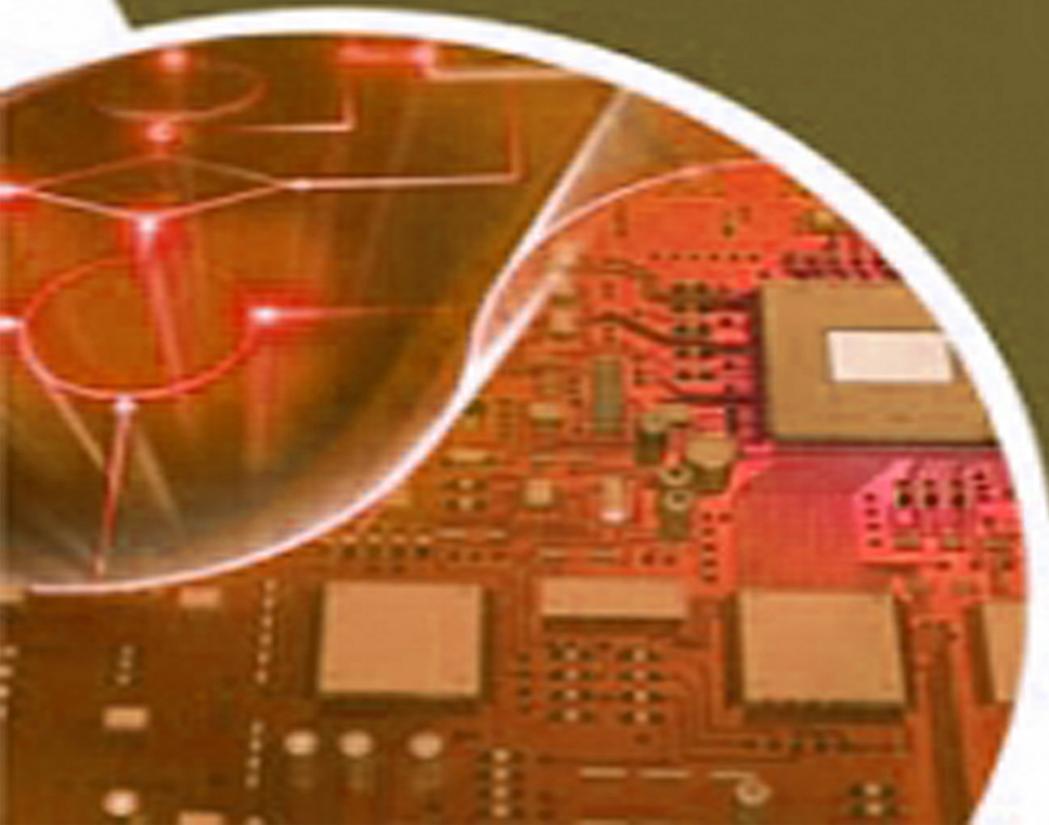


Class 10th
PHYSICS

ICSE Question Papers



ICSE Board
Class X Physics
SCIENCE Paper - 1
Board Question Paper 2014
(Two 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 I is compulsory. Attempt **any four** questions from **Section II**.
The intended marks for questions or parts of questions are given in brackets [].

SECTION I (40 Marks)

*Attempt **all** questions from this Section.*

Question 1

- (a) A force is applied on (i) a non-rigid body and (ii) a rigid body. How does the effect of the force differ in the above two cases? [2]
- (b) A metallic ball is hanging by a string from a fixed support. Draw a neat labelled diagram showing the forces acting on the ball and the string. [2]
- (c) (i) What is the weight of a body placed at the centre of the earth?
(ii) What is the principle of an ideal machine? [2]
- (d) Is it possible to have an accelerated motion with a constant speed? Explain [2]
- (e) (i) When does a force do work?
(ii) What is the work done by the moon when it revolves around the earth? [2]

Question 2

- (a) Calculate the change in the Kinetic energy of a moving body if its velocity is reduced to $1/3^{\text{rd}}$ of the initial velocity. [2]
- (b) State the energy changes in the following devices while in use:
(i) A loud speaker.
(ii) A glowing electric bulb. [2]

(c) (i) What is nuclear energy?

(ii) Name the process used for producing electricity using nuclear energy. [2]

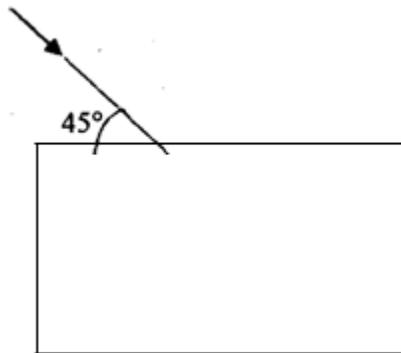
(d) State one important advantage and disadvantage each of using nuclear energy for producing electricity. [2]

(e) (i) The conversion of part of the energy into an undesirable form is called _____.

(ii) For a given height h , _____ the length l of the inclined plane, lesser will be the effort required. [2]

Question 3

(a) Draw the diagram given below and clearly show the path taken by the emergent ray.



[2]

(b) (i) What is consumed using different electrical appliances, for which electricity bills are paid?

(ii) Name a common device that uses electromagnets. [2]

(c) (i) A ray of light passes from water to air. How does the speed of light change?

(ii) Which colour of light travels fastest in any medium except air? [2]

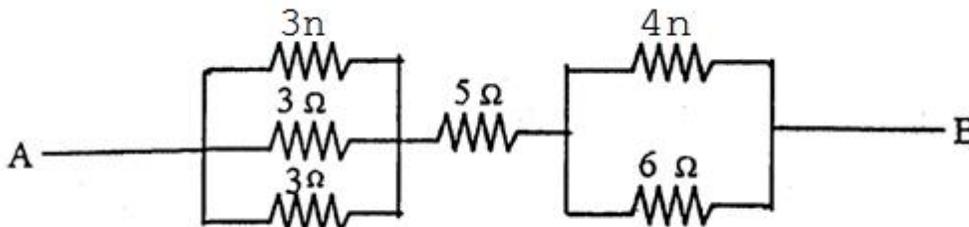
(d) Name the factors affecting the critical angle for the pair of media. [2]

(e) (i) Name a prism required for obtaining a spectrum of Ultraviolet light.

(ii) Name the radiations which can be detected by a thermopile. [2]

Question 4

- (a) Why is the colour red used as a sign of danger? [2]
- (b) (i) What are mechanical waves?
- (ii) Name one property of waves that do not change when the wave passes from one medium to another. [2]
- (c) Find the equivalent resistance between points A and B



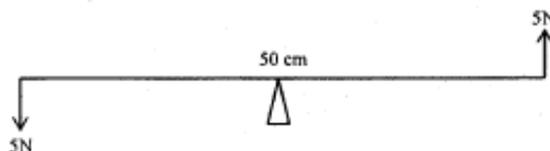
- (d) 50 g of metal piece at 27°C requires 2400 J of heat energy so as to attain a temperature of 327°C . Calculate the specific heat capacity of the metal. [2]
- (e) An electron emitter must have _____ work function and _____ melting point. [2]

SECTION II (40 Marks)

Attempt any **four** questions from this Section

Question 5

- (a) (i) A man having a box on his head, climbs up a slope and another man having an identical box walks the same distance on a levelled road. Who does more work against the force of gravity and why?
- (ii) Two forces each of 5N act vertically upwards and downwards respectively on the two ends of a uniform metre rule which is placed at its mid-point as shown in the diagram. Determine the magnitude of the resultant moment of these forces about the midpoint. [4]



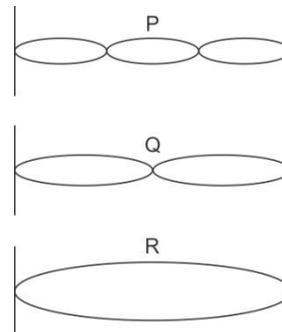
- (b) (i) A body is thrown vertically upwards. Its velocity keeps on decreasing.
What happens to its kinetic energy as its velocity becomes zero?
- (ii) Draw a diagram to show how a single pulley can be used so as to have its ideal $M.A = 2$. [3]
- (c) Derive a relationship between mechanical advantage, velocity ratio and efficiency of a machine. [3]

Question 6

- (a) (i) Light passes through a rectangular glass slab and through a triangular glass prism. In what way does the direction of the two emergent beams differ and why?
- (ii) Ranbir claims to have obtained an image twice the size of the object with a concave lens. Is he correct? Give a reason for your answer. [4]
- (b) A lens forms an erect, magnified and virtual image of an object.
- (i) Name the lens.
- (ii) Draw a labelled ray diagram to show the image formation. Define the power of a lens. [3]
- (c) (i) Define the power of a lens.
- (ii) The lens mentioned in 6(b) above is of focal length 25cm. Calculate the power of the lens. [3]

Question 7

- (a) The adjacent diagram shows three different modes of vibrations P, Q and R of the same string.



- (i) Which vibration will produce a louder sound and why?
- (ii) The sound of which string will have maximum shrillness?
- (iii) State the ratio of wavelengths of P and R. [4]

- (b) A type of electromagnetic wave has wavelength 50 \AA .
- (i) Name the wave.
 - (ii) What is the speed of the wave in vacuum?
 - (iii) State one use of this type of wave. [3]
- (c) (i) State one important property of waves used for echo depth sounding.
- (ii) A radar sends a signal to an aircraft at a distance of 30 km away and receives it back after 2×10^{-4} second. What is the speed of the signal? [3]

Question 8

- (a) Two resistors of 4Ω and 6Ω are connected in parallel to a cell to draw 0.5 A current from the cell.
- (i) Draw a labelled circuit diagram showing the above arrangement.
 - (ii) Calculate the current in each resistor. What is an Ohmic resistor? [4]
- (b) (i) What is an Ohmic resistor?
- (ii) Two copper wires are of the same length, but one is thicker than the other.
- (1) Which wire will have more resistance?
 - (2) Which wire will have more specific resistance? [3]
- (c) (i) Two sets A and B, of three bulbs each, are glowing in two separate rooms. When one of the bulbs in set A is fused, the other two bulbs also cease to glow. But in set B, when one bulb fuses, the other two bulbs continue to glow. Explain why this phenomenon occurs.
- (ii) Why do we prefer arrangements of Set B for house circuiting? [3]

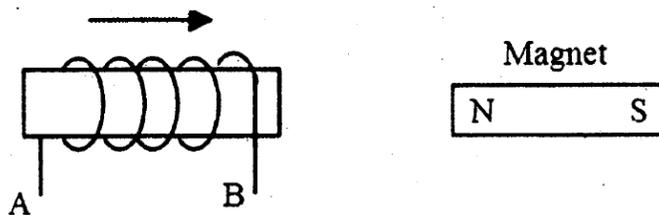
Question 9

- (a) Heat energy is supplied at a constant rate to 100g of ice at 0°C . The ice is converted into water at 0°C in 2 minutes. How much time will be required to raise the temperature of water from 0°C to 20°C ? [Given: sp. heat capacity of water = $4.2 \text{ J g}^{-1} \text{ }^\circ\text{C}^{-1}$, sp. latent heat of ice = 336 J g^{-1}]. [4]

- (b) Specific heat capacity of substance A is $3.8 \text{ J g}^{-1}\text{K}^{-1}$ whereas the specific heat capacity of substance B is $0.4 \text{ J g}^{-1}\text{K}^{-1}$
- Which of the two is a good conductor of heat?
 - How is one led to the above conclusion?
 - If substances A and B are liquids then which one would be more useful in car radiators? [3]
- (c) (i) State any two measures to minimize the impact of global warming.
 (ii) What is the Greenhouse effect? [3]

Question 10

- (a) (i) Name two factors on which the magnitude of an induced e.m.f. in the secondary coil depends.
 (ii) In the following diagram an arrow shows the motion of the coil towards the bar magnet.
- State in which direction the current flows, A to B or B to A?
 - Name the law used to come to the conclusion.



- [4]
- (b) A nucleus ${}_{11}\text{Na}^{24}$ emits a beta particle to change into Magnesium (Mg)
- Write the symbolic equation for the process.
 - What are numbers 24 and 11 called?
 - What is the general name of ${}_{12}^{24}\text{Mg}$ with respect to ${}_{11}^{24}\text{Na}$? [3]
- (c) In a cathode ray tube state:
- the purpose of covering cathode by thorium and carbon.
 - the purpose of the fluorescent screen.
 - how is it possible to increase the rate of emission of electrons. [3]

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Class X Physics
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1.

(a) When a force is applied on a non rigid body, then the body comes into motion along with a small deformation. The acceleration \mathbf{a} of the body is less than the calculated value i.e. $\mathbf{a} = \frac{\mathbf{F}}{\mathbf{m}}$. It is because some part of force is utilized to deform the body (where \mathbf{F} is the force applied on the body of mass \mathbf{m}).

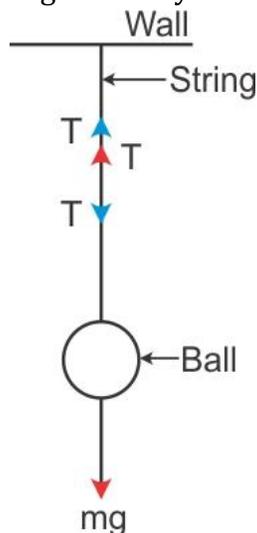
When a force is applied on a perfectly rigid body, then the body comes into motion with no deformation. The acceleration \mathbf{a} of the body can be calculated from $\mathbf{a} = \frac{\mathbf{F}}{\mathbf{m}}$.

(b) When a metallic ball is hanging by a string from a fixed support, the forces acting on the string are: (represented by blue coloured arrows in the diagram)

- 1) Tension \mathbf{T} applied by wall acting vertically upward.
- 2) Tension \mathbf{T} applied by ball acting vertically downward.

The forces acting on the ball are: (represented by red coloured arrows in the diagram)

- 1) Tension \mathbf{T} applied by string acting vertically upward.
- 2) Gravitational pull (\mathbf{mg}) acting vertically downward.



(c)

- (i) Weight of the body at the centre of the earth is zero, since \mathbf{g} is zero.
- (ii) An ideal machine takes energy in one form and converts into another form without any energy losses. The work output is equal to the work input.

(d) Yes, it is possible to have accelerated motion with a constant speed. For e.g. in a uniform circular motion, the body moves with constant linear speed with a constant centripetal acceleration acting towards the centre of the circle.

(e)

(i) A force does work whenever there is a displacement in the direction of force applied.

(ii) The work done by moon is zero since the displacement during one complete revolution is zero.

2.

(a)

Let the initial kinetic energy be $E_1 = E$

Now, the kinetic energy is directly proportional to the square of the velocity.

$$\text{K.E} \propto v^2$$

$$\therefore \text{Final kinetic energy} = E_2 = \frac{1}{9}E$$

Hence, the change in kinetic energy is given as,

$$\Delta E = E_1 - E_2$$

$$= E - \frac{1}{9}E$$

$$= \frac{8}{9}E$$

(b) (i) electrical energy to sound energy.

(ii) electrical energy to light and heat energy.

(c) (i) The energy released/required during disintegration of a nucleus is called nuclear energy.

(ii) Nuclear fission

(d) Advantage: A very small amount of nuclear fuel (such as uranium-235) can produce a tremendous amount of energy.

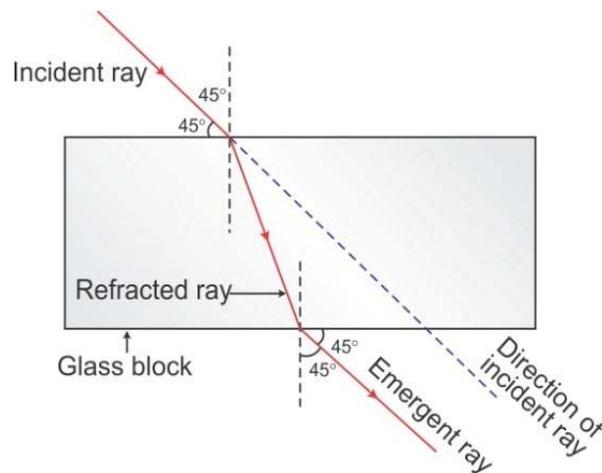
Disadvantage: The waste obtained from the nuclear plants causes environmental pollution.

(e) (i) dissipation of energy

(ii) more

3.

(a) The path of the emergent ray will be parallel to the incidence ray extended. This is according to Snell's law.



(b)

(i) Electrical energy

(ii) Fan, motors

(c)

(i) The speed of light increases as it passes from water to air.

(ii) The red colour of light will travel the fastest in any medium.

(d) Factors affecting the critical angle are:

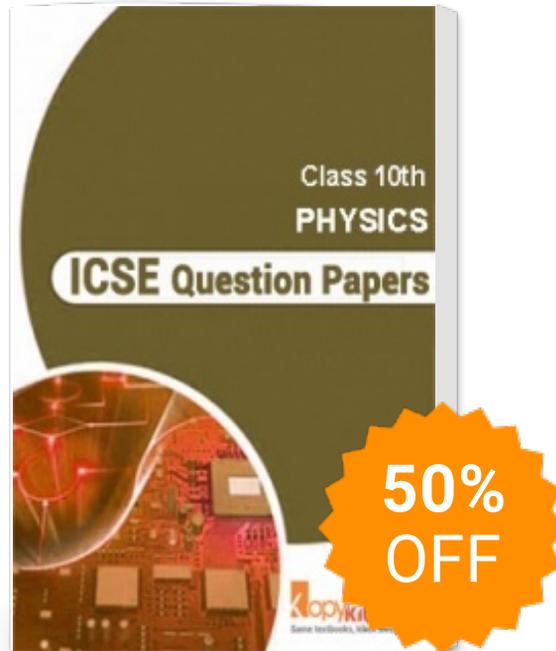
1. **Colour (or wavelength) of light:** The refractive index of a transparent medium is most for violet light and least for red light; therefore, the critical angle for a pair of media is least for violet light and most for red light. Thus, the critical angle increases with increase in wavelength of light.

2. **Temperature:** On increasing the temperature of the medium, its refractive index decreases, so the critical angle for that pair of media increases. Thus, the critical angle increases with increase in temperature

(e) (i) Quartz prism is used to obtain a spectrum of UV light.

(ii) Infrared radiations can be detected by thermopile.

ICSE Sample Question Papers For Class 10 PHYSICS



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