

## 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  $m = (12.4 \pm 0.2) \text{ kg}$  and  $V = (6.68 \pm 0.1) \text{ m}^3$   
Calculate the uncertainty in the density value.
- 5 What are the volume and its uncertainty for a sphere with a radius of  $r = (21 \pm 1)$
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*

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## SECTION C

- 1 What is projectile motion? A shell is fired with a velocity  $V_0$  at an angle  $\theta$  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  $\vec{A} \cdot \vec{B} = \vec{B} \cdot \vec{A}$

## UNIT 3

## DYNAMICS

### SECTION B

**PROF:IMRAN HASHMI**

- 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. Derive 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.

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- 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

**PROF:IMRAN HASHMI**

- 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 FIELD

### 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

**PROF: IMRAN HASHMI**

- 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



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## 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

**PROF:IMRAN HASHMI**

- 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