V I B G Y O R H I G H

Semester-1 Preliminary Examination

AY 2021-2022

PHYSICS

Grade: X **Max. Marks : 40**

Date : 01/10/2021 **Time Allowed: 1 hour**

INSTRUCTIONS:

Time allowed: One hour (inclusive of reading time)

ALL QUESTIONS ARE COMPULSORY

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

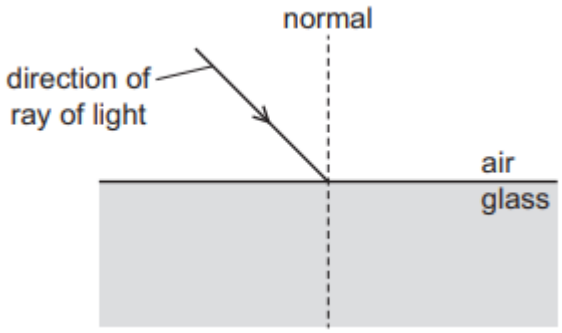
Select the correct option for each of the following questions.

Question 1 **[10]**

a A lens deviates a light ray towards its centre. [1]

1. The power of the lens is positive.
2. The power of the lens is negative.
3. It is a concave lens.
4. The power of the lens is zero.

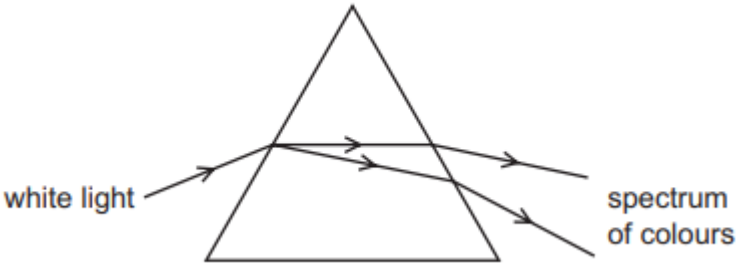
b A ray of light is incident on the surface of a glass block. [1]



Choose the option which correctly describes the change in the speed and the direction of the ray of light when it enters glass.

1. The speed of light decreases and it bends towards the normal.
2. The speed of light increases and it bends towards the normal.
3. The speed of light decreases and it moves away from the normal.
4. The speed of light increases and it moves away from the normal.

c Light passes through a prism as shown. The light changes direction and produces a spectrum of colours. [1]



Which term is used to describe the production of spectrum of colours?

1. Diffraction
2. Dispersion
3. Refraction
4. Total internal reflection

d How do infra-red waves differ from ultraviolet waves? [1]

1. Infra-red waves are longitudinal in nature whereas ultraviolet waves are transverse in nature.
2. Infra-red waves have speed lower than that of ultraviolet waves in vacuum.
3. Infra-red waves have frequencies lower than ultraviolet waves.
4. Infra-red waves have smaller wavelength as compared to ultraviolet waves.

e An object is placed at a distance of 24 cm from a convex lens of focal length 8 cm. [2]

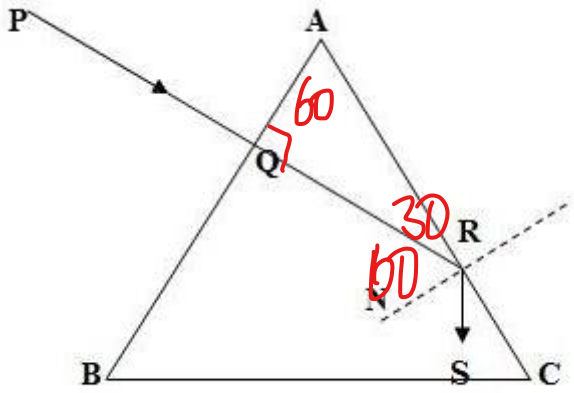
(i) What is the characteristic of the image so formed?

1. Real
2. magnified
3. same size as that of the object
4. Virtual

(ii) What is the distance of the image from the lens?

1. 15 cm
2. 12 cm
3. 8 cm
4. 24 cm

f A ray of light PQ passes through an equilateral glass prism as shown in the diagram. Observe the diagram and answer the questions that follow. [4]



(i) The phenomenon at the surface AB is

1. Refraction
2. Partial reflection
3. Total internal reflection
4. Scattering

(ii) The angle of incidence at the surface AC is

1. 30°
2. 0°
3. 60°
4. 90°

(iii) The angle of incidence at the surface AB is

1. 30°
2. 0°
3. 60°
4. 90°

(iv) Which of the following statement is incorrect?

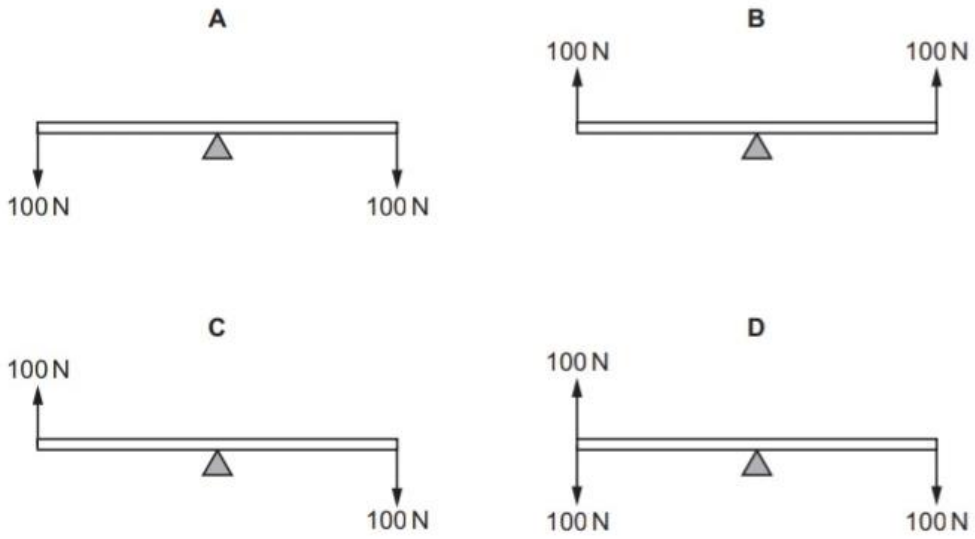
1. Speed of light ray PQ is equal to the speed of light ray QR.
2. Speed of light ray QR is equal to the speed of light ray RS.
3. Speed of light ray PQ is greater than the speed of light ray RS.
4. Speed of light ray RQ is less than the speed of light ray PQ.

Question 2 **[10]**

a In explosion of crackers the chemical energy changes to: [1]

1. Heat energy
2. Light energy
3. Sound energy
4. All of the above

b A uniform rod rests on a pivot at its centre. The rod is not attached to the pivot. Forces are then applied to the rod in four different ways,as shown. Ignoring the weight of the rod, which diagram shows the rod in equilibrium? [1]



1. A
2. B
3. C
4. D

c The centre of gravity of a hollow cone is at : [1]

1. its geometric centre
2. at a height h/4 from the base on its axis
3. at a height h/3 from the base on its axis
4. at a height 3h/4 from the base on its axis

d A student carries a bag weighing 5.5 kg from the ground floor to his class on the first floor that is 2 m high. The work done by the student is: [1]

1. 11 J
2. 110 J
3. 1.1 J
4. 1100 J

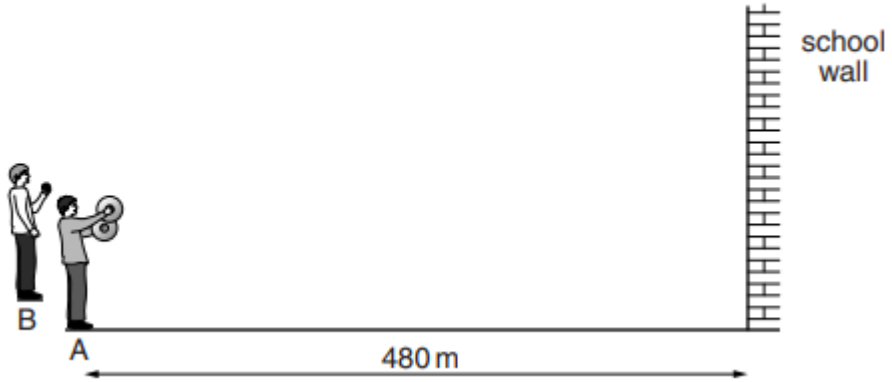
e (i) Select the correct option for reflection of sound. [2]

1. Sound waves do not obey the laws of reflection.
2. Reflection of sound waves requires a smooth and shining surface like a mirror.
3. The size of the reflecting surface must be bigger than the wavelength of the sound wave.
4. The reflected sound if heard along with the original sound is called echo.

(ii) The condition required to hear a clear and distinct echo by humans, in air :

1. The reflected sound must reach the ears within 0.1 second.
2. The incident sound should have frequency more than 25000 Hz.
3. The incident sound should have frequency less than 20 Hz.
4. The minimum distance between the source of sound and the reflector must be 17m.

f Two students A and B are carrying out an experiment to determine the speed of sound. They are standing side by side at a distance of 480 m from the school wall, as shown in the figure below. Student A makes a loud sound by banging two pan lids together once. They hear the echo after 3 seconds. [4]



(i) The speed of sound in air is:

1. 160 m/s
2. 320 m/s
3. 240 m/s
4. 720 m/s

(ii) The formula used by the students to find the velocity of sound is:

1. $v = \frac{2d}{t}$ (where d = distance from the wall, t = time interval)

2. $v = \frac{d}{t}$ (where d =distance from the wall, t = time interval)

3. $v = t\ x\ d$ (where d =distance from the wall, t = time interval)

4. $v = \frac{td}{2}$ (where d =distance from the wall, t = time interval)

(iii) If the speed of sound is the same then, by how much distance should the students move away from the wall in order to hear the echo after 4 seconds?

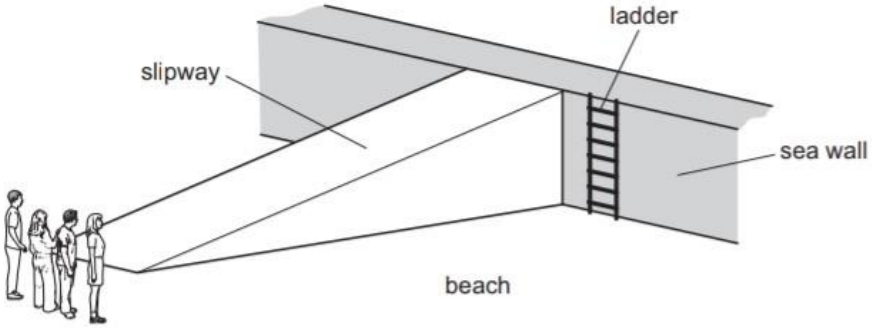
1. 160 m
2. 1120 m
3. 320 m
4. 240 m

(iv) The speed of sound changes to 330 m/s. If the students are standing at a distance of 495 m from the wall, after how time will they be able to hear the echo?

1. 0.3 s
2. 4 s
3. 1.5 s
4. 3 s

Question 3 **[10]**

a Four people of equal weight on a beach use different routes to get to the top of a sea wall. [1]



Which person produces the greatest average power?

Person	Route	Time taken
P	Runs across the beach, then climbs the ladder	8
Q	Walks across the beach, then climbs the ladder	16
R	Runs up the slipway	5
S	Walks up the slipway	10

1. P
2. Q
3. R
4. S

b If the velocity of a body is doubled, its kinetic energy: [1]

1. gets doubled
2. becomes half
3. remains the same
4. becomes 4 times

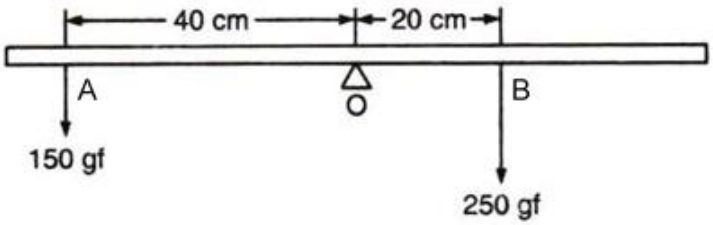
c In case of negative work, the angle between the force and displacement is: [1]

1. 0^0
2. 45^0
3. 90^0
4. 180^0

d Which of the following is **not** a unit of energy? [1]

1. joule
2. newton metre
3. kilowatt
4. kilowatt hour

e The diagram shows a uniform metre rule weighing 100 gf, pivoted at the centre, 'O'. [2]



i) The total anticlockwise moment is:

1. 5000 gf cm
2. 6000 gf cm
3. 7000 gf cm
4. 1000 gf cm

ii) The resultant moment is:

1. 1000 gf cm anticlockwise
2. 1000 gf cm clockwise
3. 2000 gf cm anticlockwise
4. 2000 gf cm clockwise

f A ball of mass 40 g falls from a height of 10 m and after striking the ground, it rebounds from the ground to a height of 8 m. [4]

(i) The kinetic energy of the ball, just before striking the ground is:

1. 0 J
2. 2 J
3. 4 J
4. 40 J

(ii) The kinetic energy of the ball, just after striking the ground is:

1. 0 J
2. 3.2 J
3. 32 J
4. 1.6 J

(iii) The loss in kinetic energy of the ball on striking the ground is:

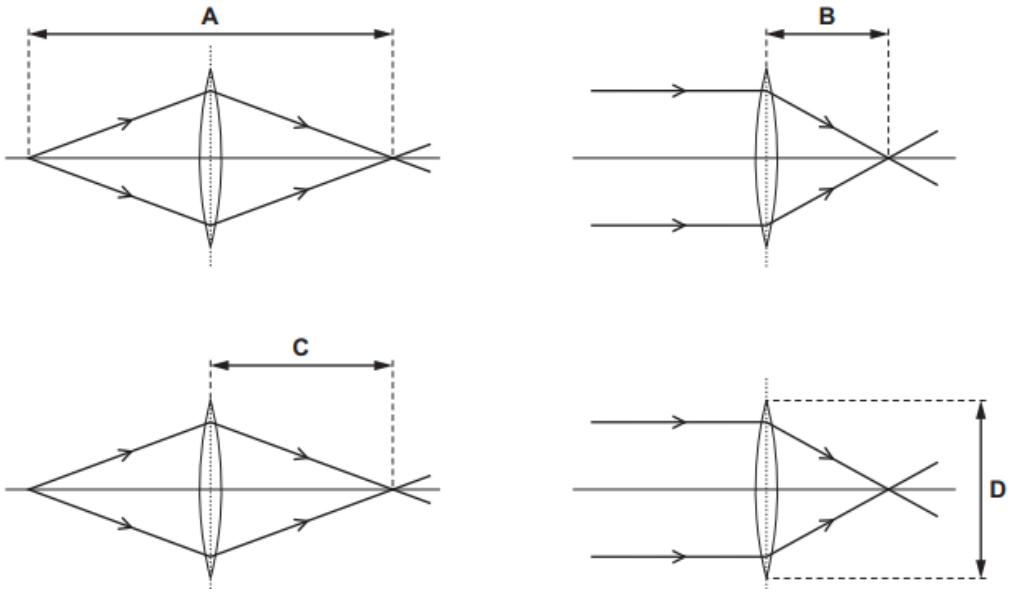
1. 0.4 J
2. 3.2 J
3. 0.8 J
4. 0 J

(iv) What happens to the loss in kinetic energy?

1. It is dissipated
2. It appears as heat and sound energies when the ball strikes the ground
3. It gets converted to potential energy
4. It gets converted to useful mechanical energy

Question 4 **[10]**

a Which labelled distance is the focal length of the lens? [1]



1. A and B
2. B and C
3. C
4. B

b Which of the following statements in incorrect? [1]

I) The velocity ratio of a single fixed pulley is always more than 1.
II) The velocity ratio of a single movable pulley is always 2.
III) The velocity ratio of a block and tackle system is always equal to the number of strands of the tackle supporting the load.

1. Only I
2. I and III
3. II and III
4. I, II and III

c A block and tackle system has 5 pulleys. If an effort of 1000 N is needed in the downward direction to raise a load of 4500 N: [2]

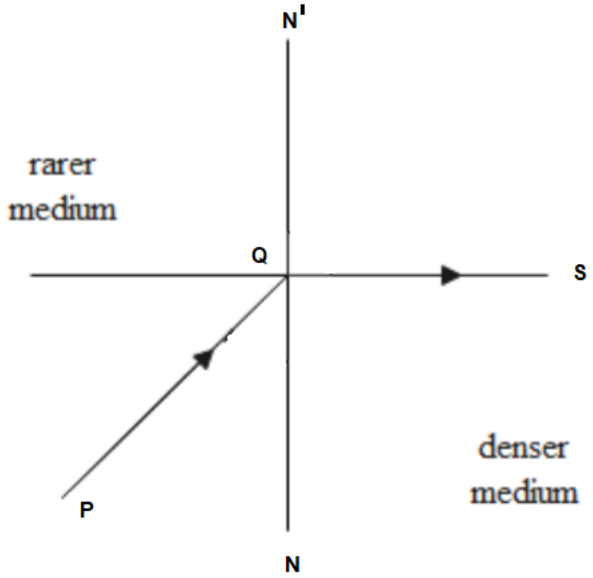
i) Its M.A is:

1. 0
2. 0.2
3. 4
4. 4.5

ii) The efficiency of the system is:

1. 90%
2. 95%
3. 100%
4. 85%

d In the figure, PQ is a light ray emerging from an object P. The ray PQ is refracted as QS. [2]



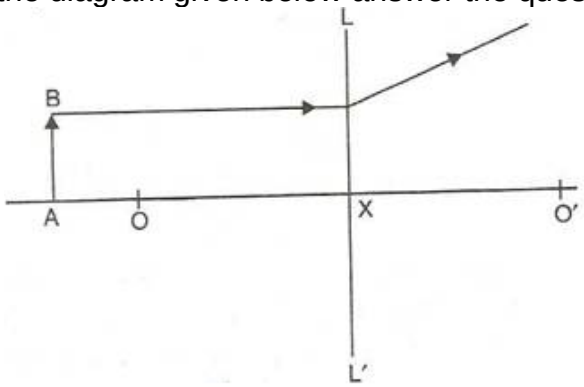
(i) The angle of refraction for the refracted ray QS is:

1. 30°
2. 0°
3. 45°
4. 90°

(ii) The phenomenon that occurs if the angle of incidence ∠PQN is increased is:

1. Refraction
2. Partial reflection
3. Total internal reflection
4. Scattering.

e With respect to the diagram given below answer the questions that follow. [4]



(i) Select the correct option for the above diagram from the following:

1. The power of this lens is positive.
2. This is a convex lens and hence the focal length will be positive.
3. The image of object AB will be formed at O.
4. This is a concave lens and hence the focal length will be negative.

(ii) The above lens forms the image of an object which is:

1. virtual, inverted, and diminished
2. virtual, upright, and diminished
3. virtual, inverted, and enlarged
4. virtual, upright, and enlarged

(iii) A device in which this action of lens is used.

1. Spectrometer
2. Spectacles for myopic eye
3. Microscope
4. Slide projectors

(iv) If the object is moved closer to the lens LL', then

1. the size of the image decreases.
2. the size of the image increases, but it remains smaller than the object.
3. the size of the image remains the same.
4. information is insufficient to conclude.

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