PHYSICS

BOOKS - NEET PREVIOUS YEAR (YEARWISE + CHAPTERWISE)

MOTION IN ONE DIMENSION

Exercise

1. Preeti reached the metro station and found that the escalator was not working. She

walked up the stationary escalator in time t_1. On other days, if the remains stationary on the moving escalator, then the escalator takes her up in time t_2. The time taken by her to walk up on the moving escalator will be :

A. $\frac{t_1 + t_2}{2}$

B. $\frac{t_1 t_2}{t_2 - t_1}$

C. $\frac{t_1 t_2}{t_2 + t_1}$

D. $t_1 - t_2$

Answer: C

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2. If the velocity of a particle is $v = At + Bt^2$, where A and B are constant, then the distance travelled by it between $1s$ and $2s$ is :

A. $3A + 7B$

B. $\frac{3}{2}A + \frac{7}{3}B$

C. $\frac{A}{2} + \frac{B}{3}$

D. $\frac{3}{2}A + 4B$

Answer: B

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3. Two cars P and Q start from a point at the same time in a straight line and their position are represented by $x_p(t) = at + bt^2$ and $x_Q(t) = ft - t^2$. At what time do the cars have the same velocity ?

A. $\frac{a-f}{1+b}$

B. $\frac{a+f}{2(b-1)}$

C. $\frac{a+f}{2(1+b)}$

D. $\frac{f-a}{2(1+b)}$

Answer: D

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4. 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 constant and x is the position of the particle. The acceleration of the particle as a function of x is given by.

A. $-2n\beta^2 x^{-2n-1}$

B. $-2n\beta^2 x^{-4n-1}$

C. $2\beta^2 x^{-2n+1}$

D. $-2n\beta^2 e^{-4n+1}$

Answer: B

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5. If Vectors $\overrightarrow{A} = \cos\omega\hat{i} + \sin\omega\hat{j}$ and $\overrightarrow{B} = (\cos)\frac{\omega t}{2}\hat{i} + (\sin)\frac{\omega t}{2}\hat{j}$ are functions of

time. Then the value of t at which they are orthogonal to each other is

A. $t = \frac{\pi}{4\omega}$

B. $t = \frac{\pi}{2\omega}$

C. $t = \frac{\pi}{\omega}$

D. $t = 0$

Answer: C

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6. The range R of projectile is same when its maximum heights are h_1 and h_2. What is the relation between R, h_1 and h_2?

A. $h_1 = 2h_2 = 3h_3$

B. $h_1 = \frac{h_2}{3} = \frac{h_3}{5}$

C. $h_2 = 3h_1$ and $h_3 = 3h_2$

D. $h_1 = h_2 = h_3$

Answer: B

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7. The motion of a particle along a straight line is described by equation : $x = 8 + 12t - t^3$ where x is in metre and t in second. The retardation of the particle when its velocity becomes zero is.

A. $24ms^{-2}$

B. zero

C. $6ms^{-2}$

D. $12ms^{-2}$

Answer: D

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8. A boy standing at the top of a tower of $20m$. Height drops a stone. Assuming $g = 10ms^{-2}$ towards north. The average acceleration of the body is.

A. $20m/s$

B. $40m/s$

C. $5m/s$

D. $10m/s$

Answer: A

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

A. $7m/s^2$

B. $\sqrt{7}m/s^2$

C. $5m/s^2$

D. $1m/s^2$

Answer: C

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10. A ball is droped from a high rise platform $t = 0$ starting from rest. After $6s$ another ball is thrown downwards from the same platform with a speed v. The two balls meet at $t = 18s$. What is the value of v ?

A. $74ms^{-1}$

B. $55ms^{-1}$

C. $40ms^{-1}$

D. $60ms^{-1}$

Answer: A

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11. A particle move a distance x in time t according to equation $x = (t+5)^{-1}$. The acceleration of particle is alphaortional to.

A. $(\text{velocity})^{3/2}$

B. $(\text{distance})^{2}$

C. $(\text{distance})^{-2}$

D. $(\text{velocity})^{2/3}$

Answer: A

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12. A particle starts its motion from rest under the action of a constant force. If the distance

covered in first $10s$ is s_1 and the covered in the first $20s$ is s_2, then.

A. $s_2 = 2s_1$

B. $s_2 = 3s_1$

C. $s_2 = 4s_1$

D. $s_2 = s_1$

Answer: C

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13. A bus is moving with a speed of $10ms^{-1}$ on a straight road. A scooterist wishes to overtake the bus in $10s$. If the bus is at a distance of $1km$ from the scooterist with what speed should the scooterist chase the bus ?

A. $20ms^{-1}$

B. $40ms^{-1}$

C. $25ms^{-1}$

D. $10ms^{-1}$

Answer: A

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14. 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 $135m$ in t seconds. The value of t is.

A. 10

B. 1.8

C. 12

D. 9

Answer: D

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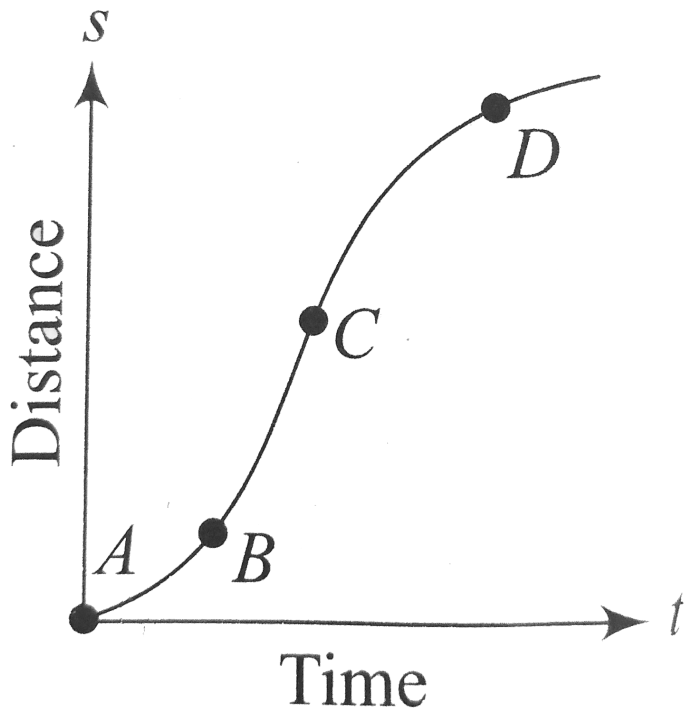
15. A particle shows distance-time curve as given in this figure. The maximum instantaneous velocity of the particle is

around the point.



A. B

B. C

C. D

D. A

Answer: B

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16. The distance travelled by a particle starting from rest and moving with an acceleration $\frac{4}{3}ms^{-2}$, in the third second is.

A. 6m

B. 4m

C. $\frac{10}{3}m$

D. $\frac{19}{3}m$

Answer: C

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17. A particle moving along x-axis has acceleration f, at time t, given by $f = f_0\left(1 - \frac{t}{T}\right)$, where f_0 and T are constant.

The particle at $t = 0$ has zero velocity. In the time interval between $t = 0$ and the instant when $f = 0$, the particle's velocity (v_x) is :

A. $f_0 T$

B. $\frac{1}{2} f_0 T^2$

C. $f_0 T^2$

D. $\frac{1}{2} f_0 T$

Answer: D

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18. A car moves from X to Y with a uniform speed v_u and returns to Y with a uniform

speed v_d. The average speed for this round trip is :

A. $\frac{2v_dv_u}{v_d+v_u}$

B. $\sqrt{v_u u_d}$

C. $\frac{v_dv_u}{v_d+v_u}$

D. $\frac{v_u+v_d}{2}$

Answer: A

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19. The position x of a particle with respect to time t along the x-axis is given by $x = 9t^2 - t^3$ where x is in meter and t in second. What will be the position of this particle when it achieves maximum speed along the positive x direction

A. 32m

B. 54m

C. 81m

D. 24m

Answer: B

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20. Two bodies A (of mass $1kg$) and B (of mass $3kg$) are dropped from heights of $16m$ and $25m$. Respectively. The ratio of the time taken to reach the ground is :

A. $-5/4$

B. $12/5$

C. $5/12$

D. $4/5$

Answer: D

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21. A particle moves along a straight line OX. At a time t (in seconds) the distance x (in metre) of the particle is given by $x = 40 + 12t - t^3$. How long would the particle travel before coming to rest ?

A. $24m$

B. $40m$

C. $56m$

D. $16m$

Answer: C

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22. The displacement x of a particle varies with time t as $x = ae^{-\alpha t} + be^{\beta t}$. Where a, b, α and β positive constant.

The velocity of the particle will.

A. decrease with time

B. be independent of α and β

C. drop to zero when $\alpha = \beta$

D. increase with time

Answer: D

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23. 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 ball are in the sky at any time (Given $g = 10\frac{m}{2^2}$)

A. Any speed less than $19.6m/s$

B. Only with speed $19.6m/s$

C. More than $19.6m/s$

D. Al least $9.8m/s$

Answer: C

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24. If a ball is thrown vertically upwards with speed u, the distance covered during the last t second of its ascent is

A. $ut - \frac{1}{2}gt^2$

B. $(u + gt)t$

C. ut

D. $\frac{1}{2}gt^2$

Answer: D

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25. A stone is thrown vertically upwards. When stone is at a height half of its maximum height, its speed is $10ms^{-1}$, then the maximum height attained by the stone is ($g = 10ms^{-2}$)

A. $8m$

B. $10m$

C. $15m$

D. $20m$

Answer: B

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26. A particle moves along a straight line such that its displacement at any time t is given by $s = 3t^3 + 7t^2 + 14t + 5$. The acceleration of the particle at $t = 1s$ is

A. $18m / s^2$

B. $32m / s^2$

C. $29m / s^2$

D. $24m / s^2$

Answer: B

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27. A car moving with a speed of $40km/h$ can be stopped by applying the brakes after at least 2 m. If the same car is moving with a speed of $80km/h$, what is the minimum stopping distance?

A. $8m$

B. $2m$

C. $4m$

D. $6m$

Answer: A

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28. If a car at rest, accelerates uniformly to a speed of $144km/h$ in $20s$, it covers a distance of

A. $2880m$

B. $1440m$

C. $400m$

D. $20m$

Answer: C

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29. The position x of a particle varies with time t as $x = at^2 - bt^3$. The acceleration at time t of the particle will be equal to zero, where (t) is equal to .`

A. zero

B. $\frac{a}{3b}$

C. $\frac{2a}{3b}$

D. $\frac{a}{b}$

Answer: B

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30. If a ball is thrown vertically upwards with a velocity of $40m/s$, then velocity of the ball after $2s$ will be $\left(g = 10m/s^2\right)$

A. $15m/s$

B. $20m/s$

C. $25m/s$

D. $28m/s$

Answer: B

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31. Three different objects of masses m_1, m_2 and m_2 are allowed to fall from rest and from the same point O along three different

frictionless paths. The speeds of three objects on reaching the ground will be:

A. $m_1 : m_2 : m_3$

B. $m_1 : 2m_2 : 3m_3$

C. $1 : 1 : 1$

D. $\frac{1}{m_1} : \frac{1}{m_2} : \frac{1}{m_3}$

Answer: C

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32. Water drops fall at regular intervals from a tap 5 m above the ground. The third drop is leaving the tap, the instant the first drop touches the ground. How far above the ground is the second drop at that instant. $(g = 10ms^{-2})$

A. $1.25m$

B. $2.50m$

C. $3.75m$

D. $5.00m$

Answer: C

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33. A body is thrown vertically upwards from the ground. It reaches a maximum height of $20m$ in $5s$. After what time it will reach the ground from its maximum height position ?

A. $2.5s$

B. $5s$

C. $10s$

D. $25s$

Answer: B

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34. A stone released with zero velocity from the top of a water, reaches the ground in 4s. The height of the tower is $\left(g = 10m/s^2\right)$

A. $20m$

B. $40m$

C. $80m$

D. $160m$

Answer: C

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35. A car accelerates from rest at a constant rate α for some time, after which it decelerates at a constant rate β, to come to rest. If the total time elapsed is t seconds.

Then evalute (a) the maximum velocity reached and (b) the total distance travelled.

A. $\left(\frac{\alpha^2+\beta^2}{\alpha\beta}\right)t$

B. $\left(\frac{\alpha^2-\beta^2}{\alpha\beta}\right)t$

C. $\frac{(\alpha+\beta)t}{\alpha\beta}$

D. $\left(\frac{\alpha\beta t}{\alpha+\beta}\right)$

Answer: D

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36. A particle moves along a staight line such that its displacement at any time t is given by $s = t^3 - 6t^2 + 3t + 4m$. Find the velocity when the acceleration is 0.

A. $3ms^{-1}$

B. $-12ms^{-1}$

C. $42ms^{-1}$

D. $-9ms^{-1}$

Answer: D

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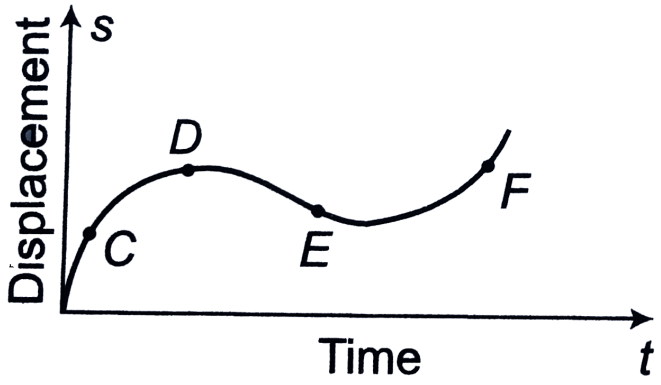
37. The displacement-time graph of moving particle is shown below



The instantaneous velocity of the particle in negative at the point

A. D

B. F

C. C

D. E

Answer: D

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38. A body starts from rest, what is the ratio of the distance travelled by the body during the 4th and 3rd s?

A. $\frac{7}{5}$

B. $\frac{5}{7}$

C. $\frac{7}{3}$

D. $\frac{3}{7}$

Answer: A

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39. A train of $150m$ length is going toward north direction at a speed of $10ms^{-1}$. A parrot flies at a speed of $5ms^{-1}$ toward south

direction parallel to the railway track. The time taken by the parrot to cross the train is equal to.

A. $12s$

B. $8s$

C. $15s$

D. $10s$

Answer: D

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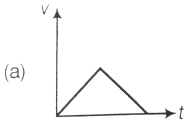
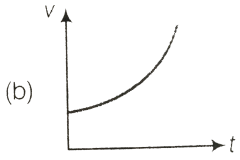
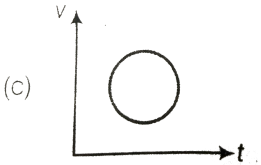
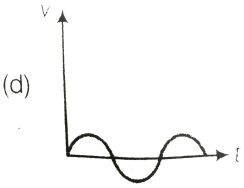
40. Which of the following curves does not represent motion in one dimensions?

A. 

B. 

C. 

D. 

Answer: C

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41. A bus travelled the first one-third distance at a speed of $10km/h$, the next one-third at $20km/h$ and the last one-third at $60km/h$. The average speed of the bus is

A. $9km/h$

B. $16km/h$

C. $18km/h$

D. $48km/h$

Answer: C

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42. A car moves a distance of $200m$. It covers the first-half of the distance at speed $40km/h$ and the second-half of distance at speed vkm/h. The average speed is $48km/h$. Find the value of v.

A. $56km/h$

B. $60km/h$

C. $50km/h$

D. $48km/h$

Answer: B

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43. A body dropped from top of a tower falls through $40m$ during the last two seconds of its fall. The height of tower in m is (g= 10 m//s^@)`

A. $60m$

B. $45m$

C. $80m$

D. $50m$

Answer: B

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44. A car travels along a straight line for first half time with speed $40km/h$ and the second

half time with speed $60km/h$. Find the average speed of the car.

A. $40km/h$

B. $48km/h$

C. $50km/h$

D. $60km/h$

Answer: B

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45. Find the ratio of the distance moved by a free-falling body from rest in fourth and fifth seconds of its journey.

A. $4:5$

B. $7:9$

C. $16:25$

D. $1:1$

Answer: B

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46. A car is moving along a straight road with a uniform acceleration. It passes through two points P and Q separated by a distance with velocity $30km/h$ and $40km/h$ respectively. The velocity of the car midway between P and Q is

A. $33.3km/h$

B. $20\sqrt{2}km/h$

C. $25\sqrt{2}km/h$

D. $0.35km/h$

Answer: C

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