XI-PHYSICS- 2026 IMPORTANT PAPER

SECTION B

SECTION B

1 Drive the equation for the period of oscillations for 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)** $S = V_i t + \frac{1}{2} a t^2$

(d) $F = \frac{mv^2}{r}$ **(e)** $v = f\lambda$ **(f)** $2d \sin\theta = m\lambda$

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

4 What is the density of a material if m = (12.4 ± 0. 2) kg and V =(6.68 ± 0. 1) m^3
Calculate the uncertainty in the density value.

5 What are the volume and its uncertainty for a sphere with a radius of r = (21±1)

6. ***Book Numerical 1, 2, 6, 7, 8 and book examples 1.1,1.2, 1.4***

UNIT 2 KINEMATICS

SECTION B

1 Drive the following equation of motion by the 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 ***Book Numerical 1, 2, 3, 5, 6, and book worked examples 2.1, 2.2, 2.4***

SECTION C

1 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) horizontal range. (iii) maximum height

2 Describe the addition of two vectors by the rectangular component method. Draw a labeled diagram.

3. Define the dot product of two vectors. Give properties and prove $\vec{A}.\vec{B} = \vec{B}.\vec{A}$

UNIT 3 DYNAMICS

SECTION B

1 State and prove the law of conservation of Linear momentum

2 Define the angle of friction. Derive an expression for the relation between the angle of friction and the angle of repose.

3 ***Book Numerical 1, 2, 3, 5, 6, 8, and book worked examples 3.2 and self-assessment questions, page 61***

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 between torque, moment of inertia, and angular acceleration.

4 Discuss forces acting 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 ***Book Numerical* 3, 4, 5, 6, 7, 8, 10, 11, *and book worked examples* 4.1, 4.3, 4.4, 4.5**

SECTION C

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

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.

5 ***Book Numerical* 2, 4, 5, 6, 9, 11, *and book worked examples* 5.1, 4.3, 5.5**

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 State Archimedes' principle and define upthrust. Derive the expression for it.
3 Discuss surface tension with at least three experiments.
4 **Book numerical 2, 3, 6, 7, 8, 10 Worked Example 6.2, 6.4, 6.5**

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 **Worked Example 7.2, 7.4,**

SECTION C

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

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, 7, 8, 9 , Worked Example 8.1, 8.2, 8.3, 8.6, 8.7, 8.8**

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 Worked Example 9.1, *self-assessment questions, page 188,190, 193***

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) a 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 for resistivity and temperature coefficient

3 What is a thermocouple? Explain how it works

4 State Kirchhoff's Current Law (KCL) and Kirchhoff's Voltage Law (KVL). Derive an expression for the equivalent resistance of two resistors connected in series or parallel using Kirchhoff's law.

4 **Numerical 1, 2, 3, 4, 5, 6, Worked Example 10.1, 10.2, 10.3,**

SECTION C

1 State Kirchhoff's Laws. What is meant by a 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, 6, 7, 10 Worked Example 11.1, 11.2,**

SECTION C

1 What are the conditions 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 the 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 the node and the 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, 9, 10 Worked Example 12.1, 12.2, 12.3**

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 to the formula for the speed of 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
4 **Numerical 1, 2, 4, 5, 12, 13, 14, 17 Worked Example 13.1, 13.2, 13.3**

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