# PHYSICS

# BOOKS - JEEVITH PUBLICATIONS PHYSICS (KANNADA ENGLISH)

# MOTION IN A STRAIGHT LINE

## One Mark Questions And Answers

**1.** What is dynamics?

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**2.** What is kinematics?

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**3.** What is kinetics?

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**4.** What is a particle?

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**5.** What is meant by motion of bodies?

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**6.** When is a body said to be under rest?

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**7.** What is meant by velocity - time graph?

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**8.** What is meant by position - time graph?

**9.** What is meant by acceleration - time graph?

**10.** Represent uniform motion on a v - t graph.

**11.** Represent uniform accelerated motion on a vt graph.

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**12.** Represent decelerated motion of a particle on vt graph.

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**13.** Represent uniform accelerated motion on a s-t graph.

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**14.** Represent uniform motion of a particle on a x - t graph.

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**15.** Represent a body under rest on a x-t graph.

**16.** Represent a body in uniform accelerated

motion on a a - t graph.

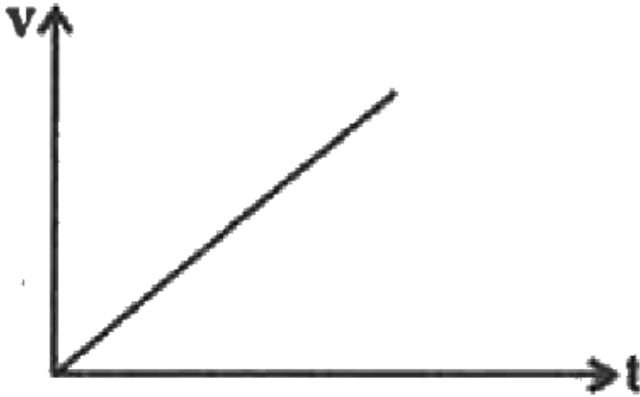**17.** Represent uniform decelerated motion of a

particle on an a-t graph.

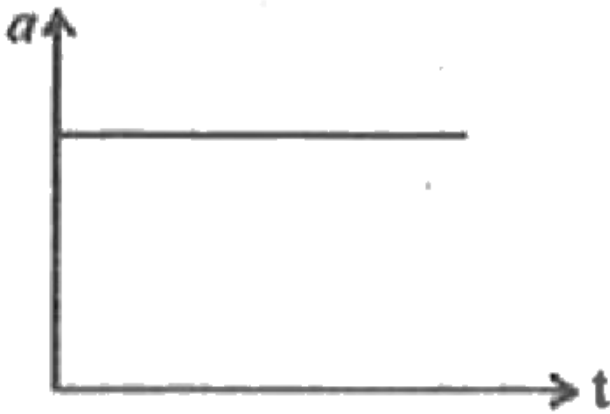**18.** Represent the following v - t graph on a a - t graph.

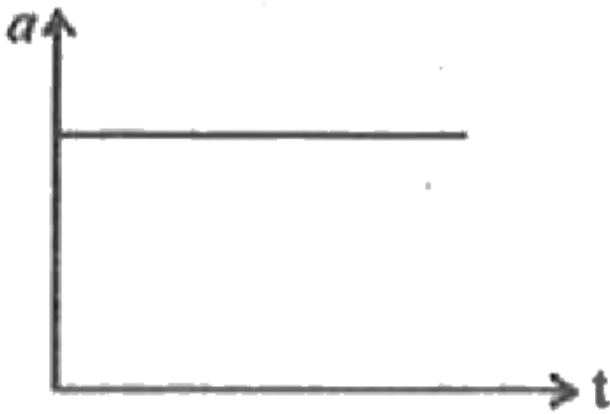**19.** Represent the following a-t graph on a v-t graph.

20. Represent the following a-t graph on a v-t graph.

**21.** Define velocity of a particle.

**22.** Define acceleration of a particle?

**23.** When is velocity said to be uniform?

**24.** When is acceleration of a particle said to be uniform ?

**25.** Define average velocity.

**26.** Define instantaneous velocity of a particle?

**27.** What does the slope of the line on a v-t graph indicate?

**28.** Can the velocity of a particle be different inspite of its speed being uniform?

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## Two Marks Questions With Answers

**1.** Define relative velocity of one body with respect to another.

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**2.** Define instantaneous velocity of a particle?

**3.** Express instantaneous acceleration of a particle for a non-uniform accelerated motion mathematically.

**4.** A ball is thrown straight up. What is its velocity and acceleration at the top?

## Three Marks Questions With Answers

**1.** Distinguish between distance covered and displacement of a particle.

**2.** Distinguish between average speed and average velocity of a particle.

**3.** Represent x - t graph for (i) $+a$ (ii) $-a$ (iii) $a = 0$ acceleration types of motion.

**4.** What are the uses of v - t graph?

## Five Marks Questions With Answers

**1.** Show that $v = v_0 + at$ by graphical method.

**2.** Show that $v^2 = v_0^2 + 2ax$ graphical method.

**3.** Show that $x = v_0t + 1/2at^2$ by graphical method.

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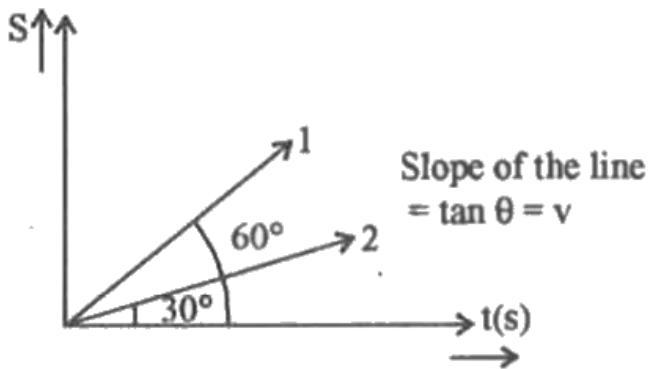
**1.** The position coordinate of a moving particle is given by $x = 6 + 18t + 9t^2$ ('x' in 'm' and 't' is 's') what is its velocity at $t = 2s$?

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**2.** With referecne to the diagram, which line represents greater velocity? What is the ratio of velocity of line 'A' to the velocity of line B?



Slope of the line
$= \tan \theta = v$

**3.** Two cars A and B are running at velocities 60 kmph and 45 kmph respectively. Calculate relative velocity of car A with respect to B if
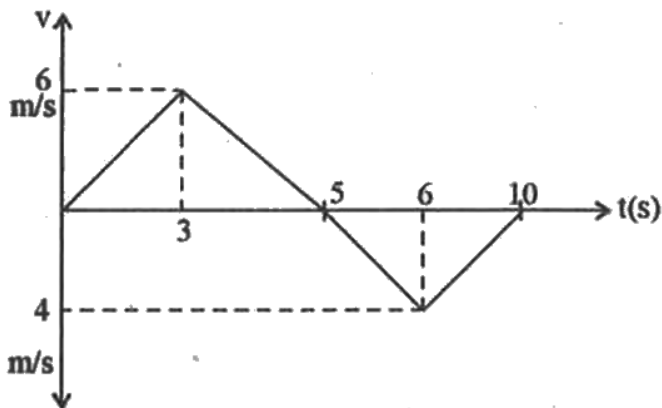
(i) they are both travelling eastwards

**4.** Two cars A and B are running at velocities 60 kmph and 45 kmph respectively calculate relative velocity of car A with respect to B if

(ii) car A is travelling eastwards and car B westwards.

5. Find the displacement and distance travelled by a body in 10s using the $v - t$ graph given below.

**6.** A particle moves in a straight line such that its displacement is $s^2 = t^2 + 1$ Find.

(i) velocity

**7.** A particle moves in a straight line such that its displacement is $s^2 = t^2 + 1$ Find.
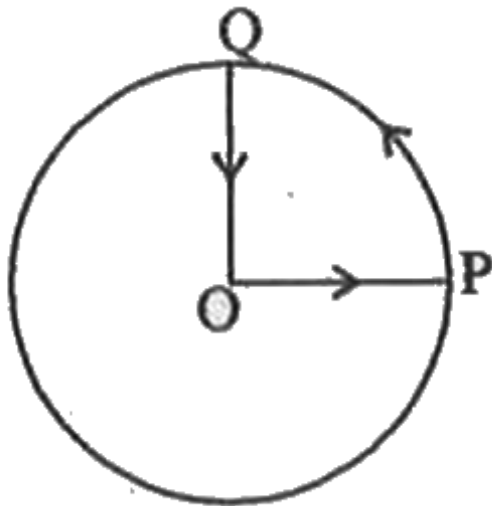
(ii) acceleration as a function of 's'

**8.** A cyclist starts from the centre 'O' of a cicular park of radius 1 km, reaches the edge of the park, then cycles along the circumference up to the point Q and returns to the centre along QO as shown in the figure. If the round trip takes 10 min, what is the

(a) Net displacement

(b) average velocity and
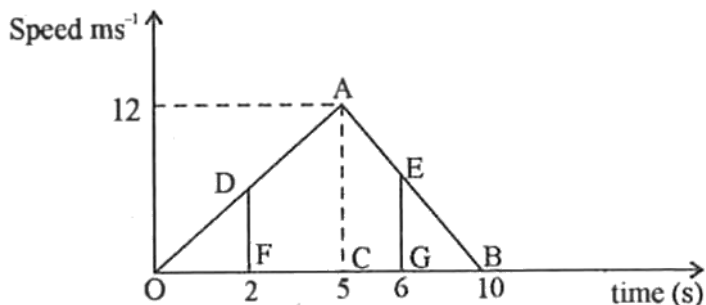
(c) average speed of the cyclist.

9. The speed time graph of a particle moving along a fixed direction is as shown in the figure. Obtain the distance travelled by the

particle from,

(a) t = 0 to 10s

(b) t= 2s to 6s

(c) What is the average speed of the particle over the intervals in (a) and (b)?

**10.** A particle starts from origin t = 0 with velocity $10.0\hat{j}\,ms^{-1}$ and moves in the $x - y$ plane with a constant acceleration of $8.0\hat{i} + 2.0\hat{j}\,ms^{-2}$

(a) At what time the x - coordinate of the particle is 16 m?

(b) What is the y - coordinate of the particle at the time?

(c) What is the speed of the particle at that time?

**11.** Two cars A and B are separated by a distance of 4 km. Car A is travelling at 72 kmph and car B at 54 kmph. After what time car A meets car B if the two are (i) travelling in the same direction and (ii) travelling in opposite directions.

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**12.** A driver of a car sights a child on the road at a distance of 200 m. If the speed of the car

is 108 kmph then calculate the retardation and time taken to stop the car just in front of the child.

**13.** A bullet travelling at $200ms^{-1}$ penetrates a wooden block of thickness 0.20 m and comes out at $20ms^{-1}$. Calculate the retardation produced inside the block. What additional thickness is required to stop the bullet.

**14.** A stone is thrown vertically upwards with a velocity of $20ms^{-1}$ from the top of a tower 96 m high. After what time will it reach the foot of the tower ? What will be the velocity of the stone reaching the point of projection? At what velocity will it strike the ground ? $\left(g = 9.8ms^{-2}\right)$

**15.** A stone is dropped from a height of 100 m and at the same time another stone is thrown vertically upwards with velocity of $40ms^{-1}$. When and where will the two stones meet ? $(g = 10ms^{-2})$

**16.** A body is dropped from certain height above the ground and covers $\left(\dfrac{5}{36}\right)^{th}$ of the total height during the last second of the fall.

Calculate height from which the body was dropped. $\left(g = 10ms^{-2}\right)$

**17.** A particle is thrown vertically upwards from the top of a tower with a certain velocity and takes 8s to reach the foot of the tower. The same when thrown with the same speed downwards, it reaches the foot of the tower in 2s. Calculate what time the particle would take to reach the foot of the tower when dropped

freely. Taking $g = 9.8 ms^{-2}$ calculate the height of the tower and the initial speed of the projectile.

**18.** A ballon is ascending at $15 ms^{-1}$. A bag containing food is dropped from it when it is at a height of 500 m from the ground. Calculate the time it takes to reach the ground. $\left(g = 9.8 ms^{-2}\right)$

**19.** A passenger train travelling at $30ms^{-1}$ covers the railway platform of length 100 m in 6 seconds. Find the length of the train. If the train covers the two hills separated by a certain linear distance in 20 s then calculate the distance between the hills.

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**20.** Drops of water trickles down from the ceiling at regular intervals of time such that

the fourth drop will just drop freely after the first drop reaches the floor. Find the position of 2nd and 3rd drop from the floor. Assume that the ceiling is 8 m from the floor.

**21.** A particle describing a uniform accelerated motion, covers 118 m in the 5th second and 138 m in 10th second. Calculate the initial velocity and acceleration of the particle. What distance

will be covered by the particle at the end of 20 s?

**22.** A particle describing a uniform accelerated motion covers 110 m in 2s and 560 m in 8s from the start. Calculate initial velocity and uniform acceleration.

**23.** A particle covers 100 m in the first 5s and 300 m in the next 5s. Calculate the uniform acceleration. Calculate the initial velocity of the particle.

**24.** A stone is dropped into water from 80 m above and a second later, another stone is thrown vertically down. Both stones strike the

water simultaneously. What is the initial speed of the second stone? Given $g = 9.8 ms^{-2}$.

**25.** Velocity of the river water is 3m/s and velocity of a boat in still waters is 5m/s. If the distance between the banks of a river is 50 m, then calculate the time taken for (i) shortest distance to cover

**26.** Velocity of the river water is 3m/s and velocity of a boat in still waters in 5m/s. If the distance between the banks of a river is 50 m, then calculate the time taken for (ii) longest distance to cover.

**27.** Obtain equations of motion for constant a acceleration using the method of calculus.

**28.** On a two - lane road, car A is travelling with a speed of 36 kmph. Two cars B and C approach car A in opposite direction with a speed of 54 kmph each. At a certain instant, when the distance AB is equal to AC both being 1 km, B decides to overtake A before C does. What minimum acceleration of car B is required to avoid an accident ?

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