Test-2

Straight line Motion

Objective questions:- **Time: 1 hr.**

1. A man goes 10m towards North, then 20m towards east then displacement is
   (a) 22.5m (b) 25m (C) 25.5m (d) 30m
2. The numerical ratio of displacement to distance covered is always:
   a) Equal to one b)Less than one c)Equal to or greater than one d)Equal to or less than one
3. Which of the following is one dimensional motion?
   a) Landing of aircraft b) Earth revolving around the sun
   c)Motion of the wheels of moving train d)Train running on a straight track
4. A particle is constrained to move on a straight line path. It returns to the starting point after 10sec. The total distance covered by the particle during this time is 30m. Which of the following statements about the motion of the particle is false?
   a) Displacement of the particle is zero b) Average speed of the particle is 3m/s
   c)Displacement of the particle is 30m d) both (a) and (b)
5. A person travels along a straight road for first half time with a velocity v_1 and the second half time with a velocity v_2. Then the mean velocity v is given by
   a) $v=(v_1+v_2)/2$ b) $v=\sqrt{v_1v_2}$
   c) $v=\sqrt{v_1/v_2}$ d) $2/v=1/v_1+1/v_2$
6. A particle starts its motion from rest under the action of a constant force. If the distance covered in first 10 seconds is S1 and that covered in the first 20 seconds is S2 then:
   a) $S_2 = S_1$ b) $S_2 = 3S_1$ c) $S_2 = 2S_1$ d) $S_2 = 4S_1$
7. A particle moves in a straight line with a constant acceleration. It changes its velocity from $10ms^{-1}$ to $20ms^{-1}$ while passing through a distance 135 m in t second. The value of t is
   a) 1.8 b)12 c)9 d)10
8. The initial velocity of a particle is u (at t=0) and the acceleration is given by f=at. Which of the following relations is valid?
   a) $v=u+at^2$ b) $v=u+at^2/2$ c) $v=u+at$ d) $v=u$

9. If a car at rest accelerates uniformly to a speed of 144 km/h in 20 s, then it covers a distance of:
   a) 20 m b) 400 m c)1440 m d)2880 m
10. If a train travelling at 72 km/h is to be brought to rest at a distance of 200 m then its retardation should be :
   a) 20 m/s^2 b)10 m/s^2 c)2 s^2 d)1 m/s^2
11. The average velocity of a body moving with uniform acceleration after travelling a distance of 3.06 m is 0.34 m/s. The change in velocity of the body is 0.18 m/s. During this time, its acceleration is
   a) 0.01 m/s^2 b)0.02 m/s^2 c)0.03 m/s^2 d)0.04 m/s^2
12. A body travels for 15 second starting from rest with constant acceleration. If it covers distances S_1,S_2 and S_3 in the first five seconds, second five seconds and next five seconds respectively then the relation between S_1,S_2 and S_3 is
   a) $S_1=S_2=S_3$ b)$5S_1=3S_2=S_3$ c)$S_1=1/3S_2=1/5S_3$ d)$S_1=1/5S_2=1/3S_3$

13. The distance traveled by a particle starting from rest and moving with an acceleration $4/3ms^{-2}$ in the third second is -
   a) 10/3m b)19/3m c)4m d)6m
14. A body starts from rest, what is the ratio of the distance travelled by the body during the 4th and 3rd second?
   a) 7/3 b)7/5 c)3/7 d)5/7
15. If a body starts from rest and travels 120 cm in the 6th second, then the acceleration of the body is
   a) 0.2 m/s^2 b)0.027 m/s^2 c)0.218 m/s^2 d)0.03 m/s^2
16. A bus is beginning to move with an acceleration of 1 m/s^2. A boy who is 48 m behind the bus starts running with constant speed of 10 m/s. The earliest time when the boy can catch the bus is
   a) 10 sec b) 8 sec c)12 sec d)14 sec
17. A man throws ball with the same speed vertically upwards one after the other at an interval of 2 seconds. What should be the speed of the throw so that more than two balls are in the sky at any time ? (Given $g=9.8m/s^2$)
   a) Any speed less than 19.6m/s b)Only with speed 19.6m/s
   c)More than 19.6m/s d)At least 9.8m/s
18. A particle moves along a straight line OX. At a time t (in second) the distance x of the particle from O is given by $x=40+12t-t^3$. How long would the particle travel before coming to rest ?
   a) 24 m b)40 m c)56 m d)16 m

19. An object projected upwards with a velocity of 100 m/s it will strike the ground after.
   a) 10 sec b) 20 sec c) 15sec d) 5 sec
20. A body is released from the top of the tower H metre high. It takes t seconds to reach the ground. Where is the body t/2 seconds after release
   a)At H/2 metres from the ground b)At (3/4)H metres from the ground
   c)At H/4 metres from the ground d)Depends up[on the mass & volume of the body.

21. A boy standing at the top of a tower of 20 m height drops a stone. Assuming $g=10ms^{-2}$, the velocity with which it hits the ground is:
a)20 m/s b)40 m/s c)10 m/s d)5 m/s

22. A ball of mass m1 and another ball of mass m2 are dropped from equal height. If the time taken by the balls are t1 and t2 respectively, then
a) t1=t2 b)t1=2t2 c) t1/t2=m1/m2 d)t1/t2=m2/m1

23. A ball is dropped downwards, after 1 sec another ball is dropped downwards from the same point. What is the distance between them after 3 sec? (Take $g=10m/s^2$)
a)20m b)25m c)50m d)9.8m

24. A stone is thrown with an initial speed of 4.9 m /s from a bridge in the vertically upward direction. It falls down in water after 2 s. The height of the bridge is :
a)24.7 m b)19.8 m c)9.8 m d)4.9 m

25. An athlete completes one round of a circle track of radius R in 40 seconds. What will be the displacement at the end of 2 minutes 20 seconds:
a)Zero b)2R c)2πR d)7πR

26. A particle covers half of its total distance with speed v1 and the rest half distance with speed v2.Its average speed during the complete journey is :
a)v1+v2/2 b)v1v2/v1+v2 c)2v1v2/v1+v2 d)$V1^2$ $v2^2/v1^2+v2^2$

27. In one dimensional motion, instantaneous speed v satisfies the condition, $0\le v<v0$,when

a)The displacement in time T must always take non-negative values.
b)The displacement x in time T satisfies - $v0T<x<v0T$.
c)The acceleration is always a non-negative number.
d)The motion has no turning points.

28. A particle is moving such that its position coordinates (x,y) are
(2m,3m) at time t=0,
(6m,7m) at time t=2 s and
(13m,14m) at time t=5 s.
Average velocity vector (→Vav) from t=0 to t=5 s is:
a)1/5(13^i+14^j) b)7/3(^i+^j) c)2(^i−^j) d)11/5(^i+^j)

29. A particle moves along a straight line such that its displacement at any time t is given by $s=t^3-6t^2+3t+4$ metres. The velocity when the acceleration is zero is:-
a)3 m/s b)−12 m/s c)42 m/s d)−9 m/s

30. The position x of a particle varies with time as $x=at^2-bt^3$. The acceleration of particle is zero at time T equal to
a)a/b b)2a3b c)a/3b d)Zero

31. The motion of a particle is described by the equation $x = a + bt^2$, where a = 15 cm and b = 3 cm/s^2. Its instantanous velocity at t = 3 s will be

a)18 cm/ s b)16 cm/ s c)32 cm /s d)33 cm/ s

32. The displacement of a particle is given by $x=(t-2)^2$ where x is in metres and t is in seconds. The distance covered by the particle in first 4 seconds is

a)8 m b)4 m c)12 m d)16 m

33. The distance traveled *s* by an accelerated particle of mass *M* is given by the following relation (in MKS units) $s=6t+3t^2$. The velocity of the particle after 2*s* in the corresponding unit.

a)6 b) 12 c) 18 d) 24

34. The displacement x of a particle varies with time t as $x = ae^{-\alpha t} + be^{\beta t}$, Where a, b, α and β are positive constants. The velocity of the particle will:

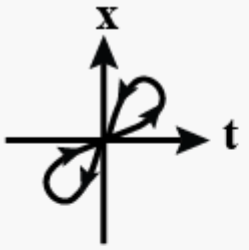
a)Be independent of α and β b)Go on increasing with time

c)Drop to zero when α = β d)Go on decreasing with time

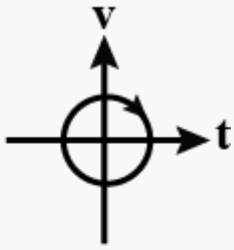
35. A particle of unit mass undergoes one-dimensional motion such that its velocity varies according to $v(x)=\beta x^{-2n}$, where β and n are constants and x is the position of the particle. The acceleration of the particle as a function of x, is given by

a)$-2\beta^2x^{-2n+1}$ b)$-2n\beta^2x^{-2n-1}$ c)$-2n\beta^2e^{-4n+1}$ d)$-2n\beta^2x^{-4n-1}$

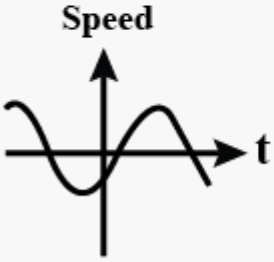
36. Which of the following graphs cannot possibly represent one dimensional motion of a particle?



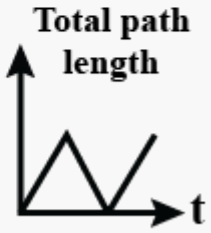
(i)



(ii)

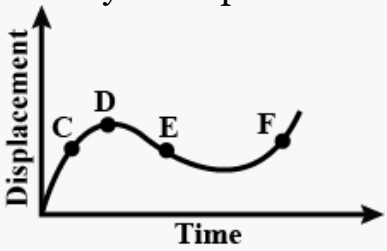


(iii)



(iv)

37. The displacement-time graph of a moving particle is as shown in the figure. The instantaneous velocity of the particle is negative at the point



a)C b)D c)E d)F

38. A body is moving with velocity 30 m/s towards east. After 10 seconds its velocity becomes 40 m/s towards north. The average acceleration of the body is

a) 5 m/s^2 b) 1 m/s^2 c) 7 m/s^2 d) $7^{1/2}$ m/s^2

39. A body freely falling from the rest has a velocity v after his falls through a height h. The distance, it has to fall down further for its velocity to become double, is :

a) 4 h b) 2h c) 6h d) 8 h

40. A body falls from a height h=200 m.The ratio of distance travelled in each 2sec during t=0 to t=6 sec of the journey is

a) 1:4:9 b) 1:2:4 c) 1:3:5 d) 1:2:3

41. The acceleration due to gravity on the planet A is 9 times the acceleration due to gravity on the planet B. A man jumps to a height of 2m on the surface A. What is the height of jump by the same person on the plane B?

a) 2/9 m b) 2/3 m c) 18 m d) 6 m

42. A body thrown vertically up reaches a maximum height of 50m. Another body with double the mass thrown up with double the intial velocity will reach a maximum height of

a) 100m b) 200m c) 400m d) 50m

43. A body thrown vertically upwards with an initial velocity u reaches maximum height in 6 seconds. The ratio of the distance travelled by the body in the first second and the seventh second is

a) 1:1 b) 11:1 c) 1:2 d) 1:11

44. A body is thrown vertically up with a velocity u. It passes three points A, B and C in its upward journey with velocities u2, u3 and u4 respectively. The ratio of the separations between points A and B and between B and C, i.e. ABBC is

a) 1 b) 2 c) 107 d) 207

45. A body A is thrown up vertically from the ground with velocity vo and another body B is simultaneously dropped from a height H. They meet at a height H2 if vo is equal to

a) $\sqrt{2gH}$ b) $\sqrt{gH}$ c) $1/2gH$ d) $\sqrt{2g/H}$