

HALF-YEARLY EXAMINATION 2023-2024

CLASS : X

SUBJECT : PHYSICS

NAME OF THE STUDENT : _____

MAX. MARKS : 80

DATE : _____

TIME : 2HOURS

NOTE : You will not be allowed to write during the 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 or parts of the questions are given in the bracket [].

Section A

(Attempt all questions from this Section)

Question 1

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

[15]

(Do not copy the question, write the correct answers only.)

(i) The kinetic energy of a given body depends on the :

- a) Position
- b) Centre of gravity of the body
- c) momentum
- d) displacement

(ii) Position of centre of gravity of a body of a given mass depends on :

- a) Its volume
- b) Its mass
- c) Distribution of mass and shape
- d) Both (a) and (c) are correct.

(iii) Rate of doing work is called :

- a) Work
- b) Energy
- c) Power developed in a body in unit time
- d) Power.

(iv) Device that converts heat energy to electrical energy is :

- a) Loudspeaker
- b) Thermocouple
- c) Geysers
- d) Battery.

(v) The moment of couple has a tendency to rotate the body in an anticlockwise direction, then the moment of couple is taken :

- a) Positive
- b) Negative
- c) Maximum
- d) 0

(vi) If velocity ratio of machine is greater than one, it will act as :

- a) Speed multiplier
- b) Force multiplier

Done



- c) To change the direction of effort
- d) An ideal machine.

(vii) Pulley whose axis of rotation is not fixed, is called :

- a) Movable Pulley
- b) Combination of fixed and movable pulley
- c) Block and tackle system
- d) None of the above.

(viii) When the speed of light decreases during refraction, refracted ray :

- a) Bends away the normal
- b) Bends towards the normal
- c) Passes over the normal
- d) Passes undeviated.

(ix) Critical angle formed in denser medium is :

- a) Angle of emergence
- b) Angle of Refraction
- c) Angle of incidence
- d) Angle of deviation.

(x) Radii of curvature of both surfaces of lenses equal in :

- a) Equi-concave lens
- b) Plano concave lens
- c) Convexo concave lens
- d) All of these are correct.

(xi) If a lens is placed in water, its focal length :

- a) Decreases
- b) Increases
- c) Becomes infinite
- d) No changes is there.

(xii) Power of convex lens is always taken :

- a) Negative
- b) Positive
- c) Sometimes positive sometimes zero
- d) Sometimes negative sometimes zero.

(xiii) Wave of longest wavelength in electromagnetic spectrum is :

- a) X Rays
- b) Microwaves
- c) Gamma rays
- d) Radio waves.

(xiv) Sound waves inaudible to human are :

- a) Infrasonic
- b) Ultrasonic
- c) Both infrasonic and ultrasonic
- d) None of the above.

(xv) Which one is not the characteristic of sound?

- a) Loudness
- b) Timbre
- c) Intensity

d) Pitch.

Question 2

- (i) (a) State two factors on which the moment of force about a point depends. [3]
(b) 1H.P. = _____ Watt.
- (ii) Define couple. State the S.I. unit of moment of couple. [2]
 - (iii) State the conditions required for total internal reflection of light to take place. [2]
 - (iv) State two differences between the centripetal and centrifugal forces. [2]
 - (v) Name a machine which can be used to : [2]
 - a) multiply force.
 - b) change the direction of force applied.
 - (vi) What is SONAR? Name the wave used in sonar. [2]
 - (vii) Where should an object be placed in front of a convex lens in order to get : [2]
 - a) an enlarged real image?
 - b) an enlarged virtual image?

Question 3

- (i) Two bodies A and B have same kinetic energies. Compare their velocities if mass of A is four times the mass of B. [2]
- (ii) Name the waves used for echo depth sounding. Give one reason for their use. [2]
- (iii) Define a kilowatt hour. How is it related to joule? [2]
- (iv) An electromagnetic radiation is used for photography in fog. [2]
 - a) Identify the radiation.
 - b) Why is this radiation mentioned by you, ideal for this purpose?
- (v) Define critical angle. State one important factor which affects the critical angle of a given medium. [2]

Section B

(Attempt any four questions)

Question 4

- (a) A uniform half metre rule balances horizontally on a knife edge at 29 cm mark when a weight of 20 gf is suspended from one end.
 - i) Draw a diagram of the arrangement.
 - ii) What is the weight of the half metre rule? [3]
- (b) (i) With reference to the direction of action, how does a centripetal force differ from a centrifugal force during a uniform circular motion?
 - (ii) Is centrifugal force the force of reaction of centripetal force?
 - (iii) Compare the magnitudes of centripetal and centrifugal force. [3]
- (c) A block and tackle system of pulleys has velocity ratio 4.
 - (i) Draw a neat labelled diagram of the system indicating clearly the points of application and direction of load and effort.
 - (ii) What will be its velocity ratio if the weight of the movable block is doubled? [4]

Question 5

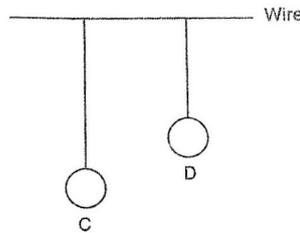
- (a) A lens forms an upright and diminished image of an object when the object is placed at the focal point of the given lens.
 - (i) Name the lens
 - (ii) Draw a ray diagram to show the image formation. [3]
- (b) How does the angle of deviation formed by a prism change with the increase in the angle of incidence? Draw a graph showing the variation in the angle of deviation with the angle of incidence at the prism surface. [3]
- (c) An object is placed at a distance 24 cm in front of a convex lens of focal length 8 cm. [4]
 - (i) What is the nature of the image so formed?



- (ii) Calculate the distance of the image from the lens.
- (iii) Calculate the magnification of the image.

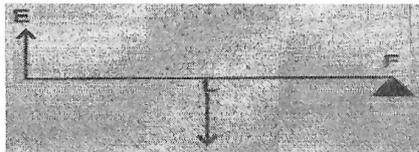
Question 6

- (a) Name the factor that determines : [3]
 - (i) Loudness of the sound heard.
 - (ii) Quality of the note.
 - (iii) Pitch of the note.
- (b) (i) What are damped vibrations? [3]
- (ii) Give one example of damped vibrations.
- (iii) Name the phenomenon that causes a loud sound when the stem of a vibrating tuning fork is kept pressed on the surface of a table.
- (c) Two pendulums C and D are suspended from a wire as shown in the figure given below. Pendulum C is made to oscillate by displacing it from its mean position. It is seen that D also starts oscillating. [4]
 - (i) Name the type of oscillation, C will execute.
 - (ii) Name the type of oscillation, D will execute.
 - (iii) If the length of D is made equal to C then what difference will you notice in the oscillations of D?
 - (iv) What is the name of the phenomenon when the length of D is made equal to C?

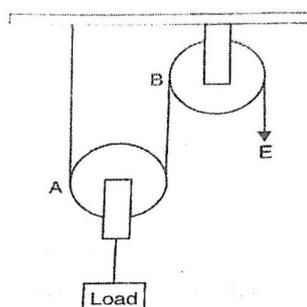


Question 7

- (a) A crane 'A' lifts a heavy load in 5 seconds, whereas another crane 'B' does the same work in 2 seconds. Compare the power of crane 'A' to that of crane 'B'. [2]
- (b) A pond appears to be 2.7 m deep. If the refractive index of water is $\frac{4}{3}$, find the actual depth of the pond. [2]
- (c) The diagram given below shows a lever in use :

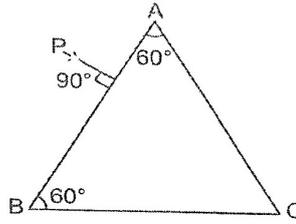


- (i) To which class of levers does it belong?
- (ii) Without changing the dimensions of the lever, if the load is shifted towards the fulcrum what happens to the mechanical advantage of the lever? [2]
- (d) The diagram given below shows a pulley arrangement : [4]
 - (i) Copy the diagram and mark the direction of tension on each strand of the string
 - (ii) What is the velocity ratio of the arrangement?
 - (iii) If the tension acting on the string is T, then what is the relationship between T and effort E?
 - (iv) If the free end of the string moves through a distance x, find the distance by which the load is raised.

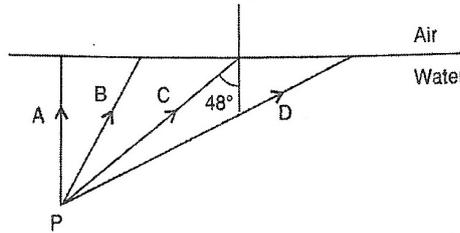


Question 8

(a) Copy the diagram given below and complete the path of light ray till it emerges out of the prism. The critical angle of glass is 42° . In your diagram mark the angles wherever necessary. [2]



- (b) (i) Why is the ratio of velocities of light of wavelength 4000 \AA and 8000 \AA in vacuum 1:1 ?
 (ii) Which of the above wavelengths has higher frequency? [2]
 (c) What do you understand by the term 'scattering of light'. Which colour of white light is scattered the least and why? [2]
 (d) The diagram below shows a point source P inside a water container. Four rays A, B, C, D starting from the source P are shown up to the water surface.



- (i) Show in the diagram the path of these rays after striking the water surface. The critical angle for water air surface is 48° .
 (ii) Name the phenomenon which the rays B and D exhibit. [4]

Question 9

- (a) A pendulum has a frequency of 4 vibrations per second. An observer starts the pendulum and fires a gun simultaneously. He hears the echo from the cliff after 6 vibrations of the pendulum. If the velocity of sound in air is 340 m/s, find the distance between the cliff and the observer. [3]
 (b) It is observed that during march-past we hear a base drum distinctly from a distance compared to the side drums.
 (i) Name the characteristic of sound associated with the above observation.
 (ii) Give a reason for the above observation. [3]
 (c) Draw a graph between displacement from mean position and time for a body executing free vibration in a vacuum. [2]
 (d) Two waves of the same pitch have amplitudes in the ratio 1:3. What will be the ratio of their:
 (i) intensities and (ii) frequencies? [2]

END