Time : 100 Mins **PHYSICS TEST 15 LAWS OF MOTION Q 1** **Marks : 364**

1. The moment of inertia of a solid sphere of density p and radius R about its diameter is:
   a) $\frac{105}{176}R^5p$ b) $\frac{105}{176}R^2p$ c) $\frac{176}{105}R^5p$ d) $\frac{176}{105}R^2p$
2. If $F_1 + F_2 + F_3 = 0$, then
   a) $F_1 > F_2$ b) $F_2 > F_3$ c) $F_3 > F_1$ d) None of these
3. A force acts on a 3.0 g particle in such a way that the position of the particle as a function of time is given by: $x = 3t - 4t^2 + t^3$
   Where x is in metres and 1 is in seconds. The work done during the first 4 s is:
   a) 570 mJ b) 450 mJ c) 490 mJ d) 530 mJ
4. A motorcycle is going on an overbridge of radius R. The driver maintains a constant speed. As the motorcycle is ascending on the overbridge, the normal force on it:
   a) increases b) decreases c) remains the same d) fluctuates erratically
5. (A) All scalar physical quantities have no direction.
   (R) The magnitude of a vector may be a negative scalar.
   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.
6. The potential energy of a body of mass m is given by: U = ax + by, where x and yare the position co-ordinates of the particle. The acceleration of the particle is:
   a) $\frac{a^2+b^2}{m}$ b) $\frac{(a+b)^{1/2}}{m}$ c) $\frac{a+b}{m}$ d) $\frac{(a^2-b^2)^{1/2}}{m}$
7. The radius of gyration of an uniform rod of length 1 about an axis passing through one of its ends and perpendicular to its length is
   a) $\frac{1}{\sqrt{2}}$ b) $\frac{1}{3}$ c) $\frac{1}{\sqrt{3}}$ d) $\frac{1}{2}$
8. (1) Centre of gravity of a body is the point at which the weight of the body acts.
   (2) Centre of mass coincides with the centre of gravity if the earth is assumed to have infinitely large radius.
   (3) To evaluate the gravitational field intensity due to any body at an external point, the entire mass of the body can be considered to be concentrated at its centre of gravity
   (4) The radius of gyration of any body rotating about an axis is the length of the perpendicular dropped from the centre of gravity of the body to the axis
   Which one of the following pairs of statements is correct?
   a) (1) and (4) b) (1) and (2) c) (2) and (3) d) (3) and (4)
9. A person in an elevator accelerating upwards with an acceleration of 2 m s^{-2}, tosses a coin vertically upwards with a speed of 20 m s^{-1}. After how much time will the coin fall back into his hand? (Take g=10 ms^{-2})
   a) $\frac{5}{3}$ s b) $\frac{3}{10}$ s c) $\frac{10}{3}$ s d) $\frac{3}{5}$ s
10. The height y and the distance x along the horizontal plane of a projectile on a certain planet (with no surrounding atmosphere) are given by: $y = (8t - 5t^2)$ metre and x = 6t metre, where t is in seconds. The velocity of projection is:
    a) 8 m/s b) 6 m/s c) 10 m/s d) not obtained from the data

11. Two particles P and Q initially at rest are l m apart. P has a mass of 0.1 kg and Q has a mass of 0.3 kg. P and Q attract each other with a constant force of 10^{-2} N. No external forces act on the system. At what distance from P' s original position do the particles collide?
    a) 0.25m b) 0.75m c) 0.5m d) 0.8m
12. The length of an elastic string is xwhen the tension is 5 N. Its length is ywhen the tension is 7 N. What will be its length, when the tension is 9 N?
    a) 2x + y b) 2y - x c) 7y - 5x d) 7y + 5x
13. 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) $\frac{6}{7}mr^2$
14. The time taken by the particles for collision is:
    a) 3 sec b) $\sqrt{15}$ sec c) 4 sec d) 1 sec
15. Ball bearings are used to:
    a) convert static to dynamic friction b) convert limiting friction to dynamic friction
    c) convert sliding friction to rolling friction d) convert rolling friction to fluid friction
16. what is the state of motion when the man stops climbing?
    a) $\vec{u}rel. > 0$ b) $\vec{u}rel. < 0$ c) $\vec{u}rel. or \vec{V} = 0$ d) None of these
17. If the earth suddenly stops revolving and all its rotational KE is used up in raising its temperature and if s is taken to be the specific heat of the earth's material, the rise of temperature of the earth will be: (R = radius ofthe earth and (ω = its angular velocity)
    a) $\frac{R^2\omega^2}{5Js}$ b) $\frac{R^2\omega^2}{5J}$ c) $\frac{R^2\omega}{5Js}$ d) $\frac{R^2\omega^2}{5s}$
18. For a body moving with constant speed in a horizontal circle, which of the following remains constant?
    a) Velocity b) Centripetal force c) Acceleration d) Kinetic energy
19. (A) Newton's second law indicates that when a net force acts on an object, it must accelerate.
    (R) When two or more forces are applied to an object, it must accelerate.
    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.
20. A body is under the action of three forces $\overrightarrow{F_1}, \overrightarrow{F_2}$ and $\overrightarrow{F_3}$ In which case the body cannot undergo angular acceleration?
    a) $\overrightarrow{F_1}, \overrightarrow{F_2}$ and $\overrightarrow{F_3}$ are concurrent b) $\overrightarrow{F_1}$ + $\overrightarrow{F_2}$ + $\overrightarrow{F_3}$ = 0
    c) $\overrightarrow{F_1}, \overrightarrow{F_2}$ is parallel to $\overrightarrow{F_3}$ but the three forces are not concurrent.
    d) $\overrightarrow{F_1}$ and $\overrightarrow{F_2}$ act at the same point but $\overrightarrow{F_3}$ acts at different point
21. Two bodies of masses m and 4 m are moving with equal kinetic energies. The ratio of their linear momentum will be :
    a) 1 : 4 b) 4 :1 c) 1 : 2 d) 2 : 1
22. A boy is hanging from a horizontal branch of a tree. The tension in the arms will be maximum when the angle between the arms is:
    a) 0^0 b) 60^0 c) 90^0 d) 120^0
23. (A) A body can have acceleration even if its velocity is zero at a given instant of time.
    (R) A body is momentarily at rest when it reverses its direction of motion.
    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 heavy uniform chain lies on horizontal table top. If the coefficient of friction between the chain and the table surface is 0.25, then the maximum fraction of the length of the chain that can hang over one edge of the table is :

a) 20% b) 25% c) 35% d) 15%

25. A rope of length 10 m and linear density of 0.5 kg/m is lying lengthwise on a smooth horizontal floor. It is pulled by a force of 25 N. The tension in the rope at a point 8 m away from the point of application is:
    a) 20 N b) 15 N c) 10 N d) 5 N

26. An astronaut accidentally gets separated out of his small spaceship accelerating in interstellar space at a constant rate of 100 m S^{-2}. What is the acceleration of the astronaut the instant after he is outside the spaceship? (Assume that there are no nearby stars to exert gravitational force on him)
    a) zero b) 10ms^{-2} c) 50 m S^{-2} d) 100 m S^{-2}

27. A player takes 0.1 see in catching a ball of mass 150 g moving with a velocity of 20 m/s. The force imparted by the ball on the hands of the player is:
    a) 0.3 N b) 3 N c) 30 N d) 300 N

28. A wire of mass m and length I is bent in the form of a circular ring, the moment of inertia of the ring about its axis is:
    a) $(\frac{1}{8\pi^2})ml^2$ b) $(\frac{1}{2\pi^2})ml^2$ c) $(\frac{1}{4\pi^2})ml^2$ d) ml^2

29. (A) In uniform circular motion, magnitude of acceleration is v^2/R and direction is always towards the centre.
    (R) In uniform circular motion, acceleration is constant.
    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. Two discs have same mass and same thickness. Their materials are of densities ρ_1 and ρ_2. The ratio of their moments of inertia about central axis will be:
    a) $\rho_1\rho_2 : I$ b) $I : \rho_1\rho_2$ c) $\rho_1 : \rho_2$ d) $\rho_2 : \rho_1$

31. A bullet of mass 40 g moving with a speed of 90 m S^{-1} enters a heavy wooden block and is stopped after a distance of 60 cm. The average resistive force exerted by the block on the bullet is
    a) 180 N b) 220 N c) 270 N d) 320 N

32. A body of weight 100 Newtons is placed on a rough horizontal plan. Determine the co-efficient of friction if a horizontal force of 60 Newtons just causes the body to slide over the horizontal plane.
    a) 1.2 b) 0.1 c) 1.9 d) 0.6

33. (A) A solid sphere and ring of same mass and radius are released simultaneously from the top of an inclined surface. The two objects roll down the plane without slipping. They reach the bottom of the incline with equal linear speeds.
    (R) Loss of potential energy for both is the different.
    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 assertion is true but reason is false.
    e) If assertion isfalse but reason is true.

34. A ring of radius 0.5 m and mass 10 kg is rotating about its diameter with angular velocity of 20 rad/s. Its KE is:
    a) 10 J b) 100 J c) 500 J d) 1000 J

35. 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

36. The angle of projection for which the horizontal range and the maximum height of the projectile are equal is:
    a) 45° b) θ=tan^{-1}(4) c) θ=tan^{-1}(0.25) d) none of these

37. Two bodies of masses 2 kg and 4 kg are moving with velocities 2 mls and 10 mls respectively towards each other due to mutual gravitational attraction. What is the velocity of their centre of mass?
    a) 5.3ms^{-1} b) 6.4ms^{-1} c) Zero d) 8.1ms^{-1}

38. A mass M is moving with a constant velocity parallel to x-axis. Its angular momentum w.r.t. origin
    a) is zero b) remains constant c) goes on increasing d) goes on decreasing

39. A 100 N force acts horizontally on a block of 10 kg placed on a horizontal rough surface of coefficient of friction p = 0.5. If the acceleration due to gravity (g) is taken as 10 ms^{-2}, the acceleration of the block (in ms^{-2})is

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a) $2.5ms^2$ b) $10ms^2$ c) $5ms^2$ d) $7.5ms^2$

40. A coin is placed on a gramophone record rotating at a speed of 45 rpm. It flies away when the rotational speed is 50 rpm. If two such coins are placed one over the other on the same record, both of them will fly away when the rotational speed is:
a) 12.5 rpm b) 25 rpm c) 50 rpm d) 100 rpm

41. A car is running on a circular track of radius R and banking angle 9. If the coefficient of friction between the wheels of the race car and the road is μ_s, then the maximum permissible speed to avoid slipping is:
a) $\left[Rg\frac{\mu_s+tan\theta}{1-\mu_s tan\theta}\right]^{1/2}$ b) $\left[Rg\frac{\mu_s+tan\theta}{1+\mu_s tan\theta}\right]^{1/2}$ c) $\left[Rg\frac{\mu_s-tan\theta}{1+\mu_s tan\theta}\right]^{1/2}$ d) $\left[\frac{\mu_s+tan\theta}{1-\mu_s tan\theta}\right]^{1/2}$

42. A raindrop of mass 0.2 g is falling with a uniform velocity of 25 ern s^{-1} . Its weight will be: (g = 10m s^{-2})
a) Zero b) 0.02 N c) 0.002 N d) 0.2 N

43. If the time of duration of impulse is increased then the impulsive force:
a) decreases b) increases c) remains same d) nothing can be said

44. (A) Many great rivers flow toward the equator. The sediments that they carry increases the time of rotation of the earth about its own axis.
(R) The angular momentum of the earth about its 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.

45. A solid sphere rolls down two different inclined planes of same height, but of different inclinations. In both cases:
a) speed and time of descent will be same b) speed will be same, but time of descent will be different
c) speed will be different, but time of descent will be same d) speed and time of descent both are different

46. A block of mass 2 kg rest on a plane inclined at an angle of 30° with the horizontal. The coefficient of friction between the block and the surface is 0.7. What will be the frictional force acting on the block?
a) 10.3 N b) 23.8 N c) 11.9 N d) 6.3 N

47. A bridge is in the form of a semi-circle of radius 40 m. The greatest speed with which a motorcycle can cross the bridge without leaving the ground at the highest point is: (g = 10 rns^{-2}), (frictional force is negligibly small).
a) 40 ms^{-1} b) 20 ms^{-1} c) 30 ms^{-1} d) 15 ms^{-1} e) 25 ms^{-1}

48. Bullets of 0.03 kg mass each hit a plate at the rate of 200 bullets per second, with a velocity of 50 mlsec and reflect back with a velocity of 30 m s^{-l}. The average force acting on the plate (in Newton) is:
a) 120 b) 180 c) 300 d) 480

49. The linear velocity ofthe particle on the N-pole ofthe earth will be:
a) zero b) 486 km h^{-1} c) infinite d) 125 ms^{-1}

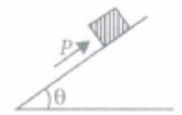
50. A sphere of diameter r is cut from a sphere of radius r such that the centre of mass of t:;c remaining mass be at maximum distance from original centre; then the distance is:
a) $\frac{r}{2}$ b) $\frac{r}{3}$ c) $\frac{r}{6}$ d) none of these

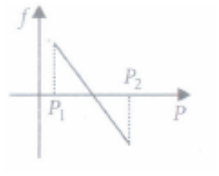
51. (A) The sum of squares of cosines of angle made by a vector with X, Y and Z axes is equal to unity.
(R) A vector makes 45° from X-axis have equal components along X and Y-axes.
a) If both assertion and reason are true and reason is the correct explanation of assertion.
b) If both assertion and reason 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.

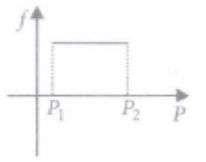
52. Two blocks of masses 6 kg and 4 kg are placed on a frictionless surface and connected by a spring. If the heavier mass is given a velocity of 14 m/s in the direction of lighter one, then the velocity gained by the centre of mass will be:
a) 7.4 m/s b) 14 m/s c) 8.4 m/s d) 10 m/s

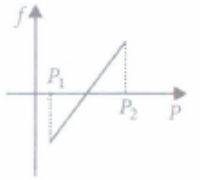
53. One end of a string of length l is connected to a particle of mass m and the other to a small peg on a smooth horizontal table. If the particle moves in a circle with speed v, the net force on the particle directed towards the centre is
(where T is the tension in the string)
a) T b) T-$\frac{mv^2}{l}$ c) T+$\frac{mv^2}{l}$ d) 0

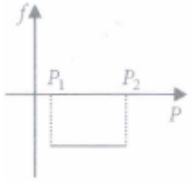
54. A block of mass m is on an incline plane of angle 8. The coefficient of friction between the block and the plane μ and tan θ > μ The block is held stationary by applying a force P parallel to the plane. The direction of force pointing up the plane is taken to be positive. As P is varied from P_1 = mg(sinθ - μcosθ) to P_2 = mg(sin + μcos), the frictional force f versus P graph will look like



a) 

b) 

c) 

d) 

55. A ring of mass m and radius r is melted and then moulded into a sphere. The moment of inertia of the sphere will be:
a) more than that of the ring b) less than that of the ring c) equal to that of the ring d) none of the above

56. A car of mass m starts from rest and acquires a velocity along east $\vec{v} = v\hat{i}$ (v > 0) in two seconds. Assuming the car moves with uniform acceleration, the force exerted on the car is
a) $\frac{mv}{2}$ eastward and is exerted by the car engine
b) $\frac{mv}{2}$ eastward and is due to the friction on the tyres exerted by the road.
c) more than $\frac{mv}{2}$ eastward exerted due to the engine and overcomes the friction of the road.
d) $\frac{mv}{2}$ exerted by the engine.

57. Two masses 2 kg and 3 kg are attached to the ends of the string passed over a pulley fixed at the top. The tension and acceleration in the string in terms of 'g' are:
a) $\left(\frac{7g}{8}, \frac{g}{8}\right)$ b) $\left(\frac{21g}{8}, \frac{g}{8}\right)$ c) $\left(\frac{21g}{8}, \frac{g}{5}\right)$ d) $\left(\frac{12g}{8}, \frac{g}{5}\right)$

58. When a mass is rotating in a plane about a fixed point its angular momentum is directed along
a) the radius b) the tangent the orbit c) the line at angle of 45° to the plane of rotation
d) the axis of rotation

59. (A) A man in a closed cabin falling freely does not experience gravity.
(R) Inertial and gravitational mass have equivalence.
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

60. A cord is bound round the circumference of a wheel of radius R. The axis of the wheel is horizontal and moment of inertia about it is 1. A weight mg is attached to the end of the cord and falls from rest. After falling through distance h, the angular velocity of the wheel will be:
a) $\left[\frac{2gh}{I+mr}\right]^{1/2}$ b) $\left[\frac{2mgh}{I+mr^2}\right]^{1/2}$ c) $\left[\frac{2mgh}{I+2m}\right]^{1/2}$ d) $\sqrt{2gh}$

61. (A) It will be much easier to accelerate a merry- go-round full of children if they stand close to its axis then if they all stand at the outer edge.
(R) For larger moment of inertia, the angular acceleration is small for given torque.
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

62. A rigid spherical body is spinning around an axis without any external torque. Due to change in temperature, the volume increases by 1%. Its angular speed:
a) will increase approximately by 1% b) will decrease approximately by 1%
c) will decrease approximately by 0.67% d) will decrease approximately by 0.33%

63. A heavy ball is thrown on a rough horizontal surface in such a way that it slides with a speed Vo initially without rolling. It will roll without sliding when its speed falls to:
a) (2/7) Vo b) (3/7) Vo c) (5/7) Vo d) (7/5) Vo

64. (A) Average angular velocity is a scalar quantity.
(R) Large angular displacement ($\triangle\theta$) is a scalar.
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 isfalse but reason is true.

65. A body is rolling without slipping on a horizontal surface and its rotational kinetic energy is equal to the translational kinetic energy. The body is:
a) disc b) sphere c) cylinder d) ring

66. A cylinder of mass 10 kg is rolling on a rough plane with a velocity of 10 rn/s. If the coefficient of friction between the surface and cylinder is 0.5, then before stopping, it will cover a distance of: (Take g = 10 M/s^2)
a) 10 m b) 7.5 m c) 5 m d) 2.5 m

67. Forces of 1 N and 2 N act along the lines x = 0 and y = O. The equation of the line along which the resultant lies is given by:
a) d - y = 0 b) y - 2x = 0 c) 2y - x = 0 d) y + x = 0

68. (A) In circular motion, work done by centripetal force is zero.
(R) In circular motion, centripetal force is perpendicular to the displacement.
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.

69. The tangential component of acceleration of a particle in circular motion is due to:
a) speed of the particle b) change in the direction of velocity c) change in the magnitude of velocity
d) rate of change of acceleration

70. A box of mass 50 kg is pulled up on an inclined plane of 12 m long and 2 m high by a constant force of 100 N from rest. It acquires a velocity of2 mls when it reaches the top of the plane. The work done against friction (in joule) is: (g = $10m/s^2$)
a) 50 b) 100 c) 150 d) 200

71. The solid cylinder is rolling without slipping on a plane having inclination θ and the coefficient of static friction μ_s The relation between θ and μ_s is
a) $\tan\theta > 3\mu_s$ b) $\tan\theta \leq 3\mu_s$ c) $\tan\theta < 3\mu_s^2$ d) none of these

72. A body is projected vertically upwards with a velocity 'u'. It crosses a point in its journey at a height 'h' twice, just after 1 and 7 seconds. The value of u (in ms^{-1}) is: (Take g = 10 m/s^2)
a) 50 b) 40 c) 30 d) 20

73. A body is whirled in a horizontal circle of radius 20 cm. It has angular velocity of 10 radls. What is its linear velocity at any point on circular path?
a) $\sqrt{2}$ ms^{-1} b) 10 ms^{-1} c) 2 ms^{-1} d) 20 ms^{-1}

74. A mass of 2 kg is whirled in a horizontal circle by means of a string at an initial speed of 5 revolutions per minute. Keeping the radius constant, the tension in the string is doubled. The new speed is nearly:
a) 14 rpm b) 10 rpm c) 2.25 rpm d) 7 rpm

75. A cracker is thrown into air with a velocity of 10 m/s at an angle of 45^0 with the vertical. When it is at a height of (1/2)m from the ground, it explodes into a number of pieces
which follow different parabolic paths. What is the velocity of centre of mass, when it is at a height of 1 m from the

ground? (g = 10 ms^{-2})
a) $4\sqrt{5}ms^{-1}$ b) $2\sqrt{5}ms^{-1}$ c) $5\sqrt{2}ms^{-1}$ d) $10\sqrt{2}ms^{-1}$

76. (A) Mass of the projectile does not affect the maximum height.
(R) Heavier the body, greater is the force required to project it.
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.

77. Which of the following statements is true for the planets orbiting around the sun?
a)
Their velocity increases when 'they are nearest to the sun in accordance with the conservation of angular momentum.
b)
Their velocity decreases when they are nearest to the sun in accordance with the conservation of angular momentum.
c) Areal velocity of the planet varies with time to conserve the energy.
d) Areal velocity of the planet is directly proportional to the distance of the planet from the sun.

78. A cyclist is riding with a speed of 27 km h^{-1}. As he approaches a circular turn on the road of radius 80 m, he applies brakes and reduces his speed at a constant rate of 0.5 ms^{-1}. The magnitude of the net acceleration of the cyclist is:
a) 0.86 ms^{-2} b) 0.43 ms^{-2} c) 1.24 ms^{-2} d) 1.76 ms^{-2}

79. A thin hollow sphere of mass m is completely filled with a liquid of mass m. When the sphere rolls with a velocity v, kinetic energy of the system is equal to:
a) $\frac{1}{2}mv^2$ b) mv^2 c) $\frac{4}{3}mv^2$ d) $\frac{4}{5}mv^2$

80. Assertion: The familiar equation rng = R for a body on a table is true only if the body is in equilibrium.
Reason: The equality of rng and R has no connection with the third law.
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.

81. If the length of the second's hand in a stop-clock is 3 em, the angular velocity and linear velocity of the tip is:
a) 0.2047 $rads^{-1}$,0.0314ms^{-1} b) 0.2547 $rads^{-1}$,0.314ms^{-1} c) 0.1472 $rads^{-1}$,0.06314ms^{-1}
d) 0.1047 $rads^{-1}$,0.00314ms^{-1}

82. A couple produces
a) purely translational motion b) purely rotational motion c) both translational and rotational motion
d) no motion

83. (A) A horse has to apply more force to start a cart than to keep it moving.
(R) The coefficient of static friction is greater than the coefficient of kinetic 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

84. An object kept on a smooth inclined plane of 1 in 1 can be kept stationary relative to the incline by giving a horizontal acceleration to the inclined plane given by:
a) g sin θ b) g cos θ c) g tan θ d) none of these

85. When the axle rotates in a sleeve, the friction involved in the process is:
a) sliding b) rolling c) limiting d) none of these

86. The radius of gyration of a body about an axis at a distance of 6 cm from its centre of mass is 10 cm. Then its radius of gyration about a parallel axis through its centre of mass will be:
a) 80 cm b) 8 cm c) 0.8 cm d) 80 m

87. A ball is thrown from a roof top at an angle 45° above the horizontal. It hits the ground a few seconds later. At what point during its motion, does the ball have greatest speed?
    a) At the highest point b) At the starting point c) At the point where it touches the ground
    d) None of the above

88. A bullet comes out of the barrel of a gun oflength 2 m with a speed of80 m/s. The average acceleration ofthe bullet is
    a) 1.6 m/s^2 b) 160 m/s^2 c) 1600 m/s^2 d) 16 m/s^2

89. To avoid slipping while walking on ice, one should take smaller steps because of the:
    a) large friction of ice b) larger normal reaction c) small friction of ice d) smaller normal reaction

90. A stream of water flowing horizontally with a speed of 15 m S^{-1} gushes out of a tube of cross-sectional area 10^{-2} m^2, and hits a vertical wall normally. Assuming that it does not rebound from the wall, the force exerted on the wall by the impact of water is :
    a) 1.25 x 10^3 N b) 2.25 x 10^3 N c) 3.25 x 10^3 N d) 4.25 x 10^3 N

91. A wheel, initially at rest, is rotated with a uniform angular acceleration. The wheel rotates through an angle θ_1 in the first one second and through an additional angle θ_2 in the next one second. The ratio θ_2/θ_1 is:
    a) 4 b) 3 c) 2 d) 1

92. A 100 kg gun fires a ball of 1 kg horizontally from a cliff of height 500 m. It falls on the ground at a distance of 400 m from the bottom of the cliff. The recoil velocity of the gun is (Take g = 10 m S^{-2})
    a) 0.2ms^{-1} b) 0.4ms^{-1} c) 0.6 m S^{-1} d) 0.8 m S^{-1}

93. A body moves along a circular path of radius 10m and the coefficient of friction is 0.5. What should be its angular velocity (in rad/sec) if it is not to slip from the surface? (Take g = 9.8m s^{-2})
    a) 10 b) 5 c) 0.1 d) 0.7

94. A piece of ice slides down a 45° incline in twice the time it takes to slide down a frictionless 45° incline. What is the coefficient of friction between the ice and incline?
    a) 0.25 b) 0.50 c) 0.75 d) 0.40

95. The average acceleration vector (taken over a full circle) for a particle having a uniform circular motion is:
    a) a constant vector of magnitude $\frac{v^2}{r}$ b) a null vector
    c) a vector of magnitude $\frac{v^2}{r}$ directed normal to the plane of the given uniform circular motion
    d) equal to the instantaneous acceleration vector

96. A uniform solid sphere rolls on a horizontal surface at 20 m s^{-1}. It then rolls up an incline having an angle of inclination at 30° with the horizontal. If the friction losses are negligible, the value of height h above the ground where the ball stops is:
    a) 14.3 m b) 28.57 m c) 57.2 m d) 9.8 m

97. A block of mass M is pulled along a horizontal frictionless surface by a rope of mass m. If a force F is applied at one end of the rope, the force which the rope exerts on the block is:
    a) F/(M + m) b) F c) FM/(m + M) d) zero

98. A circular disc is rolling on a horizontal plane. Its total kinetic energy is 150 J. What is its translational KE?
    a) 200 J b) 100 J c) 125 J d) None of these

99. A particle is rotating with constant angular acceleration on a circular track. If its angular velocity changes from 20 π rad/s to 40π rad/s in 10 s, what are the number of revolutions that the particle has completed during this time?
    a) 100 b) 150 c) 250 d) 1000

100. If the moment of inertia of a disc about an axis tangentially and parallel to its surface be 1, then the moment of inertia about the axis tangential but perpendicular to the surface will be:
    a) $\frac{6}{5}I$ b) $\frac{3}{4}I$ c) $\frac{3}{2}I$ d) $\frac{5}{4}I$