NOTE :

* Answer **all** the question.

* Answer questions from **1** to **25** using **(1), (2), (3), (4), (5)** answer by selecting the **correct or most appropriate** answer. **Indicate the answer in the given answer script using a cross.**

---

01. Which of the following physical quantities are having equal dimensions?

1) Speed, Impulse
2) Pressure, force
3) Energy, moment of a force
4) Energy, Velocity
5) Momentum, force

02. For similar vectors to be equal

A) Magnitudes of two vectors should be equal
B) Directions of two vectors should not be parallel to each other
C) Directions of vectors should be equal

Of the following

1) A, B are correct
2) A, C are correct
3) B, C are correct
4) All A, B, C are correct
5) All A, B, C are incorrect

03. A motor vehicle was displaced by 12 km towards the southern direction, and then displaced again by 5 km towards eastern direction. The resultant displacement of the motor vehicle is,

1) 12 km towards Southern direction
2) 13 km towards Northern direction
3) 12 km towards North western direction
4) 13 km towards a direction with an angle $\tan^{-1}(^5/_{12})$ to the Northern direction
5) 13 km towards a direction with an angle $\tan^{-1}(^5/_{12})$ to the Southern direction

04. The resultant magnitude of two equal forces of magnitude $10\sqrt{2}$ N which are acting with an angle $60°$ between them is,

1) $10\sqrt{6}$ N
2) $10\sqrt{3}$ N
3) $10\sqrt{2}$ N
4) 10 N
5) 20 N

03. An eroplane moving along a runner way, takes off with a ...
   horizontal. The magnitudes of vertical and horizontal components of its velocity, in km h^{-1} respec...
   are,

   1) $150\sqrt{3}$, 150

   2) $\frac{75}{\sqrt{3}}$, 75

   3) 75, $75\sqrt{1}$

   4) $75\sqrt{3}$, 75

   5) $75\sqrt{3}$, 150

06. The magnitude of the resultant force of two equal forces of magnitude $20\sqrt{3}$ N and the angle betw...
   force
   them is 60°, in N is,

   1) $40\sqrt{3}$

   2) $10\sqrt{3}$

   3) 20

   4) $\frac{20}{\sqrt{3}}$

   5) $20\sqrt{3}$

07. The physical quantity represented by ML^2T^{-2} is,

   1) Power

   2) Energy

   3) Impulse

   4) Momentum

   5) Pressure

08. 220 pF Equals to

   1) 2.2×10^{-9} F

   2) 2.2×10^{-12} F

   3) 0.22 nF

   4) 2.2×10^{-6} µF

   5) 2.2 nF

09. Consider the following statements related to the equation Ft = mV - mu (Usual symbols have been used)

   A) Dimensions of F is MLT^{-2}.

   B) Dimensions of mV is MLT^{-1}

   C) Dimensions of all three terms are same

   Of the above statements

   1) Only A is correct

   2) Only B is correct

   3) Only C is correct

   4) A and B are correct

   5) All A, B, C are correct

10. For the dimensions of the equation acceleration = K × density to be correct, the dimensions of K should
   be,

   1) ML^{-2}

   2) LT^{-2}
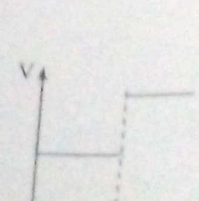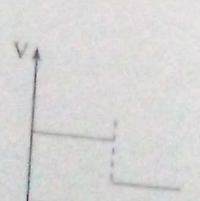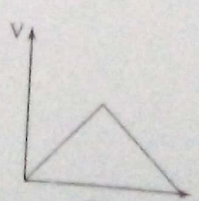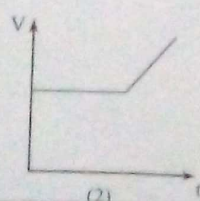
   3) $ML^{-2}T^{-2}$

   4) $M^{-1}L^4T^{-1}$

   5) $M^{-1}L^4T^{-2}$

11. A ball that is moving with a uniform velocity 10 ms^{-1} along a smooth
   table moves toward a smooth inclined plane at the end of the table as
   shown in the figure. If the velocity of the ball is 10 ms^{-1} and the
   inclination of the inclined plane to the horizontal is 30°, the graph that
   represents its acceleration is,

   (1)   (2)   (3)   (4)   (5)

   02
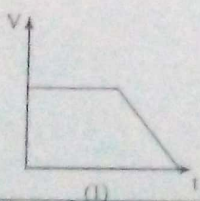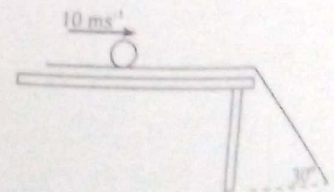
12. Which of the following graphs does not represent the change of velocity Vs time?

    (1)   (2)   (3)   (4)   (5)
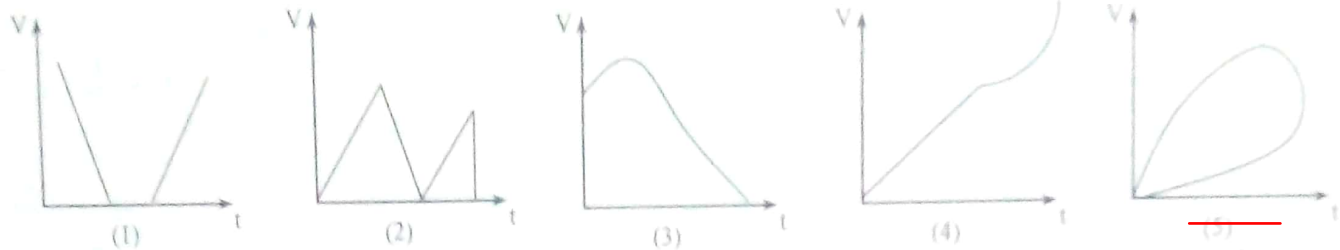
13. The velocity of an object that is falling down freely under the gravity is given by $V \propto g^a h^b$ Here g is acceleration due to gravity, h is free displacement of the object. Values of a and b are,

1) $\dfrac{1}{2}, \dfrac{1}{2}$

2) $\dfrac{1}{2}, -\dfrac{1}{2}$

3) $-\dfrac{1}{2}, \dfrac{1}{2}$

4) $-\dfrac{1}{2}, -\dfrac{1}{2}$

5) $0, 1$

14. Displacement Vs time graphs of two objects A and B are shown in the figure. Velocity of B relative to A can be, (Consider that both A and B are moving towards the same direction.)

1) 4 km h^{-1}

2) 16 km h^{-1}

3) 20 km h^{-1}

4) 14 km h^{-1}

5) 12 km h^{-1}
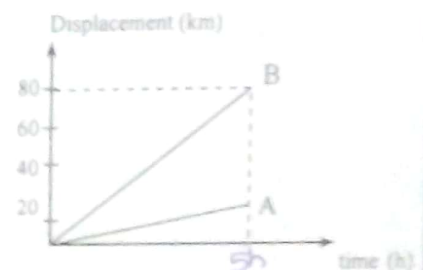
15. The resultant force of two forces P and Q, inclined to each other, is R. these forces are represented according to parallogram law of forces, is correctly represented by,

    (1)   (2)   (3)   (4)   (5)
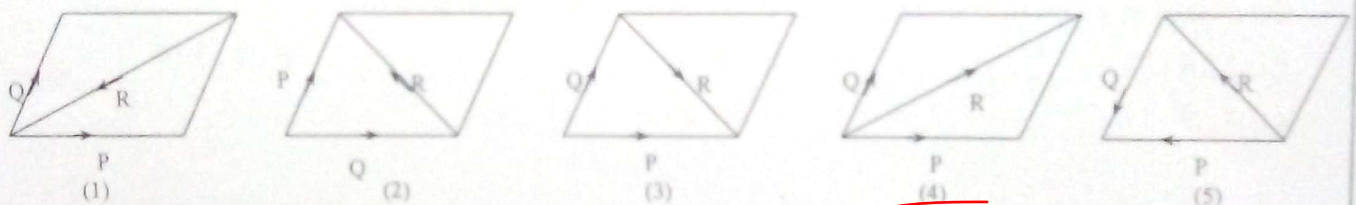
16. An object is moving with a constant acceleration on a linear path from A to B. If the velocities of the object at A and B are U and V respectively, Velocity of the midpoint of AB is,

1) $\sqrt{\dfrac{U^2 + V^2}{2}}$

2) $\dfrac{U+V}{2}$

3) $\dfrac{(U+V)^2}{2}$

4) $\dfrac{U^2 - V^2}{2}$

5) $\sqrt{\dfrac{V^2 - U^2}{2}}$

17. A stone is dropped from a balloon that is moving vertically up with a velocity 10 ms^{-1}. Then the balloon was 400 m above the earth. The time that the stone takes to reach the earth is,

1) 10 s   2) $4\sqrt{5}$ s   3) 8 s   4) 4 s   5) 16 s

$$\left(4\sqrt{5} + 1\right) \simeq 9.8$$

03

18. Displacement time graph of an object is given below. Which of the following statements is correct.
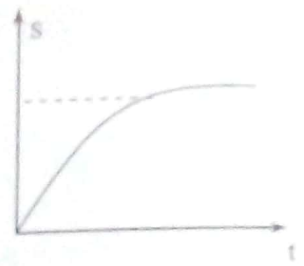
   1) The object has an initial velocity. But comes to rest after deceleration.
   2) The velocity of the object is constant through the motion.
   3) The acceleration of the object is constant through the motion.
   4) The object has an initial velocity. Velocity increases gradually and becomes constant at the end.
   5) The object starts from the rest. But comes to rest after acceleration.

19. A ball was projected vertically up under the gravity. If the time taken by the ball at the height h from the level of projection is t_1 and t_2, then h is ?

   1) $\frac{t_1 t_2}{2g}$

   2) $2g (t_1 + t_2)$

   3) $g\, t_1\, t_2$

   4) $\frac{g t_1 t_2}{2}$

   5) $\frac{2g}{t_1 t_2}$

20. A child jumps maximum possible distance with speeds $4\sqrt{2}$, $2\sqrt{2}$, $2\sqrt{2}$, $\sqrt{2}$ in ms^{-1} along a linear path on a horizontal plane as AB, BC, CD, DE. Displacement of the child from the starting point (A) to the ending point (E) is,

   1) 3.2 m
   2) 5 m
   3) 5.8 m
   4) 6 m
   5) 6.2 m

21. An object is projected vertically down with an initial velocity $10\ ms^{-1}$ under the gravity. The ratio among the distances travel by the object in its 1st, 2nd and 3rd seconds respectively.

   1) 3 : 8 : 15
   2) 3 : 5 : 7
   3) 1 : 3 : 5
   4) 7 : 9 : 11
   5) 1 : 2 : 3

22. 29 parts of main scale concide with 30 parts of the vernier scale of a circular vernier scale. If the part of the main scale is $\frac{1}{2}^{0}$, the least count of the instrument is,

   (29.51)

   1) 0.1'
   2) 1'
   3) 10'
   4) 20'
   5) 30'

23. The correct displacement Vs time graph for the motion of a stone that was thrown vertically up from the earth is,

(1)   (2)   (3)   (4)   (5)
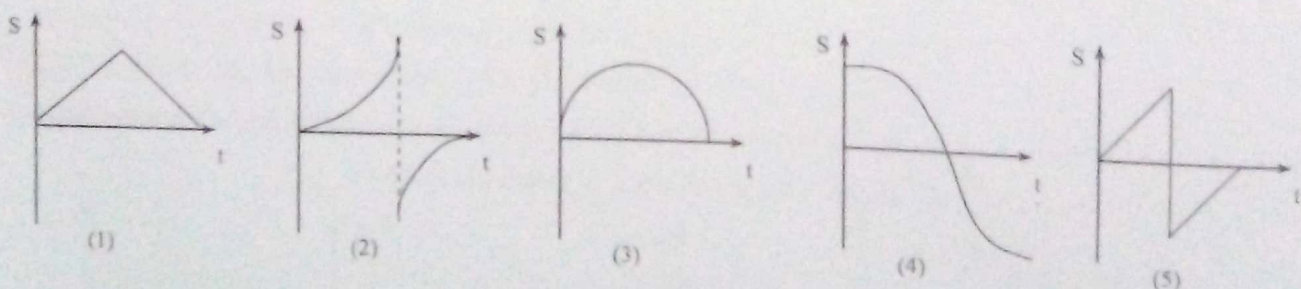
24. The velocity Vs time graph for the above (23) is,

25. The acceleration Vs time graph for the above mentioned motion is,
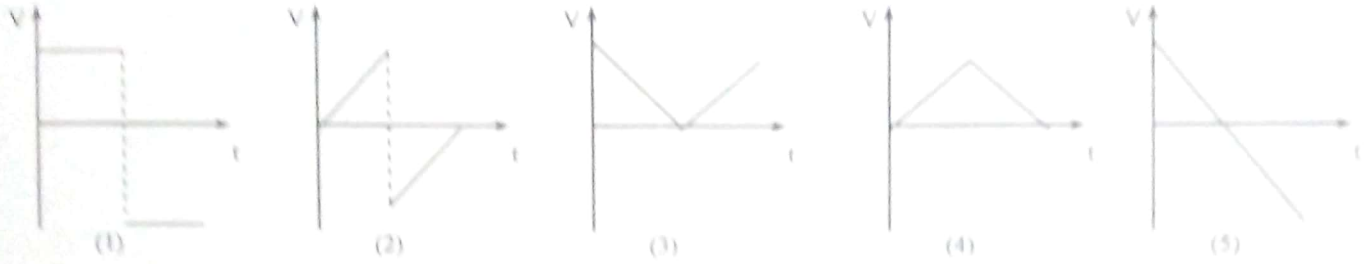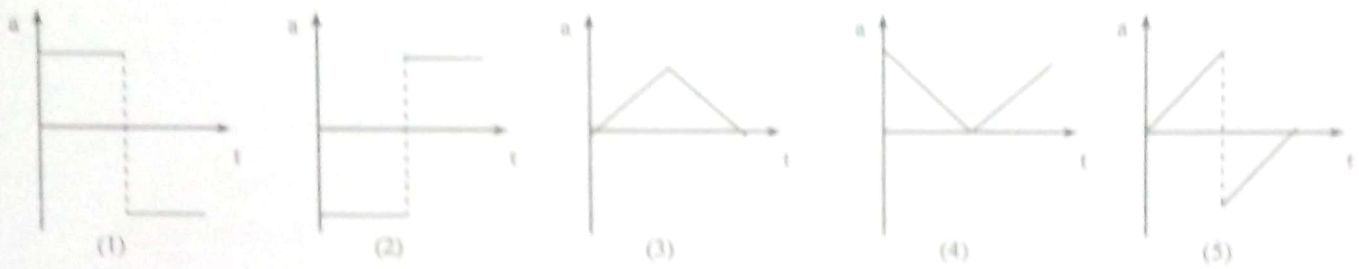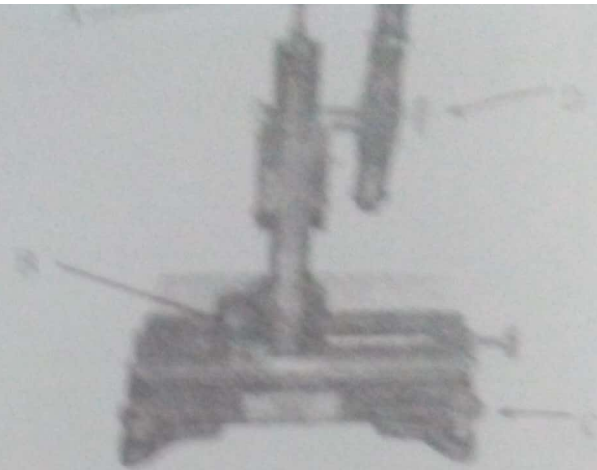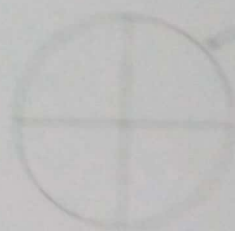

***

6. Traveling microscope use in school laboratory is given in the figure. Its scales are not drawn to the real scales.

(a) What is the purpose of adjusting nails A, B, C and D?

A ....

B ....

C ....

D ....

(b) It has been focused to a cross section of a capillary hole to measure its diameter and the microscope adjusted so that point P on the horizontal cross wire and point Q on the vertical cross wire.

(i) Draw how the image of the hole is appeared on the above screen. The size of the image should be to the size mentioned on the left side. Mention the points P, Q, R and S on the image.

(ii) Mention the direction towards the microscope should be displaced so that the points S and R touch the cross wires. (left / right / up / down)

S .... R ....

(c) Vernier scale readings of points S and Q that touches cross wires are given below.
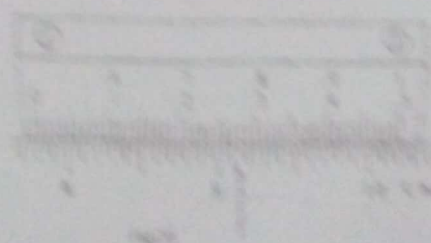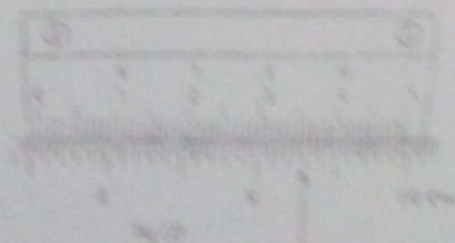
(ii) What is the least count in vernier scale in mm?

....

(iii) What is the reading of S of the travelling microscope in mm?

....

(iv) What is the reading of Q of the travelling microscope in mm?

....

(v) What is the diameter of the hole of capillary tube.

....
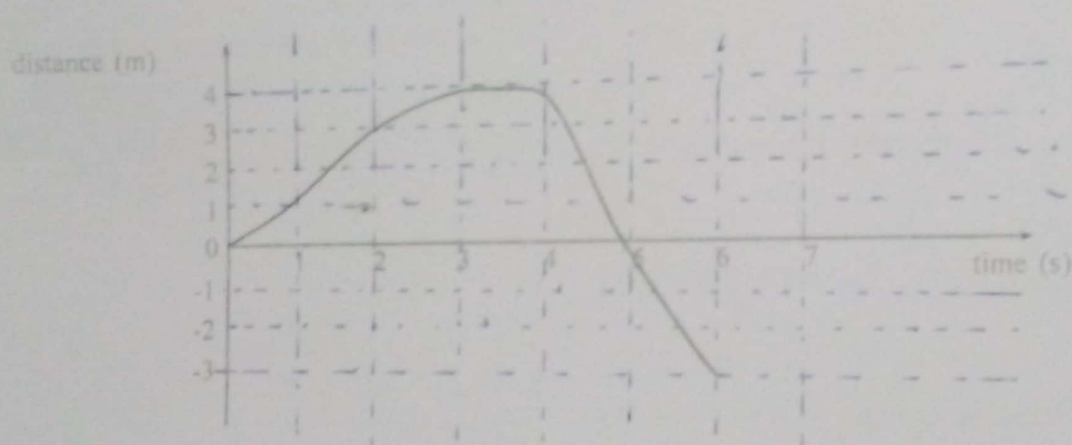
(d) What are the strategies to be followed to get more accuracy readings for the diameter of the hole of capillary tube.

....

....

....

....

02.

distance (m) vs time (s) graph

(a) A graph displacement Vs time of an object moving along a linear path is given above.

(i) What is the total displacement of the object?

....

(ii) What is the distance traveled by the object?

...

(b) (i) Mention whether the direction of the velocity of the object is changed or not, in 5 seconds. If it is changed, mention whether it is towards (+) to (-) or (-) to (+).

....

(ii) Mention whether the direction of the acceleration of the object is changed, in 5 seconds.

....

(c) A graph velocity Vs time of an object moving along a linear path is given below.
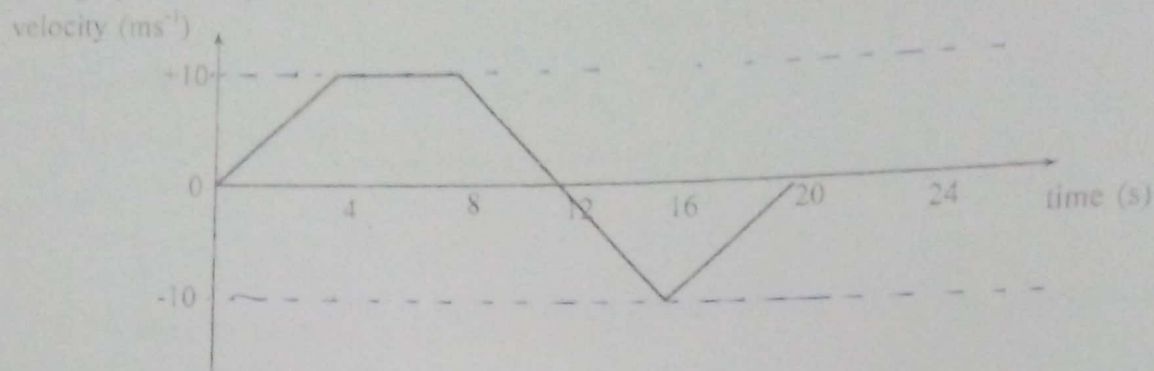
velocity (ms⁻¹)

(i) Mark the scales on the displacement axis correctly, and draw the displacement Vs time graph corresponding to the above velocity Vs time graph.
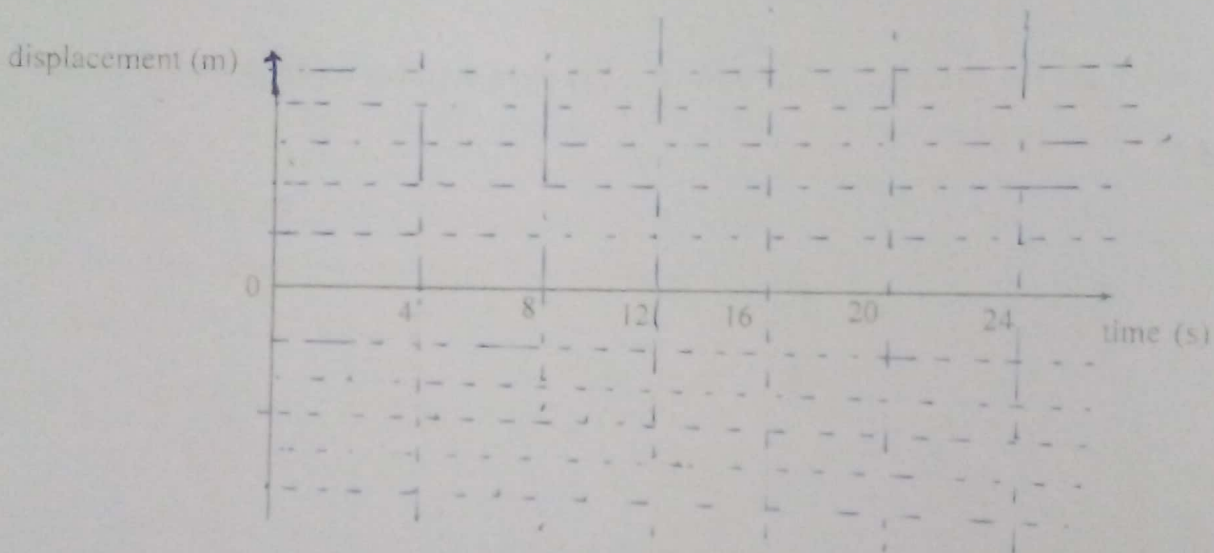
displacement (m)

(ii) What is the resultant displacement of the object?

....

(iii) What is the average speed of the object?

....

(iv) What is the average velocity of the object?

....