PHYSICS 1

VSAQS

PHYSICAL WORLD

1. What are the fundamental forces in nature ***
2. What is raman effect *
3. What is contribution of Chandrasekhar to physics ****
4. What is discovery of c.v. raman***
5. What is physics**
6. What is beta decay. Which force is a function of it?*

UNITS AND MEASURMENTS

1. Distinguish between accuracy and precision**
2. What are significant numbers ?write the number of significant digits in the measurement of .002308**
3. How can systematic errors be minimized**
4. Why do we have different units for the same physical quantity**
5. Distinguish between fundamental units and derived units**
6. The percentage error in the mass and speed are 2% and 3% respectively. What is the maximum error in kinetic enery ?calculate using these quantities*
7. Define unified atomic mass unit and write its value in kg*

MOTION IN A PLANE

1. The vertical component of a vector is equal to its horizontal components . what is the angle made by the vector with x axis? ***
2. If a+b = a-b, what is the angle between and b **
3. A= i+j. what is the angle between the vector and x axis ***
4. If p = 2i + 4j +14k , Q= 4I +4j +10k find the magnitude of P+Q ***
5. If a bomb at rest explodes into two pieces, the pieces must travel in opposite directions. Explain ***
6. When two right angled vectors of magnitude 7 unis and 24 units combine what is the magnitude of thetr resultant ? ***

LAWS OF MOTION

1. If a bomb at rest explodes into two pieces, the pieces must travel in opposite directions. Explain ***
2. Can the coefficient of friction be greater than one **
3. Why does a heavy rifle not recoil as strongly as light rifle using the same caridges and velocity **
4. What is inertia ? what gives the measure of inertia ? ***
5. What happens to the coeffiecient of friction if the weight of he body is doubled ? **
6. Why does the car with a flattened tyre stop sooner than the one with inflated tyres **

7. A horse has to pull harder during the start of the motion than later. Explain **
8. When a bullet is fired from a gun, the gun gives a kick in the backward direction . explain **

MECHANICAL PROPERTIES OF FLUIDS

1. Define viscosity. What are the units of co effiecent of viscosity. **
2. Why are liquid drops and soap bubbles spherical **
3. What is the principle behind the carbureter of an automobile ***
4. If the diameter of a soap bubble is 10mm and its surface tension is 0.04 N/m , find the excess pressure inside the bubble **
5. Define coefficient of viscosity. What are its units **
6. Give the expression for the excerss pressure in a liquid drop. Mention the terms in the expression **
7. Find the excess pressure inside a soap bubble of radius 5mm (surface tension is 0.04 N/m) **
8. Give the expression for the excess pressure in a soap bubble ***
9. What is magnus effect ***
10. Mention any two applications of bernoullis theorem **
11. Why water droplets wet the galss surface and does not wet lotus leaf **
12. What is angle of contact **
13. Define average pressure. Mention its units and dimensional formula. Is it a scalar or vector ***
14. What are water proofing and water wetting agents? What do they do? **
15. When a water flows through a pipe, which of the layers moves fastest and slowest **

THERMAL PROPERTIES OF MATTER

1. Can a substance contract on heating ? give an example **
2. State the different modes of transmission of heat. Which of these modes require medium**
3. State newtons law of cooling **
4. Why utensils are coated black ? why the bottom of the utensils are made of copper ?***
5. Define latent heat. Write its units**
6. What is regelation. Write one of its application *
7. The roof of the building are often painted white during summer. Why **
8. Why is it easier to perform the skating on the snow*
9. What is green house effect. Explain global warming***
10. What are lower and upper fixing points in Celsius and Fahrenheit scales***
11. What is thermal expansion**
12. What is triple point of water. Mention the values of temperature and pressure at triple point of water *
13. State the conditions under which newtons law of cooling is applicable **
14. Distinguish between heat and temperature**
15. Define absorptive power of a body. What is absorptive power of a perfect black body**
16. Ventilators are provided in rooms just below the roof ? why **

17. What are units and dimensions of a specific gas constant***
18. State weins displacement law***

KINETIC THEORY OF GASES

1. When does a real gas behaves as an ideal gas****
2. Define mean free path***
3. State daltons law of partial pressure****
4. What is the law of equipartition of energy**
5. State boyles law and Charles law**
6. Write the equation for mean free path***
7. The absolute temperatue of a gas is increased 3 times. What will be the increase in rms velocityof the gas molecule ***
8. Define molar specific heat capacity*

PROBLEMS

1. State zeroth law of thermodynamics*
2. Find the torque of a force 7i+3j-5k about the origin. The force acts on a particle whose position vector is i-j*
3. Rain is falling vertically with a speed of 35 m/s. a woman rides a bicycle with a speed of 12 m/s in east to west direction. What is the direction win which she should hold her umbrella?*
4. A bats man hits back a ball straight in the direction of the bowler without changing its initial speed of 12 m/d. If the mass of the ball is 0.15kg, determine the impulse imparted to the ball. (assume linear motion of the mall)*
5. What is meant by hydrostatic paradox*
6. If the maximum intensity of radiation for a black body is found at 1.45 micro meter, what is the temperature o radiating body ? (weins constant = $2.9*10^{-3}$) *
7. We cannot open or close the door by applying force at hinges . why *
8. Two forces of magnitudes 3 units and 5 units act at 60 degress with each other. What is the magnitude of their resultant**
9. Is it necessary that a mass should be present at the center of mass of any system**
10. By spinning eggs on table top. How will you distinguish a hard boiled egg from a raw egg **
11. Why are spokes provided in a bicycle wheel**

Saqs

Motion in a plane

1. A car travels the first third of distance with a speed of 10 kmph , the second third at 20 kmph and the last third at 60 kmph. What is its mean speed over the entire distance****
2. A man runs across the roof of a tall building and jumps horizontally on to the roof of an adjacent building. If his speed is 9 m/s and the horizontal distanced between the building is 10 m and the height difference between the roofs is 9 m, will he be able to land on the next building (g= 10)****

3. A ball is thrown vertically upwards with a velocity of 20 m/s from the top of a multistoreyed building. The height of the point from where the ball is thrown is 25 m from the ground . How high will the ball rise from the ground ? how long will it be before the ball hits the ground (g= 10)**
4. A parachutist flying in an aeroplane jumps when it is at a height of 3km above the ground. He opens his parachute when he is about 1 km above ground. Describe the motion*
5. A ball is dropped from the roof of a tall building and simultaneously another ball is thrown horizontally with some velocity from the same roof. Which ball lands first ? explain your answer****
6. A bullet moving with a speed of 150 m/s stikes a tree and penetrates 3.5 cm before stopping. What is the magnitude of its retardation in the tree and the time taken for it to stop after striking the tree**
7. A bird holds a fruit in its beak and flies parallel to the ground. It lets go of the fruit at some height. Describe the trajectory of the fruit as it falls to the ground as seen be (a)the bird (b) a person on the ground*
8. A man walks on a straight road from his home to a market 2.5 km away with a speed of 5 km/fr. Finding the market closesd, he instantly truns and walks back home with a speed of 7.5 km/fr, what is the magnitude of average velocity and average speed of the man over the time interval 0 to 50 min**

MOTION IN A PLANE

1. If a+b = a-b , prove that the angle between a and b is 90 degrees**
2. Show that the trajectory of an object thrown at certain angle with horizontal is a parabola***
3. By using parallelogram law of vectors , derive an expression for the magnitude and direction of the resultant vector***
4. Can the velocity of an object be in a direction other than the direction of acceleration of the object ? if so , give an example*
5. O is the point on the ground chosen as origin, A body first suffers a displacement of 10root2 m north – east , next 10m north and finally 10 root2 m. how far is it from the origin*
6. Show that the maximum height reached by a projectile launched at an angle of 45 degress is one quarter of the range**

LAWS OF MOTION

1. Define the terms momentum and impulse. State and explain the law of conservation of momentum *
2. State newtons second law of motion. Hence derive the equation of motion F=ma from it**
3. Explain friction. Mention the methods to decrease the friction**
4. Explain the advantages and disadvantages of friction**
5. Why is pulling the lawn roller preferred to pushing it*

SYSTEM OF PARTICLES AND ROTATIONAL MOTION

1. Distinguish between center of mass and center of gravity****
2. Find center of mass of three particles 100 gm , 150 gm , 200 gm placed at the vertices of an equilateral triangle of each side 0.5 m long (take 100 gm at origin and 150 gm along x axis)**
3. Define angular acceleration and torque. Establish the relation between angular acceleration and torque****
4. Define vector product . explain the properties of a vector product with an example***
5. Define angular velocity . derive v=rw**
6. State and prove the principle of conservation of angular momentum. Explain the principle of conservation of angular momentum with example*

GRAVITATION

1. What is geostationary satellite . state its uses****
2. State keplers laws of planetary motin**
3. What is escape velocity ? obtain an expression for it**
4. What is orbital velocity ? obtain an expression for it**
5. Derive the relation between acceleration due to gravity at the surface of a planet and graavitaitonal contant*

MECHANICAL PROPERTIES OF SOLIDS

1. Define strain energy and derive an expression for it**
2. Describe the behavior of a wire under gradually increasing load****
3. Define stress and explain the types of stress**
4. Define youngs modulus, bulk modulus and shear modulus*

THERMAL PROPERTIES OF MATTER

1. In what way is the anomalous behavior of water advantageous to aquatic animals****
2. Explain conduction , convection and radiation with examples**
3. State and explain newton law of cooling. Specify the coditions under which it is applicable*
4. Pendulum clocks generally go fast in winter and slows in summer . why****
5. Explain Celsius and Fahrenheit scales of temperature. Obtain the relation between Celsius and Fahrenheit **

LAQS

WORK POWER AND ENERGY

1. State and prove law of conservation of energy incase of a freely falling body. ****
2. What are collisions ? explain the types of collisions. Show that in case of one dimensional elastic collision the relative velocity of approach of two colliding bodies before collision is equal to the relative velocity of separation after collisoion**
3. Develop the notions of work and kinetic energy and show that it leads to work energy theorem. State conditions under which a force does no work**

OSCILLATIONS

1. **Show that the motion of a simple pendulum is simple harmonic and hence derive an equation fo its time period. What is seconds pendulum.******
2. **Define simple harmonic motion. Show that the motion of projection of a particle performing uniform circular motion , on any diameter is simple harmonic******

THERMODYNAMICS

1. **Explain reversible and irreversible process . describe the working of carnot engine . obtain an expression for its efficiency******
2. **Define the second law of thermodynamics. Specify the working of heat engine and refrigerator. What is the difference between these two?******

PROBLEMS WITH LAQS

1. **A machine gun fires 360 bullets per minute and each bullet travals with a velocity of 600 m/s. If the mass of each bullet is 5 gm, find the power of machine gun.******
2. **An elevator can carry a maximum load of 1800 kg is moving up with a constant speed of 2m/s. the frictional force opposing the motion is 4000N. Determine the minimum power delivered by the motor to the elevator in watts****
3. **Find the total energy of a body of 5 kg mass, which is at a height of 10m from the earth and falling downwards straightly with a velocity of 20 m/s ($g=10m/s^2$)****
4. **A pump is required to lift 600 kg of water per minute fom a well of 25 m deep and to eject it with a speed of 50 m/s. calculate the power required to perform theabove task ($g=10m/s^2$)******
5. **In a ballistics demonstration, a police officer fires a bullet of mass 50 g with speed 200 m/s on soft plywood of thickness 2 cm. The bullet emerges with only 10% of its kinetic energy. What is the emergent speed of the bullet ?****
6. **Calculate the change in the length of a simple pendulum of length 1m, when its period of oscillation changes from 2 sec to 1.5 sec****
7. **What is seconds pendulum ? Calculate the length of the seconds pendulum*******
8. **What happens to the time period of a simple pendulum if its length is increased upto four times?****
9. **Can a simple pendulum be used in an artificial satellite ? give reason.******