

XI Physics Worksheet

Time: 30 min

Chapter#1 : Physical World-01

Full Marks: 20

**Instructions:**

**1. All questions are compulsory.**

**2. Please give the explanation for the answer where applicable.**

Q1 - How physics is related to society?

(2 Marks)

Q2 - State various types of forces in nature.

(2 Marks)

Q3 - Name four physical devices widely used in medical diagnosis.

(2 Marks)

Q4 - Define technology.

(2 Marks)

Q5 - Name a few war time applications of physics?

(2 Marks)

Q6 - Name a few maritime applications of physics?

(2 Marks)

Q7 - Why do we call physics as an exact science?

(2 Marks)

Q8 - Name some German Physicists with their contribution.

(2 Marks)

Q9 - Who proposed the wave theory of light?

(1 Mark)

Q10 - Name the device which is based on amplification of light by population inversion

(1 Mark)

Q11 - How elastic spring forces arise?

(1 Mark)

Q12 - On which scientific principle does optical fibres work?

(1 Mark)

**Instructions:**

- 1. All questions are compulsory.**
- 2. Please give the explanation for the answer where applicable.**

- Q1 - What is physics?  
(2 Marks)
- Q2 - Technology is related to physics? Comment on this.  
(2 Marks)
- Q3 - State various types of forces in nature.  
(2 Marks)
- Q4 - Name four physical devices widely used in medical diagnosis.  
(2 Marks)
- Q5 - Name a few war time applications of physics?  
(2 Marks)
- Q6 - Name a few maritime applications of physics?  
(2 Marks)
- Q7 - Why do we call physics as an exact science?  
(2 Marks)
- Q8 - Who proposed the wave theory of light?  
(1 Mark)
- Q9 - Who discovered nuclear forces?  
(1 Mark)
- Q10 - Name the scientist whose field of work was elasticity.  
(1 Mark)
- Q11 - Name the device which is based on amplification of light by population inversion  
(1 Mark)
- Q12 - Who discovered the phenomenon of neutron induced fission of uranium  
(1 Mark)
- Q13 - Name the branch of science which deals with study of earth.  
(1 Mark)

## XI Physics Worksheet

Time: 30 min

Chapter#2 : Unit and Measurement-02

Full Marks: 20

### Instructions:

1. All questions are compulsory.
2. Please give the explanation for the answer where applicable.

Q1 - Why other methods to measure the time is replaced by cesium atom clock. (2 Marks)

Q2 - What are errors? Explain two types of errors? (3 Marks)

Q3 - Convert 25 Joule into erg. (3 Marks)

Q4 - Derive the formulae for velocity ( $v$ ) of water waves that may depend upon their wavelength  $\lambda$ , density of water  $\rho$  and acceleration due to gravity  $g$ . (3 Marks)

Q5 - Find the expression for centripetal force if it depends upon mass of the body, speed of the body, and the radius of the circular path. (5 Marks)

Q6 - Which is the most accurate clock? (1 Mark)

Q7 - What is the significance of precision? (1 Mark)

Q8 - What is the responsibility of National physical laboratory (NPL)? (1 Mark)

Q9 - Name the error associated with the resolution of the instrument. (1 Mark)

## XI Physics Worksheet

Time: 30 min

Chapter#2 : Unit and Measurement-02

Full Marks: 20

### Instructions:

1. All questions are compulsory.

2. Please give the explanation for the answer where applicable.

Q1 - What do you mean by measurement of a physical quantity?

(2 Marks)

Q2 - Metre is well defined in terms of wavelength and time in terms of periods of radiation why?

(3 Marks)

Q3 - Explain echo method to find the distance of moon.

(3 Marks)

Q4 - If  $x = a + bt + ct^2$  where  $x$  is in metres and  $t$  in seconds, write the units of  $a$ ,  $b$ ,  $c$ .

(3 Marks)

Q5 - Find the expression for centripetal force if it depends upon mass of the body, speed of the body, and the radius of the circular path.

(5 Marks)

Q6 - What is atomic mass unit (a.m.u.)?

(1 Mark)

Q7 - Which method is used for measuring nuclear sizes?

(1 Mark)

Q8 - What is principle of homogeneity in dimensional method?

(1 Mark)

Q9 - A quantity has dimensions. Is it necessary it must have a unit?

(1 Mark)

XI Physics Worksheet

Time: 30 min

Chapter#3 : Motion in Straight Line-01

Full Marks: 20

**Instructions:**

1. All questions are compulsory.
2. Please give the explanation for the answer where applicable.

Q1 - Explain displacement.

(2 Marks)

Q2 - A body moves through distance  $x$  from a point A to a point B and returns back to A by same path. What will be the distance and the displacement covered by the body.

(2 Marks)

Q3 - Give some important features of uniform motion.

(2 Marks)

Q4 - A jet plane is moving with a velocity of 800 km/hr. The gases are ejecting from rear of jet plane with velocity of 1600 km/hr with respect to jet. Find the velocity of gases w.r.t a person on ground.

(3 Marks)

Q5 - Draw the position time graphs for two objects initially occupying different positions but having zero relative velocity.

(3 Marks)

Q6 - Derive the equations of motion  $v = u + at$ ,  $s = ut + (1/2)at^2$ ,  $v^2 - u^2 = 2as$  by calculus.

(5 Marks)

Q7 - Can a body have Constant speed but a varying Velocity?

(1 Mark)

Q8 - What is frame of reference?

(1 Mark)

Q9 - A car and a bike with the same kinetic energy are brought to rest by the application of brakes which provide equal retarding forces. Which of them will come to rest in a shorter distance?

(1 Mark)

## XI Physics Worksheet

Time: 30 min

Chapter#3 : Motion in Straight Line-02

Full Marks: 20

### Instructions:

1. All questions are compulsory.
2. Please give the explanation for the answer where applicable.

Q1 - What are scalar and vector quantities?

(2 Marks)

Q2 - Differentiate speed and velocity.

(2 Marks)

Q3 - The distance 'x' of particle moving in one dimension under the action of a constant force is related to time t by relation

$$t = \sqrt{x + 3}$$

Where 'x' is in m, t is in sec. Find displacement when velocity is zero.

(3 Marks)

Q4 - Explain following velocity time graphs.

(3 Marks)

Q5 - A particle is moving along X axis the position is given by

$$x = K + jt^2$$

where K = 8m and j = 4 m/s<sup>2</sup> t is time. Find velocity of particle at t = 0, t = 3 sec.

(3 Marks)

Q6 - A body is dropped from the top of a tower, which falls through 40m during the last two seconds of its fall. What is the height of tower ?(g= 10 m/s<sup>2</sup>)

(5 Marks)

Q7 - The displacement of a body is zero. Is the distance covered by it also necessarily zero?

(1 Mark)

Q8 - If a body has constant speed, is it true that it can have acceleration?

(1 Mark)

XI Physics Worksheet

Time: 30 min

Chapter#4 : Motion in Plane-01

Full Marks:

Instructions:

1. All questions are compulsory.
2. Please give the explanation for the answer where applicable.

XI Physics Worksheet

Time: 30 min

Chapter#4 : Motion in Plane-02

Full Marks: 20

Instructions:

1. All questions are compulsory.
2. Please give the explanation for the answer where applicable.

XI Physics Worksheet

Time: 30 min

Chapter#5 : Laws of Motion-01

Full Marks: 20

**Instructions:**

1. All questions are compulsory.
2. Please give the explanation for the answer where applicable.

Q1 - Automobile tyres have generally irregular projections over their surfaces. Explain why?

(2 Marks)

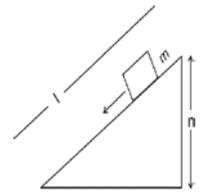
Q2 - Is large brake on a bicycle wheel more effective than a small one? Explain.

(2 Marks)

Q3 - A stone tied at the end of a string is whirled in a horizontal circle .When the string breaks, the stone flies away tangentially. Explain why.

(2 Marks)

Q4 -A body of mass  $m$  is released from the top of a rough inclined plane. If force of friction is  $f$  what will be the velocity at bottom.

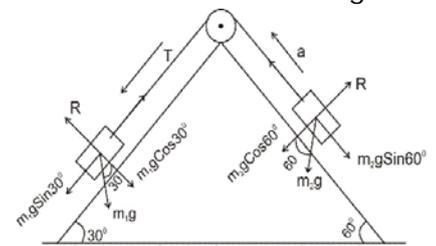


(3 Marks)

Q5 - A shell of mass  $0.02\text{kg}$  is fired from a gun of mass  $100\text{ kg}$ . If the muzzle speed of the shell is  $80\text{ m/s}$ , what is the recoil speed of the gun?

(3 Marks)

Q6 -Two blocks of mass  $m_1= 3\text{kg}$  and  $m_2=(1/3)^{1/2}\text{ kg}$  are connected by a light inextensible string which passes over a smooth peg. The peg is fixed on top of wedge. Two masses  $m_1$  and  $m_2$  are inclined at  $30^\circ$  and  $60^\circ$  respectively with horizontal. Calculate the acceleration of masses and tension in string.



(5 Marks)

Q7 - A body is moving with uniform velocity. Is it in equilibrium?

(1 Mark)

Q8 - What is the maximum speed with which a vehicle can negotiate a curve?

(1 Mark)

Q9 - Define inertia.

(1 Mark)

XI Physics Worksheet

Time: 30 min

Chapter#5 : Laws of Motion-02

Full Marks: 20

**Instructions:**

- 1. All questions are compulsory.**
- 2. Please give the explanation for the answer where applicable.**

Q1 - When a ball falls on the earth, the earth also moves up to meet it. But the motion of the earth is not noticeable. Explain why?

(2 Marks)

Q2 - Can a single isolated force exist in nature? Give reason.

(2 Marks)

Q3 - When a man jumps out of a boat, the boat is pushed away. Why?

(2 Marks)

Q4 - A body of mass  $m$  moves along  $x$ -axis such that its position co-ordinate at any instant  $t$  is  $x = at^4 - bt^3 + ct$ . Where  $a, b, c$  are constant. What is the force acting on the particle at any instant.

(3 Marks)

Q5 - Express newton's second law of motion in component form. Give its significance.

(3 Marks)

Q6 - An electric bulb suspended from the roof of a railway train by a flexible wire shifts through an angle of  $19^\circ 48'$  when the train goes horizontally round a curved path of 200m radius. Find speed of train.

(5 Marks)

Q7 - Is an external force required to keep a body in uniform motion?

(1 Mark)

Q8 - Suppose you are sitting inside a van at rest. You push the van from within. will it move?

(1 Mark)

Q9 - Is force of friction independent of path?

(1 Mark)

## XI Physics Worksheet

Time: 30 min

Chapter#6 : Work Energy and Power-01

Full Marks: 20

### Instructions:

1. All questions are compulsory.
2. Please give the explanation for the answer where applicable.

Q1 - A light body and a heavy body have same momentum, which will have greater kinetic energy ?

(2 Marks)

Q2 - A ball is dropped from height  $h_1$  and it rebounds to a height  $h_2$ . Find the Values of Coefficient of restitution.

(2 Marks)

Q3 -What is the minimum energy released in the annihilation of an electron positron pair ?

(2 Marks)

Q4 -A truck and a car are moving with the same kinetic energy on a straight road. Their engines are simultaneously switched off.Which one will stop at a lesser distance ?

(3 Marks)

Q5 - A ball of mass  $m_1$  moving with velocity  $v$  collides head on with stationary ball of mass  $m_2$ . The velocity of the ball becomes  $v/4$  after the collision.Assuming the collision to be elastic, find the ratio  $m_2/m_1$ .

(3 Marks)

Q6 - Derive an expression for the final velocities of two bodies of masses  $m_1$  and  $m_2$  that undergoes a head on elastic collision.

(5 Marks)

Q7 - What happens to the potential energy of a spring when it is compressed or stretched?

(1 Mark)

Q8 - A spring is cut into two equal halves. How is the spring constant of each half affected?

(1 Mark)

Q9 - What is the work done in holding a suitcase of 20 kg for 16 minutes while waiting for a bus?

(1 Mark)

XI Physics Worksheet

Time: 30 min

Chapter#6 : Work Energy and Power-02

Full Marks: 20

**Instructions:**

1. All questions are compulsory.
2. Please give the explanation for the answer where applicable.

Q1 - Define work energy theorem.

(2 Marks)

Q2 - Define conservative and non conservative forces.

(2 Marks)

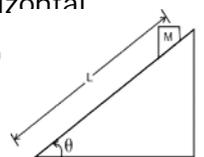
Q3 - A uniform chain of mass,  $m$  and length,  $l$  is held on a frictionless table such that one third of its length hangs over the edge. Calculate the work done to pull the hanging part of the chain back on the table?

(3 Marks)

Q4 - A bullet weighing 10 g is fired with a velocity of 800 m/s. After passing through a mud wall 1 m thick, its velocity decreases to 100 m/s. Find the average resistance offered by the mud wall.

(3 Marks)

Q5 - A block of mass,  $m$  is kept on a rough inclined plane making an angle  $\theta$  with the horizontal. Find the velocity of the block when it reaches the bottom. (Given, coefficient of friction  $\mu$ )



(5 Marks)

Q6 - What happens to the potential energy of a body when conservative force does positive work?

(1 Mark)

Q7 - When an air bubble rises in water, what happens to its potential energy ?

(1 Mark)

Q8 - Define coefficient of restitution?

(1 Mark)

Q9 - Can potential energy of an object be negative?

(1 Mark)

Q10 - Is linear momentum of a system always conserved ?

(1 Mark)

## XI Physics Worksheet

Time: 30 min    Ch#7 : System of Particles and Rotational Motion-01    Full Marks: 20

### Instructions:

1. All questions are compulsory.
2. Please give the explanation for the answer where applicable.

Q1 - Two masses  $m_1$  and  $m_2$  start moving towards each other due to their mutual force of attraction. What will be the change in their respective centre of mass position?

(1 Mark)

Q2 - What is the S.I. unit of angular momentum?

(1 Mark)

Q3 - Is radius of gyration of a body a constant quantity?

(1 Mark)

Q4 - A child starts running from one end to another end of a trolley which is moving with uniform speed  $V$  on a smooth horizontal floor. What is the speed of the C.M. of the (trolley+ child) system?

(2 Marks)

Q5 - Find the moment of inertia of a solid sphere about a tangent to the sphere.

(2 Marks)

Q6 - Prove that the torque experienced by a particle is equal to the product of its moment of inertia and angular acceleration.

(2 Marks)

Q7 - Find the moment of inertia of a rod of length  $l$  about an axis passing through its mid point and perpendicular to it?

(3 Marks)

Q8 - A man of mass  $m_1$  is standing on a platform of mass  $m_2$  kept on a smooth horizontal surface. The man starts moving on the platform with a velocity  $V_r$  relative to the platform. Find the recoil velocity of the platform.

(3 Marks)

Q9 - A particle traverses its circular path as

$$\theta = 2t^2 + t \text{ where,}$$

$\theta$  is the angle made at the centre in radian and  $t$  is time in seconds. Find

- (a) angular displacement at  $t = 2$  s
- (b) angular velocity at  $t = 2$  s
- (c) angular acceleration
- (d) tangential acceleration at  $t = 1$  s if radius of circle is 5 m.

(5 Marks)

XI Physics Worksheet

Time: 30 min    Ch#7 : System of Particles and Rotational Motion-02    Full Marks: 20

**Instructions:**

1. All questions are compulsory.
2. Please give the explanation for the answer where applicable.

Q1 - Where is the centre of mass of a uniform cube located?  
(1 Mark)

Q2 - A solid sphere and a hollow sphere having same density and radius are rolling down an inclined plane. Which one of them will reach first?  
(1 Mark)

Q3 - Where is the centre of mass of a system of two particles is situated?  
(1 Mark)

Q4 - In which situation, centre of mass has no acceleration?  
(1 Mark)

Q5 - A solid cylinder of mass 20 kg rotates on its axis with angular speed  $100 \text{ rad s}^{-1}$ . The radius of the cylinder is 0.25 m. What is the kinetic energy associated with the rotation of the cylinder? What is the magnitude of angular momentum of the cylinder about its axis?  
(2 Marks)

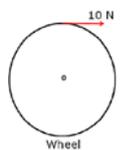
Q6 - A rope of negligible mass is wound over a hollow cylinder of mass 4 kg and radius 27 cm. What is the angular acceleration of the cylinder if the rope is pulled with a force of 30N? What is the linear acceleration of the rope?  
(2 Marks)

Q7 - What do you mean by conservation of linear momentum?  
(2 Marks)

Q8 - A bullet of mass 50 g and speed 500 m/sec gets embedded exactly at the centre of the door. If the door is 1 m wide and weighs 12 kg, find the angular speed of the door just after the bullet embedded into it?  
(2 Marks)

Q9 - A uniform chain of length 3 m is kept on a table such that a length of 40 cm hangs freely from the edge of the table. The total mass of the chain is 4 kg. What is the work done in pulling the entire chain on the table?  
(3 Marks)

Q10 - A wheel is resting about its axis (fixed). A constant force of 10 N is applied tangentially to the wheel. Find the angular displacement made after one second. Also find angular speed after one revolution. Mass of the wheel is 10 kg and radius is 0.5 m.



(5 Marks)

**Instructions:**

- 1. All questions are compulsory.**
- 2. Please give the explanation for the answer where applicable.**

Q1 - Write an expression for the gravitational potential at the surface of the earth.

(1 Mark)

Q2 - Suppose the earth's diameter becomes twice its present diameter but mass remains same. How does the weight of a body on the earth surface change?

(1 Mark)

Q3 - Give one important application of geostationary satellites.

(1 Mark)

Q4 - Does escape velocity depend on the mass of the object?

(1 Mark)

Q5 - What is the value of the acceleration due to gravity at a depth below earth's surface?

Why the weight of all bodies is zero at the earth's centre?

(2 Marks)

Q6 - Escape velocity of a planet is  $v_e$ . If the radius of the planet remains same, and mass becomes four times, then find the new escape velocity.

(2 Marks)

Q7 - What happens to the total energy of the satellite if its speed is increased?

(1 Mark)

Q8 - A satellite is revolving around the earth at a height of  $6 \times 10^5$  m. Find

- The speed of the satellite and
- The time period of the satellite.

It is given radius of the earth is  $6.4 \times 10^6$  m and mass of the earth is  $6 \times 10^{24}$  kg.

(3 Marks)

Q9 - An artificial satellite is going around the earth. Find the time period of the satellite if it is close to the surface of the earth. Radius of the earth =  $6.4 \times 10^6$  m.

(3 Marks)

Q10 - An artificial satellite is moving in a circular orbit around the earth with a speed equal to half of the escape speed from the surface of the earth. Determine

- The height of the satellite above the earth's surface.
- If the satellite is stopped suddenly in its orbit and allowed to fall freely towards the earth, find the speed with which it hits the surface of the earth.

(5 Marks)

XI Physics Worksheet

Time: 30 min

Chapter#8 : Gravitation-02

Full Marks: 20

**Instructions:**

- 1. All questions are compulsory.**
- 2. Please give the explanation for the answer where applicable.**

Q1 - Define gravitational potential.

(1 Mark)

Q2 - Define geostationary satellites.

(1 Mark)

Give one important use of such satellites.

(1 Mark)

Q3 - What will happen to the weight of the body if earth stops rotating?

(1 Mark)

Q4 - What is the value of the acceleration due to gravity at a depth below earth`s surface?

Why the weight of all bodies is zero at the earth`s centre?

(2 Marks)

Q5 - Calculate the escape velocity from the moon. It is given that mass of the moon =  $7.4 \times 10^{22}$  kg and radius of the moon is 1740 km.

(2 Marks)

Q6 - (a)Is the potential energy of a system of bodies positive or negative?

(b)What is the maximum value of gravitational potential energy and where?

(2 Marks)

Q7 - If a body is projected at double the speed of escape velocity, find its speed at an infinite distance from the earth? It is known that escape velocity of earth is 11.2 km/sec.

(2 Marks)

Q8 - State Kepler`s laws of planetary motion.

(3 Marks)

Q9 - What is the minimum energy required to launch a satellite of mass  $m$  from the surface of the earth of mass ' $M$ ' and radius ' $R$ ' in a circular orbit at an altitude  $2R$ ?

(5 Marks)

## XI Physics Worksheet

Time: 30 min    Chapter#9: Mechanical Properties of Solids-01    Full Marks: 20

### Instructions:

1. All questions are compulsory.
2. Please give the explanation for the answer where applicable.

Q1 - Define stress. (1 Mark)

Q2 - What is the dimensional formula of young's modulus of elasticity? (1 Mark)

Q3 - What is the value of young's modulus for a perfectly rigid body? (1 Mark)

Q4 - Two wires of same material and length are stretched by the same force. Their masses are in the ratio 3:2. Find the ratio of their elongations. (2 Marks)

Q5 - The young's modulus of the material of a wire is  $6 \times 10^{12} \text{N/m}^2$  and there is no transverse strain in it. Find its modulus of rigidity? (2 Marks)

Q6 - Explain why solids are more elastic than gases? (2 Marks)

Q7 - A long spring is stretched by 2 cm and its potential energy is V. Find the potential energy of the spring if it is stretched by 10 cm? (3 Marks)

Q8 - Forces of 105 N each are applied in opposite directions on upper and lower faces of a cube of side 10cm, shifting the upper face parallel to itself by 0.5cm. If the side of the cube were 20cm, what would be the displacement? (3 Marks)

Q9 - A 14.5 kg mass, fastened to the end of a steel wire of unstretched length 1m, is whirled in a vertical circle with an angular velocity of 2 rev/sec at the bottom of the circle. The cross sectional area of the wire is  $0.065 \text{cm}^2$ . Calculate the elongation of the wire when the mass is at the lowest point of its path.  $Y_{\text{steel}} = 2 \times 10^{11} \text{N/m}^2$  (5 Marks)

## XI Physics Worksheet

Time: 30 min    Chapter#9: Mechanical Properties of Solids-02    Full Marks: 20

### Instructions:

1. All questions are compulsory.
2. Please give the explanation for the answer where applicable.

Q1 - Why young's modulus and shear modulus are relevant only for solids? (1 Mark)

Q2 - What is the value of modulus of rigidity for a liquid? (1 Mark)

Q3 - A wire 3 m in length suspended vertically stretches by 1 mm when mass of 40 kg is attached to the lower end. What is the potential energy gained by the wire? (1 Mark)

Q4 - The breaking stress of aluminium is  $8.1 \times 10^7 \text{Nm}^{-2}$ . Find the greatest length of aluminium wire that can hang vertically without breaking. Density of aluminium is  $2.7 \times 10^3 \text{kgm}^{-3}$ . (2 Marks)

Q5 - Two wires A and B of the same material have radii in the ratio 2:1 and lengths in the ratio 4:1. Find the ratio of the normal forces required to produce the same change in the lengths of the two wires? (2 Marks)

Q6 - A rod elongates by  $l$  when a body of mass  $m$  is suspended from it. Find the work done in the process? (2 Marks)

Q7 - A copper and a steel wire of same length and cross section are attached end to end. The compound wire is hung from a rigid support and a load is suspended from the free end. If  $Y$  of steel is  $(20/9)$  times of copper then find the ratio of increase in length of steel wire to copper wire? (3 Marks)

Q8 - Compute the fractional change in volume of a glass slab, when subjected to a hydraulic pressure of 1 atm. It is given bulk modulus of glass =  $37 \times 10^9 \text{Nm}^{-2}$  (3 Marks)

Q9 - One end of a wire 2m long and diameter 2mm is fixed in the ceiling. A naughty boy of mass 10kg jumps to catch the free end and stays there. Find the change in the length of the wire.  $Y = 2 \times 10^{11} \text{N/m}^2$  (5 Marks)

XI Physics Worksheet

Time: 30 min

Chapter# 10: Mechanical Properties of Fluids-01

Full Marks: 20

**Instructions:**

1. All questions are compulsory.
2. Please give the explanation for the answer where applicable.

Q1 - What is a fluid?

(1 Mark)

Q2 - What happens to the surface tension of the liquid when temperature is increased?

(1 Mark)

Q3 - What is surface energy?

(1 Mark)

Q4 - What will be the acceleration of a body falling through a viscous medium after terminal velocity is reached?

(2 Marks)

Q5 - Explain why the blood pressure in humans is greater at the feet than at the brain.

(2 Marks)

Q6 - Explain why surface tension of the liquid is independent of the area of contact of the liquid surface.

(2 Marks)

Q7 - Explain why we should blow over the paper to keep it horizontal.

(3 Marks)

Q8 - The level of water in a tank is 5 m high. A hole of area  $1 \text{ cm}^2$  is made at the bottom of the tank. Find the rate of leakage of water from the hole?

(3 Marks)

Q9 - Water is flowing in a river. If the velocity of a layer at a distance 10 cm from the bottom is 20 cm/sec, find the velocity of layer at a height of 40 cm from the bottom?

(5 Marks)

**XI Physics Worksheet**

Time: 30 min

**Chapter#10: Mechanical Properties of Fluids-02**

Full Marks: 20

**Instructions:**

**1. All questions are compulsory.**

**2. Please give the explanation for the answer where applicable.**

Q1 - What is a streamline flow?

(1 Mark)

Q2 - What is surface tension? Give its unit.

(1 Mark)

Q3 - What is Reynold's number?

(1 Mark)

Q4 - What is capillarity?

(2 Marks)

Q5 - The excess pressure inside a soap bubble of radius 4 cm is 30 dyne/cm<sup>2</sup>. Find the surface tension?

(2 Marks)

Q6 - A 40kg girl wearing high heel shoes balances on a single heel. The heel is circular with diameter 2cm. What is the pressure exerted by the heel on the horizontal floor?

(2 Marks)

Q7 - The excess pressure inside a soap bubble is twice the excess pressure inside a second soap bubble. The volume of the first bubble is 'n' times the volume of the second bubble. Find the value of 'n'?

(3 Marks)

Q8 - Find the work done by a boy in making soap bubble of diameter 1.4 cm by blowing. Surface tension of soap bubble is 0.03N/m.

(3 Marks)

Q9 - The cylindrical tube of a spray pump has a cross section of 8.0cm<sup>2</sup>, one of which has 40 fine holes each of diameter 1.0mm. If the liquid flows inside the tube at the rate of 1.5m per minute, what is the speed of ejection of the liquid through the holes?

(5 Marks)

## XI Physics Worksheet

Time: 30 min

Chapter#11: Thermal Properties of Matter-01

Full Marks: 20

### Instructions:

1. All questions are compulsory.
2. Please give the explanation for the answer where applicable.

Q1 - What is heat?

(1 Mark)

Q2 - Define specific heat.

(1 Mark)

Q3 - What is meant by triple point?

(1 Mark)

Q4 - A piece of metal has a length 30 cm at 150°C. At 90°C its length increases by 0.027 cm. Find the coefficient of cubical expansion of the metal?

(2 Marks)

Q5 - Explain why water does not freeze at the bottom of the lakes in winter.

(2 Marks)

Q6 - It is required to prepare a steel meter scale, such that the millimeter intervals are to be accurate within 0.0005mm at a certain temperature. Determine the maximum temperature variation allowable during the rulings of millimeter marks.

Given  $\alpha$  for steel =  $1.322 \times 10^{-5} \text{ } ^\circ\text{C}^{-1}$

(2 Marks)

Q7 - A person weighing 60 kg takes in 2000 kcal diet in a day. If this energy were to be used in heating the person without any losses, what would be his rise in temperature? Given specific heat of human body is  $0.83 \text{ cal g}^{-1} \text{ } ^\circ\text{C}^{-1}$

(3 Marks)

Q8 - If  $I$  is the moment of inertia of a solid body, find the change in  $I$  corresponding to a small change in temperature?

(3 Marks)

Q9 - Two vessels of volumes 5 and 3 litres contain air at pressure of 3 and 7 atmospheres, respectively. What will be the resultant pressure when they are connected through a small-bore tube? Assume temperature remains constant throughout.

(5 Marks)

XI Physics Worksheet

Time: 30 min

Chapter# 11: Thermal Properties of Matter-02

Full Marks: 20

**Instructions:**

1. All questions are compulsory.
2. Please give the explanation for the answer where applicable.

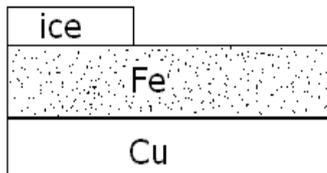
Q1 - Name the thermometers which are used to measure very high temperature. (1 Mark)

Q2 - Define specific heat of a gas at constant volume. (1 Mark)

Q3 - What is a trade wind? (1 Mark)

Q4 - How is skating possible on snow? (2 Marks)

Q5 - A cube of ice is placed on a bimetallic strip at room temperature as shown in the fig. What will happen if the upper strip is of iron and lower strip is of copper?



(2 Marks)

Q6 - A platinum resistance thermometer has resistance  $2.2 \Omega$  at  $0^\circ\text{C}$  and  $5.6 \Omega$  at  $100^\circ\text{C}$ . If its resistance is  $7.3 \Omega$  in a bath, find the temperature of the bath on the platinum resistance thermometer?

(2 Marks)

Q7 - State Newton's law of cooling. (3 Marks)

Q8 -How much should the temperature of a brass rod be increased so as to increase its length by 1%?  
Given  $\alpha$  for brass is  $0.00002 \text{ }^\circ\text{C}^{-1}$

(3 Marks)

Q9 - A pendulum clock having copper rod keeps correct time at  $20^\circ\text{C}$ . It gains 15 seconds per day if cooled to  $0^\circ\text{C}$ . Calculate the coefficient of linear expansion of copper. (5 Marks)

**Instructions:**

**1. All questions are compulsory.**

**2. Please give the explanation for the answer where applicable.**

Q1 - What is an adiabatic process?

(1 Mark)

Q2 - What is an isothermal process?

(1 Mark)

Q3 - Can the Carnot engine be realized in practice?

(1 Mark)

Q4 - What is critical temperature?

(2 Marks)

Q5 - What happens to the rate of loss of heat when small temperature difference between a liquid and its surroundings is doubled?

(2 Marks)

Q6 - A refrigerator is to maintain eatables kept at  $9^{\circ}\text{C}$ . If room temperature is  $36^{\circ}\text{C}$ , calculate the coefficient of performance.

(2 Marks)

Q7 - State Kelvin-Planck statement of second law of thermodynamics.

(3 Marks)

Q8 - Calculate the efficiency of a Carnot's engine working between steam point and ice point.

(3 Marks)

Q9 - What amount of heat must be supplied to  $2 \times 10^{-2}\text{kg}$  of nitrogen at room temperature to raise its temperature by  $45^{\circ}\text{C}$  at constant pressure?

Given molecular mass of nitrogen is 28 and  $R = 8.3 \text{ Jmole}^{-1}\text{K}^{-1}$

(5 Marks)

XI Physics Worksheet

Time: 30 min

Chapter#12: Thermodynamics-02

Full Marks: 20

**Instructions:**

**1. All questions are compulsory.**

**2. Please give the explanation for the answer where applicable.**

- Q1 - Which thermodynamic variable is defined by (a) Zeroth law of thermodynamics (b) First law of thermodynamics?  
(1 Mark)
- Q2 - An ideal gas is compressed at a constant temperature, will its internal energy increase or decrease?  
(1 Mark)
- Q3 - Can whole of heat be converted into work?  
(1 Mark)
- Q4 - What is zeroth law of thermodynamics?  
(2 Marks)
- Q5 - What is internal energy of a system?  
(2 Marks)
- Q6 - What is Clausius statement of second law of thermodynamics?  
(2 Marks)
- Q7 - State first law of thermodynamics.  
(3 Marks)
- Q8 - Explain why two bodies at different temperatures  $T_1$  and  $T_2$ , if brought in thermal contact do not necessarily settle to the mean temperature  $(T_1 + T_2) / 2$  ?  
(3 Marks)
- Q9 - A sample of ideal gas ( $\gamma = 1.4$ ) is heated at constant pressure. If an amount of 140 J of heat is supplied to the gas, find (a) change in internal energy of the gas (b) work done by the gas?  
(5 Marks)

**Instructions:**

- 1. All questions are compulsory.**
- 2. Please give the explanation for the answer where applicable.**

Q1 - Do the molecules of an ideal gas attract or repel each other? (1 Mark)

Q2 - According to kinetic theory of gases, what is the relation between energy per mole and temperature of the gas? (1 Mark)

Q3 - What happens to the random motion when an ideal gas undergoes free expansion? (1 Mark)

Q4 - Explain the rise of temperature on heating, on the basis of kinetic theory. (2 Marks)

Q5 - A gas in a vessel is at the pressure  $P_0$ . If the masses of all the molecules be made half and their speeds be made double, then find the resultant pressure. (2 Marks)

Q6 - What is equipartition of energy? (2 Marks)

Q7 -What is mean free path? (3 Marks)

Q8 - Air is filled in a vessel at  $60^{\circ}\text{C}$ . To what temperature should it be heated in order that 1/3rd of air may escape out of the vessel? (3 Marks)

Q9 -A diatomic gas ( $\gamma = 1.4$ ) does 200j of work when it is expanded isobarically. Find the heat given to the gas in the process? (5 Marks)

XI Physics Worksheet

Time: 30 min

Chapter#13: Kinetic Theory-01

Full Marks: 20

**Instructions:**

1. All questions are compulsory.
2. Please give the explanation for the answer where applicable.

- Q1 - The rms speed of the molecules of a gas in a vessel is 400m/sec. If half of the gas leaks out at constant temperature, find the rms speed of the remaining molecule?  
(1 Mark)
- Q2 - When a gas behaves more closely as an ideal gas?  
(1 Mark)
- Q3 - What is degree of freedom?  
(1 Mark)
- Q4 - Calculate the kinetic energy of a gram molecule of oxygen at 127<sup>o</sup>C. Value of Boltzmann constant= $1.381 \times 10^{-23} \text{ JK}^{-1}$ . Avogadro's no= $6.022 \times 10^{23}$  gm-mole.  
(2 Marks)
- Q5 - Find the temperature at which oxygen molecules have the same rms speed as N<sub>2</sub> molecules at 7<sup>o</sup>C?  
(2 Marks)
- Q6 - Calculate the rms speed of nitrogen at STP (Pressure=1 atm and temperature = 0<sup>o</sup>C, Density of nitrogen is 1.25 kg/m<sup>3</sup> )  
(2 Marks)
- Q7 - Find the temperature at which average translational kinetic energy of a molecule is equal to the kinetic energy of an electron accelerated from rest through a potential difference of 1V  
(3 Marks)
- Q8 - A vessel of volume 2000cm<sup>3</sup> contains 0.1mole of oxygen and 0.2mole of carbon dioxide. If the temperature of the mixture is 300K, find its pressure.  
(3 Marks)
- Q9 - One mole of a monatomic ideal gas is mixed with one mole of a diatomic ideal gas. What is the molar specific heat of the mixture at constant volume?  
(5 Marks)

XI Physics Worksheet

Time: 30 min

Chapter#14: Oscillations-01

Full Marks: 20

**Instructions:**

- 1. All questions are compulsory.**
- 2. Please give the explanation for the answer where applicable.**

Q1 - If the length of a simple pendulum is doubled what will be its new time period?  
(1 Mark)

Q2 - In which condition the motion of a simple pendulum is simple harmonic?  
(1 Mark)

Q3 - A pendulum clock is observed to give correct time at the equator. What will happen if the same pendulum clock is taken to the pole of the earth?  
(1 Mark)

Q4 - A mass  $m$  is vertically suspended from a spring of negligible mass. The system oscillates with a frequency  $\nu$ . Find the frequency of the system if a mass  $4m$  is suspended from the same spring?  
(2 Marks)

Q5 - If the period of oscillation of mass  $m$  suspended from a spring is  $2s$ , find the period of mass  $4m$ ?  
(2 Marks)

Q6 - A vertical U-tube of uniform cross section contains water upto a height of  $0.5m$ . If water on one side is depressed a little and then released it performs SHM up and down. Calculate (a) time period and (b) angular frequency of the vibration.  
(2 Marks)

Q7 - At what distance from the mean position is the kinetic energy in simple harmonic oscillation equal to P.E ?  
(3 Marks)

Q8 - A simple pendulum of length  $l$  and having a bob of mass  $m$  is suspended in a car. The car is moving on a circular track of radius  $r$  with a uniform speed  $v$ . If the pendulum makes small oscillations in a radial direction about its equilibrium position what will be its time period?  
(3 Marks)

Q9 - A mass attached to a spring is free to oscillate, with angular frequency  $\omega$ , in a horizontal plane without friction or damping. It is pulled to a distance  $x_0$  and pushed towards the centre with a velocity  $v_0$  at a time  $t=0$ . Determine the amplitude of the resulting oscillations in terms of the parameters  $\omega$ ,  $x_0$  and  $v_0$ .  
(5 Marks)

Instructions:

1. All questions are compulsory.
2. Please give the explanation for the answer where applicable.

Q1 - What is periodic motion?

(1 Mark)

Q2 - What is oscillatory motion?

(1 Mark)

Q3 - Is the damping force constant on a system executing SHM ?

(1 Mark)

Q4 - Is rotation of earth about its axis is an example of SHM?

(2 Marks)

Q5 - A body of mass  $m$  is suspended by a spring of spring constant  $k$ . When the body is depressed a little and released, find its frequency of oscillation?

(2 Marks)

Q6 - When displacement is one-fourth of the amplitude, find the fraction of the total energy which is kinetic?

(2 Marks)

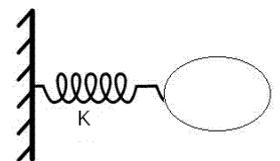
Q7 - A block of mass 5 kg executes simple harmonic motion under the restoring force of a spring. The amplitude and the time period of the motion are 0.1m and 3.14s respectively. Find the maximum force exerted by the spring on the block.

(3 Marks)

Q8 - The total energy of a particle, executing SHM is independent of displacement. Explain.

(3 Marks)

Q9 - A uniform cylinder of mass  $m$  and radius  $r$  is attached to one end of the spring as shown in the fig on rough horizontal surface. If the cylinder is slightly displaced, then find the time period of the oscillation given that there is no slipping on the surface.



(5 Marks)

XI Physics Worksheet

Time: 30 min

Chapter#15: Waves-01

Full Marks: 20

Instructions:

1. All questions are compulsory.
2. Please give the explanation for the answer where applicable.

Q1 - What types of waves are sound and light?

(1 Mark)

Q2 - If the temperature increases, then what happens to the frequency of the sound produced by the organ pipe?

(1 Mark)

Q3 - In case of standing wave, where constructive interference is formed?

(1 Mark)

Q4 - Is the velocity of vibration of the medium same as the velocity of the wave motion?

(2 Marks)

Q5 - The displacement of a wave is represented by  $y = 0.25 \times 10^{-3} \sin(500t - 0.05x)$  where all the quantities are in their proper units. Find the maximum particle velocity of the medium?

(2 Marks)

Q6 - If the ratio of the amplitudes of the two interfering beams be 2:3 then find the ratio of the minimum and maximum intensities of sound?

(2 Marks)

Q7 - Find the molecular weight of a gas in which the velocity of sound is 1260 m/sec at  $0^{\circ}\text{C}$  and  $\gamma$  whose = 1.4.

(3 Marks)

Q8 - The fundamental frequency of a closed organ pipe is equal to the first overtone frequency of an open organ pipe. If the length of the open pipe is 60 cm, what is the length of the closed pipe?

(3 Marks)

Q9 - Two trains are moving towards each other at speeds of 54 km/hr and 36 km/hr respectively relative to the ground. The first train sounds a whistle of frequency 600 Hz. Find the frequency of the whistle as heard by a passenger in the second train (a) before the trains meet and (b) after the trains have crossed each other. The speed of sound in air is 340m/sec.

(5 Marks)

XI Physics Worksheet

Time: 30 min

Chapter#15: Waves-02

Full Marks: 20

**Instructions:**

- 1. All questions are compulsory.**
- 2. Please give the explanation for the answer where applicable.**

Q1 - What are pressure waves?

(1 Mark)

Q2 - Is the phenomena of beats observable in case of two light waves of nearly equal frequencies?

(1 Mark)

Q3 - Will there be a doppler effect if source and listener both move in the same direction with the same speed?

(1 Mark)

Q4 - At what temperature, velocity of sound at  $27^{\circ}\text{C}$  doubles?

(2 Marks)

Q5 - A string of mass 2 kg is under a tension of 200 N. The length of the stretched string is 10 m. If the transverse jerk is struck at one end of the string, how long does the disturbance take to reach the other end?

(2 Marks)

Q6 - An open organ pipe has fundamental frequency of 300 Hz. Find the length of the pipe. Speed of sound is 330m/sec.

(2 Marks)

Q7 - The extension in the string obeying Hook's law is  $x$ . The speed of sound in string is  $v$ . If the extension in the string is increased to  $1.5x$  then find the speed of sound.

(3 Marks)

Q8 - Two tuning forks A and B set in vibration gives 4 beats per second. If a prong of the fork A is filed, the beats per second is reduced to 2. Determine the frequency of A if that of B is 250 Hz.

(3 Marks)

Q9 - An observer moves towards a stationary source with a velocity  $1/5$  of the velocity of sound. What is the percentage increase in the apparent frequency?

(5 Marks)