1to1 GURU
Learn to Lead, Learn to Succeed

**Date :-11/02/2022** **Time :-120 Minutes** **Exam Name :-1to1Guru-TestSeries#1** **Mark :- 200**

## PHYSICS

**1.** The linear momentum of a particle varies with time $t$ as $p = a + bt + ct^2$ Which of the following statements is correct?

**(a)** Force varies with time in a quadratic manner

**(b)** Force is time-dependent

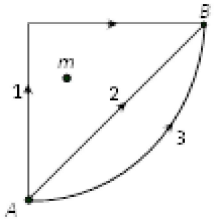
**(c)** The velocity of the particle is proportional to time

**(d)** The displacement of the particle is proportional to $t$

**2.** A particle is moving with constant acceleration from $A$ to $B$ in a straight line $AB$. If $u$ and $v$ are the velocities at $A$ and $B$ respectively then its velocity at the midpoint $C$ will be

**(a)** $\left(\frac{u^2+v^2}{2u}\right)^2$ **(b)** $\frac{u+v}{2}$ **(c)** $\frac{v-u}{2}$ **(d)** $\sqrt{\frac{u^2+v^2}{2}}$

**3.** If $W_1, W_2$ and $W_3$ represent the work done in moving a particle from $A$ to $B$ along three different paths 1, 2 and 3 respectively (as shown) in the gravitational field of a point mass m, find the correct relation between $W_1, W_2$ and $W_3$




**(a)** $W_1 > W_2 > W_3$ **(b)** $W_1 = W_2 = W_3$

**(c)** $W_1 < W_2 < W_3$ **(d)** $W_2 > W_1 > W_3$

**4.** A $20\ kg$ block is initially at rest on a rough horizontal surface. A horizontal force of $75\ N$ is required set the block in motion. After it is in motion, a horizontal force of $60\ N$ is required to keep the block moving with constant speed. The coefficient of static friction is

**(a)** 0.38 **(b)** 0.44 **(c)** 0.52 **(d)** 0.60

**5.** A boy of mass $0.25\ kg$ is projected with muzzle velocity $100\ ms^{-1}$ from a tank of mass $100\ kg$. What is the recoil velocity of the tank

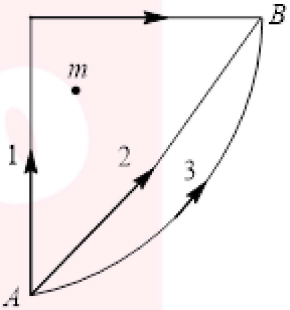
**(a)** $5\ ms^{-1}$ **(b)** $25\ ms^{-1}$ **(c)** $0.5\ ms^{-1}$ **(d)** $0.25\ ms^{-1}$

**6.** The dimensional formula of capacitance in terms of $M, L, T$ and $I$ is

**(a)** $[\ ML^2T^2I^2\ ]$ **(b)** $[\ ML^{-2}T^4I^2\ ]$ **(c)** $[\ M^{-1}L^3T^3I\ ]$

**(d)** $[\ M^{-1}L^{-2}T^4I^2\ ]$

**7.** If $W_1, W_2$ and $W_3$ represent the work done in moving a particle from A to B along three different paths 1, 2 and 3 respectively(as shown)in the gravitational field of a point mass m. Find the correct relation between $W_1, W_2$ and $W_3$




**(a)** $W_1 > W_2 > W_3$ **(b)** $W_1 = W_2 = W_3$

**(c)** $W_1 < W_2 < W_3$ **(d)** $W_2 > W_1 > W_3$

**8.** An artillery piece which consistently shoots its shells with the same muzzle speed has a maximum range $R$. To hit a target which is $\frac{R}{2}$ from the gun and on the same level, the elevation angle of the gun should be

**(a)** $15°$ **(b)** $45°$ **(c)** $30°$ **(d)** $60°$

**9.** A train has to negotiate a curve of radius $400$ m. The speed of the train is $72$ km/ hour. The horizontal distance is to be raised with respect to the inner radius by h. If distance between rail is $l = 1$ m, the value of h will be $(g = 10\ m/s^2)$

**(a)** 15 cm **(b)** 10 cm **(c)** 5 cm **(d)** 2.5 cm

**10.** A body is falling freely under gravity. The distances covered by the body in first, second and third minute of its motion are in the ratio

**(a)** 1 : 4 :9 **(b)** 1 : 2 : 3 **(c)** 1 : 3 : 5 **(d)** 1 : 5 : 6

**11.** A body of mass $m$ is projected at an angle of $45°$ with the horizontal. If air resistance is negligible, then total change in momentum when it strikes the ground is

**(a)** $2mv$ **(b)** $\sqrt{2}\,mv$ **(c)** $mv$ **(d)** $mv/\sqrt{2}$

**12.** An asteroid of mass $m$ is approaching earth, initially at a distance of $10\,R_e$ with speed $v_i$ . It hits the earth with a speed $v_f$ ( $R_e$ and $M_e$ are radius and mass of earth), then

**(a)** $v_f^2 = v_i^2 + \frac{2Gm}{M_e R}\left(1 - \frac{1}{10}\right)$

**(b)** $v_f^2 = v_i^2 + \frac{2GM_e}{R_e}\left(1 + \frac{1}{10}\right)$

**(c)** $v_f^2 = v_i^2 + \frac{2GM_e}{R_e}\left(1 - \frac{1}{10}\right)$

**(d)** $v_f^2 = v_i^2 + \frac{2Gm}{R_e}\left(1 - \frac{1}{10}\right)$

**13.** Sun is about 330 times heavier and 100 times bigger in radius than earth. The ratio of mean density of the sun to that of earth is

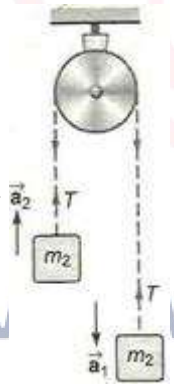
**(a)** $3.3 \times 10^{-6}$ **(b)** $3.3 \times 10^{-4}$ **(c)** $3.3 \times 10^{-2}$

**(d)** 1.3

**14.** A spring pong ball of mass $m$ is floating in air by a jet of water emerging out of a nozzle. If the water strikes the ping pong ball with a speed $v$ and just after collision water falls dead, the rate of flow of water in the nozzle is equal to

**(a)** $\frac{2mg}{v}$ **(b)** $\frac{m}{g}$ **(c)** $\frac{mg}{v}$ **(d)** $\frac{2m}{vg}$

**15.** The two bodies of mass $m_1$ and $m_2 (m_1 > m_2)$ respectively are tied to the ends of a massless string, which passes over a light and frictionless pulley. The masses are initially at rest and the released. Then acceleration of the centre of mass of the system is




**(a)** $\left[\frac{m_1 - m_2}{m_1 + m_2}\right]^2 g$ **(b)** $\left[\frac{m_1 - m_2}{m_1 + m_2}\right]^2$ **(c)** $g$ **(d)** zero

**16.** From the top of tower, a stone is thrown up. It reaches the ground in $t_1$ second. A second stone thrown down with the same speed reaches the ground in $t_2$ second. A third stone released from rest reaches the ground in $t_3$ second. Then

**(a)** $t_3 = \frac{(t_1 + t_2)}{2}$ **(b)** $t_3 = \sqrt{t_1 t_2}$ **(c)** $\frac{1}{t_3} = \frac{1}{t_1} - \frac{1}{t_2}$

**(d)** $t_3^2 = t_2^2 - t_1^2$

**17.** A bullet fired into a fixed wooden block loses half of its velocity after penetration 40 cm. it comes to rest after penetrating a further distance of

**(a)** $\frac{22}{3}$ cm **(b)** $\frac{40}{3}$ cm **(c)** $\frac{20}{3}$ cm **(d)** $\frac{22}{5}$ cm

**18.** A car of mass m is driven with an acceleration a along a straight level road against a constant external resistive force R. When the velocity of the car is v, the rate at which engine of the car is doing work, will be

**(a)** $R \cdot v$ **(b)** $ma \cdot v$ **(c)** (R+m **(d)** $\cdot v$

**19.** An object weighs $72\,N$ on earth. Its weight at a height of $R/2$ from earth is

**(a)** $32\,N$ **(b)** $56\,N$ **(c)** $72\,N$ **(d)** Zero

**20.** A stone of mass 2 kg is projected upward with KE of 98 J. The height at which the KE of the body becomes half its original value, is given by (Take $g = 10 ms^{-2}$ )

**(a)** 5 m **(b)** 2.5 m **(c)** 1.5 m **(d)** 0.5 m

**21.** A motorcycle is travelling on a curved track of radius $500\,m$ . If the coefficient of between road and tyres is 0.5, the speed avoiding skidding will be

**(a)** $50\,m/s$ **(b)** $75\,m/s$ **(c)** $25\,m/s$ **(d)** $35\,m/s$

**22.** A coolie 1.5 m tall raises a load of 80 kg in 2 s from the ground to his head and then walks a distance of 40 m in another 2 s. The power developed by the coolie is $[\mathbf{g = 10\ ms^{-2}}]$

**(a)** 0.2 kW **(b)** 0.4 kW **(c)** 0.6 kW **(d)** 0.8 kW

**23.** The value of Planck s constant is

**(a)** $6.63 \times 10^{-34}\,J$ - $sec$ **(b)** $6.63 \times 10^{34}\,J$ - $sec$

**(c)** $6.63 \times 10^{-34}\,kg$ - $m^2$ **(d)** $6.63 \times 10^{34}\,kg$ - $sec$

**24.** A uniform rope of length $l$ lies on a table. If the coefficient of friction is $\mu$ , then the maximum length $l_1$ of the part of this rope which can overhang from the edge of the table without sliding down is

**(a)** $\frac{1}{\mu}$ **(b)** $\frac{1}{\mu + l}$ **(c)** $\frac{\mu l}{1 + \mu}$ **(d)** $\frac{\mu l}{\mu - 1}$

**25.** Two bodies $A$ and $B$ have masses $M$ and $m$ respectively, where $M > m$ and they are at a distance $d$ apart. Equal force is applied to them so that they approach each other. The position where they hit each other is

**(a)** Nearer to $B$ **(b)** Nearer to $A$

**(c)** At equal distance from $A$ and $B$

**(d)** Cannot be decided

**26.** Four particles given, have same momentum. Which has maximum kinetic energy

**(a)** Proton **(b)** Electron **(c)** Deutron

**(d)** $\alpha$ - particles

**27.** The work done in pulling up a block of wood weighing $2\ kN$ for a length of $10\ m$ on a smooth plane inclined at an angle of $15°$ with the horizontal is $[\sin 15° = 0.2588]$

**(a)** $4.36\ kJ$ **(b)** $5.17\ kJ$ **(c)** $8.91\ kJ$ **(d)** $9.82\ kJ$

**28.** A body weighs $700\ g\ wt$ on the surface of the earth. How much will it weigh on the surface of a planet whose mass is $\frac{1}{7}$ and radius is half that of the earth

**(a)** $200\ g\ wt$ **(b)** $400\ g\ wt$ **(c)** $50\ g\ wt$

**(d)** $300\ g\ wt$

**29.** The engine of a car produces an acceleration of $6\ \text{ms}^{-2}$ in the car. If this car pulls another car of the same mass, then the acceleration would be

**(a)** $6\ \text{ms}^{-2}$ **(b)** $12\ \text{ms}^{-2}$ **(c)** $3\ \text{ms}^{-2}$ **(d)** $1.5\ \text{ms}^{-2}$

**30.** Spot the $wrong$ statement: The acceleration due to gravity $'g'$ decreases if

**(a)** We go down from the surface of the earth towards its centre

**(b)** We go up from the surface of the earth

**(c)** We go from the equator towards the poles on the surface of the earth

**(d)** The rotational velocity of the earth is increased

**31.** A steel ball of mass 5 g is thrown downward with velocity $10\ \text{ms}^{-1}$ from height 19.5 m. It penetrates sand by 50 cm. The change in mechanical energy will be $(g = 10\text{ms}^{-2})$

**(a)** 1 J **(b)** 1.25 J **(c)** 1.5 J **(d)** 1.75 J

**32.** The resultant of two forces acting at an angle of $120°$ is 10 kg-wt and is perpendicular to one of the forces. That force is

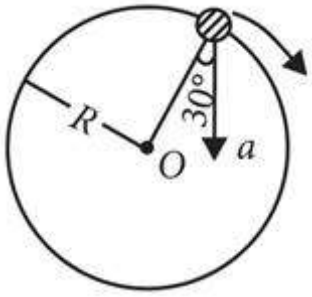
**(a)** $\frac{10}{\sqrt{3}}$ kg- wt **(b)** 10 kg-wt **(c)** $20\sqrt{3}$ kg-wt **(d)** $10\sqrt{3}$ kg-wt

**33.** Moment of inertia of a disc about a diameter is $I$ . Find the moment of inertia of disc about an axis perpendicular to its plane and passing through its rim?

**(a)** $6\,I$ **(b)** $4\,I$ **(c)** $2\,I$ **(d)** $8\,I$

**34.** In the given figure, $a = 15\ \text{m s}^{-2}$ represents the total acceleration of a particle moving in the clockwise direction in a circle of radius $R = 2.5$ m at a given instant of time. The speed of the particle is

(NEET-II 2016)




**(a)** $4.5\ \text{m s}^{-1}$ **(b)** $5.0\ \text{m s}^{-1}$ **(c)** $5.7\ \text{m s}^{-1}$

**(d)** $6.2\ \text{m s}^{-1}$

**35.** If $g$ is the acceleration due to gravity on the surface of earth, its value at a height equal to double the radius of earth is

**(a)** $g$ **(b)** $\frac{g}{2}$ **(c)** $\frac{g}{3}$ **(d)** $\frac{g}{9}$

**36.** Two particles of equal mass $m$ go around a circle of radius $R$ under the action of their mutual gravitational attraction. The speed of each particle with respect to their center of mass is

**(a)** $\sqrt{\frac{Gm}{R}}$ **(b)** $\sqrt{\frac{Gm}{4R}}$ **(c)** $\sqrt{\frac{Gm}{3R}}$ **(d)** $\sqrt{\frac{Gm}{2R}}$

**37.** A big ball of mass $M$ , moving with velocity $u$ strikes a small ball of mass $m$ , which is at rest. Finally small ball obtains velocity $u$ and big ball $v$ . Then what is the value of $v$

**(a)** $\frac{M-m}{M+m}u$ **(b)** $\frac{m}{M+m}u$ **(c)** $\frac{2m}{M+m}u$ **(d)** $\frac{M}{M+m}u$

**38.** A circular disc of radius $R$ and thickness $\frac{R}{6}$ has moment of inertia $I$ about an axis passing through its centre and perpendicular to its plane. It is melted and recasted into a solid sphere. The moment of inertia of the sphere about its diameter as axis of rotation is

**(a)** $I$ **(b)** $\frac{2I}{8}$ **(c)** $\frac{I}{5}$ **(d)** $\frac{I}{10}$

**39.** The radius of the earth is about 6400 km and that of the mars is 3200 km. The mass of the earth is about 10 times the mass of the mars. An object weighs 200 N on the surface of earth, its weight on the surface of mars will be

**(a)** 8 N **(b)** 20 N **(c)** 40 N **(d)** 80 N

**40.** The value of g on the earth s surface is $980\ \text{cms}^{-2}$ . Its value at a height of 64 km from the earth s surface is

**(a)** $960.40\ \text{cms}^{-2}$ **(b)** $984.90\ \text{cms}^{-2}$

**(c)** $982.45\ \text{cms}^{-2}$ **(d)** $977.55\ \text{cms}^{-2}$

**41.** If a long spring is stretched by $0.02\ m$ , its

potential energy is $U$ . If the spring is stretched by $0.1\ m$ , then its potential energy will be

**(a)** $\frac{U}{5}$ **(b)** $U$ **(c)** $5\ U$ **(d)** $25\ U$

**42.** A body is acted upon by a force towards a point. The magnitude of the force is inversely proportional to the square of the distance. The path of body will be

**(a)** Ellipse **(b)** Hyperbola **(c)** Circle **(d)** Parabola

**43.** A rope of length $L$ is pulled by a constant force $F$ . What is the tension in the rope at distance $x$ from the end when the force is applied?

**(a)** $\frac{F(L-x)}{L}$ **(b)** $\frac{FL}{L-x}$ **(c)** $\frac{FL}{x}$ **(d)** $\frac{Fx}{L-x}$

**44.** A bullet comes out of the barrel of gun of length 2m with a speed $80\ \mathrm{ms}^{-1}$. The average acceleration of the bullet is

**(a)** $1.6\ \mathrm{ms}^{-2}$ **(b)** $160\ \mathrm{ms}^{-2}$ **(c)** $1600\ \mathrm{ms}^{-2}$

**(d)** $16\ \mathrm{ms}^{-2}$

**45.** A particle of mass $M$ is moving in a horizontal circle of radius $R$ with uniform speed $v$. When it moves from one point to a diametrically opposite point, its $(1992)$

**(a)** kinetic energy change by $Mv^2/4$

**(b)** momentum does not change

**(c)** momentum change by $2Mv$

**(d)** kinetic energy changes by $Mv^2$

**46.** The only mechanical quantity which has negative dimension of mass is

**(a)** Angular momentum **(b)** Torque

**(c)** Coefficient of thermal conductivity

**(d)** Gravitational constant

**47.** A constant force acts on a body of mass $0.9\ kg$ at rest for $10s$. If the body moves a distance of $250\ m$ , the magnitude of the force is

**(a)** $3N$ **(b)** $3.5N$ **(c)** $4.0N$ **(d)** $4.5N$

**48.** If a body of mass $m$ is carried by a lift moving with an upward acceleration $a$ , then the forces acting on the body are (i) the reaction $R$ on the floor of the lift upwards (ii) the weight $mg$ of the body acting vertically downwards. The equation of motion will be given by

**(a)** $R = mg - ma$ **(b)** $R = mg + ma$

**(c)** $R = ma - mg$ **(d)** $R = mg \times ma$

**49.** A ball of mass $m_1$ is a moving with velocity $v$ . It collides head on elastically with a stationary ball of mass $m_2$ . The velocity of ball becomes $v/3$ after collision. Then the value of the ratio $\frac{m_2}{m_1}$ is

**(a)** 1 **(b)** 2 **(c)** 3 **(d)** 4

**50.** A cannon of a level plane is aimed at an angle θ above the horizontal and a shell is fired muzzle velocity $v_0$ towards a cliff $D$ distance away. The height at which the canon strikes the cliff is given by

**(a)** $D\sin\theta - \frac{1}{2}\frac{gD^2}{v_0^2\sin^2\theta}$ **(b)** $D\cos\theta - \frac{1}{2}\frac{gD^2}{v_0^2\sin^2\theta}$

**(c)** $D\tan\theta - \frac{1}{2}\frac{gD^2}{v_0^2\cos^2\theta}$ **(d)** $D\tan\theta - \frac{1}{2}\frac{gD^2}{v_0^2\sin^2\theta}$