Sample Paper 11

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 force F acts on a rigid body capable of turning around a fixed point. The moment of force depends upon

(a) magnitude of perpendicular distance between the point of action of force and the turning point.
(b) magnitude of force F.
(c) both (a) and (b)
(d) none of these

(ii) 1000 watt = ... MW.

(a) 10^{-3} (b) 10^{-12}
(c) 10^{6} (d) 10^{9}

(iii) A body P has kinetic energy E. Another body Q, whose mass is 9 times than P, also has kinetic energy E. Calculate the ratio of velocities of P and Q ?

(a) 2 : 1 (b) 1 : 1
(c) 4 : 1 (d) 3 : 1

(iv) A stationary radioactive nucleus of mass 210 units disintegrates into an α-particle of mass 4 units and residual nucleus of mass 206 units. If the kinetic energy of the α-particle is E, then the kinetic energy of the residual nucleus is

(a) $(\frac{103}{105})E$ (b) $(\frac{2}{105})E$

(c) $(\frac{2}{105})E$ (d) $(\frac{2}{103})E$

(v) **Assertion :** A resistor of resistance R is connected to an ideal battery. If the value of R is decreased, the power dissipated in the circuit will increase.
Reason : The power dissipated in the circuit will increase.

(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 critical angle for a material X is 45°. The total internal reflection will take place, if the angle of incidence in the denser medium is :

(a) less than 45°
(b) less than 45°, but not zero degree
(c) 90°
(d) more than 45°, but not 90°

(vii) Water from a tap is allowed to fall in a vessel with a thin neck. The pitch of sound produced by falling water ..... with the volume of water in the vessel.

(a) increases (b) decreases
(c) remains same (d) none of these

(viii) Uniform linear motion has ..... .

(a) Variable speed, variable velocity (b) Constant speed, constant velocity
(c) Constant speed, variable velocity (d) Variable speed, constant velocity

(ix) A nichrome wire of length l and area of cross-section $\frac{a}{4}$ has a resistance R. Another nichrome wire of length $3l$ and area of cross-section $\frac{a}{2}$ has a resistance of R_1. Find the ratio of $R_1 : R$.

(a) 1 : 2 (b) 2 : 2
(c) 4 : 2 (d) 3 : 2

(x) Two conductors A and B have 500 and 100 units of negative charge when the conductors are connected by an electric wire the conventional current flows from :

(a) B to A (b) A to B
(c) Current does not flow (d) none of these

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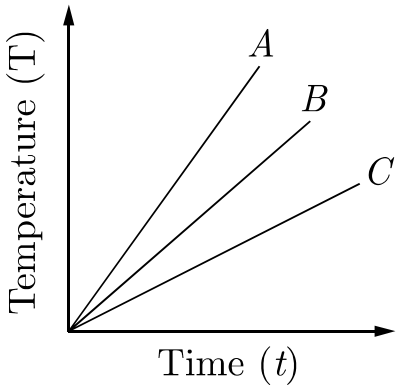
(xi) An electric kettle draws a current of 4 A for 2.5 min. If the resistance of its element is 100 Ω, calculate the electric energy drawn by kettle in kilo joules.

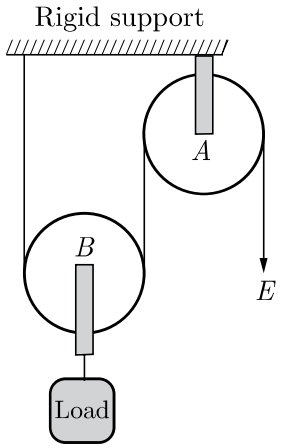
(a) 100 kJ
(b) 240 kJ
(c) 200 kJ
(d) 140 kJ

(xii) Which of the substance A, B and C has the lowest heat capacity, if heat is supplied to all of them at equal rates. The temperature versus time graph is shown.



(a) A
(b) C
(c) B
(d) All have equal specific heat

(xiii) In the diagram shown below, the velocity ratio of the arrangement is.



(a) 1
(b) 2
(c) 3
(d) 0

(xiv) The refracted ray is ..... to the base of the prism in minimum deviation position.

(a) collinear
(b) parallel
(c) perpendicular
(d) inclined

(xv) Which lens has one surface plane and another surface convex?

(a) bi-convex
(b) bi-concave
(c) plano-convex
(d) piano-concave

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QUESTION 2.

(i) Can the couple acting on a rigid object produce transitory motion ? [3]

(ii) Where does the position of centre of gravity lie for: [2]
(a) a circular lamina,
(b) a triangular lamina?

(iii) A pulley system has four pulleys in all and is 90% efficient. Calculate [2]
(a) M.A.
(b) Effort required to lift a load of 1000 N.

(iv) Define work and explain how to measure it. [2]

(v) State two conditions when work done by a force is zero. [2]

(vi) Two resistors of 3 ohm and 6 ohm are connected in parallel. What is the equivalent resistance ? [2]

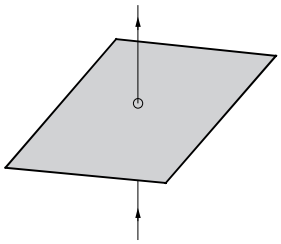
(vii) (a) Name the waves used for echo depth sounding. [2]
(b) Give one reason for their use for the above purpose.

QUESTION 3.

(i) (a) What is meant by 'dispersion of light ? [2]
(b) In the atmosphere which colour of light gets scattered the least ?

(ii) In a three-pin plug, why is the earth pin made longer and thicker than the other two pins ? [2]

(iii) (a) A straight wire conductor passes vertically through a piece of cardboard sprinkled with iron fillings. Copy the diagram and show the setting of iron fillings when a current is passed through the wire in the upward direction and the cardboard is tapped gently. Draw arrows to represent the direction of the magnetic field lines. [2]



(b) Name the law which helped you to find the direction of the magnetic field lines.

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(iv) 50 g of ice at 0°C is added to 300 g of a liquid at 30°C. What will be the final temperature of the mixture when all the ice has melted? The specific heat capacity of the liquid is $2.65\,\mathrm{J\,g^{-1}\,^{\circ}C^{-1}}$ while that of water is $4.2\,\mathrm{J\,g^{-1}\,^{\circ}C^{-1}}$. Specific latent heat of fusion of ice $= 336\,\mathrm{J\,g^{-1}}$. [2]

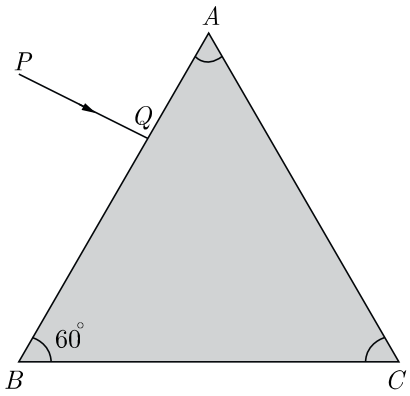
(v) State three uses of X-rays. [2]

SECTION - B

(Attempt any four questions.)

QUESTION 4.

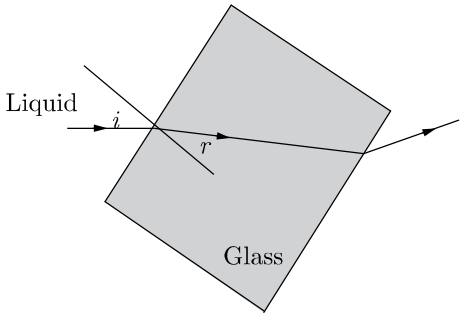
(i) (a) In the diagram shown below, a ray of light PQ is incident normally on one face AB of an equilateral glass prism. What are the angles of incidence at the faces AB and AC ? [3]



(b) Complete the ray diagram showing its emergence into air after passing through the prism.

(ii) A convex lens forms an image 16 cm long of an object 4 cm long kept at a distance of 6 cm from the lens. The object and image are on the same side of lens. Draw diagram and find (a) nature of image (b) focal length of lens. [3]

(iii) (a) The given diagram shows the path of a ray of light through a rectangular glass block placed in a liquid of uniform density. [4]



1. Does the light speed up or slow down in glass?
2. Give reasons for your answer.

(b) What is the angular deviation of the emergent ray from the glass block with respect to the incident ray?

(c) Show with the help of a ray diagram the path of the ray when incident normally on the first surface of the glass block, through the block and the liquid.

QUESTION 5.

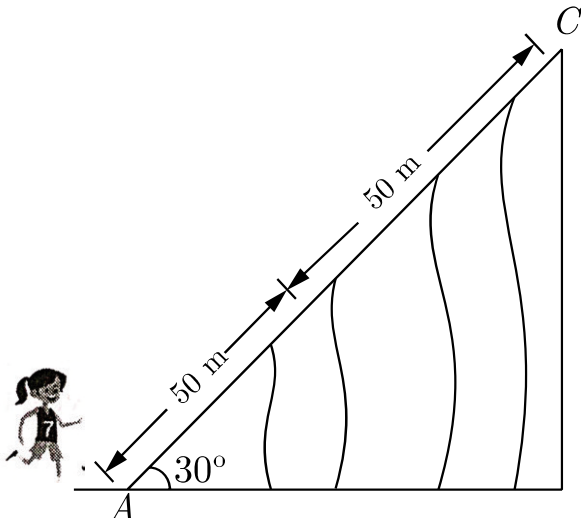
(i) A uniform meter rule weighing 100 gf pivoted at its centre O. Two weights 150 gf and 250 gf hang from the meter rod as shown. Calculate (a) the total antic lock wise moments about O (b) the total clockwise moments about O (c) the difference of antic lock wise and clockwise moments about O and (d) the distance from O where a 100 gf weight should be placed to balanced the meter rule. [3]

(ii) (a) Why are infrared radiations used as signals during war? [3]
(b) State three characteristics of the image of an extended source formed by a concave lens.

(iii) What do you understand by the term "quality" of a musical note ? Illustrate your answer with a diagram. [4]

QUESTION 6.

(i) Maya is climbing a hill from point A to point C as shown in the figure below. The distance between each point is 50 m and the hill has a constant slope of 30°. Maya has a mass of 100kg. Assume negligible friction throughout the climb. [3]



(a) Calculate the total work done by Maya in climbing from point A to C.

(b) Determine the potential energy gained by Maya at point C relative to point A.

(ii) 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. [3]
(a) Calculate the mechanical advantage of the inclined plane.
(b) Calculate the effort applied by the coolie.
(c) In actual practice, the coolie needs to apply more effort than what is calculated. Give one reason why you think the coolie needs to apply more effort.

(iii) A boy pulls a toy car with a force of 50 N through a string which makes an angle of 30° with the horizontal, so as to move the toy by a distance of 1 m in the horizontal direction. If the string were inclined at an angle of 45° with the horizontal, how much pull would he apply along the string in order to move it through the same distance of 1 m ? (Given $\cos 30^\circ = 0.8667$, $\cos 45^\circ = 0.7071$) [4]

QUESTION 7.

(i) (a) A man stands at a distance of 68 m from a cliff and fires a gun. After what time interval will he hear the echo, if the speed of sound in air is $340\ \text{m s}^{-1}$? [3]
(b) If the man had been standing at a distance of 12 m from the cliff would he have heard a clear echo ?

(ii) An atomic nucleus A is composed of 84 protons and 128 neutrons. [3]
(a) The nucleus A emits an alpha particle and is transformed into nucleus B. What is the composition of nucleus B ?
(b) The nucleus B emits a beta particle and is transformed into a nucleus C. What is the composition of nucleus C ?
(c) Does the composition of nucleus C change if it emits gamma radiations ?

(iii) A stone of mass 'm' is rotated in a circular path with a uniform speed by tying a strong string with the help of your hand. Answer the following questions : [4]
(a) Is the stone moving with a uniform or variable speed ?
(b) Is the stone moving with a uniform acceleration ? In which direction does the acceleration act ?
(c) What kind of force acts on the hand and state its direction ?

QUESTION 8.

(i) How does the resistance of a metallic wire depend on the following ? [3]
(a) the length of wire
(b) the thickness of wire
(c) the temperature of wire

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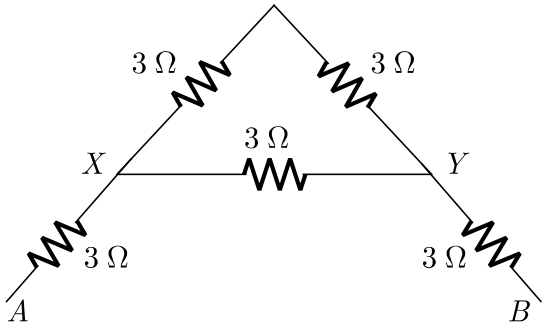
(ii) (a) Define radioactivity. [3]
(b) What happens inside the nucleus that causes the emission of beta particle?
(c) Express the above change in the form of an equation.

(iii) In the diagram given below, calculate the resistance between the points [4]



(a) X and Y and
(b) A and B.

QUESTION 9.

(i) An electric heater supplies 1.8 kg of power in the form of heat to a tank of water. How long will it take to heat the 200 kg of water in the tank from 10°C to 70°C? Assume heat losses to the surroundings to be negligible. [3]

(ii) Explain the following : [3]
(a) Why is water used as a coolant in motor car radiators ?
(b) Why is water sprayed on roads in the evening in hot summer ?
(c) Why does the temperature in hot summer, falls sharply after a sharp shower ?

(iii) With the help of a diagram, explain the two way staircase wiring. [4]

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