

MGMs JUNIOR COLLEGE

Physics Department

Subject - Physics

Total Questions - 30

Total Marks - 30

Roll No.

XII PHYSICS

01-Apr-2015

00:00 To 00:00

This is to certify that, the entry of Roll No. has been correctly written and verified.

CET

Candidate's Signature

Invigilator's Signature

Note :

- i) All Questions are compulsory
- ii) Darken (●) the appropriate circle(○) of the most correct option/response with black ball point pen.

Laws of Motion

- 1) If a constant force $\vec{F} = -(i + 5j)\text{N}$ acts on the body, the time in which the y – component of the velocity becomes zero is [EAMCET (Med.) 2000]
- A) 5 sec-onds B) 20 sec-onds C) 40 sec-onds D) 80 sec-onds
- 2) A train has to negotiate a curve of radius 200 m. By how much should the outer rails be raised with respect to the inner rails for a speed of 36 km h^{-1} ? The distance between the rails is 1.5 m. Take $g = 10 \text{ ms}^{-2}$.
- A) 7.5 cm B) 10 cm C) 12.5 cm D) 15 cm
- 3) A man fires a bullet of mass 200 g at a speed of 5 m/s. The gun is of one kg mass. By what velocity the gun rebounds backwards P [CBSE PMT 1996; JIPMER 2000; Similar AFMC 1995; JIPMER 1999; Pb. PMT 2002; DCE 2004]
- A) 0.1 m/s B) 10 m/s C) 1 m/s D) 0.01 m/s
- 4) A rocket is propelled by a gas which is initially at a temperature of 4000 K. The temperature of the gas falls to 1000 K as it leaves the exhaust nozzle. The gas which will acquire the largest momentum while leaving the nozzle, is [SCRA 1994]
- A) Hydrogen B) Helium C) Nitrogen D) Argon
- 5) A body of mass 10 kg is falling with an acceleration of 10 m/sec^2 . Its apparent weight will be ($g = 10 \text{ m/sec}^2$) [MP PET 2002; Similar NCERT 1977; EAMCET (Med.) 1995; Pb. PMT 1999; KCET 2000]
- A) 1.0 kgwt B) 2.0 kgwt C) 0.5 kgwt D) Zero
- 6) A piece of wire is bent in the shape of a parabola $y = kx^2$ (y– axis vertical) with a bead of mass m on it. The bead can slide on the wire without friction. It stays at the lowest point of the parabola when the wire is at rest. The wire is now accelerated parallel to the x– axis with a constant acceleration a. The distance of the new equilibrium position of the bead, where the bead can stay at rest with respect to the wire, from the y– axis is [IIT 2009]
- A) $\frac{a}{gk}$ B) $\frac{a}{2gk}$ C) $\frac{2a}{gk}$ D) $\frac{a}{4gk}$
- 7) In the first second of its flight, rocket ejects $1/60$ of its mass with a velocity of 2400 ms^{-1} . The acceleration of the rocket is
- A) 19.6 ms^{-2} B) 30.2 ms^{-2} C) 40 ms^{-2} D) 49.8 ms^{-2}
- 8) The engine of a car produces acceleration 4 m/s^2 in the car. If this car pulls another car of same mass, what will be the L acceleration produced [RPET 1996]
- A) 8 m/s^2 B) 2 m/s^2 C) 4 m/s^2 D) $1/2 \text{ m/s}^2$
- 9) Three solids of masses m_1 , m_2 and m_3 are connected with weightless string in succession and are placed on a frictionless table. If the mass m_3 is dragged with a force T, the tension in the string between m_2 and m_3 is [MP PET 1995]
- A) $\frac{m_2}{m_1 + m_2 + m_3} T$ B) $\frac{m_3}{m_1 + m_2 + m_3} T$
- C) $\frac{m_1}{m_1 + m_2 + m_3} T$ D) $\frac{m_2 + m_3}{m_1 + m_2 + m_3} T$
- 10) A smooth sphere A is moving on a horizontal frictionless surface with angular speed ω and centre of mass velocity v.

It collides head-on with an identical sphere B at rest. After the collision their angular speeds are ω_A and ω_B respectively. If the collision is elastic and the friction is neglected, then [IIT.1999]

- A) $\omega_A = \omega$ B) $\omega_B = 0$ C) $\omega_A < \omega_B$ D) $\omega_A = \omega_B$

11) A block of mass M is attached to the lower end of a vertical spring. The spring is hung from a ceiling and has force constant value k. The mass is released from rest with the spring initially unstretched. The maximum extension produced in the length of the spring will be [CBSE PMT 2009]

- A) $1M_g/k$ B) $2M_g/k$ C) $4M_g/k$ D) $M_g/2k$

12) A player caught a cricket ball of mass 150 gm moving at the rate of 20 m/sec. If the catching process be completed in 0.1 sec the force of the blow exerted by the ball on the hands of player is [AFMC 1993; CBSE PMT 2001; BHU 2001; Kerala PET 2005; AIEEE 2006]

- A) 0.3 N B) 30 N C) 300 N D) 3000 N

13) An explosion blows a rock into three parts. Two parts go off at right angles to each other. These two are, 1 kg first part moving with a velocity of 12ms^{-1} and 2 kg second part moving with a velocity of 8ms^{-1} . If the third part flies off with a velocity of 4ms^{-1} , its mass would be

- A) 5 kg B) 7 kg C) 17 kg D) 3 kg

14) When a bullet is fired at a target, its velocity decreases by half after penetrating 30 cm into it. The additional thickness it will penetrate before coming to rest is [Kerala PMT 2007]

- A) 30 cm B) 40 cm C) 10 cm D) 50 cm

15) A student attempts to pull himself up by tugging on his hair. He will not succeed

- A) As the force exerted is small
B) The frictional force while gripping, is small.
C) Newton's law of inertia is not applicable to living beings.
D) As the force applied is internal to the system.

16) A ship of mass 3×10^7 kg initially at rest is pulled by a force of 5×10^4 N through a distance of 3 m. Assume that the resistance due to water is negligible, the speed of the ship is [IIT 1980; MP PMT 2000]

- A) 1.5 m/s B) 60 m/s C) 0.1 m/s D) 5 m/s

17) A block, released from rest from the top of a smooth inclined plane of inclination θ , has a speed v when it reaches the bottom. The same block, released from the top of a rough inclined plane of the same inclination θ , has a speed v/n on reaching the bottom, where n is a number greater than unity. The coefficient of friction is given by

- A) $\mu = \left(1 - \frac{1}{n^2}\right) \tan \theta$ B) $\mu = \left(1 - \frac{1}{n^2}\right) \cot \theta$
C) $\mu = \left(1 - \frac{1}{n^2}\right)^{1/2} \tan \theta$ D) $\mu = \left(1 - \frac{1}{n^2}\right)^{1/2} \cot \theta$

18) In an air collision between an aeroplane and a bird, the force experienced by the bird as compared to that of the aeroplane is [DUMET 2010]

- A) Very high B) Equal C) Less D) Zero

19) When forces F_1, F_2, F_3 are acting on a particle of mass m such that F_2 and F_3 are mutually perpendicular, then the particle remains stationary. If the force F_1 is now removed then the acceleration of the particle is [AJEE 2002]

- A) F_1/m B) $F_2 F_3 / m F_1$ C) $(F_2 - F_3)/m$ D) F_2/m

20) A solid disc of mass M is just held in air horizontally by throwing 40 stones per sec vertically upwards to strike the disc. If 0.05 Jcg what is the mass of the disc ($g = 10\text{ms}^{-2}$)

- A) 1.2kg B) 0.5 kg C) 20 kg D) 3 kg

21) A thick uniform rope of mass 6 kg and length 3 m is hanging vertically from a rigid support. The tension in the rope at a point 1 m from the support will be (Take $g = 10\text{ms}^{-2}$)

- A) 20 N B) 30 N C) 40 N D) 60 N

22) A body is moving down a long inclined plane of angle of inclination θ . The coefficient of friction between the body and the plane varies as $\mu = 0.5x$, where x is the distance moved down the plane. The body will have the maximum velocity when it has travelled a distance x given by

- A) $x = 2 \tan \theta$ B) $x = \frac{2}{\tan \theta}$
C) $x = \sqrt{2} \cot \theta$ D) $x = \frac{\sqrt{2}}{\cot \theta}$

23) 25 kg is projected with muzzle velocity 100ms^{-1} from a tank of mass 100 kg. What is the recoil velocity of the tank [AFMC 1996]

- A) 5ms^{-1} B) 25ms^{-1} C) 0.5ms^{-1} D) 0.25ms^{-1}

24) Two forces of magnitude F have a resultant of the same magnitude F. The angle between the two forces is [CBSE PMT 1990; Similar MP PMT 1999]

- A) 45 B) 120 C) 150 D) 60

25) Human heart is pumping blood with constant velocity v m s^{-1} at the rate of M kg s^{-1} . The force required for this is (in N) [Kerala PMT 2010]

- A) M B) Mv C) $\frac{M}{v}$ D) $v \frac{dM}{dt}$

26) A ball is released from the top of a tower of height h metre. It takes T second to reach the ground. What is the position of the ball at $\frac{T}{3}$ second? (A.I.E.E.E. 2004)

- A) $\frac{h}{9}$ metre from the ground B) $\frac{7h}{9}$ metre from the ground
C) $\frac{8h}{9}$ metre from the ground D) $\frac{17h}{18}$ metre from the ground.

27) A parachute of mass m starts coming down with a constant acceleration a. Determine the ballast mass to be

released for the parachute to have an upward acceleration of same magnitude. Neglect air drag.

- A) $\frac{2ma}{a+g}$ B) $\frac{ma}{a-g}$ C) $\frac{ma}{a+g}$ D) $\frac{2ma}{a-g}$

28) Three weights W , $2W$ and $3W$ are connected to identical springs suspended from a rigid horizontal rod. The assembly of the rod and the weights fall freely. The positions of the weights from the rod are such that **[Roorkee 1999]**

- A) $3W$ will be farthest
 B) W will be farthest
 C) All will be at the same distance
 D) $2W$ will be farthest

29) A block is lying on a horizontal frictionless surface. One end of a uniform rope is fixed to the block which is pulled in the horizontal direction by applying a force F at the other end. If the mass of the rope is half the mass of the block, the tension in the middle of the rope will be

- A) F B) $\frac{2F}{3}$ C) $\frac{3F}{5}$ D) $\frac{5F}{6}$

30) When the speed of a moving body is doubled **[UPSEAT 2004]**

- A) Its acceleration is doubled
 B) Its momentum is doubled
 C) Its kinetic energy is doubled
 D) Its potential energy is doubled