Sample Paper 16

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

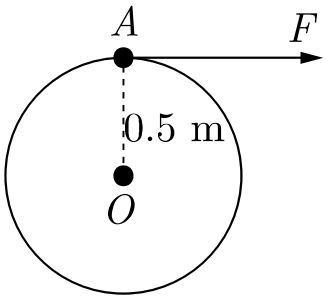
(Attempt all questions from this Section.)

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) The diagram alongside shows a force F acting at point A, such that it produces a moment of force of 20 Nm in clockwise direction. Calculate the magnitude of force F.



(a) 30 N
(b) 40 N
(c) 10 N
(d) 20 N

(ii) In a washing machine the electrical energy is converted into .....

(a) mechanical kinetic rotational energy
(b) kinetic energy
(c) vibrational energy
(d) sound energy

(iii) A heart of a rabbit beats 100 times in a minute when a fox chases it during which the work performed is 1.5 J. Find the power of the heart ?

(a) 0.25 J (b) 25 J
(c) 2.5 J (d) 5 J

(iv) When four hydrogen nuclei combine to form a helium nucleus in the interior of sun, what amount of energy released per nucleon in this process ?

(a) 46.3 MeV (b) 26.7 MeV
(c) 18.5 MeV (d) 24.5 MeV

(v) **Assertion :** On moving from optically rarer to denser medium, a ray of light bends away from the normal.
Reason : Speed of light is more in denser medium and less in rarer medium.

(a) Both Assertion and Reason are true and Reason is the correct explanation of Assertion.
(b) Both Assertion and Reason are true but Reason is not the correct explanation of Assertion.
(c) Assertion is true but Reason is false.
(d) Both Assertion and Reason are false.

(vi) The focal length of a concave lens is 10 cm. Calculate its power.

(a) − 11.5 D (b) − 10 D
(c) + 11.5 D (d) + 10 D

(vii) Given below is a diagram showing a set of percussion instruments (i.e., producing sound on being struck).

Which of the following statements is not true about the percussion instrument ?

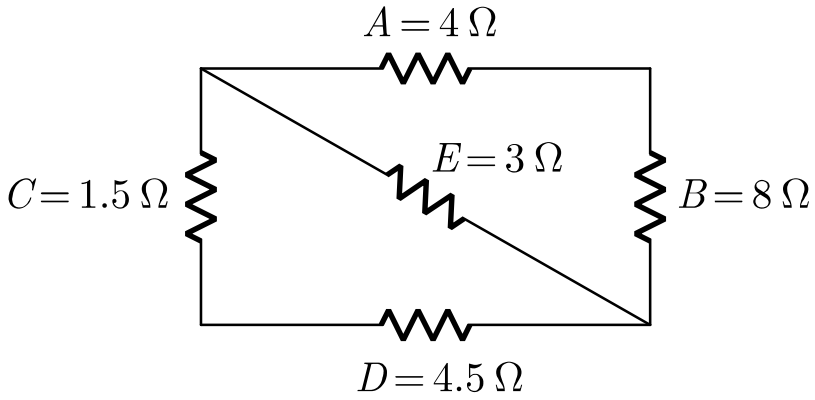
(a) When the vibrating surface is touched, then sound will stop
(b) These instruments can produce only loud sounds
(c) The surface of the instrument vibrates when struck, thus producing sound
(d) Louder sound can be produced, if hit with greater force

(viii) For hearing an echo, the minimum distance between the source of sound and reflecting body should be.

(a) 12 m (b) 24 m
(c) 51 m (d) 17 m

(ix) Which is not the characteristic of a fuse wire ?
(a) It has high resistance
(b) It has low resistance
(c) It is an alloy of lead and tin
(d) It has low melting point

(x) Calculate the equivalent resistance of circuit diagram shown in figure below.



(a) 2.71 Ω
(b) 3.71 Ω
(c) 0.71 Ω
(d) 1.71 Ω

(xi) Anectric bulb draws a current of 0.8 A and works on 250 V on an average 8 hrs a day. If energy costs 1.50 per board of trade unit, calculate the monthly bill.
(a) 78
(b) 72
(c) 83
(d) 112

(xii) Global warming will result in :
(a) decrease in disease caused by bacteria
(b) increase in the level of sea water
(c) increase in agricultural production
(d) decrease in the level of sea water

(xiii) The SI unit of specific latent heat is :
(a) Jg^{-1}
(b) cal g^{-1}
(c) J kg^{-1} K^{-1}
(d) J kg^{-1}

(xiv) For minimum deviation the angle of incidence ..... angle of refraction.
(a) greater than
(b) equal to
(c) less than
(d) directly proportional to

(xv) Diamond sparkle because of ..... .
(a) Refraction followed by T.I.R.
(b) T.I.R followed by refraction.
(c) T.I.R followed by entrapping of light inside it.
(d) none of the above.

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QUESTION 2.

(i) Name the unit of physical quantity obtained by the formula $2\,K/V^2$, where K : Kinetic energy, V : Linear velocity. [3]

(ii) A 50 cm uniform ruler is freely pivoted at 15 cm mark which balances horizontally when an object of weight 40 dyne is hung from the 2 cm mark. [2]
(a) Draw a force diagram of the arrangement and
(b) calculate the weight of the ruler. Also calculate the force with which pivot is pressed.

(iii) A barrel of 50 kg is raised up on a 10 m long inclined plane by an effort of 25 N. Calculate (a) the vertical height through which barrel rises (b) gradient of inclined plane.
(Takeg $= 10\,m\,s^2$) [2]

(iv) A body is acted upon by a force. State two conditions under which the work done could be zero. [2]

(v) (a) State the principle of conservation of energy. [2]
(b) Name the form of energy which a body may possess even when it is not in motion.

(vi) Two lamps one rated 100 W, 220 V and the other rated 60 W, 220 V are connected in parallel to a 220 V supply. What current is drawn from the supply line ? [2]

(vii) (a) What are mechanical waves ? [2]
(b) Name one property of waves that do not change when the wave passes from one medium to another.

QUESTION 3.

(i) (a) A ray of light passes from water to air. How does the speed of light change ? [2]
(b) Which color of light travels fastest in any medium except air ?

(ii) (a) Name two safety devices which are connected to the live wire of a household electrical circuit. [2]
(b) Give one important function of each of these two devices.

(iii) How are Fleming's left hand rule and right hand rule different from each other ? [2]

(iv) 40 g of ice at 0°C is used to bring down the temperature of a certain mass of water at 60°C to 10°C. Find the mass of water used. [2]
[Specific heat capacity of water $= 4200\,J\,kg^{-1}\,°C^{-1}$]
[Specific latent heat of fusion of ice $= 336 \times 10^3 J\,kg^{-1}$]

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(v) (a) How does the position of an element change in the periodic table when it emits out a beta particle ? [2]

(b) What changes occur in the nucleus of radioactive element when it emits gamma radiation ? Give an example.

SECTION - B

(Attempt any four questions.)

QUESTION 4.

(i) (a) If a monochromatic beam of light undergoes minimum deviation through an equiangular prism, how does the beam pass through the prism, with respect to its base ? [3]

(b) If white light is used in the same way as in (i) above, what change is expected in the emergent beam ?

(ii) Draw a diagram to locate the position of a convex lens kept between a candle and screen separated by a distance of 90 cm so that a small image of the candle half the size of it may be formed on the screen. Deduce the focal length from the diagram. [3]

(iii) (a) A stick partly immersed in water appears to be bent. Draw a ray diagram to show the bending of the stick when placed in water and viewed obliquely from above. [4]

(b) A ray of monochromatic light is incident from air on a glass slab:

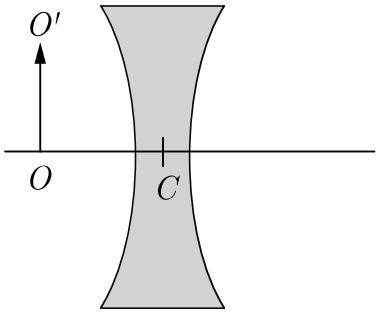
1. Draw a labelled ray diagram showing the change in the path of the ray till it emerges from the glass slab.
2. Name the two rays that are parallel to each other.
3. Mark the lateral displacement in your diagram.

QUESTION 5.

(i) A candle is burning at some distance on one side of a glass box. The image of the candle is formed of same size on a screen kept at 0.20 m on the other side of the box. Name the lens arrangement in the box. What will be its power ? [3]

(ii) (a) What do you mean by absolute refractive index of a medium ? [3]

(b) Given OC is equal to the focal length of the lens; copy the diagram in your answer book. Draw two rays from the linear object OO' and obtain the image formed by the lens.



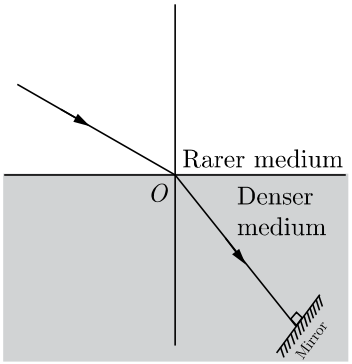
(iii) A vibrating tuning fork is placed over the mouth of [4]

(a) A stringed musical instrument, such as the Sitar, is provided with a number of wires of different thickness's. Explain the reason for this.

(b) What is meant by noise pollution? Write the name of one source of sound that causes noise pollution.

QUESTION 6.

(i) Rohit wants to study the phenomena of a ray of light is moving from rarer to a denser medium and strikes a plane mirror placed at 90° to the direction of the ray as shown in the figure. And when a light ray after suffering any number of reflections and refractions, its final path has reversed, it travels back along its entire initial path. This is called principle of reversibility of light. [3]



(a) Copy the diagram and mark the arrows to show the path of the ray of light after it is reflected from the mirror.

(b) Name the principle you have used to mark the arrow to show the direction of the ray.

(ii) A labourer uses a sloping wooden plank of length 2.0 in to push up a load of 600 N into the truck at a height of 0.8 m. [3]

(a) What is the mechanical advantage of the sloping plank ?

(b) How much effort is needed to push the load up into the truck ?

(c) What assumption have you made in arriving at your answer in part (b) above ?

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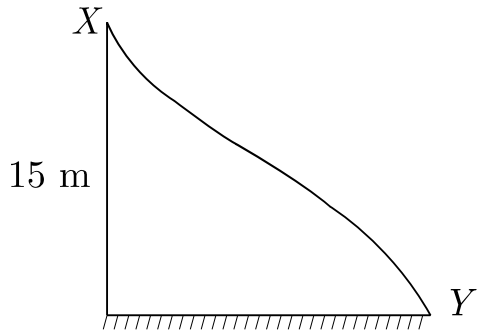
(iii) A small block of mass 1 kg is released from seat at X which is at a height of 15 m from ground. The block comes down and reaches at Y travelling a curved path. Calculate the velocity of the block when it finally reaches Y. [4]



QUESTION 7.

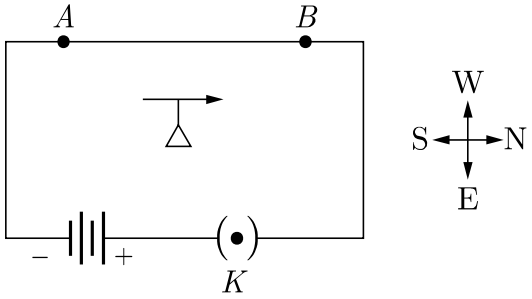
(i) The ratio of amplitude of two waves of same pitch is 3 : 4. What is the ratio of their: [3]
(a) loudness ?
(b) frequencies ?

(ii) (a) What is meant by Radioactivity ? [3]
(b) What is meant by nuclear waste ?
(c) Suggest one effective way for the safe disposal of nuclear waste.

(iii) A block and tackle system of pulleys has velocity ratio 4. [4]
(a) Draw a neat labelled diagram of the system indicating clearly the points of application and direction of load and effort.
(b) What will be its V.R., if the weight of the movable block is doubled ?

QUESTION 8.

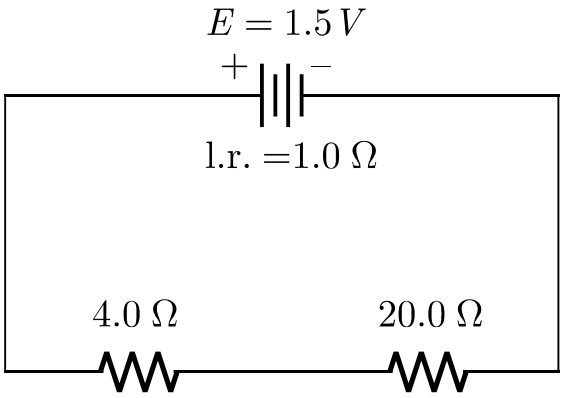
(i) The diagram below shows a magnetic needle kept just below the conductor AB which is kept in North South direction. [3]



(a) In which direction does the needle deflect when the key is closed ?
(b) Why is the deflection produced ?
(c) What will be the change in the deflection if the magnetic needle is taken just above the conductor AB ?

(ii) A mixture of radioactive substances gives off three types of radiations. [3]
(a) Name the three types of radiations.
(b) Name the radiations which are charged.
(c) Name the radiation similar in nature to cathode rays.

(iii) A cell of e.m.f. 1.5 V and internal resistance 1.0 Ω is connected to two resistors of 4.0 Ω and 20.0 Ω in series as shown in the figure: [4]



Calculate the:
(a) current in the circuit.
(b) potential difference across the 4.0 ohm resistor.
(c) voltage drop when the current is flowing.
(d) potential difference across the cell.

QUESTION 9.

(i) (a) [3]
1. It is observed that the temperature of the surroundings starts falling when the ice in a frozen lake starts melting. Give a reason for the observation.
2. How is the heat capacity of the body related to its specific heat capacity ?

(b) Why does a bottle of soft drink cool faster when surrounded by ice cubes than by ice cold water, both at 0°C ?

(ii) (a) Does land cool at a slower or faster rate than water? Give one reason for your answer.
(b) Explain why steam pipes warm a building more effectively than hot water pipes in cold countries. [3]

(iii) An electrical appliance is rated 1500 W, 250 V. This appliance is connected to 250 V mains. Calculate: [4]
(a) the current drawn.
(b) the electrical energy consumed in 60 hours,
(c) the cost of electrical energy consumed at ₹ 2.50 per kW h.

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