

FULL SYLLABUS TEST

Class: X ICSE

PHYSICS

Full Marks: 80

Time: 2 hours

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

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 questions or parts of questions are given in brackets []

Take $g = 10 \text{ ms}^{-2}$

SECTION A

(Attempt all questions from this Section)

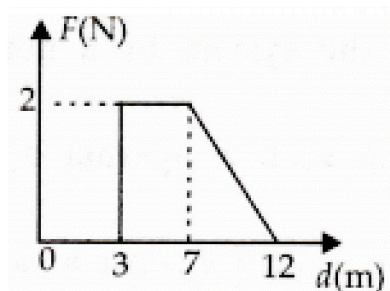
Question 1

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

[15]

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

- (i) Distance of the centre of mass of a solid uniform cone from its vertex is Z_0 . If the radius of its base is R and its height is h , then Z_0 is equal to
 (a) $h^2/4R$ (b) $3h/4$ (c) $5h/8$ (d) $3h^2/8R$
- (ii) Two masses of M and $4M$ are moving with equal kinetic energy. The ratio of their linear momenta is
 (a) $1 : 8$ (b) $1 : 4$ (c) $1 : 2$ (d) $4 : 1$
- (iii) Force F on a particle moving in a straight line varies with distance d as shown in below figure



The work done on the particle during its displacement of 12m is

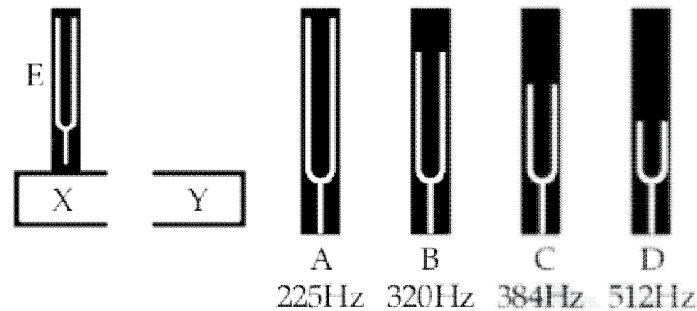
- (a) 13 J (b) 18 J (c) 21 J (d) 26 J
- (iv) A movable pulley is used as
 (a) force multiplier (b) speed multiplier
 (c) device to change the direction of effort (d) all of the above
- (v) A short pulse of white light is incident from air to a glass slab at normal incidence. After travelling through the slab, the first color to emerge is
 (a) blue (b) green (c) violet (d) Red

- (vi) **Assertion:** A diamond glitter brilliantly.
Reason: A diamond does not absorb light.
 (a) Both Assertion (A) and Reason (R) are true and R is the correct explanation of A
 (b) Both Assertion (A) and Reason (R) are true but R is not the correct explanation of A
 (c) Both Assertion (A) and Reason (R) are true
 (d) Both Assertion (A) and Reason (R) are false
- (vii) The source of ultraviolet light is
 (a) electric bulb (b) red hot iron ball
 (c) sodium vapour lamp (d) carbon arc lamp
- (viii) Free vibrations are
 (a) the vibrations under the influence of a periodic force
 (b) the vibrations with larger amplitude
 (c) the vibrations when the frequency continuously decreases
 (d) the vibrations with a constant frequency and constant amplitude
- (ix) Which one of the following diagnostic methods use reflection of sound?
 (a) CT scan (b) Electro cardiogram
 (c) Echocardiogram (d) MRI
- (x) The ratio of velocities of light of wavelength 400 nm and 800 nm in a vacuum is
 (a) 1 : 1 (b) 1 : 2 (c) 2 : 1 (d) 1 : 3
- (xi) When the current is drawn from a cell in a closed circuit, the potential difference between the terminals of cell is called
 (a) Voltage drop (b) Electromotive force
 (c) Terminal voltage (d) None of these
- (xii) According to new convention, the colour of live wire is
 (a) Black (b) Red (c) Green (d) Brown
- (xiii) Ohm's law is applicable to
 (a) Discharge of electricity through gases (b) Diode valve
 (c) All metallic conductors (d) All of these
- (xiv) What is the minimum distance between an object and its real image formed by a convex lens?
 (a) 0 (b) f (c) $2f$ (d) $4f$
- (xv) A parallel beam is incident on a convex lens. What will be the nature of image formed?
 (a) Real, erect and magnified (b) Real, inverted and enlarged
 (c) Real, erect and diminished (d) Real, inverted and diminished

Question 2

- (i) **Complete the following by choosing the correct answer from the bracket.** [6]
 (a) In a beam balance when the beam is balanced in a horizontal position, it is in _____ [Static / Dynamic] equilibrium.
 (b) The rotation is always produced by a _____ [pair / single] of force.
 (c) A monochromatic beam of light of wave length $6000 \text{ \AA}$ in vacuum enters a medium of refractive index 1.5. In the medium its wavelength is _____ [$4000 \text{ \AA}$ / $9000 \text{ \AA}$], and its frequency is _____ [$5 \times 10^{14} \text{ Hz}$ / $1.5 \times 10^{16} \text{ Hz}$]
 (d) _____ radiation [uv / infra red] can be detected by their chemical activity on dyes.
 (e) In automobiles, chemical energy of petrol changes into _____ [mechanical / electrical] energy.

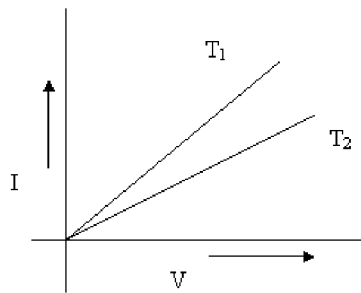
- (ii) The diagram below shows a vibrating tuning fork E mounted on a sound box X. When the vibrating tuning forks A, B, C and D are placed on the sound box Y one by one, it is observed that a louder sound is produced when the tuning fork B is placed on Y. [2]



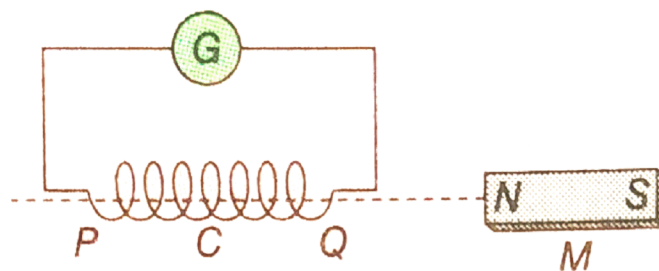
- (a) What is the frequency of tuning fork E?
(b) Why does B produce a louder sound?
- (iii) A bullet is fired from a rifle. The rifle is free to recoil. Compare the kinetic energy of the rifle with that of the bullet. [2]

Question 3

- (i) The current-voltage graphs for a given metallic wire at two different temperatures T_1 and T_2 are shown in the figure. Is the temperature T_2 greater than T_1 ? Explain. [2]

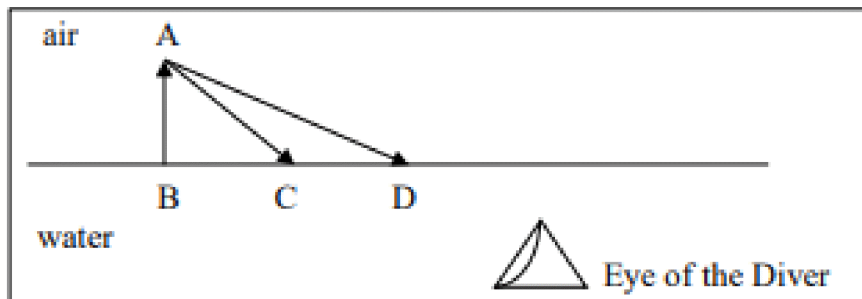


- (ii) With reference to figure below, where a small bar magnet M approaches a coil C (with ends connected to a galvanometer). What will be the magnetic polarity of the coil according to the diagram, as the magnet moves through it and comes out from the left? [2]



- (iii) Electric field or magnetic field can independently exist in nature, but in electromagnetic waves, neither electric field nor magnetic field can exist independently. Why? [2]
- (iv) The power of a lens is $-5D$. [2]
(a) Find its focal length
(b) Name the type of lens.
- (v) A type of single pulley is very often used as a machine even though it does not give any gain in mechanical advantage [2]
(a) Name the type of pulley used.
(b) For what purpose is such a pulley used?

- (vi) What is that which provides the necessary centripetal force in the following cases: [2]
- the Earth going round the Sun
 - electrons revolving round the nucleus of an atom?
- (vii) A diver in water looks obliquely at an object AB in air. [3]



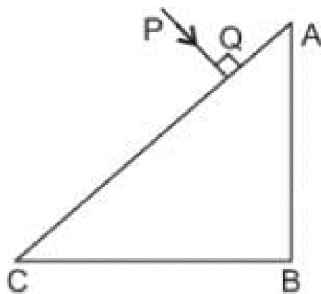
- Does the object appear taller, shorter or of the same size to the diver?
- Show the path of two rays AC and AD starting from the tip of the object as it travels towards the diver in water and hence obtain the image of the object.

SECTION – B

(Answer any 4 questions)

Question 4

- For same angle of incidence the angles of refraction for three different media A, B and C are 15° , 25° and 35° respectively. In which medium the velocity of light is minimum?
- A ray of light passes through a glass slab of thickness t and refractive index μ . If velocity of light in vacuum is c then how much time will the light take to emerge from the slab?
- A ray of light is incident on the hypotenuse of a isosceles right angle prism ABC as shown in diagram.

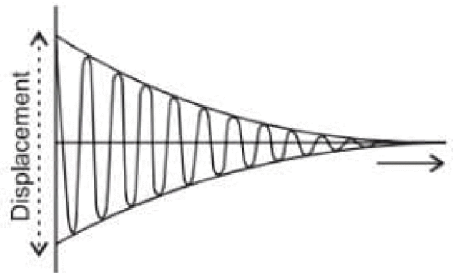


- Copy the diagram and complete the path of ray PQ, till emerges from prism.
 - What is the value of angle of deviation for this prism?
 - Name the instrument where this action of prism is used.
- (iv)
- What do you understand by the term critical angle?
 - Name a factor which determines the critical angle for a pair of media.

[2+2+4+2]

Question 5

- (i) (a) What is meant by resonance?
(b) State two ways in which resonance differs from forced vibrations.
- (ii) (a) A man standing between two cliffs produces a sound and hears two successive echoes at intervals of 3 seconds and 4 seconds respectively. If speed of sound is 330 ms^{-1} , what is distance between two cliffs?
(b) Why will an echo not be heard when distance between source of sound and reflecting surface is 10 m?
- (iii) The diagram below shown a displacement-time graph for a vibrating body:

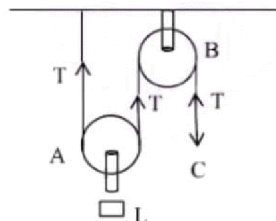


- (a) Name the type of vibrations produced by a body.
- (b) Give one example of a body producing such vibrations.
- (c) Why is the amplitude of wave gradually decreasing?
- (d) What will happen to vibrations of body after some time?

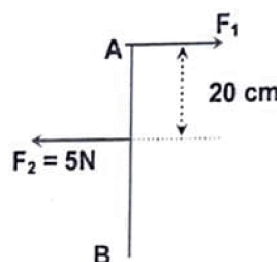
[3+3+4]

Question 6

- (i) (a) Differentiate between centripetal and centrifugal force.
(b) The position of centre of gravity remains unchanged, even when the body is deformed. Comment on the statement.
- (ii) From the given diagram answer the questions that follow:



- (a) What kind of pulleys are A and B?
- (b) State the purpose of pulley B.
- (c) What effort has to be applied at C to just raise the load $L = 20 \text{ kgf}$?
(Neglect the weight of pulley A and friction)
- (iii) A uniform rod AB of mass 1 kg moves translationally with acceleration of 2 m/s^2 due to two antiparallel forces F_1 and F_2 . The separation between F_1 and F_2 is 20 cm. Find the length of the rod if $F_2 = 5 \text{ N}$.

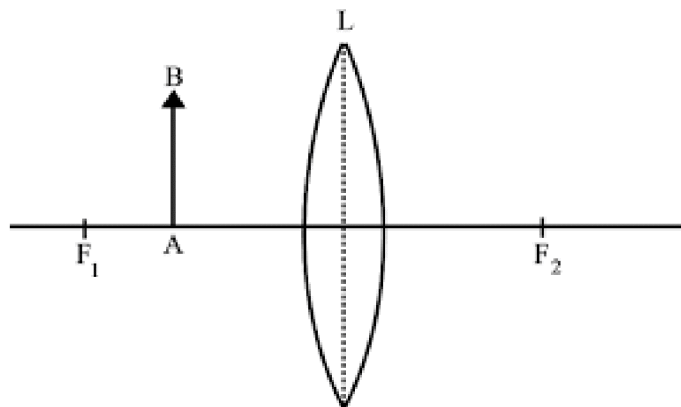


[3+3+4]

Question 7

- (i) “A convex lens of focal length f can form a magnified, erect as well as an inverted image of an object placed in front of it.” Justify this statement stating the position of object with respect to the mirror in each case for obtaining these images.

- (ii) (a) The figure shows the position of an object AB in relation to a converging lens whose foci are F_1 and F_2 . Draw two rays to locate the position of image.

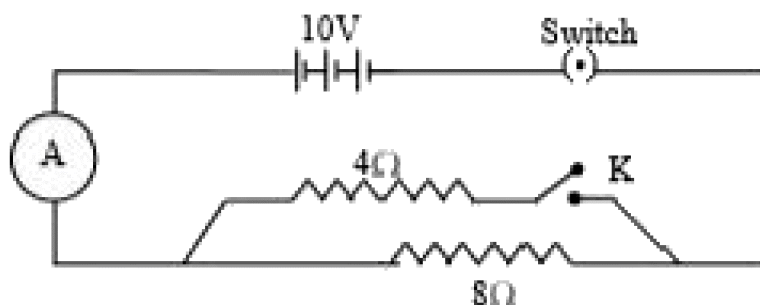


- (b) State three characteristics of image formed.
- (iii) Name the waves
- of lowest wavelength
 - used for taking photographs in dark
 - produced by the changes in the nucleus of an atom
 - of wavelength nearly 0.1 nm.

[3+3+4]

Question 8

- (i) A body of mass 10kg falls from a height of 10m. What will be its kinetic energy just before it touches the ground? Prove that, this kinetic energy is equal to the potential energy stored at the initial position of the body.
- (ii) What is the effect on the kinetic energy of a moving car if
- mass is doubled
 - its velocity is halved?
- (iii) Calculate the reading of A when



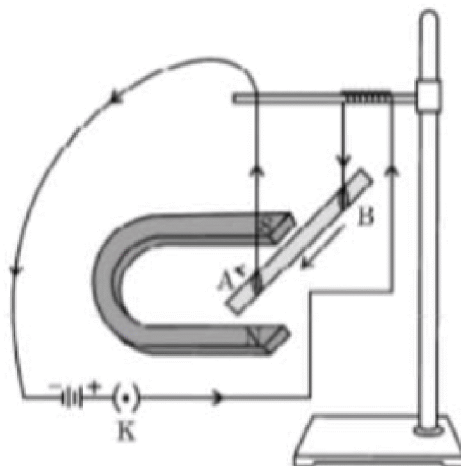
- K is closed
- K is open.

[3+3+4]

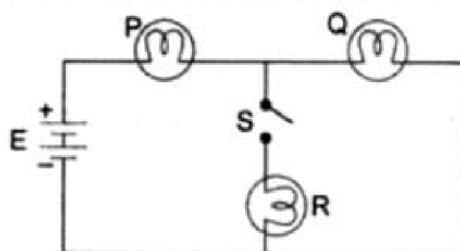
Question 9

- (i) Read the text carefully and answer the questions:

A student was asked to perform an experiment to study the force on a current carrying conductor in a magnetic field. He took a small aluminium rod AB, a strong horse shoe magnet, some connecting wires, a battery and a switch and connected them as shown. He observed that on passing current, the rod gets displaced. On reversing the direction of current, the direction of displacement also gets reversed. On the basis of your understanding of the phenomenon, answer the following questions:



- (a) Why does the rod get displaced on passing current through it?
 - (b) State the rule that determines the direction of the force on the conductor AB.
 - (c) (1) If the U shaped magnet is held vertically and the aluminium rod is suspended horizontally with its end B towards due north, then on passing current through the rod from B to A as shown, in which direction will the rod be displaced?
 - (2) Name any two devices that use current carrying conductors and magnetic field.
- (ii) A battery E is connected to three identical lamps P, Q and R as shown in figure:



Initially the switch S is kept open and the lamp P and Q are observed to glow with same brightness. Then switch S is closed. How will the brightness of the glow of bulbs P and Q will change? Justify your answer.

- (iii) Show how would you join three resistors, each of resistance 9Ω so that the equivalent resistance of the combination is
- (a) 13.5Ω
 - (b) 6Ω

[4+3+3]