

2024

SPECIMEN PAPERS

ICSE 2024 EXAMINATION

SPECIMEN QUESTION PAPER

PHYSICS

(SCIENCE PAPER 1)

Maximum Marks: 80

Time allowed: Two hours

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

You will not be allowed to write during 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 [ ].

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) A moment of couple has a tendency to rotate the body in an anticlockwise direction. Then the moment of couple is taken as:

(a) positive

(b) negative

(c) maximum

(d) zero

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(ii) The kinetic energy of a given body depends on the:

(a) position

(b) centre of gravity of the body.

(c) momentum

(d) displacement

(iii) For burning of coal in a thermoelectric station, the energy conversion taking place is:

(a) chemical to heat to mechanical

(b) chemical to heat to mechanical to electrical

(c) chemical to heat to light

(d) heat to chemical to mechanical

(iv) A nucleus of an atom consists of 146 neutrons and 95 protons. It decays after emitting an alpha particle. How many protons and neutrons are left in the nucleus after an alpha emission?

(a) protons = 93, neutrons = 144

(b) protons = 95, neutrons = 142

(c) protons = 89, neutrons = 144

(d) protons = 89, neutrons = 142

(v) Assertion: Infrared radiations travel long distances through dense fog and mist.

Reason: Infrared radiations undergoes minimal scattering in earth's atmosphere

(a) both assertion and reason are true.

(b) both assertion and reason are false.

(c) assertion is false but reason is true.

(d) assertion is true reason is false.

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(vi) For a convex lens, the minimum distance between an object and its real image in terms of focal length (f) of a given lens must be:

(a) 1.5 f

(b) 2.5 f

(c) 2 f

(d) 4 f

(vii) Two sound waves X and Y have same amplitude and same wave pattern, but their frequencies are 60 Hz and 120 Hz respectively, then:

(a) X will be shriller and Y will be grave

(b) X will be grave and Y will be shriller

(c) X will differ in quality than Y

(d) X is louder than Y.

(viii) Vibrations produced in a body under the influence of the periodic force is;

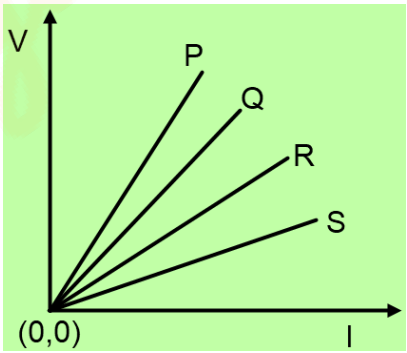
(a) forced vibrations

(b) resonant vibrations

(c) damped vibrations

(d) sympathetic vibrations

(ix) The graph of voltage vs current for four different materials is shown below.



Which of these four materials would be used for making the coil of a toaster?

(a) Q

(b) S

(c) P

(d) R

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(x) According to the old convention the colour of the earth wire is:

(a) black

(b) green

(c) yellow

(d) red

(xi) Lenz's law is based on the law of conservation of:

(a) force

(b) charge

(c) mass

(d) energy

(xii) Heat capacity of a body is:

(a) the energy needed to melt the body without the change in its temperature

(b) the energy needed to raise the temperature of the body by 1°C

(c) the increase in the volume of the body when its temperature increases by 1°C

(d) the total amount of internal energy that is constant.

(xiii) The amount of heat energy required to melt a given mass of a substance at its melting point without rise in its temperature is called:

(a) specific heat capacity

(b) specific latent heat of fusion

(c) latent heat of fusion

(d) specific latent heat of freezing

(xiv) When a ray of light enters from a denser medium to a rarer medium then:

(a) the light ray bends towards the normal

(b) the speed of light increases

(c) the angle of incidence is greater than the angle of refraction

(d) its wavelength decreases.

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(xv) An endoscope uses optical fiber to transmit high resolution images of internal organs without loss of information. The phenomenon of light that governs the functioning of the optical fiber is:

(a) refraction

(b) reflection

(c) scattering

(d) total internal reflection.

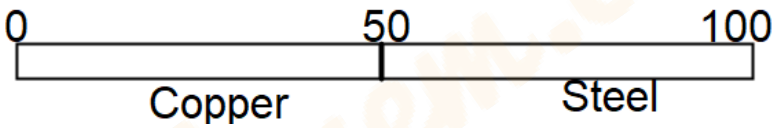
Question 2

(i) (a) Name the principle on which a lever works. [3]

(b) Which radiations that are emitted during the decay of a nucleus, having highest penetrating power?

(c) Does the emission of the above-mentioned radiation result in a change in the mass number?

(ii) [2]

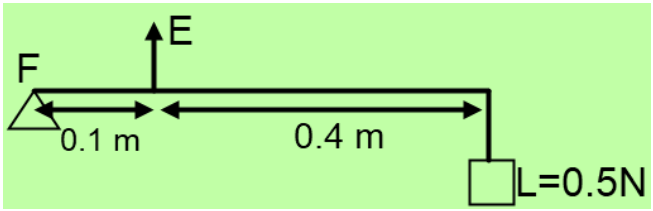


A metre rod made of copper and steel as shown in the diagram. Weights of copper and steel are 10 N and 8 N respectively.

(a) On which part does the centre of gravity lie (0 to 50 or 50 to 100).

(b) Justify your answer.

(iii) A lever is shown below. [2]



(a) Identify the type of lever.

(b) Calculate its mechanical advantage.

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(iv) Two bodies A and B have same kinetic energies. Compare their velocities if mass of A is four times the mass of B. [2]

(v) Draw a graph of potential energy vs height from the ground for a body thrown vertically upwards. [2]

(vi) Two copper wires A and B are of the same thickness and are at the room temperature. If the length of A is twice the length of B then: [2]

(a) Compare their resistances

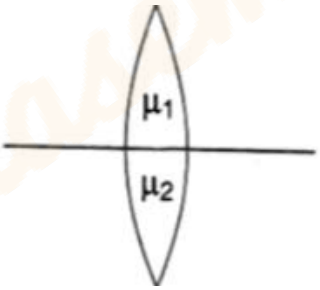
(b) Compare their resistivities

(vii) (a) Name the waves used for echo depth sounding. [2]

(b) Give one reason for their use in the above application.

Question 3

(i) (a) Refer to the diagram given below. A lens with two different refractive indices is shown. If the rays are coming from a distant object, then how many images will be seen? [2]



(b) A glass lens always forms a virtual, erect and diminished image of an object kept in front of it. Identify the lens.

(ii) It is observed that the house circuits are arranged in a parallel combination. Give two advantages of this arrangement. [2]

(iii) A transformer is used to change a high alternating e.m.f. to a low alternating e.m.f. of the same frequency. [2]

(a) Identify the type of transformer used for the above purpose.

(b) State whether the turns ratio of the above transformer is =1 or >1 or <1.

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(iv) A solid of mass 60 g at 100°C is placed in 150 g of water at 20°C. The final steady temperature is 25°C. Calculate the heat capacity of solid. [2]

[sp. heat capacity of water = 4.2 J g^{-1} K^{-1}]

(v) What is a nuclear waste? State one method to dispose it safely. [2]

SECTION B

*(Attempt **any four** questions.)*

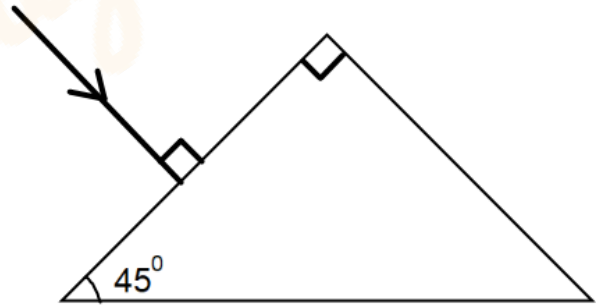
Question 4

(i) The diagram below shows a fish in the tank and its image seen in the surface of water. [3]



(a) Name the phenomenon responsible for the formation of this image.

(b) Complete the path of the ray through the glass prism of critical angle 42^o till it emerges out of the prism.

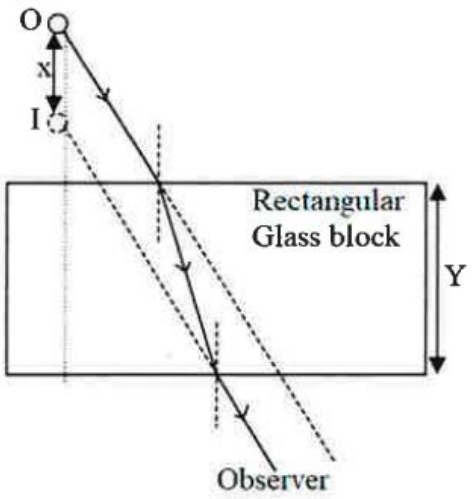


(ii) (a) The refractive index of water is 1.33 at a certain temperature. When the temperature of water is increased by 40^{o}C, the refractive index changes to 'x'. State whether x < 1.33 or x > 1.33. [3]

(b) State two differences between normal reflection and total internal reflection.

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(iii) [4]



The above diagram shows that an observer sees the image of an object O at I.

(a) Name and define the phenomenon responsible for seeing the image at a different position.

(b) State the effect on X when:

1. Y increases

2. Y decreases

Question 5

(i) An object is placed at a distance 24 cm in front of a convex lens of focal length 8 cm. [3]

(a) What is the nature of the image so formed?

(b) Calculate the distance of the image from the lens.

(ii) When sunlight passes through water droplets in the atmosphere it gets dispersed into its constituent colours forming a rainbow. A similar phenomenon is observed when white light passes through a prism. [3]

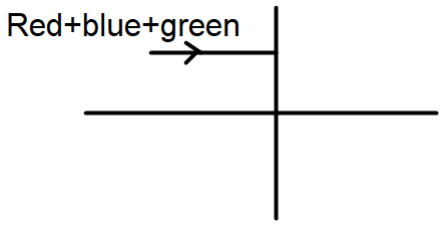
(a) Which colour will show the maximum angle of deviation and which colour will show the minimum angle of deviation?

(b) If instead of sunlight, a green-coloured ray is passed through a glass prism. What will be the colour of the emergent ray?

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(iii) (a) Mixture of red+blue+green is passed through a convex lens as shown in the diagram below. State whether the ray passes through a single point or through different points on principle axis after refraction. [4]



(b) Name the invisible radiations which can be obtained using quartz prism? State one use of these radiations.

(c) Name one radiations having wavelenght longer than the wavelength of these radiations.

Question 6

(i) [3]



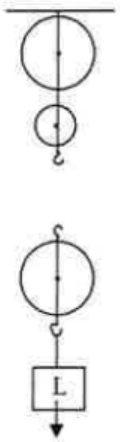
Sumit and Sachin went for a trek and during the journey they visited a cottage. They suspended their bags to the two ropes hanging from P and Q on a wheel capable of rotating around O. Sumit suspended his bag to the rope Q and Sachin suspended his bag from the rope P. The wheel remained in equilibrium.

(a) State with a reason who is carrying a heavier bag.

(b) Based on the principle of moments, write a mathematical relation that can be used to determine the weight (W) of Sachin's bag, given that the weight of Sumit's bag is 18 kgf.

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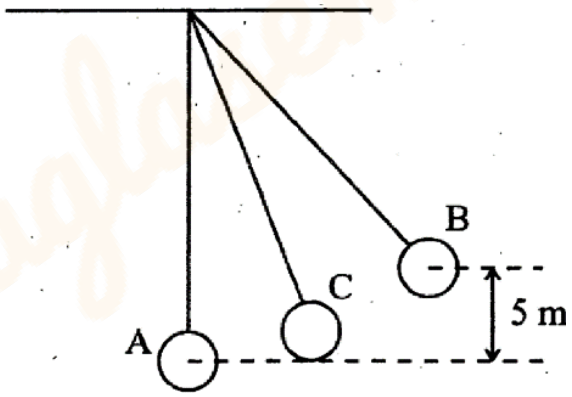
(ii) The diagram below shows a block and tackle system. [3]



(a) Copy and complete the labelled diagram showing the correct connection of the tackle, the direction of the forces involved to obtain maximum V.R. with the convenient direction.

(b) Calculate the M.A. of this pulley system if its efficiency is 80%.

(iii) The figure below shows a simple pendulum of mass 200 g. It is displaced from the mean position A to the extreme position B. The potential energy at the position A is zero. At the position B the pendulum bob is raised by 5 m. [4]



(a) What is the potential energy of the pendulum at the position B?

(b) What is the total mechanical energy at point C?

(c) What is the speed of the bob at the position A when released from B?

(Take g = 10 ms^{-2} and given that there is no loss of energy.)

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Question 7

(i) A person standing in front of a cliff fires a gun and hears its echo after 3s. If the speed of sound in air is 336 ms^{-1}. [3]

(a) Calculate the distance of the person from the cliff.

(b) After moving a certain distance from the cliff, he fires the gun again and this time the echo is heard 1.5 s later than the first. Calculate distance moved by the person.

(ii) A radioactive nucleus X emits an alpha particle followed by two beta particles to form nucleus Y. [3]

(a) With respect to the element X, where would you position the element Y in the periodic table?

(b) What is the general name of the element X and Y.

(c) If the atomic number of Y is 80 then what is the atomic number of X?

(iii) A boy tunes a radio channel to a radio station 93.5 MHz. [4]

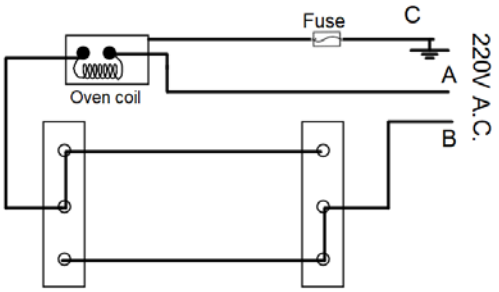
(a) Name and define the scientific wave phenomenon involved in tuning the radio channel.

(b) Name the important characteristics of sound that is affected during this phenomenon.

(c) Convert 93.5 MHz to SI unit.

Question 8

(i) Purvi's friend Tim wants to connect a fuse to his oven. He wants to control the oven from two different locations. Shown below is his circuit diagram. [3]



(a) Which one of the two, A or B should be a live wire?

(b) In the event of an overload, will the fuse serve its purpose?

(c) What is the meaning of the statement that the bulb is rated 600W, 220 V?

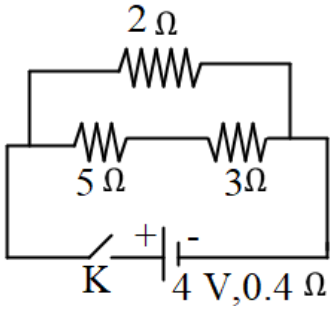
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(ii) (a) Copy and complete the following nuclear reaction. [3]

$^{222}_{86}Rn \rightarrow {}^{218}_{84}Po + _X$

(b) What will be the effect on the radiation X, emitted in the above reaction when it is allowed to pass through an electric field?

(iii) Observe the given circuit diagram and answer the questions that follow: [4]



(a) Calculate the resistance of the circuit when the key K completes the circuit.

(b) Calculate the current through 3Ω resistance when the circuit is complete.

Question 9

(i) What mass of ice at 0°C added to 2.1 kg water, will cool it down from 75°C to 25°C? [3]

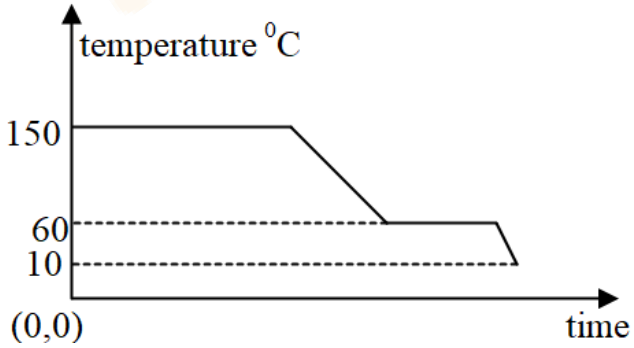
Given Specific heat capacity of water = 4.2 $Jg^{-1}\ ^oC^{-1}$,

Specific latent heat of ice = 336 jg^{-1}.

(ii) The diagram below shows a cooling curve for a substance: [3]

(a) State the temperatures at which the substance condenses.

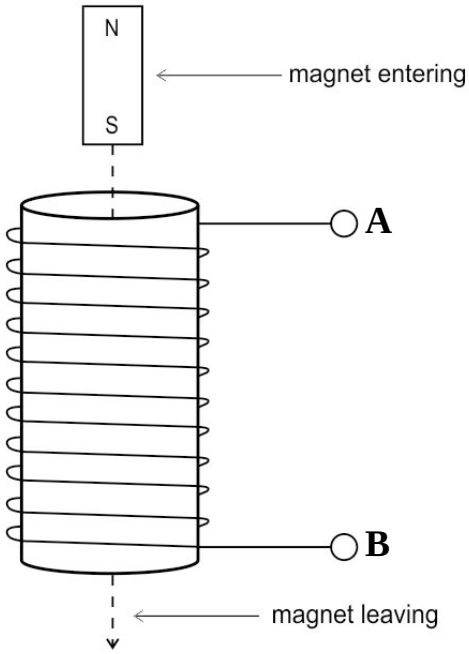
(b) The temperature range in which the substance is in liquid state.



(c) Why do we prefer ice to ice-cold water for cooling a drink?

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(iii) A magnet is released along the axis of a copper coil as shown in the diagram. [4]



(a) State the polarity at the top end of the coil when the magnet leaves the coil.

(b) The direction of the current is from A to B when magnet enters the coil. What will be the direction of the current when the magnet leaves the coil.

(c) Name the law which can be used to determine the direction of the induced current in the coil?

(d) State one way to increase the magnitude of the induced current in the coil?

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