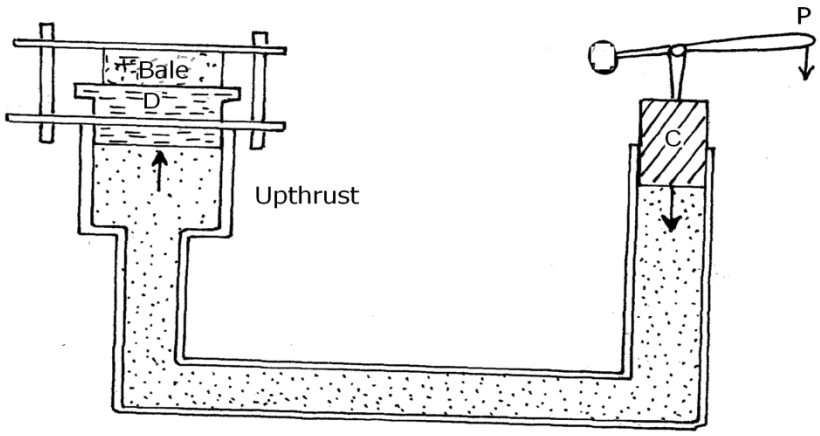
(b)The diagram below shows jets from two holes at the side of a tank filled with water. Explain why Jet A is longer than B (2mks)



b. a) An oil drop of volume 0.4mm^3 was placed on a clean water surface. It spread to form a monoatomic circular patch of area 2000mm^2. Use this data to calculate the diameter of a molecule of oil. (3mks)

SECTION B

12. The figure below shows a hydraulic press



The two pistons C and D are of areas 100cm^2 and 2m^2 respectively. A force of 100N is applied on the smaller piston, find the load that can be lifted on the large piston if:-

(a)The piston has negligible weights and no frictional forces. (3mks)

(b)The small and larger pistons have negligible weights and frictional forces 10N and 40N respectively (3mks)

(c)The small piston has a weight of 5N, the larger piston has weight of 10N and the frictional forces are negligible (3mks)

13. (a) Define density and state its S.I units. (2mks)

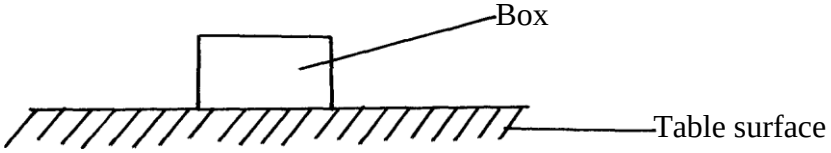
(b) A density bottle weighs 80g when empty, 130g when full of oil and 150g when full of water. If the density of water is $1g/cm^3$, calculate the density of oil. (3mks)

(c) Water of volume $2m^3$ and density $1g/cm^3$ is mixed with milk of volume $1m^3$ and Density $1.4g/cm^3$. Calculate the density of the resulting mixture. (4mks)

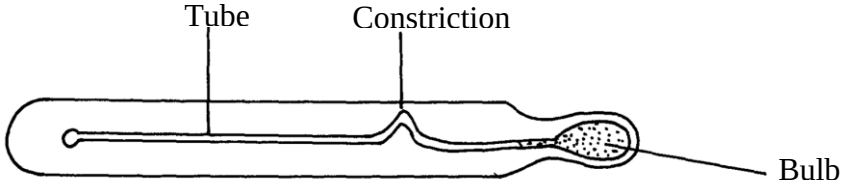
14. (a) Define force and give its S.I units (2mks)

(b) State **two** effects of force on an object (2mks)

(c) Name and show forces acting on a box placed on a table. (2mks)



15. The figure is of a clinical thermometer.



Explain why;

(i) there is a constriction on the tube (1mk)

(ii) the bulb glass is thin (1mk)

(iii) the tube is thin (1mk)

16. (a) Define the term magnification as applied to the formation of images by a pin hole camera. (1mk)

(b) A pin hole camera of length 15cm forms an image 3cm high of a man standing 9m in front of the camera. Determine the height of the man to the nearest centimeter. (3mks)