Top 20 most important questions for class 11th first term examination.

This assignment contain 22 most important questions for class 11th first term examination, from unit-1 to unit- 7 (gravitation) . this assignment contain the questions based on derivation only (for important numerical you have to see another assignment).

1. What is dimensions? What are the uses of dimensions on the basis of their uses answer the following questions.
   (a) If $(p+ a/V^2) (V-b)=RT$ where the symbols has their usual meanings, then what is the dimension of a/b . (b) If F= a/ b+√d , where f=force ,d= density , then find the dimension of a and b.(c) The factors effecting the time period (T) of the simple pendulum depends on mass , length and acceleration due to gravity . Deduce the relation for time period of the simple pendulum.

2. (i) Draw velocity -time graph of uniformly accelerated motion in one dimension .From the velocity time graph of uniform Accelerated motion ,deduce the equations of motion in using this graph (or using calculus method). (ii) A ball is thrown vertically upwards. Draw its: (i) Velocity-time curve (ii) Acceleration-time curve, If T is the time of flight. Using calculus method also find the distance covered in n^{th} second.

3. Define average velocity and relative velocity. A car travels first half of a length S with velocity u_1. The second half is covered with velocities u_2 and u_3 for equal time intervals .Find the average velocity of the motion. Also answers the following questions (a) A body start from rest and accelerates uniformly .find the ratio of the displacement in, (1)one, two and three seconds, (2) first ,seconds and third second. (b). A body covers 12 m in 2^{nd} seconds and 20 m in 4^{th} seconds .find what distance the body will cover in 4 second after 5^{th} second.

4.State the triangle law and parallelogram law of vector addition, derive the expression for the magnitude and direction of the resultant of two vector. (**Also solve some numericals based on this derivation).also write the answers of the following questions
(a) If a man can swim with speed s in still water , if a river flowing with speed v from east to west , find the(1) velocity of swimmer with respect to river ,(2) in which direction should he swim to reach the opposite direction (3) what is the minimum time taken by the swimmer to reach on opposite bank if width of the river is 'd'.
(b) Rain is falling vertically downward with speed Vr , and a man is running on the horizontal road with speed Vm , in which direction should he hold his umbrella to protect him from rain.

5. A projectile is fired at an angle θ with the horizontal . (a) show that its trajectory is parabolic, (b) Obtain the expression for , time of flight ,horizontal range and vertical height. A body is projected horizontally from the top of a building of height H , if velocity of projection is 'u' find (a) time it will take to reach the ground (b)horizontal distance from the foot of the building where it will strike the ground, and (c) velocity with which body strikes

the ground. Also answer the following questions (i)at what value of θ the range will be maximum, ((ii)) prove that for a given velocity of projection the horizontal range is same for θ and 90- θ .

6. Define centripetal acceleration and centripetal force find the expression for it if a body of mass m moving with a uniform speed u in a circular path of radius r (derivation of centripetal acceleration).

7. Answer the following questions (a) State, Newton's second law of motion. show that second law is the real law of motion .(b) If a man of mass m is in a lift find the apparent weight of the man when (i) lift is accelerating upward with acceleration 'a', (ii)lift is accelerating downward with acceleration 'a' , (iii) lift is moving upward with constant velocity v ,(d) lift is falling freely under gravity.(c)Explain, Why pull is easy as compared to push a rolling body ?

8. Distinguish between static friction , limiting friction and kinetic friction, haw do they vary with the applied force , explain with the help of a diagram. . (b)write the laws of limiting friction (c)Why are ball bearings used in machinery? (d) What is the need of banking of road. (e) State two advantage and disadvantages of friction.(d) Explain why (i) a cyclist slow dawn his speed while taking turn. (ii) a cyclist bend himself towards the centre at the turn . (iii) it is necessary of banking of road ?

9. Define impulse .(a) A cricket ball of mass m moving with speed of v m/s, calculate the impulse received by the ball (b) a ball moving by a momentum of strike against a wall at an angle of θ with the normal and is reflected at the same angle and with the same speed . find the change in momentum of the ball.

10. Define conservative and non- conservative force. How will you find variable force ? what is the significance of F-x graph.? Explain conservation of energy ,draw a graph showing the variation of potential and kinetic energy with respect to the height of a free fall under gravity.

11. Define elastic and inelastic collision . discuss elastic collision in one dimension . obtain expression for velocities of two bodies after such a collision .Also show that for perfactaly elastic collision coefficient of restitution is 1.

12. State and explain work energy theorem.Also Find the relation between kinetic energy and linear momentum . using this relation answer the given questions, (a) two bodies of masses M and m (M>m)having same momentum , which has more kinetic energy? (b)) two bodies of masses M and m (M>m)having same kinetic energy, which has more momentum? (c)the linear momentum of a body is increased by 10% what is the % change in kinetic energy? (d) the kinetic energy of a body is increased by 10% what is the % change in linear momentum?

13 . Find the expression for the potential energy stored in a stretched spring of spring constant K and it is stretched by distance X. Also plot the graph which shows the variation in kinetic energy and potential energy with respect to X if spring is free to oscillate.

14.State Newtons law of gravitation in vector form .(I)Haw can you find the mass of earth ,starting from the law of gravitation?)II) What are the factors affecting the value of G ? (III)If mass of two bodies are doubled and distance is halved , how will the gravitational force change ? Write the differences between (I) Inertial ang gravitational mass,(II) G and g (III)escape velocity and orbital velocity on earth.

15. Define gravitational acceleration , find the expression for it, also find its value on the surface of earth .Haw the value of g changes (I) With altitude (II)with the depth .A planet reduces its radius by 1% with its mass remaining same , haw acceleration due to gravity changes ? Find the relation between height h above the earth surface with the depth from the earth surface where the value of g will be same.

16. what is geostationary satellite ? calculate the height of the orbit above the surface of the earth in which a satellite is placed , will appear stationary, and also write the conditions for the launching of geo stationary satellite .Also, define the term orbital velocity , find the expression for (a) orbital velocity(b) time period and(c) total energy of the satellite . Obtain the relation for orbital speed and escape velocity of the satellite from earth surface.

17. Answer the following questions-(a) what is the percentage increase in velocity for moon to escape from the gravitational pull of the earth ?(b) If the earth supposed to be a uniform sphere , suddenly contract and its radius becomes half of its original value , what will be the duration of day (or what will be time of rotation of earth on its own axis/ what will be the %change in duration of day)?(c)Why space craft usually launched from west to east ? why is it more advantageous to launch rockets in the equatorial plane?(d) What is escape velocity ? obtain the expression for the escape velocity on earth . why there is no atmosphere on moon? Explain. Also state and prove Kepler's laws of planetary motion.

18. Answer the following questions, (a)Is it possible to open a pen cap with one finger? Why? (b)When a sphere, ring, disc and spherical shell are coming down on an inclined plane, rolling without slipping, which will reach the ground first?(c)How will you distinguish between a hard-boiled egg and a raw egg by spinning each on a table top?(d)What is torque? Write its formula in vector form. Handle, to open the door, is always provided at the free edge of a door. Why? (e)If earth were to shrink suddenly, what would happen to the length of the day?

19. Answer the following questions
(a)Derive the relations (i)$L = I\omega$ (ii) $\tau = I\alpha$ (b)If angular momentum is covered in a system whose moment of inertia is decreased, will its rotational kinetic energy to be also conserved? Explain.
(c)Can a body in translatory motion have angular momentum? (d)Explain.Write an expression for the moment of inertia of a circular disc of a mass M and radius R(i)about an axis passing through its centre, and a perpendicular to its plane.(ii) about its diameter.(iii)about a tangent to its own plane.(iv) about a tangent perpendicular to the plane of the disc.

20. Obtain an expression for position vector of centre of mass of a two particle system. From a uniform circular disc of diameter d , a circular hole of diameter d/6 and having its centre at a distance of d/4 from the centre of the disc is scooped out , find the centre of mass of the remaining portion .

21. What is the difference between rotational kinetic energy and rolling kinetic energy?Show that rolling kinetic energy of a rolling body is given by $1/2mv^2((K^2/r^2)+1)$, where r is the radius of the body and K is the radius of gyration of the body. How much fraction of the K.E. of rolling is purely (i) translational (ii) rotational ?

22.(i) Define moment of inertia and radius of gyration also write the parallel and perpendicular axis theorem.(ii)Derive an expression for moment of inertia of a disc of radius r, mass m(iii)Derive an expression for moment of inertia of a thin circular ring passing through the centre and perpendicular to the plane of the ring.