

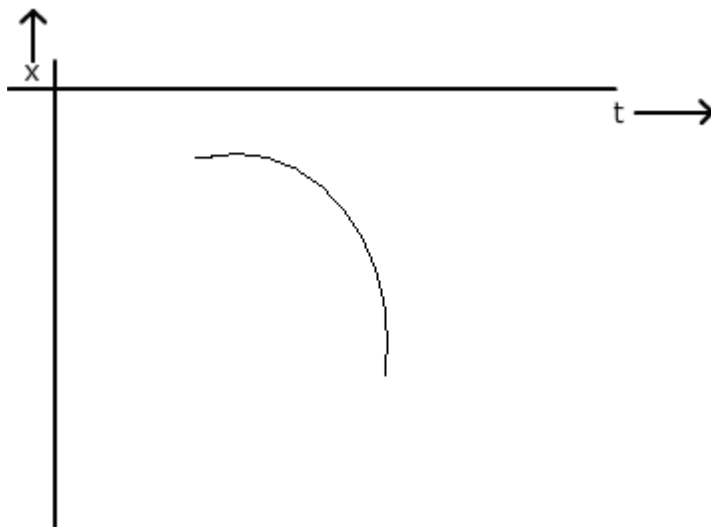
Important Questions

The Questions number from 1 to 9 below carries 3 marks each:

Q1. What is absolute error? The temperature of two bodies measured by a thermometer are $t_1 = 20^\circ\text{C} \pm 0.5^\circ\text{C}$ and $t_2 = 50^\circ\text{C} \pm 0.5^\circ\text{C}$. What is the temperature difference and the error therein?

Q2. From the following graph, find the sign of
(i) Velocity (ii) Acceleration.

Give reasons for each answer.



Q3. (i) Classify the following into conservative and non-conservative spring force, human push, gravitational force, viscous drag

(ii) Potential energy of a system due to a conservative force F is U . What is the relation between them?

Q4. State perpendicular axis theorem. What is the moment of inertia of a ring of mass 2 kg and radius 0.5m about an axis passing through its centre and perpendicular to its plane? Also find moment of inertia about a parallel axis through its edge.

Q5. State Bernoulli's theorem. Explain the lift on an airfoil using the theorem.

Q6. State the main features of kinetic theory of an ideal gas.

Q7. Find the potential energy of a system of four identical particles placed at the vertices of a square of side a . Also obtain the potential at the centre of the square.

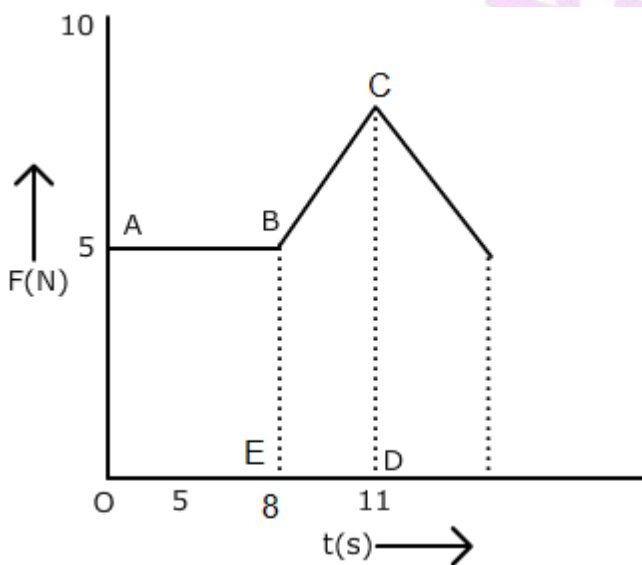
Q8. Explain why

- (i) A body with large reflectivity is a poor emitter
- (ii) Heating systems based on circulation of steam are more efficient in warming a building than those based on circulation of hot water.

Q9. What is a conservative force? Prove that gravitational force is conservative and frictional force is non-conservative

The Questions number from 10 to 15 below carries 5 marks each:

Q10. (a) Force-time graph for a body is given below. What is the velocity of the body at the end of 11 sec? Mass of the body is 7 kg and assumes it to be initially at rest.



(b) When an automobile moving with a speed of 36 km/h reaches an upward inclined road of angle 30° , its engine is switched off. If the coefficient of friction involved is 0.1, use an appropriate free body diagram to find the retardation suffered by the automobile.

Q12. Define angle of contact. For what nature of angle of contact will a liquid wet the solid? A liquid drop of diameter 4 mm breaks into 1000 droplets of equal size. Calculate the resultant change in surface energy if the surface

tension of the liquid is 0.07 N/m.

Q13. A displacement wave is represented by

$$y = 0.25 \times 10^{-3} \sin (500t + 0.025 \text{ Hz})$$

where y , t and z are in cm, sec and m respectively.

Deduce the followings:

- (i) The direction of travel of the wave.
- (ii) Wave frequency
- (iii) Wavelength
- (iv) The wave speed
- (v) Maximum particle velocity

Q14. (a) What is Doppler effect? A whistle is being rotated in a horizontal circle. What will be the effect on the sound frequency for a listener standing

- (i) outside the circle (ii) at the centre of the circle.

(b) What is the beat frequency when two tuning forks of frequency 200 Hz and 205 Hz are sounded together? Mention one application of beats.

Q15.

a) What is a projectile? Derive the expressions for the time of flight, and maximum height for the projectile thrown upwards at an angle θ with the horizontal direction.

b) The ceiling of a long hall is 25 m high. What is the maximum horizontal distance that a ball thrown with a speed of 40 m s⁻¹ can go without hitting the ceiling of the hall?