STD 11 PHYSICS IMPORTANT QUESTIONS (VOLUME – I)

Two Marks

Unit 1: Nature of the Physical World and Measurement	
1.	What are the limitations of dimensional analysis?
2.	Define Precision and accuracy. Explain with one example.
. **Unit 2: Kinematics**	
3.	Explain what is meant by Cartesian coordinate system?
4.	How do you deduce that two vectors are perpendicular?
5.	Define a radian.
6.	What is non uniform circular motion?
Unit 3: Laws of Motion	
7.	Under what condition will a car skid on a leveled circular road?
8.	Define one newton.
9.	States Newton's laws.
Unit 4: Work, Energy and Power	
10.	Coefficient of restitution
11	Power
12.	Law of conservation of energy
13.	loss of kinetic energy in inelastic collision.
Unit 5: Motion of system of Particles and Rigid bodies	
14.	Define Centre of mass.
15.	What is the relation between torque and angular momentum?
16.	Find out the centre of mass for the given geometrical structures. a) Equilateral triangle b) Cylinder c) Square
17.	Define couple
18.	State principle of moments.
19.	Define centre of gravity.
20.	Mention any two physical significance of moment of inertia

Three Marks

Unit 1: Nature of the Physical World and Measurement	
1.	Explain the principle of homogeneity of dimensions. Give it's uses.
2.	Write a note on triangulation method and radar method to measure larger distances.
3.	How will you measure the diameter of the Moon using parallax method?
Unit 2: Kinematics	
4.	Discuss the properties of scalar and vector products.
5.	Write down the kinematic equations for angular motion.
6.	Derive the equations of motion for a particle (a) falling vertically (b) projected vertically
7.	Define angular displacement and angular velocity.
Unit 3: Laws of motion	
8.	What are concurrent forces? State Lami's theorem.
9.	Explain the similarities and differences of centripetal and centrifugal forces.
10.	State the empirical laws of static and kinetic friction.
11.	Explain various types of friction. Suggest a few methods to reduce friction.
12.	Show that impulse is the change of momentum.
13.	Using free body diagram, show that it is easy to pull an object than to push it.

Unit 4: Work Energy Power	
14.	Write the differences between conservative and Non-conservative forces. Give two examples each.
15.	Explain the characteristics of elastic and inelastic collision.
16.	Write the various types of potential energy.
17.	Differentiate work done constant force and variable force.
Unit 5: Motion of system of Particles and Rigid bodies	
18.	Explain the types of equilibrium with suitable examples.
19.	State and prove perpendicular axis theorem.
20.	Discuss conservation of angular momentum with example.
21.	What is radius of gyration?
22.	What is the difference between sliding and slipping?
23.	Define torque and mention its unit. What are the conditions in which force can not produce torque? Give any two examples of torque in day-to-day life.

Five Marks

Unit 1: Nature of the Physical World and Measurement	
1.	What do you mean by propagation of errors? Explain the propagation of errors in addition and multiplication.
2.	Explain in detail the various types of errors.
Unit 2: Kinematics	
3.	Derive the kinematic equations of motion for constant acceleration.
4.	Derive the expression for centripetal acceleration.
5.	Explain in detail the triangle law of addition.
Unit 3: Laws of Motion	
6	Prove the law of conservation of linear momentum. Use it to find the recoil velocity of a gun when a bullet is fired from it.
7.	Explain the motion of blocks connected by a string in i) Vertical motion ii) Horizontal motion.
8.	Explain the need for banking of tracks.
9.	Briefly explain the origin of friction. Show that in an inclined plane, angle of friction is equal to angle of repose.
Unit 4: Work, Energy and Power	
10.	Arrive at an expression for power and velocity. Give some examples for the same.
11.	Arrive at an expression for elastic collision in one dimension and discuss various cases.
12.	State and explain work energy principle. Mention any three examples for it.
Unit 5: Motion of system of Particles and Rigid bodies	
13.	Explain why a cyclist bends while negotiating a curve road? Arrive at the expression for angle of bending for a given velocity.
14.	Derive the expression for moment of inertia of a rod about its centre and perpendicular to the rod.
15.	Derive the expression for moment of inertia of a uniform ring about an axis passing through the centre and perpendicular to the plane.
16.	State and prove parallel axis theorem.
17.	Discuss rolling on inclined plane and arrive at the expression for the acceleration.

Problems

Unit 1: Nature of the Physical World and Measurement	
1.	From a point on the ground, the top of a tree is seen to have an angle of elevation 60°. The distance between the tree and a point is 50 m. Calculate the height of the tree?
2.	A RADAR signal is beamed towards a planet and its echo is received 7 minutes later. If the distance between the planet and the Earth is 6.3×10^{10} m. Calculate the speed of the signal?
3.	A physical quantity x is given by $x = \frac{a^2 b^3}{c\sqrt{d}}$. If the percentage errors of measurement in a, b, c and d are 4%, 2%, 3% and 1% respectively, then calculate the percentage

	error in the calculation of x.
4.	Convert 76 cm of mercury pressure into Nm^{-2} using the method of dimensions.
5.	If the value of universal gravitational constant in SI is 6.6×10^{-11} $Nm^2 kg^{-2}$, then find its value in CGS System?
6.	Check the correctness of the equation $\frac{1}{2}mv^2 = mgh$ using dimensional analysis method.
7.	Obtain an expression for the time period T of a simple pendulum. The time period T depends on (i) mass 'm' of the bob (ii) length 'l' of the pendulum and (iii) acceleration due to gravity g at the place where the pendulum is suspended. (Constant k = 2π)
8.	The radius of the circle is 3.12 m. Calculate the area of the circle with regard to significant figures.
9.	In a submarine equipped with sonar, the time delay between the generation of a pulse and its echo after reflection from an enemy submarine is observed to be 80 s. If the speed of sound in water is 1460 ms^{-1} . What is the distance of enemy submarine?
10.	Assuming that the frequency γ of a vibrating string may depend upon i) applied force (F) ii) length (l) iii) mass per unit length (m), prove that $\gamma \alpha \frac{1}{l}\sqrt{\frac{F}{m}}$, using dimensional analysis.
. **Unit 2: Kinematics**	
11.	Check whether the following vectors are orthogonal. i) $\vec{A} = 2\hat{i} + 3\hat{j}$ and $\vec{B} = 4\hat{i} - 5\hat{j}$ ii) $\vec{C} = 5\hat{i} + 2\hat{j}$ and $\vec{D} = 2\hat{i} - 5\hat{j}$
12.	Two vectors are given $\vec{r} = 2\,\hat{\imath} + 3\,\hat{\jmath} + 5\,\hat{k}$ and $\vec{F} = 3\,\hat{\imath} - 2\,\hat{\jmath} + 4\,\hat{k}$. Find the resultant vector $\vec{\tau}$.
13.	An athlete covers 3 rounds on a circular track of radius 50 m. Calculate the total distance and displacement travelled by him.
14.	The velocity of three particles A, B, C are given below. Which particle travels at the greatest speed? $\overrightarrow{v_A} = 3\hat{i} - 5\hat{j} + 2\hat{k}$ $\overrightarrow{v_B} = \hat{i} + 2\hat{j} + 3\hat{k}$ $\overrightarrow{v_C} = 5\hat{i} + 3\hat{j} + 4\hat{k}$
15.	Consider two masses of 10 g and 1 kg moving with the same speed 10 m s^{-1}. Calculate the magnitude of the momentum.
16.	A particle moves along the x-axis in such a way that its coordinates x varies with time 't' according to the equation $x = 2 - 5t + 6t^2$. What is the initial velocity of the particle?
17.	Suppose two cars A and B are moving with uniform velocities with respect to ground along parallel tracks and in the same direction. Let the velocities of A and B be 35 km h^{-1} due east and 40 km h^{-1} due east respectively. What is the relative velocity of car B with respect to A?
18.	How long will a boy sitting near the window of a train travelling at 36 km h^{-1} see a train passing by in the opposite direction with a speed of 18 km h^{-1}. The length of the slow-moving train is 90 m.
19.	Of a river is 12 km h^{-1}. Against the direction of flow of the river the swimmer's speed is 6 km h^{-1}. Calculate the swimmer's speed in still water and the velocity of the river flow.
20.	If the position vector of the particle is given by $\vec{r} = 3t^2\hat{i} + 5t\hat{j} + 4\hat{k}$, Find the a) The velocity of the particle at t = 3 s b) Speed of the particle at t = 3 s c) acceleration of the particle at time t = 3 s
21.	A train was moving at the rate of 54 km h-1 when brakes were applied. It came to rest within a distance of 225 m. Calculate the retardation produced in the train.
22.	A object is thrown with initial speed 5 m s^{-1} with an angle of projection 30°. What is the height and range reached by the particle?
23.	If an object is thrown horizontally with an initial speed 10 m s^{-1} from the top of a building of height 100 m. what is the horizontal distance covered by the particle?

24.	Calculate the area of the triangle for which two of its sides are given by the vectors $\vec{A} = 5\,\hat{\imath} - 3\,\hat{\jmath},\ \vec{B} = 4\,\hat{\imath} + 6\,\hat{\jmath}$
25.	An object at an angle such that the horizontal range is 4 times of the maximum height. What is the angle of projection of the object?
26.	Convert the vector $\vec{r} = 3\,\hat{\imath} + 2\,\hat{\jmath}\ i$nto a unit vector.
Unit 3: Laws of Motion	
27.	If two objects of masses 2.5 kg and 100 kg experience the same force 5 N, what is the acceleration experienced by each of them?
28.	An object of mass 10 kg moving with a speed of 15 m s−1 hits the wall and comes to rest within a) 0.03 second b) 10 second Calculate the impulse and average force acting on the object in both the cases.
29.	If a stone of mass 0.25 kg tied to a string executes uniform circular motion with a speed of 2 m s^{-1} of radius 3 m, what is the magnitude of tensional force acting on the stone?
30.	Consider a circular road of radius 20 meter banked at an angle of 15 degree. With what speed a car has to move on the turn so that it will have safe turn?
31.	A football player kicks a 0.8 kg ball and imparts it a velocity 12 ms^{-1}. The contact between the foot and ball is only for one- sixtieth of a second. Find the average kicking force.
Unit 4: Work, Energy and Power	
32.	A box is pulled with a force of 25 N to produce a displacement of 15 m. If the angle between the force and displacement is 30^o, find the work done by the force.
33.	A weight lifter lifts a mass of 250 kg with a force 5000 N to the height of 5 m. (a) What is the workdone by the weight lifter? (b) What is the workdone by the gravity? (c) What is the net workdone on the object?
34.	Two objects of masses 2 kg and 4 kg are moving with the same momentum of 20 kg ms^{-1}. (a) Will they have same kinetic energy? (b) Will they have same speed?
35.	Let the two springs A and B be such that kA>kB. On which spring will more work has to be done if they are stretched by the same force?
36.	Water in a bucket tied with rope is whirled around in a vertical circle of radius 0.5 m. Calculate the minimum velocity at the lowest point so that the water does not spill from it in the course of motion. (g = 10 ms^{-2})
37.	A vehicle of mass 1250 kg is driven with an acceleration 0.2 ms^{-2} along a straight level road against an external resistive force 500 N. Calculate the power delivered by the vehicle's engine if the velocity of the vehicle is 30 ms^{-1}.
38.	Calculate the energy consumed in electrical units when a 75 W fan is used for 8 hours daily for one month (30 days).
39.	Show that the ratio of velocities of equal masses in an inelastic collision when one of the masses is stationary is . $\frac{v_1}{v_2} = \frac{1-e}{1+e}$
Unit 5: Motion of system of Particles and Rigid bodies	
40.	The position vectors of two point masses 10 kg and 5 kg are $(-3\,\hat{\imath} + 2\,\hat{\jmath} + 4\,\hat{k})$m and $(3\,\hat{\imath} + 6\hat{\jmath} + 5\,\hat{k})m$m respectively. Locate the position of centre of mass.
41.	Two point masses 3 kg and 5 kg are at 4 m and 8 m from the origin on X-axis. Locate the position of centre of mass of the two point masses (i) from the origin and (ii) from 3 kg mass.
43.	A force of $(4\,\hat{\imath} - 3\,\hat{\jmath} + 5\,\hat{k})$N is applied at a point whose position vector is $(7\,\hat{\imath} + 4\,\hat{\jmath} - 2\hat{k})N$. Find the torque of force about the origin.
44.	A cyclist while negotiating a circular path with speed 20 m s^{-1} is found to bend an angle by 30o with vertical. What is the radius of the circular path? (given, g = 10 m s^{-2})
45.	Find the moment of inertia of a uniform rod about an axis which is perpendicular to the rod and touches any one end of the rod.

46.	Find the radius of gyration of a disc of mass M and radius R rotating about an axis passing through the centre of mass and perpendicular to the plane of the disc.
47.	Find the rotational kinetic energy of a ring of mass 9 kg and radius 3 m rotating with 240 rpm about an axis passing through its centre and perpendicular to its plane. (rpm is a unit of speed of rotation which means revolutions per minute)
48.	A rolling wheel has velocity of its centre of mass as 5 ms-1. If its radius is 1.5 m and angular velocity is 3 rad s-1, then check whether it is in pure rolling or not.
.	