Physics

Board - CBSE	Class - 12	Topic - Laws of motion

Very Short Answer Type 1 Mark Questions

1.	Is net force needed to keep a body moving with uniform velocity?
	Ans:
2.	Is Newton's 2nd law (F = ma) always valid. Give an example in support of your answer?
	Ans:
3.	Action and reaction forces do not balance each other. Why?
	Ans:
4.	Can a body remain in state of rest if more than one force is acting upon it?
	Ans:
5.	Is the centripetal force acting on a body performing uniform circular motion always constant?
	Ans:
6.	The string is holding the maximum possible weight that it could withstand. What will happen to the string if the body suspended by it starts moving on a horizontal circular path and the string starts generating a cone?
	Ans:
7.	What is the reaction force of the weight of a book placed on the table?
	Ans:
8.	What is the maximum acceleration of a vehicle on the horizontal road? Given that coefficient of static friction between the road and the tyres of the vehicle is μ.
	Ans:
9.	Why guns are provided with the shoulder support?
	Ans:
10.	While paddling a bicycle what are the types of friction acting on rear wheels and in which direction?
	Ans:

Short Answer Type 2 Mark Questions

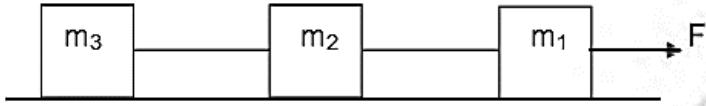| 1.	Explain why the water doesn't fall even at the top of the circle when the bucket full of water is upside down rotating in a vertical circle?
	Ans:
2.	The displacement of a particle of mass 1 kg is described by $s = 2t + 3t^2$. Find the force acting on particle? (F = 6N)
	Ans:

3.	A particle of mass 0.3 kg is subjected to a force of $F = -kx$ with $k = 15$ Nm^{-1}. What will be its initial acceleration if it is released from a point 10 cm away from the origin?($a = -5$ ms^{-2})
	Ans:
4.	Three forces F_1, F_2 and F_3 are acting on the particle of mass m which is stationary. If F_1 is removed, what will be the acceleration of particle? ($a = F_1/m$)
	Ans:
5.	A spring balance is attached to the ceiling of a lift. When the lift is at rest spring balance reads 50 kg of a body hanging on it. What will be the reading of the balance if the lift moves:- (i) Vertically downward with an acceleration of 5 ms^{-2} (ii) Vertically upward with an acceleration of 5 ms^{-2} (iii) Vertically upward with a constant velocity. Take $g = 10$m /s^2
	Ans:
6.	Is larger surface area break on a bicycle wheel more effective than small surface area brake? Explain?
	Ans:
7.	Calculate the impulse necessary to stop a 1500 kg car moving at a speed of 25ms^{-1}? (-37500 N-s)
	Ans:
8.	Give the magnitude and directions of the net force acting on a rain drop falling freely with a constant speed of 5 m/s? ($F_{Net} = 0$)
	Ans:
9.	A block of mass ,5kg rests on a smooth horizontal table. What steady force is required to give the block a velocity of 2 m/s in 4 s? ($F = .25$N)
	Ans:
10.	Calculate the force required to move a train of 200 quintal up on an incline plane of 1 in 50 with an acceleration of 2 ms-2. The force of friction per quintal is 0.5 N? ($F = 44100$N)
	Ans:

Short Answer Type 3 Mark Questions

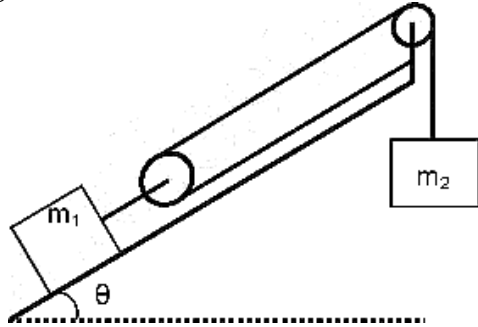| 1.	A bullet of mass 0.02 kg is moving with a speed of 10m^{-1}s. It penetrates 10 cm of a wooden block before coming to rest. If the thickness of the target is reduced to 6 cm only find the KE of the bullet when it comes out?
	Ans:
2.	A man pulls a lawn roller with a force of F. If he applies the force at some angle with the ground. Find the minimum force required to pull the roller if coefficient of static friction between the ground and the roller is μ?
	Ans:
3.	A ball bounces to 80% of its original height. Calculate the change in momentum?
	Ans:
4.	A pendulum bob of mass 0.1 kg is suspended by a string of 1 m long. The bob is displaced so that the string becomes horizontal and released. Find its kinetic energy when the string makes an angle of (i) 0°, (ii) 30°, (iii) 60° with the vertical?
	Ans:

5.	The velocity of a particle moving along a circle of radius R depends on the distance covered s as F = 2as where a is constant. Find the force acting on the particle as a function of s?
	Ans:
6.	A block is projected horizontally on rough horizontal floor with initial velocity u. The coefficient of kinetic friction between the block and the floor is μ. Find the distance travelled by the body before coming to rest?
	Ans:
7.	A locomotive of mass m starts moving so that its velocity v changes according to v = $\sqrt{(\alpha s)}$, where α is constant and s is distance covered. Find the force acting on the body after time t?
	Ans:
8.	Derive an expression for the centripetal force?
	Ans:
9.	Find the maximum value of angle of friction and prove that it is equal to the angle of repose?
	Ans:
10.	State and prove Lami's theorem?
	Ans:

Long Answer Type 5 Marks Questions

1.	Find the maximum and minimum velocity of a vehicle of mass m on a banked road of banking angle θ, if coefficient of static friction of the wheels of vehicle with the road is μ?
	Ans:
2.	Find the maximum and minimum force applied parallel up the incline on a block of mass m placed on it if angle of inclination is θ and coefficient of static friction with the block is μ so that the block remains at rest?
	Ans:
3.	Prove that in case of vertical circular motion circular motion of a body tied to a string velocity at topmost and lowermost point be $\sqrt{(rg)}$ and $\sqrt{(5rg)}$ respectively and tensions in the strings be 0 and 6mg respectively?
	Ans:
4.	Find the maximum horizontal velocity that must be imparted to a body placed on the top of a smooth sphere of radius r so that it may not loose contact? If the same body is imparted half the velocity obtained in the first part then find the angular displacement of the body over the smooth sphere when it just loses contact with it?
	Ans:
5.	Find the acceleration of the blocks and the tension in the strings?
	Ans:

Some Intellectual Stuff

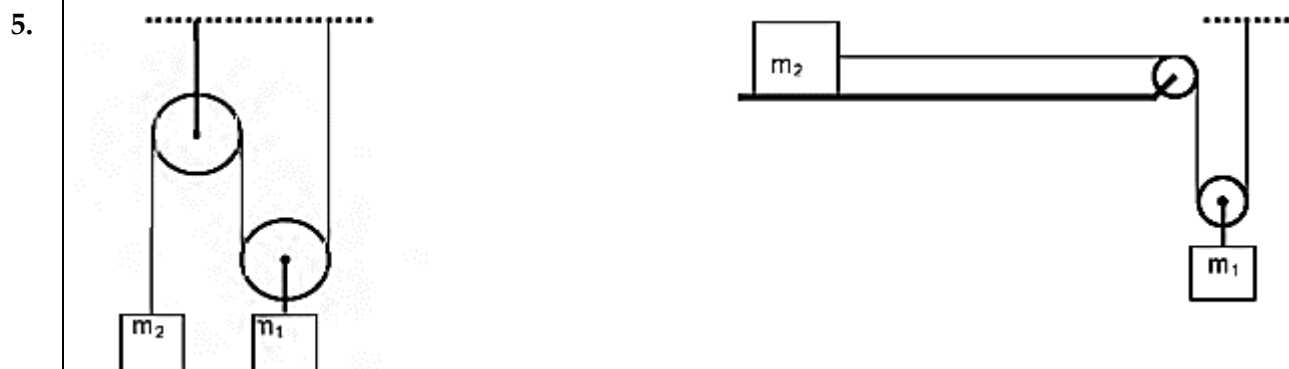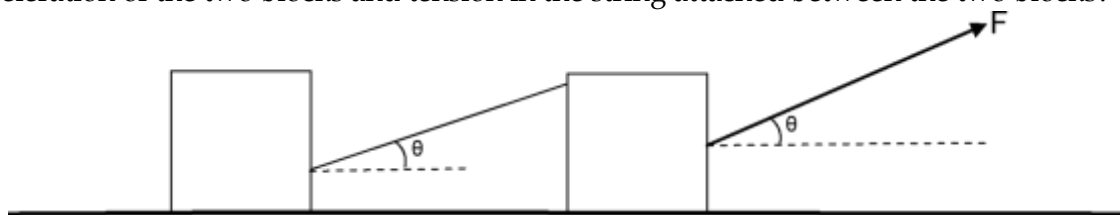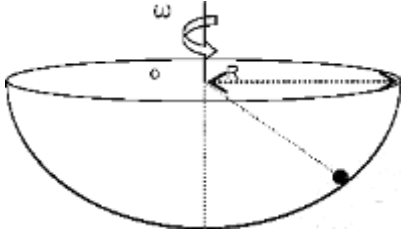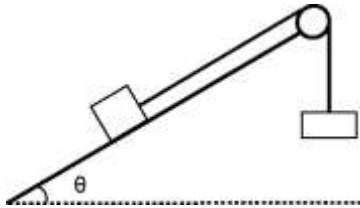| 1.	Find the acceleration of the blocks m_1 and m_2. All the surfaces are smooth and string and pulley are light? Also find the net force on the clamped pulley?
	Ans:
2.	A body of mass m explodes into three fragments of with masses in the ratio 2:2:6 If the two similar masses move of perpendicular to each other with the speed of 10m/s each, find the velocity of the third particle and its direction relative to the two other bodies?
	Ans:
3.	A mass of 5 kg is suspended by a rope of length 2m from the ceiling. A horizontal force of 50 N is applied at the midpoint P of the rope? Calculate the angle that the rope makes with the vertical and the tension in the part of the rope between the point of suspension and point P?. Neglect the mass of the rope, (g = 10ms^{-2})
	Ans:
4.	A body moving inside a smooth vertical circular track is imparted a velocity of $\sqrt{(4rg)}$ at the lowermost point. Find its position where it just loses contact with the track?
	Ans:
5.	
	Find in both the cases (i)Acceleration of the two blocks.(ii)Tension in the clamp holding the fixed pulley?
	Ans:
6.	Mass of both the blocks is m and coefficient of kinetic friction with the ground is μ. Find the acceleration of the two blocks and tension in the string attached between the two blocks?
	Ans:

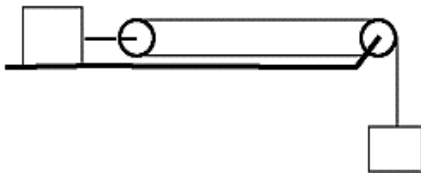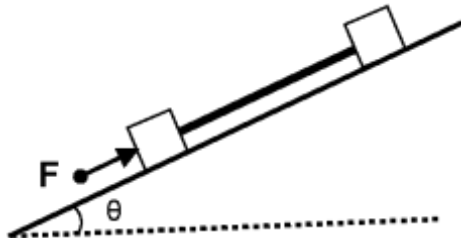| 7.	A small sphere of mass m is placed in a hemispherical bowl of radius R. Bowl is rotated with angular velocity ω. Find the angle made by the radius of the bowl passing through the sphere with the vertical when the sphere starts rotating with the bowl?
	Ans:
8.	Mass of both the blocks is m find net force on the pulley?
	Ans:
9.	Mass of both the blocks is m find acceleration of both the blocks and net force on the clamp holding the fixed pulley?
	Ans:
10.	Mass of both the blocks is m find acceleration of the system and the tension in the rod?
	Ans: