Additional Problems For Self Practice (APSP)

PART-I : PRACTICE TEST PAPER

Max. Marks : 120 **Max. Time : 1 Hr.**

Important Instructions :

1. The test is of **1 hour** duration and max. marks 120.
2. The test consists **30** questions, **4 marks** each.
3. Only one choice is correct **1 mark** will be deducted for incorrect response. No deduction from the total score will be made if no response is indicated for an item in the answer sheet.
4. There is only one correct response for each question. Filling up more than one response in any question will be treated as wrong response and marks for wrong response will be deducted accordingly as per instructions 3 above.

1. The initial velocity of a body moving along a straight line is 7 m/s. It has a uniform acceleration of 4 m/s^2. The distance covered by the body in the 5th second of its motion is

(1) 25 m (2) 35 m (3) 50 m (4) 85 m

2. A train covers 50 metre distance and stops when applied the breaks. If the velocity of train is just doubled and applied the same retarding force then the distance covered by the train is

(1) 50 m (2) 100 m (3) 150 m (4) 200 m

3. A body travels 200 cm in the first two seconds and 220 cm in the next four second. The velocity at the end of the seventh second from the start will be (acceleration is constant)

(1) 10 cm/s (2) 5 cm/s (3) 15 cm/s (4) 20 cm/s

4. A body dropped from the top of a tower covers 7/16 of the total height in the last second of its fall. The time of fall is

(1) 2 sec (2) 4 sec (3) 1 sec (4) $\left(\frac{50}{7}\right)$ sec

5. 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

(1) go on decreasing with time (2) be indepenent of α and β
(3) drop to zero when $\alpha = \beta$ (4) go on increasing with time

6. A ball is thrown vertically upward. It has a speed of 10 m/s when it has reached one half of its maximum height. How high does the ball rise ? (Taking g = 10 m/s^2)

(1) 15 m (2) 10 m (3) 20 m (4) 5 m

7. Two bodies, A (of mass 1kg) and B (of mass 3kg) are dropped from heights of 16 m and 25 m, respectively. The ratio of the time taken by them to reach the ground is :

(1) 5/4 (2) 12/5 (3) 5/12 (4) 4/5

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

(1) 32 m (2) 54 m (3) 81 m (4) 24 m

9. 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 constants. 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 :

(1) f_0T (2) $\frac{1}{2} f_0T^2$ (3) $f_0 T^2$ (4) $\frac{1}{2} f_0 T$

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

(1) 6 m (2) 4 m (3) $\frac{10}{3}$ m (4) $\frac{19}{3}$ m

11. A particle after starting from rest, experiences constant acceleration for 20 sec. If it covers a distance s_1 in first 10 sec, then the distance covered during next 10 sec will be

(1) s_1 (2) $2s_1$ (3) $3s_1$ (4) $4s_1$

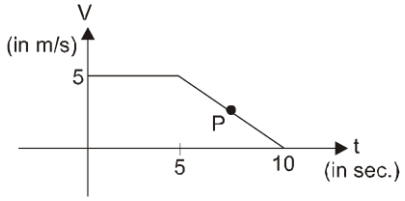
12. The velocity of bullet is reduced from 200 m/s to 100 m/s while travelling through a wooden block of thickness of 10 cm. The retardation assuming to be uniform, will be :

(1) 15×10^4 m/s^2 (2) 13.5×10^4 m/s^2 (3) 12×10^4 m/s^2 (4) none of these

13. A ball is thrown upwards, it takes 4 s to reach back to the ground. Find its initial velocity :

(1) 30 ms^{-1} (2) 10 ms^{-1} (3) 40 ms^{-1} (4) 20 ms^{-1}

14. V-t graph for the motion of a particle moving along a straight line is shown. Slope of the curve at point 'P' shown in the graph is correctly represented by :



(1) -1 m/s^2 (2) tan 45º (3) tan 15º (4) $\frac{3\pi}{4}$

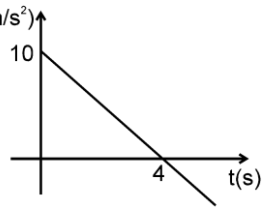
15. A body falls from a height h = 200 m. The ratio of distance travelled in each 2 s, during t = 0 to t = 6 s of the journey is :

(1) 1 : 4 : 9 (2) 1 : 2 : 4 (3) 1 : 3 : 5 (4) 1 : 2 : 3

16. A point initially at rest moves along x-axis. Its acceleration varies with time as a = (6t + 5) m/s^2. If it starts from origin, the distance covered in 2 s is.

(1) 20 m (2) 18 m (3) 16 m (4) 25 m

17. The acceleration time graph of a particle moving along a straight line is as shown in the figure. At what time the particle acquires its velocity equal to initial velocity ?



(1) 12 sec (2) 5 sec

(3) 8 sec (4) none of these

18. The velocity of a bullet is reduced from 200 m/s to 100 m/s, while travelling through a wooden block of thickness 10 cm. Assuming it to be uniform, the retardation will be :

(1) 15×10^4 m/s^2 (2) 10×10^4 m/s^2 (3) 12×10^4 m/s^2 (4) 14.5 m/s^2

19. A body A starts from rest with an acceleration a_1. After 2 s another body B starts from rest with an acceleration a_2. If they travel equal distances in 5th s, after the starts of A, the ratio $a_1 : a_2$ will be equal to

(1) 9 : 5 (2) 5 : 7 (3) 5 : 9 (4) 7 : 9

20. When a ball is thrown up vertically with velocity υ_0 , it reaches a maximum height of h. If one wishes to triple the maximum height then the ball should be thrown with velocity :

(1) $\sqrt{3}\,\upsilon_0$ (2) 3 υ_0 (3) 9 υ_0 (4) 3/2 υ_0

21. A car travels 6 km towards north at an angle of 45° to the east and then travels distance of 4 km towards north at an angle 135° to east. How far is the point from the starting point ? What angle does the straight line joining its initial and final position makes with the east ?

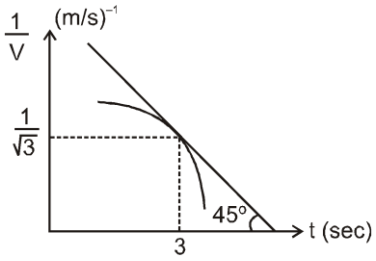
(1) $\sqrt{50}$ km and $\tan^{-1}(5)$ (2) 10 km and $\tan^{-1}(\sqrt{5})$

(3) $\sqrt{52}$ km and $\tan^{-1}(5)$ (4) $\sqrt{52}$ km and $\tan^{-1}(\sqrt{5})$

22. The displacement of a particle, starting from rest (at t = 0) is given by $s = 6t^2 - t^3$
The time in seconds at which the particle will attain zero velocity again is

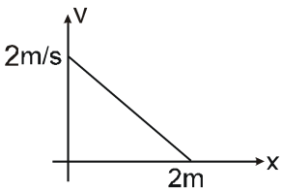
(1) 2 (2) 4 (3) 6 (4) 8

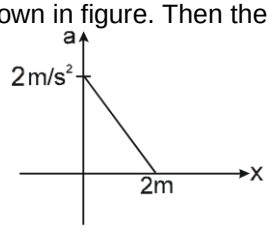
23. The graph shows the variation of $\frac{1}{V}$ (where V is the velocity of the particle) with respect to time. Then find the value of acceleration at t = 3 sec.

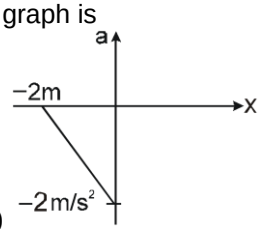


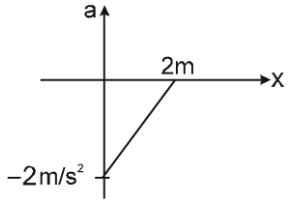
(1) 3 m/s^2 (2) 5 m/s^2 (3) 1 m/s^2 (4) None of these

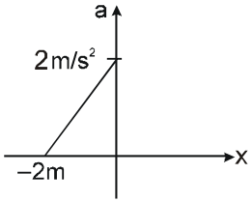
24. The velocity displacement graph of a particle moving along a straight line is shown in figure. Then the acceleration displacement graph is



(1)


(2)


(3)


(4)


25. A ball is dropped from a bridge 125 m above a river. 2s later a second ball is thrown straight down. What must be the initial velocity of second ball so that both hit the water surface simultaneously?

(1) $\frac{80}{3}$ m/s (2) $\frac{160}{3}$ m/s (3) $\frac{40}{3}$ m/s (4) $\frac{20}{3}$ m/s

26. The friction of air causes a vertical retardation equal to 10% of the acceleration due to gravity (g = 10 m/s^2). The maximum height will be decreases by nearly (when object is thrown vertically upwards)

(1) 8% (2) 9% (3) 10% (4) 11%

27. Two particles are projected upwards with initial speeds of 20m/sec and 40m/sec. If the displacements of these particles in last second of their upward flight are y_1 and y_2 then value of $y_1 : y_2$ is : (g = 10 m/s^2)

(1) 1 : 2 (2) 2 : 1 (3) 1 : 1 (4) 1 : 3

28. A particle moves along a curve $y = x^3$ in x-y plane with constant speed v m/s. Then the magnitude of acceleration of particle when it is at origin will be

(1) 0 (2) v^2 (3) $\frac{v^2}{4}$ (4) $4v^2$

29. The position vector of particle at any time t is $\vec{r} = 3t\hat{i} + 3t^2\hat{j}$. The velocity vector makes an angle θ with positive x–axis. The rate of change of θ at time t = 3 sec will be (in rad/sec) :

(1) $\frac{2}{37}$ (2) $\frac{2}{33}$ (3) $\frac{2\sqrt{2}}{37}$ (4) $\frac{5}{37}$

30. A particle confined to move only along x-axis, has its acceleration given by $a = x^2$. If at t = 0, x = 0 and v = 0 then

(1) Acceleration = 4 m/s^2 after some time.
(2) Acceleration is always positive
(3) The particle can have both negative as well as positive velocity
(4) Particle remains stationary.

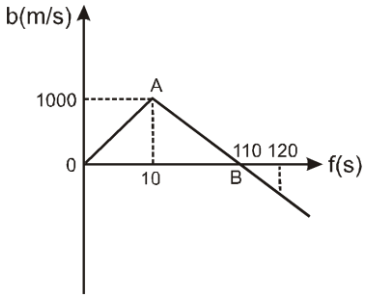
Practice Test (JEE-Main Pattern)

OBJECTIVE RESPONSE SHEET (ORS)

Que.	1	2	3	4	5	6	7	8	9	10
Ans.										
Que.	11	12	13	14	15	16	17	18	19	20
Ans.										
Que.	21	22	23	24	25	26	27	28	29	30
Ans.										

PART - II : PRACTICE QUESTIONS

1. The graph shows the variation of velocity of a rocket with time. The time of burning of fuel from the graph is



(1) 10 s (2) 110 s (3) 120 s (4) Data insufficient

2. A particle moving with a uniform acceleration travels 24 m and 64 m in the first two consecutive intervals of 4 sec each. Its initial velocity is

(1) 1 m/sec (2) 10 m/sec (3) 5 m/sec (4) 2 m/sec

3. The displacement of a body is given to be proportional to the cube of time passed. The magnitude of the acceleration of the body, is

(1) Increasing with time (2) Decreasing with time (3) Constant but not zero (4) Zero

4. A car moves for half of its time at 80 km/h and for rest half of time at 10 km/h. Total distance covered is 60 km. What is the average speed of the car

(1) 60 km/h (2) 45 km/h (3) 120 km/h (4) 180 km/h

5. A body dropped from a height h with initial velocity zero, strikes the ground with velocity 3 m/s. Another body of same mass is dropped from the height h with an initial velocity of 4 m/s. Find the final velocity with which it strikes the ground

(1) 3 m/s (2) 4 m/s (3) 5 m/s (4) 12 m/s

6. If a body starts from rest and travels 1.2 m in the 8th second then what is the acceleration

(1) 0.20 m/s^2 (2) 0.16 m/s^2 (3) 0.08 m/s^2 (4) 0.2255 m/s^2

7. A body sliding on a smooth inclined plane requires 4 seconds to reach the bottom, starting from rest at the top. How much time does it take to cover one-fourth the distance starting from rest at the top

(1) 1 sec (2) 2 sec (3) 4 sec (4) 16 sec

8. A car moving with a speed of 40 km/hr can be stopped by applying breaks after atleast 2m. If the same car is moving with a speed of 80 km/h. What is the minimum stopping distance.

(1) 8 m (2) 2 m (3) 4 m (4) 6 m

9. A car travels half distance with 40 km/hr and rest half distance with 60 km/hr., then the average speed of car is

(1) 40 km/hr (2) 48 km/hr (3) 52 km/hr (4) 60 km/hr

10. Two car A and B are initially at rest. Now car A starts moving with a constant velocity of 40 m/s and car B starts moving with constant acceleration of 4 m/s^2. How much time will have lapsed from before the cars again meet.

(1) 15 second (2) 20 second (3) 30 second (4) 35 second

11. A wheel covers a distance of 9.5 km in 2000 revolutions. The diameter of the wheel is

(1) 15 cm (2) 7.5 cm (3) 1.5 m (4) 7.5 m

12. If a freely falling body travels in the last second, a distance equal to the distance travelled by it in the first three seconds, the time of its travel is

(1) 3 sec (2) 4 sec (3) 5 sec (4) 6 sec

13. If a ball is thrown vertically upwards at 40 m/s, its velocity after two seconds will be

(1) 10 m/s (2) 20 m/s (3) 30 m/s (4) 40 m/s

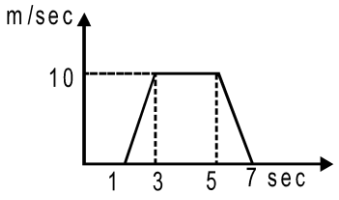
14. Velocity-time curve for a body projected vertically upwards is

(1) Ellipse (2) Parabola (3) Hyperbola (4) Straight line

15. A body starts from rest and has an acceleration 20 cm/sec^2. What is the distance covered by the body in first 8 sec

(1) 160 cm (2) 640 cm (3) 1280 cm (4) 1640 cm

16. A particle moves according to above velocity time graph. Then what is the ratio between distance travelled in last 2 seconds and 7 seconds



(1) $\frac{1}{4}$ (2) $\frac{1}{2}$

(3) $\frac{1}{8}$ (4) $\frac{1}{6}$

17. For a freely falling body ratio of distances travelled in first, second and third second of its motion will be

(1) 5 : 3 : 1 (2) 1 : 4 : 9 (3) 1 : 3 : 5 (4) 9 : 4 : 1

18. A very large number of balls are thrown vertically upwards in quick succession in such a way that the next ball is thrown when the previous one is at the maximum height. If the maximum height is 5m, the number of balls thrown per minute is (take g = 10 ms^{-2})

(1) 120 (2) 80 (3) 60 (4) 40

19. A particle moves along a circle with a uniform speed v. After it has made an angle of 60^0, the change in its speed and velocity will be

(1) $v\sqrt{2}$, v (2) $\frac{v}{\sqrt{2}}$, 0 (3) $v\sqrt{3}$, v (4) 0, v

20. In the one-dimensional motion of a particle, the relation between position x and time t is given by $x^2 + 2x = t$ (here $x > 0$). Choose the correct statement :

(1) The retardation of the particle is $\frac{1}{4(x+1)^3}$

(2) The uniform acceleration of the particle is $\frac{1}{(x+1)^3}$

(3) The uniform velocity of the particle is $\frac{1}{(x+1)^3}$

(4) The particle has a variable acceleration of 4t + 6.

21. **Assertion :** Retardation is directly opposite to the velocity.
Reason : Retardation is equal to the time rate of decrease of speed.
(1) If both assertion and reason are true and reason is the correct explanation of assertion
(2) If both assertion and reason are true but reason is not the correct explanation of assertion.
(3) If assertion is true but reason is false
(4) If assertion is false but reason is true

22. A particle covers half of its total distance with speed v_1 and the rest half distance with speed v_2. Its average speed during the complete journey is :

(1) $\frac{v_1v_2}{v_1+v_2}$ (2) $\frac{2v_1v_2}{v_1+v_2}$ (3) $\frac{2v_1^2v_2^2}{v_1^2+v_2^2}$ (4) $\frac{v_1+v_2}{2}$

23. If relation between distance and time is $s = a + bt + ct^2$, and initial velocity and acceleration :
(1) b + 2 ct, 2 c (2) b, 2 c (3) 2 c, b (4) b + 2 c, 2 c

APSP Answers

PART- I

1.	(1)	**2.**	(4)	**3.**	(1)	**4.**	(2)	**5.**	(4)	**6.**	(2)	**7.**	(4)
8.	(2)	**9.**	(4)	**10.**	(3)	**11.**	(3)	**12.**	(1)	**13.**	(4)	**14.**	(1)
15.	(3)	**16.**	(2)	**17.**	(3)	**18.**	(1)	**19.**	(3)	**20.**	(1)	**21.**	(3)
22.	(2)	**23.**	(1)	**24.**	(3)	**25.**	(1)	**26.**	(2)	**27.**	(3)	**28.**	(1)
29.	(1)	**30.**	(4)										

PART- II

1.	(1)	**2.**	(1)	**3.**	(1)	**4.**	(2)	**5.**	(3)	**6.**	(2)	**7.**	(2)
8.	(1)	**9.**	(2)	**10.**	(2)	**11.**	(3)	**12.**	(3)	**13.**	(2)	**14.**	(4)
15.	(2)	**16.**	(1)	**17.**	(3)	**18.**	(3)	**19.**	(4)	**20.**	(1)	**21.**	(1)
22.	(2)	**23.**	(2)										