PLUS ONE PHYSICS VOLUME-1&2 (QUESTION BANK)
IMPORTANT FIVE MARKS

UNIT - 1 Nature of Physical World and Measurement

1. i) Explain triangulation method and radar method to measure larger distances. (Pg-13,15)
2. What do you mean by propagation of errors? Explain the propagation of errors in addition and multiplication. (Pg-23,24)
3. Explain the conversion of physical quantity from one system of units to another with the Examples. (i) Convert 76 cm of mercury into Nm^{-2} using the method of dimension. (Pg-32)
   (ii) 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? (Pg-33)
4. 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 $k = 2\pi$) (Pg-34)
5. The force F acting on a body moving in a circular path depends on mass of the body(m), velocity(v) and radius (r) of the circular path. Obtain the expression for the force by dimensional analysis method. (Take the value of k=1) (Pg-*)
6. What do you mean by propagation of errors? Explain the propagation of errors in difference and division or quotient of two quantities. (Pg-24,25)

UNIT – 2 Kinematics

1. Explain in detail the triangle law of addition. (Pg-47,48)
2. Discuss the properties of scalar and vector products. (Pg-53,56,57)
3. Derive the kinematic equations of motion for constant acceleration. (Pg-76)
4. Derive the equations of motion for a particle a) falling vertically b) projected vertically.(Pg-77,78,80)
5. Derive the equation of motion, range and maximum height reached by the particle thrown at an oblique angle θ with respect to the horizontal direction. (Pg-81-84)
6. Find horizontal range and time of flight projectile in horizontal projection? (Pg-82,83)
7. Derive an expression for the centripetal acceleration of a body moving in a circular path of radius 'r' with uniform speed? (Pg-91,92)

UNIT - 3 Laws of motion

1. Explain the motion of blocks connected by a string in
   i) Vertical motion ii) Horizontal motion. (Pg-126-128)
2. Explain the need for banking of tracks. (Pg-152)
3. Explain particle moving in an inclined plane find i) acceleration ii) speed of the sliding object using free body diagram? (Pg-122,123)
4. Explain the motion of two bodies in contact on a horizontal surface? (Pg-124,125)

UNIT - 4 Work, Energy and Power

1. State and explain work-energy principle. Mention any three examples for it. (Pg-174,175)
2. Arrive at an expression for elastic collision in one dimension and discuss various cases.(Pg-194)
3. What is inelastic collision? Derive the expression for loss of kinetic energy in perfect inelastic collision. (Pg-193,198-200)

UNIT -5 Motion of System of Particles and Rigid Bodies

1. Discuss rolling on inclined plane and arrive at the expression for the acceleration.(Pg-256)
2. Derive the expression for moment of inertia of a rod about its center and perpendicular to the rod. (Pg-234,235)
3. Explain why a cyclist bends while negotiating a curve road? Arrive at the expression for angle of bending for a given velocity. (Pg-232,233)
4. Derive an expression for the position vector of the center of mass of particle system. (Pg-209)
5. Derive an expression for the kinetic energy of a body in pure rolling. (Pg-255)

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UNIT-6 GRAVITATION

1. Derive the expression for gravitational potential energy. (Pg-13)
2. Prove that at points near the surface of the Earth, the gravitational potential energy of the object is U = mgh. (Pg-15)
3. Explain the variation of g with latitude, altitude, depth from the Earth's surface. (Pg-19-21)
4. Derive an expression for escape speed. (Pg-22)
5. Derive the time period of satellite orbiting the Earth. (Pg-24)
6. Derive an expression for energy of satellite. (Pg-25)
7. Discuss the apparent weight of man standing inside the elevators. (Pg-28)

UNIT-7 PROPERTIES OF MATTER

1. State Hooke's law and verify it with the help of an experiment. (Pg-54)
2. Derive an expression for the elastic energy stored per unit volume of a wire. (Pg-59)
3. Derive the expression for the terminal velocity of a sphere moving in a high viscous fluid using stokes force. (Pg-69)
4. Derive Poiseuille's formula for the volume of a liquid flowing per second through a pipe under streamlined flow. (Pg-70)
5. What is capillarity? Obtain an expression for the surface tension of a liquid by capillary rise method. (Pg-80)
6. State and prove Bernoulli's theorem for a flow of incompressible, non-viscous, and streamlined flow of fluid. (Pg-83)

UNIT-8 HEAT AND THERMODYNAMICS

1. Explain Calorimetry and derive an expression for final temperature when two thermodynamic systems are mixed. (Pg-106)
2. Explain in detail Newton's law of cooling. (Pg-109)
3. Derive the work done in an isothermal process. (Pg-126)
4. Derive the work done in an adiabatic process. (Pg-130)
5. Explain in detail Carnot heat engine. (Pg-144)

UNIT-9 KINETIC THEORY OF GASES

1. Derive the expression of pressure exerted by the gas on the walls of the container. (Pg-165)
2. Describe the total degrees of freedom for monoatomic molecule, diatomic molecule and triatomic molecule. (Pg-174)
3. Derive the expression for mean free path of the gas. (Pg-177)

UNIT-10 OSCILLATIONS

1. Discuss the simple pendulum in detail. (Pg-207)
2. Describe the vertical oscillations of a spring. (Pg-201)
3. Discuss in detail the energy in simple harmonic motion. (Pg-210)
4. Explain the horizontal oscillations of a spring. (Pg-200)
5. Explain (i) Springs connected in series (ii) Springs connected in parallel (Pg-203,205)

UNIT-11 WAVES

1. Show that the velocity of a travelling wave produced in a string is $v = \sqrt{\frac{T}{\mu}}$ (Pg-232)
2. Derive an expression for Velocity of longitudinal waves in an elastic medium. (Pg-233)
3. Describe Newton's formula for velocity of sound waves in air and also discuss the Laplace's correction. (Pg-236)
4. Obtain the equations for constructive and destructive interference for sound waves. (Pg-248)
5. Explain how overtones are produced in a (a) Closed organ pipe (b) Open organ pipe (Pg-261)

IMPORTANT THREE MARKS

UNIT - 1 Nature of Physical World and Measurement

1. How will you measure the diameter of the Moon using parallax method? (Pg-14)
2. Write the rules for determining significant figures. (Pg-28)
3. What are the limitations of dimensional analysis? (Pg-*)
   (i) This method gives no information about the dimensionless constants in the formula like 1, 2, ...π,e, etc.
   (ii) This method cannot decide whether the given quantity is a vector or a scalar.
   (iii) This method is not suitable to derive relations involving trigonometric, exponential and logarithmic functions.
   (iv) It cannot be applied to an equation involving more than three physical quantities.
   (v) It can only check on whether a physical relation is dimensionally correct but not the correctness of the relation. For example using dimensional analysis, $s = ut + \frac{1}{3}at^2$ is dimensionally correct whereas the correct relation is $s = ut + \frac{1}{2}at^2$
4. Define precision and accuracy. Explain with one example. (Pg-19)
5. Write the rules for Rounding - off with example.(Pg-27,28)
6. Explain the principle of homogeneity of dimensions. What are its uses? Give example. (Pg-32)
7. Explain Scope and Excitement of physics? (Pg-5)
8. Explain how physics in relation to technology and society? (Pg-6)
9. Write the rules for finding the significant figures in the addition and subtraction of two numbers with example. (Pg-29)
10. Write the rules for finding the significant figures in the multiplication and division of two numbers with example. (Pg-29)

UNIT – 2 Kinematics

1. Distinguish between average acceleration and instantaneous acceleration? (Pg-73)
2. Write the kinetic equations for linear motion. (Pg-77)
3. Define the term relative velocity. How can it be obtained vectorially, When the two objects with uniform velocities move in same direction? (Pg-70)
4. Write the expression for the magnitude and direction of the relative velocity. (Pg-71)
5. Derive the relation between linear velocity and angular velocity? (Pg-90)
6. Find the expressions tangential acceleration? (Pg-90,91)
7. Derive the expression for total acceleration in the non uniform circular motion. (Pg-92,93)
8. A man moving in rain holds an umbrella inclined to the vertical though the rain drops are falling vertically. Why? (Pg-71)
9. Explain components of A vector? (Pg-50)

UNIT - 3 Laws of motion

1. Explain the concept of Inertia. Write two examples each for inertia of motion, inertia of rest and inertia of direction. (Pg-106,107)
2. Using free body diagram, show that it is easy to pull an object than to push it. (Pg-140)
3. Explain various types of friction. Suggest a few methods to reduce friction. (Pg-136)
4. What are concurrent forces? State Lami's theorem. (Pg-129)
5. State Newton's three laws . (Pg-106,109,110)
6. Describe the method of measuring angle of repose. (Pg-142)
7. Write the salient features of Static and Kinetic friction. (Pg-140)

UNIT - 4 Work, Energy and Power

1. Write the significance of kinetic energy in the work – kinetic energy theorem. (Pg-175)
2. Explain with graphs the difference between work done by a constant force (Pg-170)

UNIT -5 Motion of System of Particles and Rigid Bodies

1. Obtain the relation between torque and angular momentum? (Pg-226)
2. Explain principle of moments. (Pg-231)
3. Obtain relation between angular momentum and angular velocity? (Pg-226)
4. Obtain an expression for the power delivered by a torque. (Pg-250)
5. Derive an expression for work done by torque. (Pg-248)
6. Write the comparison of translational and rotational quantities? (Pg-250)
7. Derive an expression for the center of mass of two point masses. (Pg-210,211)
8. Obtain the relation between torque and angular acceleration. (Pg-224)

UNIT-6 GRAVITATION

1. Explain the variation of g with latitude. (Pg-21)
2. Explain the variation of g with altitude. (Pg-19)
3. Explain the variation of g with depth from the Earth's surface. (Pg-20)
4. Derive an expression for orbital velocity of satellite. (Pg-24)

UNIT-7 PROPERTIES OF MATTER

1. State Hooke's law and verify it with the help of an experiment. (Pg-54)
2. Explain coefficient of viscosity. (Pg-66)
3. Write stoke's law and its applications. (Pg-70)
4. How is surface tension related to surface energy? (Pg-75)
5. Obtain an expression for the excess of pressure inside a i) liquid drop ii) liquid bubble iii) air bubble. (Pg-77)
6. Obtain an equation of continuity for a flow of fluid on the basis of conservation of mass.(Pg-82)
7. Explain the applications of Bernoulli's theorem. (Pg-84)
8. Describe the construction and working of venturimeter. (Pg-85)

UNIT-8 HEAT AND THERMODYNAMICS

1. Derive the expression for the work done in a volume change in a thermodynamic system.(Pg-121)
2. Derive Mayer's relation for an ideal gas. (Pg-124)
3. Explain in detail the isothermal process. (Pg-124)
4. Explain in detail an adiabatic process. (Pg-128)
5. Explain the isobaric process and derive the work done in this process. (Pg-132)
6. Explain in detail the isochoric process. (Pg-134)
7. Derive the expression for Carnot engine efficiency. (Pg-148)

UNIT-9 KINETIC THEORY OF GASES

1. Explain in detail the kinetic interpretation of temperature. (Pg-167)
2. Derive an expression for the relation between the average kinetic energy and pressure? (Pg-168)
3. State and Explain the law of equipartition of energy. (Pg-175)

UNIT-10 OSCILLATIONS

1. State the laws of simple pendulum? (Pg-208)
2. All the oscillatory motions are periodic, whereas all periodic motions need not be oscillatory. Explain. (Pg-189)
3. If the spring is cut in to two pieces, what is the spring constant of that two species? (Pg-206)
4. Derive an expression for Pendulum length due to effect of temperature. (Pg-209)

UNIT-11 WAVES

1. Describe the formation of beats. (Pg-252)
2. What are stationary waves? Explain the formation of stationary waves and also write down the characteristics of stationary waves. (Pg-255)
3. Discuss the law of transverse vibrations in stretched strings. (Pg-259)
4. Explain intensity and loudness. (Pg-260)
5. Briefly explain the difference between travelling waves and standing waves. (Pg-256)

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IMPORTANT TWO MARKS

UNIT - 1 Nature of Physical World and Measurement

1. Define light year. (Pg-16)
2. Define astronomical unit. (Pg-16)
3. What are Random errors? How is it minimized? (Pg-20)
4. What are Gross errors? How is it minimized? (Pg-21)
5. What is relative error or fractional error? (Pg-22)
6. What is percentage error? (Pg-22)
7. What is General rule? (Pg-26)
8. Define significant figure or digits. (Pg-27)
9. Define dimensional constant and dimensionless constant. (Pg-32)
10. Define dimensional variable and dimensionless variable. (Pg-32)
11. What are the uses of dimensional analysis? (Pg-32)
12. Check the correctness of the equation $\frac{1}{2}mv^2 = mgh$ using dimensional analysis method. (Pg-33)

UNIT – 2 Kinematics

1. What is meant by Cartesian coordinate system? (Pg-42)
2. Define Uniform circular motion. (Pg-91)
3. Define a radian? (Pg-88)
4. Define angular displacement and angular velocity. (Pg-89)
5. What is non uniform circular motion? (Pg-92)
6. Write down the kinematic equations for angular motion. (Pg-94)
7. What is point mass? (Pg-43)
8. State triangular law of addition. (Pg-48)
9. What is called relative velocity. (Pg-70)
10. Write the kinetic equations for linear motion. (Pg-77)
11. What is meant by projectile? (Pg-81)
12. Define Time of flight.(Pg-82)
13. What is Horizontal range? (Pg-83)
14. Define maximum height. (Pg-85)
15. Define angular acceleration. (Pg-88)

UNIT - 3 Laws of motion

1. State Newton's second law. (Pg-109)
2. Define one newton. (Pg-109)
3. What are inertial frames? (Pg-108)
   - If an object is free from all forces, then it moves with constant velocity or remains at rest when seen from inertial frames.
   - Thus, there exists some special set of frames in which if an object experiences no force it moves with constant velocity or remains at rest.
4. Under what condition will a car skid on a leveled circular road? (Pg-151)
5. State Newton's First law. (Pg-106)
6. Define Inertia of rest, motion and direction. (Pg-107)
7. What is free body diagram? What are the steps to be followed for developing free body diagram?(Pg-114)
8. What is meant by static friction? (Pg-136)
9. What is meant by kinetic friction? (Pg-139)
10. Define Angle of Friction. (Pg-141)
11. How did the ball bearing reduce kinetic friction? (Pg-145)
12. What is the reason for force changes the velocity of the particle? (Pg-147,148)
13. What is called banking of tracks? (Pg-152)

UNIT - 4 Work, Energy and Power

1. Define Work done by a constant force? (Pg-170)
2. Define Work done by a variable force? (Pg-172)
3. Define Energy, Kinetic energy and potential energy. (Pg-173)
4. Define Work – kinetic energy theorem. (Pg-175)
5. Define Power. (Pg-190)
6. Define Average power. (Pg-190)
7. Define Instantaneous power. (Pg-191)
8. Define unit of power or watt? (Pg-191)
9. Distinguish between Elastic Collision and Inelastic Collision? (Pg-193)

UNIT -5 Motion of System of Particles and Rigid Bodies

1. Define center of mass. (Pg-209)
2. Define torque and mention its unit. (Pg-217)
3. What are the conditions in which force cannot produce torque? (Pg-219)
4. Give any two examples of torque in day-to-day life. (Pg-217)
5. Define couple. (Pg-230)
6. State principle of moments. (Pg-231)
7. Define center of gravity. (Pg-231)
8. Mention any two physical significance of moment of inertia. (Pg-234)
   - In translational motion, mass is a measure of inertia; in the same way, for rotational motion, moment of inertia is a measure of rotational inertia.
     The unit of moment of inertia is, kg m^2. Its dimension is M L^2.
   - In general, mass is an invariable quantity of matter (except for motion comparable to that of light). But, the moment of inertia of a body is not an invariable quantity.
   - It depends not only on the mass of the body, but also on the way the mass is distributed around the axis of rotation.
9. What is the condition for pure rolling? (Pg-256)

UNIT-6 GRAVITATION

1. Define the gravitational field. Give its unit. (Pg-10)
2. Define gravitational potential energy. (Pg-14)
3. Define gravitational potential. (Pg-16)
4. What is the difference between gravitational potential and gravitational potential energy?(Pg-14,16)
5. What is meant by escape speed in the case of the Earth? (Pg-22)
6. Why is the energy of a satellite (or any other planet) negative? (Pg-26)
7. What are geostationary and polar satellites? (Pg-26,27)
8. Define weight. (Pg-27)
9. Is potential energy the property of a single object? Justify. (Pg-*)
   Potential energy is a property of a system rational than of a single object due to its physical position. Because gravitational potential energy depends on relative position. So, a reference level at which to set the potential energy equal to zero.
10. Define orbital velocity of a satellite. (Pg-24)
11. Define Time period of a satellite. (Pg-24)
12. Write a note on weightlessness? (Pg-29)
13. The astronauts in space ships experience weightlessness. Why? (Pg-29)

UNIT-7 PROPERTIES OF MATTER

1. Define stress and strain. (Pg-52,53)
2. State Hooke's law of elasticity. (Pg-54)
3. Define Poisson's ratio. (Pg-58)

4. Which one of these is more elastic, steel or rubber? Why? (Pg-60)
5. Define coefficient of viscosity of a liquid. (Pg-66)
   The coefficient of viscosity is defined as the force of viscosity acting between two layers per unit area and unit velocity gradient of the liquid. Its unit is Nsm^{-2} and dimension is $[ML^{-1}T^{-1}]$.
6. Distinguish between streamlined flow and turbulent flow. (Pg-67)
7. What is Reynold's number? Give its significance. (Pg-68)
8. Define terminal velocity. (Pg-69)
9. State Bernoulli's theorem. (Pg-83)
10. Two streamlines cannot cross each other. Why? (Pg-67)
11. Define viscosity. (Pg-65)
12. Define angle of contact for a given pair of solid and liquid. (Pg-76)
13. What are the factors affecting the surface tension of a liquid? (Pg-73,74)
14. What do you mean by capillarity or capillary action? (Pg-79)
15. What is called deforming force? (Pg-51)
16. Define elasticity. (Pg-51)
17. What is called restoring force? (Pg-52)
18. Define plasticity. (Pg-51)
19. Define elastic limit. (Pg-53)
20. Give the applications of elasticity. (Pg-59)
21. Give the applications of viscosity. (Pg-71)
22. Give the practical application of angle of contact. (Pg-76)
23. Give the practical applications of capillarity. (Pg-80)
24. Give the applications of surface tension. (Pg-81)
25. Define capillarity. (Pg-79)
26. Why the roof of hut or house is blown off during wind storm? (Pg-84)
27. What is the effect of temperature on elasticity? (Pg-*)
    If the temperature of the substance increases, its elasticity decreases.
28. What happens to the pressure inside a soap bubble when air is blown into it? (Pg-*)
    When air is blown in to the soap bubble, the radius of the bubble is increased. So that the excess pressure inside it decreases.

UNIT-8 HEAT AND THERMODYNAMICS

1. State Stefan-Boltzmann law. (Pg-111)
2. What is Wien's law? (Pg-111)
3. What is a thermodynamic system? Give examples. (Pg-113)
4. What are intensive and extensive variables? Give examples. (Pg-114)
5. What is an equation of state? Give an example. (Pg-114)
6. State Zeroth law of thermodynamics. (Pg-115)
7. Define the internal energy of the system. (Pg-116)
8. State the first law of thermodynamics. (Pg-119)
9. Can we measure the temperature of the object by touching it? (Pg-116) Activity
10. Define the quasi-static process. (Pg-120)
11. What is PV diagram? (Pg-122)
12. If the piston of a container is pushed fast inward. Will the ideal gas equation be valid in the intermediate stage? If not, why? (Pg-120*)
13. Draw the PV diagram for a) Isothermal process (Pg-125) b) Adiabatic process(Pg-129)
    c) isobaric process (Pg-132) d) Isochoric process (Pg-135)
14. What is a cyclic process? (Pg-138)
15. State Kelvin-Planck statement of second law of thermodynamics. (Pg-144)

16. Define heat engine. (Pg-142)
17. Can the given heat energy be completely converted to work in a cyclic process? If not, when can the heat can completely converted to work? (Pg-144) Note
18. State the second law of thermodynamics in terms of entropy. (Pg-150)
19. Why does heat flow from a hot object to a cold object? (Pg-150)
20. What is anomalous expansion of water. (Pg-104)
21. State Prevost theory of heat exchange. (Pg-111)

UNIT-9 KINETIC THEORY OF GASES

1. Define the term degrees of freedom. (Pg-173)
2. State the law of equipartition of energy. (Pg-175)
3. Define mean free path and write down its expression. (Pg-177,178)
4. List the factors affecting the mean free path. (Pg-178)

UNIT-10 OSCILLATIONS

1. What is meant by periodic and non-periodic motion? Give examples,for each motion.(Pg-189)
2. What is meant by force constant of a spring? (Pg-190)
3. Define time period of simple harmonic motion. (Pg-196)
4. Define frequency of simple harmonic motion. (Pg-196)
5. What is an epoch? (Pg-196)
6. All the oscillatory motions are periodic, whereas all periodic motions need not be oscillatory. Explain. (Pg-189)
7. Define simple harmonic motion (SHM). (Pg-190)
8. Define angular frequency. Give its unit. (Pg-196)
9. What is phase difference? (Pg-196)

UNIT-11 WAVES

1. Write down the types of waves. (Pg-227)
2. What are transverse waves?. Give one example. (Pg-227)
3. What are longitudinal waves?. Give one example. (Pg-227)
4. Write down the relation between frequency, wavelength and velocity of a wave. (Pg-230)
5. What is meant by interference of waves? (Pg-249)
6. What is meant by the beats and beat frequency?. (Pg-252)
7. Define intensity of sound and loudness of sound. (Pg-260)
8. Sketch the function $y = x + a$. Explain your sketch. (Pg-244*) line shifts towards left side
9. Define wave number. (Pg-230)
10. Define wave velocity. (Pg-230)
11. Define wave vector. (Pg-230)
12. Give the relation between velocity ($\boldsymbol{v}$), angular velocity (m) and wave number (k). (Pg-230)
13. What is progressive wave (or) travelling wave? (Pg-243)
14. Give the relation between phase difference and path difference. (Pg-251)
15. What are called stationary waves? (Pg-254)
16. Give the properties of stationary waves. (Pg-225)
17. Define inverse square law of sound intensity. (Pg-260)
18. State Weber-Fechner's law. (Pg-261)