XI-PHYSICS- 2025 IMPORTANT PAPER

UNIT 1 PHYSICS AND MEASURMENTS

SECTION B

1 **Drive the equation for the period of oscillations far a mass suspended by a vertical spring by dimensional analysis**

(i) $T = 2\pi\sqrt{\frac{L}{g}}$ **(ii)** $T = 2\pi\sqrt{\frac{m}{k}}$

2 Prove that the following equations are dimensionally correct.

(a) $2as = V_f^2 - V_i^2$ **(b)** $V = \sqrt{\frac{T}{\mu}}$ **(c)** $S = V_i t + \frac{1}{2} a t^2$

SECTION C

3. **(i)** Differentiate between accuracy and precision.
(ii) Differentiate systematic error and random error.

4. ***All Book Numerical and all book examples***

UNIT 2 KINEMATICS

SECTION B

1 Drive the following equation of motion by graphical method

(i) $2as = v_f^2 - v_i^2$ (ii) $s = v_i t + \frac{1}{2} a t^2$

2 define any three of the following
(i) Null vector (ii) free vector (iii) unit vector (iv) position vector

4 Numerical 1, 2, 3, 5, 6 ***all book examples***

SECTION C

1 What are Dot product and cross product and give four properties of Each?
Prove (i) $(\vec{A} . \vec{B} = \vec{B} . \vec{A})$ (ii) $(\vec{A} \times \vec{B} \neq \vec{B} \times \vec{A})$

2 What is projectile motion? A shell is fired with a velocity V_o at an angle θ with the horizontal to hit the target at ground level. Derive an expression for the(i) time taken to reach the maximum height (ii) total time of flight (iii) horizontal range. (iv) maximum height

UNIT 3 DYNAMICS

SECTION B

1 State and prove the law of conservation of Linear momentum
2 Define angle of friction. Derive an expression for the relation of angle of friction and angle of repose.
3 Numerical 2, 3, 4, 5, 6, 7 ***all book examples***

SECTION C

1 Define elastic collision. Two non-rotating spheres of masses m_1 and $m_2$moving along a straight line with velocities U_1 and U_2 respectively, collide elastically. Drive an expression for the velocities V_1 and V_2

UNIT 4 ROTATIONAL AND CIRCULAR MOTION

SECTION B

1 Define angular velocity and give its units and establish the relation, $v = r\omega$ or $a = r\alpha$
2 State and explain the law of conservation of angular momentum
3 Define torque. Derive a relation torque, moment of inertia, and angular acceleration.
4 Discuss forces action on the banked curve and derive the relation between curve angle and velocity.
5 Define moment of inertia. Derive the expression for rotational inertia of two-particle systems.
6 Define orbital velocity and derive the expression for it
7 Num 3, 4,5,6,7,8,10,11 ***all book examples***

SECTION C

1 Define Centripetal force and Centripetal acceleration and derive the expression for the Centripetal acceleration.

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UNIT 5 WORK ENERGY AND POWER

SECTION B

1 How the work done in a gravitational field is along a closed path is zero. Or How the work done in a gravitational field is independent of the path
2 Derive Work-Energy equations
4 Define power. Derive the relation between power and velocity.
4 Numerical 1,2,5,6,8 ,9,10,11 ***book all examples***

SECTION C

1 State and prove the law of conservation of Energy.
2 Derive the expression for absolute gravitational potential energy

UNIT 6 FLUID STATICS

SECTION B

1 State and explain Pascal's principle. Describe its two applications.
2 Explain Archimedes' principle and find gold purity by using density
3 Define upthrust. Derive the expression for it.
4 Discuss surface tension with at least three experiments.
5 numerical 1,2,3,4, 6,7,8,9 ***book all examples***

UNIT 7 FLUID DYNAMICS

SECTION B

1 Derive the equation of continuity. Also shows its physical significance
2 state stokes law. Define terminal velocity in liquid. Derive an expression for it.
3 Discuss the concept of Reynolds number and its significance in fluid dynamics
4 Numerical 1,2,3, 5,7,8,9,10 ***all book examples***

SECTION C

1 State Bernoulli's principle. Derive Bernoulli's equation.

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UNIT 8 ELECTRIC FILED

SECTION B

1 State and explain Coulombs law. Apply it to calculate the electric field due to an isolated point charge
2 Define electric flux. State and prove Gauss's law
3 Derive an expression for the relation between electric intensity and electric potential.
4 Numerical 1,2,3,4,5, 9, 10 **all book examples**

SECTION C

1 Define an electric dipole. Derive formula for the electric field due to an electric dipole at a point "P" placed on its axial line.

UNIT 9 CAPACITOR

SECTION B

1 Drive expressions for the combined capacitance of two capacitors (a) connected in series, (b) connected in parallel.
2 Derive an expression for the energy stored in a capacitor C when there is a potential difference V between the plates.
3 Numerical 1,3,4,5,6,7 all examples

SECTION C

1 What is the capacitance of a capacitor? Derive an expression for the capacitance of a parallel plate capacitor when i) air is present between the plates ii) dielectric slab is placed between the plates

UNIT 10 DC CIRCUIT

SECTION B

1 What is a Potentiometer? How is it used to compare the e.m.f of two cells? Answer with a circuit diagram.

2 Define resistivity and temperature coefficient. Derive an expression of resistivity and temperature coefficient
3 What is a thermocouple? Explain how it works
4 Numerical 1,2,3,4,6 all examples

SECTION C

1 State Kirchhoff's Laws. What is meant by balanced Wheatstone Bridge? Derive an expression for it

UNIT 11 OSCILLATIONS

SECTION B

1 Explain the concept of damping and its effects on oscillatory motion. Discuss the types of damping, such as over-damping, under-damping, and critical-damping
2 Derive the equation of motion for a mass-spring horizontal or vertical system in SHM, illustrating each step of the derivation
3 Numerical 1,2,3,4,7,10 all examples

SECTION C

1 What are the condition of the SHM? Show that the motion of projection of a particle in a uniform circular motion is simple harmonic on one of its diameters of reference circle.
2 Prove that the motion of a simple pendulum is simple harmonic when the angle of its swing is very small.
3 Discuss the concept of energy in SHM. Explain how kinetic energy and potential energy vary throughout the motion of a particle in SHM and how the total mechanical energy is conserved

UNIT 12 ACOUSTICS

SECTION B

1 Define standing waves and explain how they are formed. Derive an expression for node and anti-node.
2 What are beats? How are they produced? Obtain an expression for the beat frequency.
3 describe any two of the following.
(i) shock wave (ii) Radar (iii) Doppler ultrasound

4 Numerical 1,4,5,6,7 ,8, 10 all book examples

SECTION C

1 What is Doppler's effect? Explain this effect analytically when the sound source moves towards a listener at rest. Write any two applications of Doppler's effect.

2 What are stationary waves? A string of length 'L' is stretched between two hooks; find the frequency of the stationary waves produced in the string when it is vibrating in (i) one loop, (ii) two loops, and (iii) three loops

3 Describe Newton's formula for the speed of sound in a medium. What correction did Laplace make the formula for speed sound and on what assumption?

UNIT 13 PHYSICAL OPTICS

SECTION B

1 Michelson interferometer.
2 Describe the setup and procedure of the diffraction of X-rays through a crystal experiment.
3 single slit diffraction
3 Numerical 1,2,4,5,12,13,15,17 all examples

SECTION C

1 What are Newton's rings? How they are formed? How these rings can be used to measure the
wavelength of a monochromatic light? Obtain an expression for the radius of bright and dark rings and the wavelength.
2 Describe a diffraction grating. How can it be used to determine the wavelength of sodium light
3 Describe Young's Double slit experiment for producing interference fringes. Find expressions for the position of bright and dark fringes and for fringe spacing.

UNIT 14 COMMUNICATION

SECTION B

1 What is the term modulation? Explain amplitude and frequency modulation