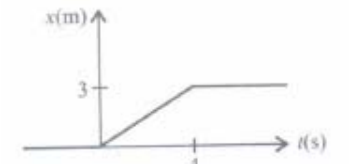
NEET PHYSICS PRACITCE PAPER

Time : 60 Mins **3 LAWS OF MOTION 1** **Marks : 200**

1. If the equation for the displacement of a particle moving on a circular path is given by:
   $\theta = 2t^3 + 0.5$
   where θ is in radian and t in second, then the angular velocity of the particle is:
   a) 8 rad/sec b) 12 rad/sec c) 24 rad /sec d) 36 rad /sec
2. A block of metal weighing 2 kg is resting on a frictionless plane. It is struck by a jet releasing water at a rate of 1 kg/s and at a speed of 5 mls. The initial acceleration of the block will be:
   a) 2.5 m/s^2 b) 5 m/s2 c) 10m/s^2 d) 20m/s^2
3. A rocket with a lift-off mass 2 x10^4 kg is blasted upwards with an initial acceleration of 5 m s^{-2}. The initial thrust of the blast is (Take g = 10 m S^{-2})
   a) 2 x 10^5 N b) 3 x 10^5 N c) 4 x 10^5 N d) 5 x 10^5 N
4. A man sits on a chair supported by a rope passing over a frictionless fixed pulley. The man who weighs 1000 N exerts a force of 450 N on the chair downwards while pulling on the rope. If the chair weighs 250 N and g is 10m.s^2, then the acceleration of the chair is:
   a) 0.45 m/sec^2 b) Zero c) 2 m/sec^2 d) (9/25) m/sec^2
5. The moment of inertia of a metre stick of mass 300 gm, about an axis at right angles to the stick and located at 30cm mark. is:
   a) 8.3 x 10^5 $g\text{-}cm^2$ b) 5.8 $g\text{-}cm^2$ c) 3.7 x 10^5 $g\text{-}cm^2$ d) None of these
6. A motor cyclist rides around the well with a round vertical wall and does not fall down while riding because
   a) the force of gravity disappears b) he loses weight some how.
   c) he is kept in this path due to the force exerted by surrounding air.
   d) the frictional force of the wall balances his weight.
7. A man walks over a rough surface; the angle between the force of friction and the instantaneous velocity of the person is:
   a) π b) $\pi/2$ c) 2π d) Zero
8. The string of a pendulum of length l is displaced through 90° from the vertical and released. Then, the minimum strength of the string in order to withstand the tension as the pendulum passes through the mean position is:
   a) mg b) 3mg c) 5mg d) 6mg
9. A body with mass 5 kg is acted upon by a force $\vec{F} = (-3\hat{i} + 4\hat{j})$ N. If its initial velocity at t = 0 is $\vec{u} = (6\hat{i} - 12\hat{j})$ m s^{-1}, the time at which it will just have a velocity along the y-axis is
   a) 0 b) 10 s c) 2 s d) 15 s
10. A block of mass 50 kg slides over a horizontal distance of 1m. If the coefficient of friction between their surfaces is 0.2, then work done against friction is:
    a) 98 J b) 72 J c) 56 J d) 34 J
11. For which of the following does the centre of mass lie outside the body?
    a) A pencil b) A shotput c) A dice d) A bangle
12. Four masses each of 2 kg are placed on a horizontal circular disc, which can be rotated about a vertical axis passing through its centre and all the masses be equidistant from the axis and at a distance of 10 em from it. The moment of inertia of the whole system (in $gm\text{-}cm^2$) is: (Assume disc is of negligible mass)
    a) 10^5 b) 10^4 c) 10^6 d) 10^8

13. (A) The torque ($\tau = I\alpha$) can be applied only about two points:
    (i) centre of mass (ii) instantaneous centre of rotation.
    (R) The equation α_{cm} = αR can always be applied in case of pure rolling.
    a) If both assertion and reason are true and reason is the correct explanation of assertion.
    b) If both assertion and reason are true but reason is not the correct explanation of assertion.
    c) If assertion is true but reason is false d) If both assertion and reason are false
    e) If assertion is false but reason is true
14. The angular speed of a motor wheel is increased from 1200 rpm to 3120 rpm in 16 seconds. The angular acceleration of the motor wheel is :
    a) $8\pi \text{ rad s}^{-2}$ b) $2\pi \text{ rad s}^{-2}$ c) $4\pi \text{ rad s}^{-2}$ d) $6\pi \text{ rad s}^{-2}$
15. For a particle performing uniform circular motion, choose the incorrect statement from the following
    a) Magnitude of particle velocity (speed) remains constant
    b) Particle velocity remains directed perpendicular to radius vector
    c) Direction of acceleration keeps changing as the particle moves
    d) Magnitude of acceleration does not remain constant
16. A weightless thread can bear tension upto 37 N. A stone of mass 500 g is tied to it and revolved in a circular path of radius 4 m in a vertical plane. If g = 10 ms $^{-2}$ then, the maximum angular velocity of the stone will be:
    a) 2 rad s^{-1} b) 4 rad s^{-1} c) 8 rad s^{-1} d) 16 rad s^{-1}
17. Two particles of masses m_1 and m_2 are connected by a rigid massless rod of length r to constitute a dumb-bell which is free to move in the plane. The moment of inertia of the dumb-bell about an axis perpendicular to the plane passing through the centre of mass is:
    a) $\frac{m_1 m_2 r^2}{(m_1+m_2)}$ b) $(m_1 + m_2) r^2$ c) $\frac{m_1 m_2 r^2}{(m_1-m_2)}$ d) $(m_1 - m_2) r^2$
18. A stone of mass 1 kg is lying on the floor of a train which is accelerating with 1 m S^{-2}. The net force acting on the stone is
    a) zero b) 1 N c) 5 N d) 10 N
19. A loop and a disc have the same mass and roll without slipping with the same linear velocity v. If the total kinetic energy of the loop is 8 J, the kinetic energy of the disc must be:
    a) 8 J b) 6 J c) 16 J d) 4 J
20. (A) If polar ice cap melts, the day will be shortened.
    (R) Angular momentum of earth about its own rotation axis is conserved
    a) If both assertion and reason are true and reason is the correct explanation of assertion.
    b) If both assertion and reason are true but reason is not the correct explanation of assertion.
    c) If assertion is true but reason is false. d) If both assertion and reason are false.
    e) If assertion is false but reason is true.
21. Assertion: To determine the motion of the centre of mass of a system, knowledge of internal forces of the system is required.
    Reason: For this purpose we need not to know the external forces on the system
    a) If both assertion and reason are true and reason is the correct explanation of assertion
    b) If both assertion and reason are true but reason is not the correct explanation of assertion
    c) If assertion is true but reason is false d) If both assertion and reason are false

22. Figure shows the position-time graph of a particle of mass 4 kg. Let the force on the particle for t < 0, 0 < t < 4 s, t > 4 s be F_I, F_2 and F_3 respectively. Then



a) $F_1 = F_2 = F_3 = 0$ b) $F_1 > F_2 = F_3$ c) $F_1 > F_2 > F_3$ d) $F_1 < F_2 < F_3$

23. (A) Angle of repose is equal to the angle of limiting friction.
(R) When the body is just at the point of motion, the force of friction in this stage is called limiting friction.
a) If both assertion and reason are true and reason is the correct explanation of assertion.
b) If both assertion and reason are true but reason is not the correct explanation of assertion.
c) If assertion is true but reason is false. d) If both assertion and reason are false.
e) If assertion is false but reason is true

24. A body of mass m slides down a rough plane of inclination α if μ is the coefficient offriction, then acceleration of the body will be:
a) g sin α b) μ cos a c) g (sin α - μ cos α) d) g (cos α - μ sin α)

25. (A) It is difficult to move a bicycle along horizontal road with applying breaks.
(B) The sliding friction is greater than the rolling friction.
a) If both assertion and reason are true and reason is the correct explanation of assertion.
b) If both assertion and reason are true but reason is not the correct explanation of assertion.
c) If assertion is true but reason is false. d) If both assertion and reason are false.
e) If assertion is false but reason is true

26. A packet of weight W is dropped with the help of a parachute and on striking the ground comes to rest with a retardation equal to twice the acceleration due to gravity. What is the force exerted on the ground?
a) W b) 2W c) 3W d) 4W

27. A mass 1 kg is suspended by a thread. It is
(i) lifted up with an acceleration 4.9 m/s^2,
(ii) lowered with an acceleration 4.9 m/s^2.
The ratio of the tensions is:
a) 3:1 b) 1:3 c) 1:2 d) 2:1

28. If the radius of a solid sphere is 35 cm, calculate the radius of gyration when the axis is along a tangent:
a) $7\sqrt{10}cm$ b) $7\sqrt{35}cm$ c) $\frac{7}{5}cm$ d) $\frac{2}{5}cm$

29. (A) In circular motion, centripetal and centrifugal forces act in opposite directions and balance each other.
(R) Centripetal force is a pseudo force.
a) If both assertion and reason are true and reason is the correct explanation of assertion.
b) If both assertion and reason are true but reason is not the correct explanation of assertion.
c) If assertion is true but reason is false. d) If both assertion and reason are false.
e) If assertion is false but reason is true.

30. A cricket mat of mass 50 kg is rolled loosely in the form ofa cylinder of radius 2 m. Now again it is rolled tightly so that the radius becomes $\frac{3}{4}$th of original value; then the ratio of moment of inertia of mat in the two cases is:
a) 1 : 3 b) 4 : 3 c) 16 : 9 d) 3 : 5

31. A pot-maker rotates pot-making wheel of radius 3 m by applying a force of 2000 N tangentially; because of this if wheel completes exactly $1\frac{1}{2}$ revolution, the work done by him is:
a) 5654.86 J b) 4321.32 J c) 4197.5 J d) 5000 J

32. A stone of mass m tied to the end of a string revolves in a vertical circle of radius R. The net forces at the lowest and highest points of the circle directed vertically downwards are T_1 and V_1 denote the tension and speed at the lowest point. T_2 and v_2 denote corresponding values at the highest point.

a)

Lowest Point	Highest Point
mg- T_1	mg+ T_2

b)

Lowest Point	Highest Point
mg + T_1	mg- T_2

c)

Lowest Point	Highest Point
mg + T_1-$\left(\frac{m_1^2}{R}\right)$	mg- T_2+$\left(\frac{m_2^2}{R}\right)$

d)

Lowest Point	Highest Point
mg - T_1-$\left(\frac{m_1^2}{R}\right)$	mg+ T_2+$\left(\frac{m_2^2}{R}\right)$

33. The static friction is:
a) equal to the dynamic friction b) always less than the dynamic friction
c) always greater than the dynamic friction d) sometimes greater and sometimes equal to dynamic friction

34. A vehicle of mass m is moving on a rough horizontal road with momentum p. If the coefficient of friction between the tyres and the road be μ, then the stopping distance is :
a) $\frac{p}{2\mu mg}$ b) $\frac{p^2}{2\mu mg}$ c) $\frac{p}{2\mu m^2 g}$ d) $\frac{p^2}{2\mu m^2 g}$

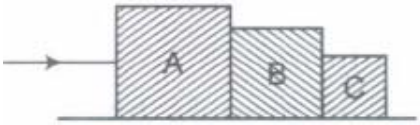
35. Assertion: The moment of inertia of a rigid body reduces to its minimum value, when the axis of rotation passes through its centre of gravity.
Reason : The weight of a rigid body always acts through its centre of gravity
a) If both assertion and reason are true and reason is the correct explanation of assertion
b) If both assertion and reason are true but reason is not the correct explanation of assertion
c) If assertion is true but reason is false d) If both assertion and reason are false

36. The instantaneous angular position of a point on a rotating wheel is given by the equation $\theta(t) = 2t2^3 - 6t^2$. The torque on the wheel becomes zero at
a) t = 1 s b) t = 0.5 s c) t= 0.25 s d) t = 2 s

37. A body of mass 8 kg is hanging from another body of mass 12 kg. The combination is being pulled by a string with an acceleration of 2.2 ms^{-2}. tension T_2 is equal to:
a) 96 N b) 48 N c) 100 N d) 80 N

38. A block of mass m is placed on a smooth inclined plane of inclination e with the horizontal. The inclined plane is accelerated horizontally so that the block does not slide down. if the block is sliding downwards due to its own weight, the force exerted on the inclined plane is:
a) mg b) mg tan θ c) mg sin θ d) None of these

39. Three blocks A, B and C, of masses 4 kg, 2 kg and 1 kg respectively, are in contact on a frictionless surface, as shown. If a force of 14 N is applied on
the 4 kg block, then the contact force between A and B is:



a) 18 N b) 2 N c) 6 N d) 8 N

40. With what minimum acceleration can a fireman slides down a rope while breaking strength of the rope is 2/3 of his weight?
a) $\frac{2}{3}g$ b) g c) $\frac{1}{3}g$ d) Zero

41. (A) A body is moving along a straight line under a variable force, area under the force-time graph on the time axis will be the 'Impulse'.
(R) Impulse is the total change in linear momentum.

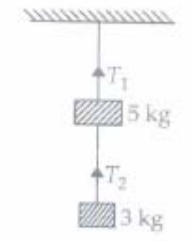
a) If both assertion and reason are true and reason is the correct explanation of assertion.
b) If both assertion and reason are true but reason is not the correct explanation of assertion.
c) If assertion is true but reason is false. d) If both assertion and reason are false.
e) If assertion is false but reason is true

42. A ring is rolling on a surface without slipping. What is the ratio of its translational to rotational kinetic energies?
a) 5 : 7 b) 2 : 5 c) 2 : 7 d) 1:1

43. The ratio of time taken by a uniform solid sphere and disc of the same mass and the same diameter to roll down through the same distance from rest on a smooth inclined plane is:
a) 15 : 14 b) $\sqrt{15} : \sqrt{14}$ c) $15^2 : 14^2$ d) $\sqrt{14} : \sqrt{15}$

44. A solid cylinder of mass 3 kg is rolling on a horizontal surface with velocity 4 ms^{-1}. It collides with horizontal spring of force constant 200 Nm^{-1}. The maximum compression produced in the spring will be :
a) 0.7 m b) 0.2 m c) 0.5 m d) 0.6 m

45. Two masses of 5 kg and 3 kg are suspended with the help of massless inextensible strings as shown in figure. The whole system is going upwards with an acceleration of 2 m s^{-2}. The tensions T_1 and T_2 are respectively (Take g = 10 m s^{-2})



a) 96 N, 36 N b) 36 N, 96 N c) 96 N, 96 N d) 36 N, 36 N

46. Two masses 5 kg and 3 kg are suspended from the ends of an unstretchable light string passing over a frictionless pulley. When the masses are released, the pressure on the pulley is:
a) 8 Kgf b) 2 kgf c) 15 kgf d) 7.5 kgf

47. A massless disc of radius ris attached with 5 masses of mass m on its rim. The total moment of inertia ofthe system is:
a) 5 mr^2 b) $\frac{11}{2}mr^2$ c) $\frac{1}{2}mr^2$ d) $\frac{6}{7}mr^2$

48. A bullet is fired from a gun. The force on the bullet is given by F = 600-2 $\times$ 10^5 t where, F is newton and / in second. The force on the bullet becomes zero as soon as it leaves the barrel. What is the average impulse imparted to the bullet?
a) 8N-s b) 0 c) 0.9N-s d) 1.8N-s

49. A solid sphere of mass 2 kg rolls up a 30° incline with an initial speed of 10 m/s. The maximum height reached by the sphere is: (Take g = 10 rn/s^2)
a) 3.5 m b) 7.0 m c) 10.5 m d) 14.0 m

50. A child is standing at one end of a long trolley moving with a speed v on a smooth horizontal floor. If the child starts running towards the other end of the trolley with a speed u, the centre of mass of the system (trolley + child) will move with a speed
a) zero b) (v + u) c) (v-u) d) v