Physics Galaxy
Telegram Test Series

DPYQ NEET Level Practice Test-1 for JEE Main & NEET Aspirants

Topic : MECHANICS **Time: 90Min Marking: +4 –1**

Section - A : All questions are compulsory MCQs

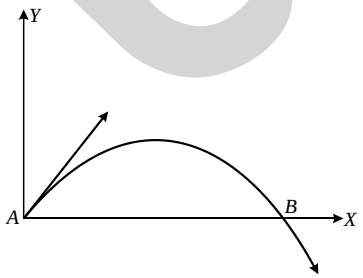
1. The distance travelled by an object starting from rest and moving with an acceleration 4 ms^{-2}, in the fifth second of its motion is :
(A) 50 m (B) 20 m
(C) 18 m (D) 200 m

2. The position x of a particle with respect to time t along x-axis is given by $x = 6t^2 - t^3$ where x is in metres and t in second. What will be the position of this particle when it achieves maximum speed along the $+ve$ x direction ?
(A) 54 m (B) 81 m
(C) 24 m (D) 16 m

3. The speed of a freestyle swimmer in still water is 20 m/s. The speed of river water is $10\sqrt{3}$ m/s and is flowing due east. If he is standing on the south bank and wishes to cross the river along the shortest path the angle at which he should make his strokes w.r.t. north is given by :
(A) 30° west (B) 0°
(C) 60° west (D) 45° west

4. A cannon ball is fired for maximum range with an initial velocity of 40 m/s in a war. If g = 10 m/s^2, the maximum range of the cannon is :
(A) 40 m (B) 80 m
(C) 160 m (D) 320 m

5. The velocity of a projectile at the initial point A is $(2\hat{i} + 3\hat{j})$ m/s. It's velocity (in m/s) at maximum height is :



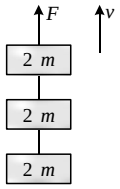
(A) $2\ \hat{i}$ (B) $-2\hat{i} + 3\hat{j}$
(C) $2\hat{i}$ (D) $3\hat{j}$

6. A lift of mass 500 kg which is moving with acceleration of 1.8 m/s^2 in upward direction, then the tension developed in string which is connected to lift is :
(A) 4900 N (B) 5800 N
(C) 11000 N (D) 4000 N

7. A monkey of mass 20 kg is holding a vertical rope. The rope will not break when a mass of 50 kg is suspended from it but will break if the mass exceeds 50 kg. What is the maximum acceleration with which the monkey can climb up along the rope ? (g = 10 m/s^2)
(A) 1.5 m/s^2 (B) 10 m/s^2
(C) 35 m/s^2 (D) 15 m/s^2

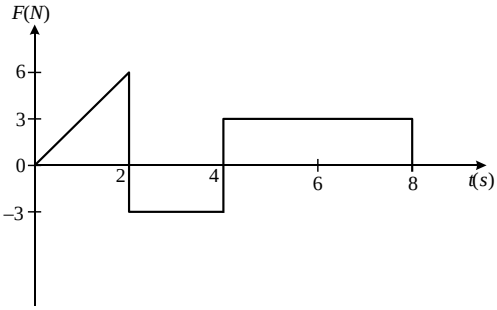
8. A stone is dropped from a height h. It hits the ground with a certain momentum P. If the same stone is dropped from a height 200% more than the previous height, the momentum when it hits the ground will change by :
(A) 41 % (B) 200 %
(C) 100 % (D) 73 %

9. Three blocks with masses $2m$, $2m$ and $2m$ are connected by strings, as shown in the figure. After an upward force F is applied on block m, the masses move upward at constant speed v. What is the net force on the block of lowest mass 2 m ? (g is the acceleration due to gravity) :



(A) Zero (B) 2 mg
(C) 3 mg (D) 6 mg

10. The force F acting on a particle of mass m is indicated by the force-time graph shown below. The change in momentum of the particle over the time interval from zero to 6 s is :



(A) 24 Ns (B) 20 Ns
(C) 12 Ns (D) 6 Ns

11. A block of mass 20kg placed on rough horizontal surface having coefficient of friction $\mu = 0.2$, if a man applies a horizontal force of 60 N then acceleration of the block will be :

(A) 10 m/s^2 (B) 5 m/s^2
(C) 2 m/s^2 (D) 0.5 m/s^2

12. A ball is projected from ground making an angle of 30º with horizontal having kinetic energy K. The kinetic energy at highest point will be :

(A) $\frac{K}{\sqrt{2}}$ (B) $\frac{K}{2}$

(C) $\frac{3K}{4}$ (D) K

13. Two springs A and B having spring constant K_A and K_B ($K_A = 4K_B$) are stretched by applying force of equal magnitude. If energy stored in spring A is E_A then energy stored in B will be:

(A) $2E_A$ (B) $E_A/4$
(C) $E_A/2$ (D) $4E_A$

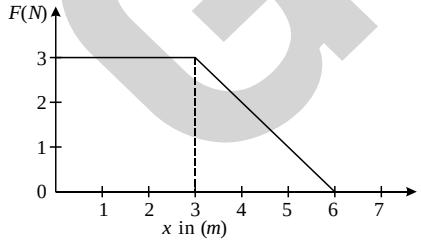
14. If kinetic energy of a body is increased by 800% then percentage change in momentum will be :

(A) 200% (B) 150%
(C) 265% (D) 73.2%

15. When a long spring is stretched by 4 cm, its potential energy is U. If the spring is stretched by 80 cm, the potential energy stored in it will be :

(A) $U/20$ (B) 20 U
(C) 400 U (D) 40 U

16. A force F acting on an object varies with distance x as shown here. The force is in newton and x in m. The work done by the force in moving the object from $x = 0$ to $x = 6$ m is :



(A) 18.0 J (B) 13.5 J
(C) 4.5 J (D) 9.0 J

17. An object of mass 5kg is under a constant force which causes a displacement s in metres in it, given by the relation $s = 1/3t^2$, where t is in seconds. Work done by the force in 3 seconds is :

(A) $\frac{100}{3}$ J (B) 10J

(C) $\frac{50}{3}$ J (D) 100 J

18. A force $F = 30 + 10y$ acts on a particle in y-direction where F is in newton and y in meter. Work done by this force to move the particle from $y = 0$ to $y = 5$ m is :

(A) 125 J (B) 150 J
(C) 375 J (D) 80 J

19. Water falls from a height of 60 m at the rate of 15 kg/s to operate a turbine. The losses due to frictional forces are 10% of energy. How much power is generated by the turbine ? (g = 10 m/s^2) :

(A) 12.3 kW (B) 7.0 kW
(C) 8.1 kW (D) 10.2 kW

20. A body of mass 1 kg begins to move under the action of a time dependent force $F = (3t\,\hat{i} + 4t^2\,\hat{j})$ N, where $\hat{i}$ and $\hat{j}$ are unit vectors along x and y-axis. What power will be developed by the force at the time t ?

(A) $\frac{9}{3}t^3 + \frac{16}{3}t^5$ (B) $(2t^2 + 4t^4)$ W

(C) $(2t^3 + 3t^4)$ W (D) $\frac{9}{2}t^3 + \frac{16}{2}t^5$

21. A car runs at a constant speed on a circular track of radius 100 m, taking 31.4 seconds for every circular lap. The average velocity and average speed for each circular lap respectively is :

(A) 0, 0 (B) 0, 20 m/s
(C) 10 m/s, 10 m/s (D) 20 m/s, 0

22. A formula car of mass 1500 kg negotiates a banked curve of radius $40\sqrt{3}$ m on a frictionless road. If the banking angle is 30º, the speed of the car is :

(A) 20 ms^{-1} (B) 30 ms^{-1}
(C) 5 ms^{-1} (D) 10 ms^{-1}

23. An object moves along a circle of radius $\left(\frac{10}{\pi}\right)$ m with constant tangential acceleration. If the velocity of the particle is 40 m/s at the end of the second revolution after motion has begun, the tangential acceleration is :

(A) 40 m/s^2 (B) 20 π m/s^2
(C) 20 m/s^2 (D) 40 π m/s^2

24. A roller coaster is designed such that riders experience ''weightlessness'' as they go round the top of a hill whose radius of curvature is 10 m. The speed of the car at the top of the hill is between :

(A) 16 m/s and 17 m/s (B) 9 m/s and 11 m/s
(C) 14 m/s and 15 m/s (D) 15 m/s and 16 m/s

25. Two persons of mass 40 kg and 50 kg have position vectors $\hat{i}+2\hat{j}+\hat{k}$ and $-3\hat{i}-2\hat{j}+\hat{k}$, respectively. The centre of mass of this system has a position vector :

(A) $-\hat{i}+\hat{j}+\hat{k}$ (B) $-\frac{2}{9}\hat{i}-\frac{11}{9}\hat{j}+\hat{k}$

(C) $-2\hat{i}-0\hat{j}+\hat{k}$ (D) $-\frac{2}{9}\hat{i}-\frac{11}{9}\hat{j}+\hat{k}$

26. A bomb of mass 40 kg at rest explodes into two pieces of masses 30 kg and 10 kg. The velocity of 30 kg mass is 6 ms^{-1}. The kinetic energy of the other mass is :

(A) 524 J (B) 1620 J
(C) 486 J (D) 324 J

27. A particle of mass m is projected with velocity v making an angle of 30° with the horizontal from level ground. When the particle lands on the level ground the magnitude of the change in its momentum will be :

(A) $mv\sqrt{2}$ (B) Zero
(C) $2mv$ (D) mv

28. A ball is thrown vertically downwards from a height of 20 m with an initial velocity v_0. It collides with the ground loses 25 percent of its energy in collision and rebounds to the same height. The initial velocity v_0 is : (Take g = 10ms^{-2})

(A) 10 ms^{-1} (B) 14 ms^{-1}
(C) 20 ms^{-1} (D) 28 ms^{-1}

29. The moment of inertia of a uniform circular disc of radius R and mass M about an axis passing from the edge of the disc and normal to the disc is :

(A) $\frac{1}{2}MR^2$ (B) $\frac{7}{2}MR^2$

(C) $\frac{3}{2}MR^2$ (D) MR^2

30. A wheel has angular acceleration of 5.0 rad/s^2 and an initial angular speed of 2.00 rad/s. In a time of 10 s it has rotated through an angle (in radian) of :

(A) 10 (B) 250
(C) 270 (D) 230

31. A hollow cylinder of mass 50 kg and radius 0.5 m is free to rotate about the horizontal axis. A massless string is wound round the cylinder with one end attached to it and other hanging freely. Tension in the string required to produce an angular acceleration of 2 revolutions s^{-2} is :

(A) 25 N (B) 314 N
(C) 78.5 N (D) 157 N

32. A ring of radius 2 m and mass 100 kg rolls on a horizontal floor. Its centre of mass has speed of 20 cm/s. How much work is needed to stop it ?

(A) 3 J (B) 4 J
(C) 2 J (D) 1 J

33. A hollow sphere of mass m and radius R is rotating about its diameter. A hollow cylinder of the same mass and same radius is also rotating about its geometrical axis with an angular speed twice that of the sphere. The ratio of their kinetic energies of rotation (E_{sphere} / $E_{cylinder}$) will be :

(A) 2 : 3 (B) 1 : 5
(C) 1 : 6 (D) 3 : 1

34. A hollow cylinder of mass 3 kg is rolling on a horizontal surface with velocity 4 ms^{-1}. It collides with a horizontal spring of force constant 100 Nm^{-1}. The maximum compression produced in the spring will be :

(A) 0.5 m (B) 0.6 m
(C) 0.96 m (D) 0.2 m

35. The ratio of the accelerations for a hollow sphere (mass m and radius R) rolling down an incline of angle θ without slipping and slipping down the incline without rolling is :

(A) 3 : 5 (B) 2 : 3
(C) 2 : 5 (D) 7 : 5

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Section - B : In actual NEET paper you will be given choice to attempt any 10 out of 15 questions in this section but for this test paper, students are advised to solve all question to compare their preparation with the provided benchmarking

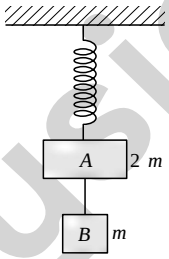
1. A particle moves in a straight line with a constant acceleration. It changes its velocity from 20 ms^{-1} to 30 ms^{-1} while passing through a distance 125 m in t second. The value of t is :

(A) 1.8 s (B) 2.7 s
(C) 10.8 s (D) 1.2 s

2. In a projectile motion, the horizontal range is 4 times that of the maximum height of a projectile . The angle of projection of the projectiles is :

(A) $\theta = \tan^{-1}\left(\frac{1}{4}\right)$ (B) $\theta = \tan^{-1}(4)$
(C) $\theta = \tan^{-1}(2)$ (D) $\theta = 45^{\circ}$

3. Two blocks A and B of masses $2m$ and m respectively are connected by a massless and inextensible string. The whole system is suspended by a massless spring as shown in figure. The magnitudes of acceleration of A and B immediately after the string is cut, are respectively :



(A) $g, \frac{g}{3}$ (B) $\frac{g}{2}, g$
(C) g, g (D) $\frac{g}{3}, \frac{g}{3}$

4. The potential energy of particle in a force field is $U = 2\frac{A}{r^2} - 3\frac{B}{r}$ where A and B are positive constants and r is the distance of particle from the centre of the field. For stable equilibrium, the distance of the particle is :

(A) $B/2A$ (B) $2A/B$
(C) $\frac{4A}{3B}$ (D) B/A

5. A block of mass 20 kg is in contact against the inner wall of a hollow cylindrical drum of radius 2 m. The coefficient of friction between the block and the inner wall of the cylinder is 0.2. The minimum angular velocity needed for the cylinder to keep the block stationary when the cylinder is vertical and rotating about its axis, will be : ($g = 10\ m/s^2$) :

(A) $\sqrt{10}$ rad/s (B) $\frac{10}{2\pi}$ rad/s
(C) 5 rad/s (D) $10\,\pi$ rad/s

6. Two persons of masses 50 kg and 45 kg respectively, are at the opposite ends of a boat. The length of the boat is 5.0 m and weighs 100 kg. The 50 kg man walks up to the 45 kg man and sits with him. Neglect friction between boat and water, if the boat is in still water the centre of mass of the system shifts by :

(A) 3.0 m (B) 2.3 m
(C) Zero (D) 0.75 m

7. On a frictionless surface a ball of M moving at speed v collides elastically with another ball of same mass M which is initially at rest. After collision the first ball moves at an angle θ to its initial direction and has a speed $\frac{v}{2}$. The second ball's speed after the collision is :

(A) $\frac{\sqrt{3}}{2}v$ (B) $\frac{2\sqrt{2}}{3}v$
(C) $\frac{\sqrt{3}v}{2}$ (D) $\frac{3}{\sqrt{2}}v$

8. Body A of mass $3m$ moving with speed u collides with another body B of mass m, at rest. The collision is head on and elastic in nature. After the collision the fraction of energy lost by the colliding body A is :

(A) $\frac{1}{9}$ (B) $\frac{3}{4}$
(C) $\frac{4}{9}$ (D) $\frac{5}{9}$

9. A thin circular disc of mass M and radius r is rotating about its axis with a constant angular velocity ω. Four objects each of mass m, are kept gently to the opposite ends of two perpendicular diameters of the disc. The angular velocity of the disc will be :

(A) $\frac{M\omega}{4m}$ (B) $\frac{M\omega}{M+4m}$
(C) $\frac{(M+4m)\omega}{M}$ (D) $\frac{(M-4m)\omega}{M+4m}$

10. A hollow sphere is in rolling motion. In rolling motion a body possesses translational kinetic energy (K_t) as well as rotational kinetic energy (K_r) simultaneously. The ratio $K_t : (K_t + K_r)$ for the sphere is :

(A) 10 : 7 (B) 6 : 10
(C) 7 : 10 (D) 10 : 6

11 . A ball is falling freely under influence of gravity. It covers distances h_1, h_2 and h_3 in the first 2 seconds, the next 2 seconds and the next 2 seconds respectively. The relation between h_1, h_2 and h_3 is :

(A) $h_1 = 2h_2 = 3h_3$ (B) $h_1 = \frac{h_2}{3} = \frac{h_3}{5}$

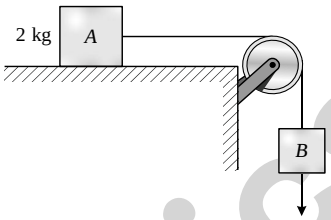
(C) $h_2 = 3h_1$ and $h_3 = 3h_2$ (D) $h_1 = h_2 = h_3$

12. A fielder in cricket catches a ball of mass 100 gm in 0.2 s moving with speed 40 m/s, then he experiences force of :

(A) 40 N (B) 20 N

(C) 2 N (D) 0.2 N

13. The coefficient of static friction, μ_s, between block A of mass 2 kg and the table as shown in the figure, is 0.4. What would be the maximum mass value of block B so that the two blocks do not move ? The string and the pulley are assumed to be smooth and massless. (g = 10 m/s^2) :



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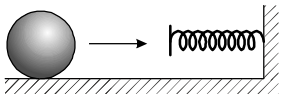
(A) 2.0 kg (B) 4.0 kg

(C) 0.8 kg (D) 0.4 kg

14. A ball of mass of 4 kg moving with a speed of 5 m/s on a horizontal smooth surface, collides with a nearly weightless spring of force constant k = 20 N/m. The maximum compression of the spring would be :



(A) 0.15 m (B) 1.8 m

(C) 1.5 m (D) 2.2 m

15. Two coins of masses m and 4 m are whirled in horizontal circles, the heavier one in radius $r/2$ and the lighter one in radius r. The tangential speed of lighter stone is n times that of the value of heavier stone when they experience same centripetal forces. The value of n is :

(A) 1 (B) 2

(C) $2\sqrt{2}$ (D) 4

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ANSWER KEY

SECTION-A

1. (C)	**2.** (D)	**3.** (C)	**4.** (C)
5. (C)	**6.** (B)	**7.** (D)	**8.** (D)
9. (A)	**10.** (D)	**11.** (C)	**12.** (C)
13. (D)	**14.** (A)	**15.** (C)	**16.** (B)
17. (B)	**18.** (C)	**19.** (C)	**20.** (A)
21. (B)	**22.** (A)	**23.** (C)	**24.** (B)
25. (D)	**26.** (B)	**27.** (A)	**28.** (B)
29. (C)	**30.** (A)	**31.** (B)	**32.** (B)
33. (C)	**34.** (C)	**35.** (A)	

SECTION-B

1. (B)	**2.** (D)	**3.** (B)	**4.** (C)
5. (C)	**6.** (C)	**7.** (C)	**8.** (B)
9. (B)	**10.** (B)	**11.** (B)	**12.** (B)
13. (C)	**14.** (A)	**15.** (C)	