Sample Paper 12

ICSE Class X 2023-24
Physics
Science Paper - 1

Time: 2 Hours   **Max. Marks: 80**

General Instructions:
1.   Answer to this Paper must be written on the paper provided separately.
2.   You will not be allowed to write during first 15 minutes.
3.   This time is to be spent in reading the question paper.
4.   The time given at the head of this Paper is the time allowed for writing the answers.
5.   Section A is compulsory. Attempt any four questions from Section B.
6.   The intended marks for questions or parts of questions are given in brackets [ ].

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 questions, write the correct answer only.)

(i)   A uniform metre scale is balanced at 20 cm mark, when a weight of 100 gf is suspended from one end. Where must the weight be suspended ? Calculate the weight of the metre scale.
(a) 77.77 gf   (b) 11.11 gf
(c) 88.88 gf   (d) 66.66 gf

(ii) Work done by buoyant force is ....
(a) negative   (b) zero
(c) positive   (d) cannot definitely say

(iii) Calculate the kinetic energy of a body of mass 100 g and having a momentum of 20 kg ms.
(a) 3975 J   (b) 1580 J
(c) 3750 J   (d) 2000 J

(iv) A radioactive substances emits :
(a) simultaneously α, β and γ radiations.
(b) X-rays and γ-rays.
(c) α-radiations or β-radiations.
(d) in the order of α, β and γ particles.

(v) **Assertion :** A torch bulb give light if operated on AC of same voltage and current as DC.
Reason : Heating effect is common to both AC and DC.
(a) Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of Assertion (A).
(b) Both Assertion (A) and Reason (R) are true but Reason (R) is not the correct explanation of assertion (A).
(c) Assertion (A) is true but Reason (R) is false.
(d) Assertion (A) is false but Reason (R) is true.

(vi) The angle of refraction in a glass block of refractive index 1.5 is 19°. Calculate the angle of incidence.
(a) 4.5 sin 19   (b) 2.5 sin 19
(c) 3.5 sin 19   (d) 1.5 sin 19

(vii) Which of the following does not produce a sound wave ?
(a) A bell ringing under water   (b) An explosion in outer space
(c) A gun fired in a room with no echoes   (d) A hammer hitting a block of rubber

(viii) The diagram along side shows a force $F = 5$ N acting at point A produces a moment of force of 6 Nm about point O. What is the diameter of the wheel ?
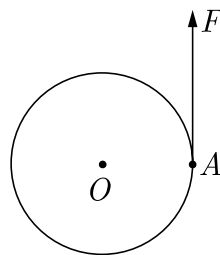
(a) 3.4 m   (b) 2.4 m
(c) 4.6 m   (d) 1.0 m

(ix) Which of the following an ohmic resistance ?
(a) Manganin wire   (b) Filament of a bulb
(c) Carbon are light   (d) Diode valve

(x) Carefully study the circuit diagram in figure and calculate the value of resistor x.

(a) 11.28 Ω   (b) 1.3 Ω
(c) 28 Ω   (d) 30 Ω
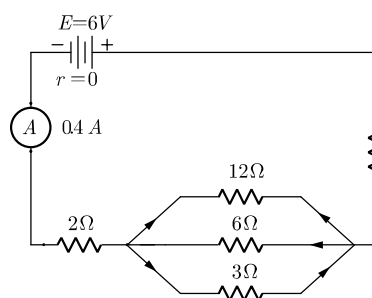
(xi) In an A.C. generator the magnitude of induced current can be increased by :
(a) increasing the area of cross-section of the coil.
(b) increasing the strength of field magnets.
(c) increasing number of turns in the coil.
(d) all of these

(xii) 1.6 kg of boiling water at 100°C is poured into 2 kg of crushed ice at $[336 \times 10^3 \text{ Jkg}^{-1}]$ 0°C, such that final temperature recorded is 0°C. Calculate the specific heat of ice.
(a) $36 \times 10^3 \text{ Jkg}^{-1}$ (b) $136 \times 10^3 \text{ Jkg}^{-1}$
(c) $336 \times 10^3 \text{ Jkg}^{-1}$ (d) $236 \times 10^3 \text{ Jkg}^{-1}$

(xiii) A woman draws water from a well using a fixed pulley. The mass of the bucket and the water together is 10 kg. The force applied by the woman is 200 N. The mechanical advantage is (Take, $g = 10 \text{ m/s}^2$)
(a) 2   (b) 20
(c) 0.05   (d) 0.5

(xiv) Why does this stone sparkle ?

(a) light being entrapped inside it due to low critical angle
(b) bending of light
(c) refraction of light
(d) reflection of light

(xv) In following case, where must an object be placed in front of a convex lens so that the image formed is at infinity.

(a) at 2F   (b) between F & 2F

(c) at Focus   (d) None of these
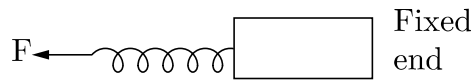
QUESTION 2.

(i) Name the rotational analogs of the following: [3]
(a) Linear velocity
(b) Linear acceleration
(c) Force
(d) Linear momentum.

(ii) One end of a spring is kept fixed while the other end is stretched by a force as shown in the diagram : [2]

$$F \longleftarrow \text{ooooo} \boxed{} \quad \begin{array}{l} \text{Fixed} \\ \text{end} \end{array}$$

(a) Copy the diagram and mark on it the direction of restoring force.
(b) Name one instrument which works on the above principle.

(iii) A coolie is pushing a box weighing 1500 N up an inclined plane 7.5 in long on to a platform, 2.5 m above the ground. [2]
(a) Calculate the mechanical advantage of the inclined plane.
(b) Calculate the effort applied by the coolie.

(iv) What do you understand by potential energy of a body? Give its SI unit. Also give two examples from everyday life. [2]

(v) What should be the angle between force and displacement to get the work: [2]
(a) maximum,
(b) minimum ?

(vi) An electric bulb draws 24 W when connected to a 12 V supply. Find the power if it is connected to a 9 V supply. [2]

(vii) (a) Name the type of waves which are used for sound ranging. [2]
(b) Why are these waves mentioned in (a) above, not audible to us ?

QUESTION 3.

(i) A converging lens is used to obtain an image of an object placed in front of it. The inverted image is formed between F_2 and $2F_2$ of the lens. [2]
(a) Where is the object placed ?
(b) Draw a ray diagram to illustrate the formation of the image obtained.

(ii) Two fuse wires of the same length are rated 5 A and 20 A. Which of the two fuse wires is thicker and why ? [2]

(iii) State two characteristics of a primary coil of a step-up transformer when compared to the secondary coil. [2]

(iv) Calculate the amount of heat released when 5.0 g of water at 20°C is changed into ice at 0°C. [2]
(Specific heat capacity of water = 4.2 J/g °C
Specific latent heat of fusion of ice = 336 J/g).

(v)   When a nucleus undergoes alpha decay, is the product atom electrically neutral ? What about in beta decay ?   [2]

SECTION - B

(Attempt any four questions.)

QUESTION 4.

(i)   (a) A ray of light strikes the surface of a rectangular glass block such that the angle of incidence is (a) 0° (b) 42°. Sketch a diagram to show the approximate path taken by the ray in each case as it passes through the glass block and emerges from it.   [3]
      (b) State the conditions required for total internal reflection of light to take place.

(ii) The diagram shows a lens as a combination of a glass block and two prisms. Name the lens formed by the combination. What is the line XX' called? Complete the path of the incident ray AB after passing through the lens. The final emergent ray will either meet XX' at a point or appear to come from a point on XX'.   [3]
      What is this point called? Label it in your diagram by the letter F.
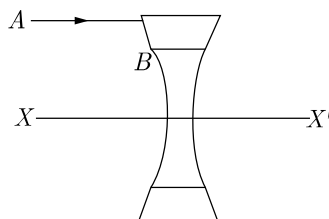
(iii) The diagram below shows a lens as a combination of a glass block and two prisms. Copy the diagram and answer the following questions :   [4]
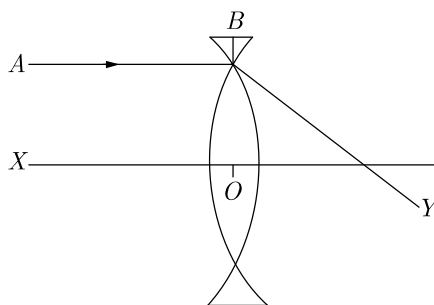
      (a) Name the lens formed by the combination.
      (b) What is the line XY called ?
      (c) Complete the ray diagram and show the path of the incident ray AB after passing through the lens.
      (d) The final emergent ray will either meet XY at a point or appear to come from a point on XY. What is the point called ?
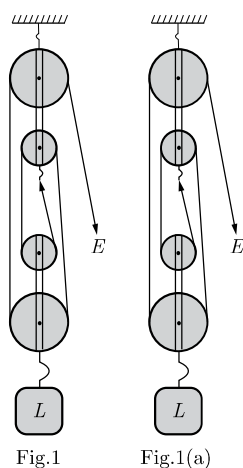
QUESTION 5.

(i)   A uniform meter scale is balanced at the 20 cm mark when masses of 100 g and 50 g are suspended from the 10 cm and 30 cm marks respectively. Calculate the mass of the meter scale.   [3]

(ii) (a) Is it possible to burn a piece of paper using a convex lens in day-light without using matches or any direct flame? Draw a diagram to support your answer.   [3]
      (b) How can you account for the brilliance of a diamond?

(iii) What do you mean by musical sound and noise? Give two examples of each. Also represent musical sound and noise graphically.   [4]
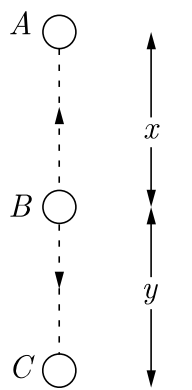
QUESTION 6.

(i)   Monu pulls a toy car through a distance of 10 m on smooth and horizontal floor. The string field is Monu's hand makes an angle 60° with horizontal surface. If the force applied by the Monu be 20 N   [3]
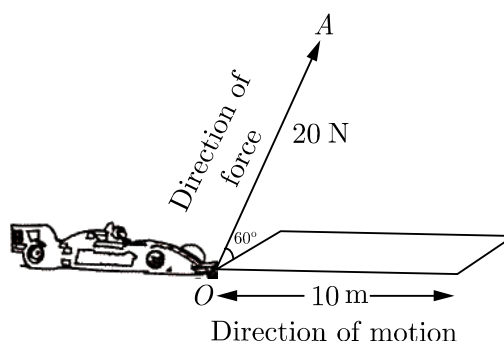
      (a) calculate the work done by the Monu is pulling the car.
      (b) If the string makes an angle 30° with the horizontal surface, then calculate work done.

(ii) Figure-1 given below shows an arrangement of four pulleys. A load L is attached to the movable lower block and an effort E is applied at the free end of the string. Copy the diagram and (a) draw arrows to indicate tension in each part of the string and (b) calculate the mechanical advantage of the system.   [3]

Fig.1   Fig.1(a)

Continue on Next Page...

(iii)   An object of mass 'm' is allowed to fall freely from point A as shown in the figure. Calculate the total mechanical energy of the object at :   [4]
(a) Point A
(b) Point B
(c) Point C
(d) State the law which is verified by your calculations in parts (a), (b) and (c).


QUESTION 7.

(i)   A radar is able to detect the reflected waves from an enemy aeroplane, after a time interval of 0.02 millisecond. If the velocity of the waves is $3 \times 10^8 \, \text{ms}^{-1}$, calculate the distance of the plane from the radar.   [3]

(ii)   (a) What is the nature of beta particles ? Explain briefly how beta particles are ejected from the nucleus of an atom.   [3]
(b) How does a helium atom differ from an alpha particle ?

(iii) State the principle of moments. How will you verify this principle if you are supplied with a metre rule, a fulcrum and a weight box ?   [4]
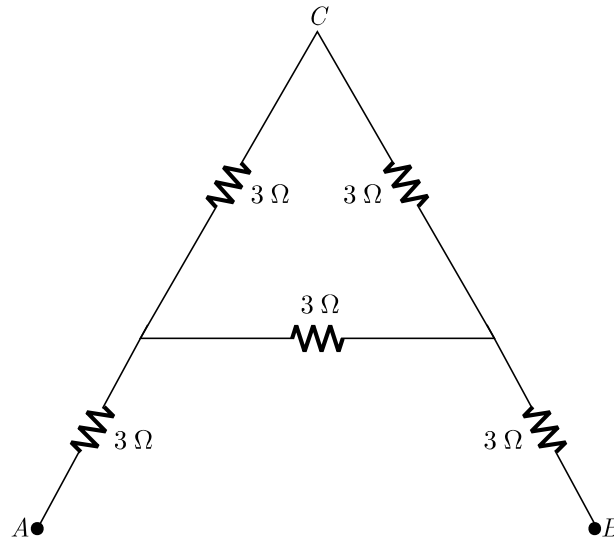
QUESTION 8.

(i)   The diagram below shows a coil connected to a centre zero galvanometer G. The galvanometer shows a deflection to the right when the N pole of a powerful magnet is moved to the right as shown.   [3]
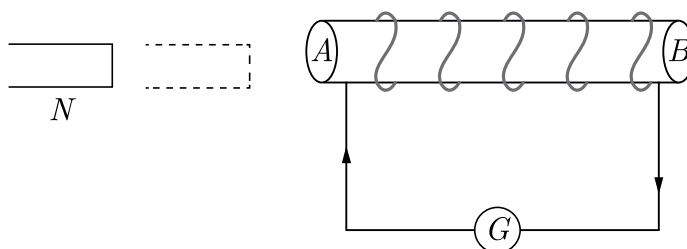
(a) Explain why the deflection occurs in the galvanometer.
(b) Does the direction of current in the coil appear clockwise or anticlockwise when viewed from end A ?
(c) State the observation in G when the coil is moved away from N.

(ii)   A radioactive sample is kept at the centre of a large evacuated sphere. How safe will it be ?   [3]

(iii) In the diagram given below, calculate the resistance between the points (a) X and Y (b) A and B.   [4]

QUESTION 9.

(i)   (a) Some hot water was added to three times its mass of cold water at 10°C and the resulting temperature was found to be 20°C. What was the temperature of the hot water ?   [3]
      (b) Why are burns caused by steam more severe than those caused by boiling water at the same temperature ?

(ii) Explain the following :   [3]
      (a) Why do sandy soils, get heated up quickly as compared to wet soils ?
      (b) Why is water considered as the best liquid for quenching thirst ?
      (c) Why is it advisable to pour cold water over burns, caused on human body by hot solids ?

(iii) (a)   [4]
         1. Define specific latent heat of vaporisation of a substance.
         2. What is the principle of calorimetry ?
      (b) Explain why water is used in hot water bottles for fomentation and also as a universal coolant.

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