



BOYS' HIGH SCHOOL AND COLLEGE

FIRST TERM EXAMINATION (2025-26)

CLASS - X

PHYSICS (SCIENCE PAPER – 1)

Maximum Marks: 80

Time allowed: Two hours.

Answers to this Paper must be written on the paper provided separately.

You will not be allowed to write during first 15 minutes.

This time is to be spent in reading the question paper.

The time given at the head of this Paper is the time allowed for writing the answers.

Section A is compulsory. Attempt **any four** questions from **Section B**.

The intended marks for the questions are given in brackets []

SECTION – A

Question 1

Choose the correct answers to the questions from the given options.

[15]

(Do not copy the questions, write the correct answer only)

1. The ^{absolute}Refractive Index (μ) is given by the formula

- a) $\mu = \text{Speed in medium} / \text{Speed in vacuum}$
- b) $\mu = \text{Speed in vacuum} / \text{Speed in medium}$
- c) $\mu = \text{Angle of incidence} / \text{Angle of refraction}$
- d) $\mu = \text{wavelength in Vacuum} / \text{frequency in medium}$

2. If the angle of incidence is 0° , the angle of refraction is:

- a) 0°
- b) 45°
- c) 90°
- d) Cannot be determined

3. When light enters a medium with a lower refractive index, it:

- a) Bends towards the normal
- b) Bends away from the normal
- c) Does not change direction
- d) Gets completely absorbed

4. Which of the following has the highest refractive index?

- a) Water
- b) Air
- c) Glass
- d) Diamond

5. Refraction of light does NOT occur when it:

- a) Travels from one medium to another
- b) Passes through a vacuum
- c) Changes speed
- d) Enters a denser medium

6. The reason for refraction of light is:

- a) Reflection from a mirror
- b) Change in speed of light in different media
- c) Scattering of light
- d) Absorption of light

7. Which type of image is formed by a concave lens for a real object placed in front of it:

- a) Real & inverted
- b) Virtual & erect
- c) Enlarged & real
- d) Virtual & inverted

8. The focal length of a convex lens is:

- a) Always negative
- b) Zero
- c) Always positive
- d) Both positive & negative

9. If a lens has a power of $-4D$, it is:

- a) A converging lens of focal length 25 cm
- b) A diverging lens of focal length -25 cm
- c) A converging lens of focal length -0.25 m
- d) A converging lens of focal length 0.25 m

10. White light is a mixture of:

- a) Two colors
- b) Primary colors only
- c) All seven colors of the visible spectrum
- d) Infra & ultraviolet rays only

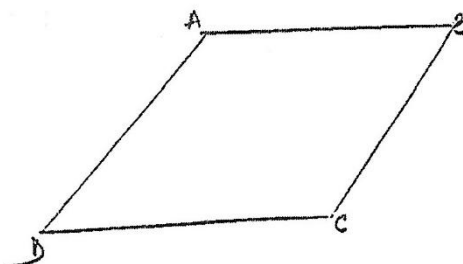
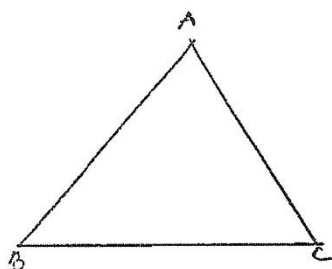
11. In Rayleigh scattering, intensity of scattered light varies inversely as power (n) of wavelength (λ) of light where n is equal to:

- a) 6
- b) 8
- c) 4
- d) 2

12. During the free fall of a body, the total energy at $\frac{3}{4}$ th the height is:
 a) Constant c) Gravitational Potential Energy at the top
 b) Zero d) $\frac{3}{4}$ the initial PE
13. An object has 450 J of kinetic energy and a mass of 10 kg what is its speed?
 a) 9.94 ms^{-1} c) 9.49 ms^{-1}
 b) 9.25 ms^{-1} d) 9.94 ms^{-1}
14. What should be the angle between force and displacement to get the maximum work?
 a) $\Theta = 180^\circ$ c) $\Theta = 0^\circ$
 b) $\Theta = 90^\circ$ d) $\Theta = 360^\circ$
15. $1 \text{ J} = \text{_____ erg}$
 a) 10^7 c) 10^5
 b) 10^6 d) 10^4

Question 2

- I. A uniform meter rule is balanced on a pivot placed at the 40 cm mark. A 2N weight is hung at the 10 cm mark. At what point should a 3N weight be hung on the other side of the pivot to balance the rule? [3]
- II. Give two properties of UV radiations which are similar to visible light. [2]
- III. When does a machine act as: [2]
 a) A force multiplier
 b) A speed multiplier
- IV. a) State Snell's law. [2]
 b) Calculate the velocity of light in a glass block of refractive index 1.5 (Take velocity of light in air = $3 \times 10^8 \text{ m/s}^{-1}$)
- V. State two factors on which torque depends. [2]
- VI. The following figure shows two pieces of cardboard of uniform thickness. Draw two lines to indicate the position of centre of gravity: [2]



- VII. a) Name the force required for uniform circular motion [2]
 b) State its direction

Question 3

- I. By drawing a neat diagram, explain how a totally reflecting prism can be used to turn rays through 180° [2]
- II. State two factors which determine lateral displacement [2]
- III. If refractive index of water is 1.33. Is the apparent depth greater than or less than real depth? [2]
- IV. Why is work done by gravity on a falling object positive? [2]
- V. Two people apply opposing forces of 15 N each at the ends of a door that is 80 cm wide. Find the moment of the couple. [2]

Section B

(Attempt any four questions)

Question 4

- (I) a) Refractive index of glass with respect to water is $\frac{9}{8}$. Find the refractive index of water with respect to glass [3]
 b) Name the principle used to find the value in part (a).
 c) If we change the temperature of water, then will the ratio $\frac{9}{8}$ remain the same? Write Yes or No.

- (II) (a) If a camera is submerged in water and pointed upward at an object above the surface. [3]
How would the object's position appear in the image?
b) Which phenomenon of light is responsible for the above?
- (III) A convex lens of focal length 15 cm forms an image three times the size of the object and the image is virtual. [4]
a) What is the object distance?
b) Where is the image formed?
c) Sketch a ray diagram to support your answer.

Question 5

- I. Write true or false for the following statements about power: [3]
a) Power is a time-based quantity.
b) If person A and person B do the same job but person B does it faster than person A, do person A and B have the same power?
c) A 60 kg boy runs up a 2.0 meter staircase in 1.5 seconds. His power is approximately 80 Watt.
- II. A body of mass 'm' is moving with a velocity 'V'. Derive an expression for the kinetic energy of this body. [3]
- III. A machine uses 2000 J of energy to lift a 20 kg load to a height of 6 m in 5 seconds: [4]
a) What is the useful work?
b) What is the machine's efficiency?
c) What is its power output?

Question 6

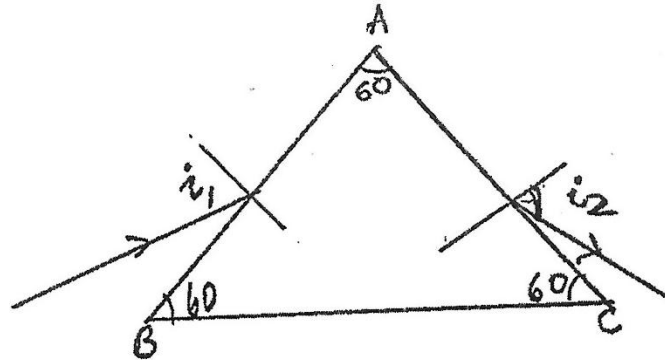
- I. Give reasons: [3]
a) In a single fixed pulley, the velocity ratio is always more than the mechanical advantage.
b) Work is said to be done only when displacement occurs.
c) It is easier to lift a heavy object using a long lever arm.
- II. Answer the following:- [3]
a) Why is a see-saw an example of first-class lever?
b) Why is a fulcrum placed closer to the load in crowbar?
c) Why is the work done by the moon revolving around the earth zero?
- III. A 3 kg object is dropped from a height of 20 m. As it falls, it experiences air resistance which does 300 J of work against its motion. [4]
a) What is the total P.E at the beginning?
b) How much K.E does the object have just before hitting the ground?
c) What is the object's speed just before hitting the ground?
(Take $g = 9.8 \text{ ms}^{-2}$)

Question 7

- I. State the energy changes in the following cases: [3]
a) An electric iron
b) Burning a candle
c) A ceiling fan
- II. A boy uses a single fixed pulley to lift a load of 50 kgf to a certain height. Another boy uses a single movable pulley to lift the same load to the same height. [3]
a) Compare the effort applied by them.
b) Give a reason to support your answer.
c) Why is a single fixed pulley often used even when there is no gain in M.A?
- III. A block and tackle has two pulleys in each block, with the tackle tied to the hook of the lower block and effort being applied upwards. [4]
a) Draw a neat diagram of the arrangement.
b) Calculate MA
c) If the load moves up by a distance 'x', by what distance will the free end of the strip move up?

Question 8

- I. How is the refractive index of a medium related to the following? [3]
 - a) In terms of angle of incidence in air (i) and angle of refraction (r) in a dense medium?
 - b) Velocity of light in vacuum and velocity of light in a given medium.
 - c) Real and apparent depth of an object in that medium
- II. Answer the following: [3]
 - a) Define lateral shift.
 - b) For what angle of incidence is the lateral shift produced by a parallel-sided glass slab zero?
 - c) Give the ratio of velocities of two light waves traveling in vacuum and having wavelengths $4000 \text{ \AA}$ and $8000 \text{ \AA}$.
- III. Complete the **ray diagram** of the equilateral prism given below and answer the following questions: [4]



- a) How does the angle of deviation formed by a prism change with the increase in angle of incidence?
- b) If angle of incidence (i_1) and (i_2) are 49° each, what would be the angle of deviation? What is this deviation angle known as?
- c) At this position of the prism, what path does the refracted ray follow?

Question 9

- I. a) Define critical angle. [3]
 - b) Name and explain two factors affecting the critical angle for a pair of media.
- II. Answer the following questions on electromagnetic spectrum: [3]
 - a) Which radiation of the electromagnetic spectrum has the shortest wavelength and highest frequency?
 - b) Write two applications of X-rays:
 - c) What are the colors of the visible spectrum, in order from longest wavelength to shortest wavelength?
- III. a) A divergent lens has a focal length of 30 cm. At what distance should an object of height 5 cm be placed from the optical centre of the lens so that the image is formed 15 cm away from the lens? Find the size of the image.
 - b) Draw the ray diagram for the above situation (not to scale) to show the formation of the image by such a lens. [4]
