ICSE 2024 EXAMINATION

PHYSICS

SAMPLE PAPER - 10

Time Allowed : 2 hours ***Max. Marks : 80***

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 (40 Marks)

(Attempt *all* questions from this Section)

Question 1 : Choose the correct answers to the questions from the given options: [15]

(i) The turning effect produced in a rigid body around a fixed point by the application of force is called:
(a) turning force (b) moment of force (c) moment of couple (d) none of these

(ii) Which is the correct expression for potential energy?
(a) mgu (b) mgh (c) $\frac{1}{2}mgh$ (d) mgv^2

(iii) Which of the following has centre of gravity outside the body?
(a) A triangular lamina (b) A hollow cylinder (c) An L-shaped body (d) A circular lamina

(iv) S.I. unit of work is joule. It is expressed in terms of mass, length and time as:
(a) kgm^2s^{-3} (b) $kg\ m^3s^{-2}$ (c) $kg^2m^2s^{-2}$ (d) $kg\ m^2s^{-2}$

(v) A single fixed pulley is used because:
(a) its effeciency is 100% (b) it multiplies effort
(c) it multiplies speed (d) it changes the direction of effort applied.

(vi) Amount of heat energy required to melt a given mass of a substance at its melting point without any rise in temperature is called:
(a) heat capacity (b) sp. heat capacity (c) latent heat of fusion (d) sp. latent heat of fusion

(vii) A glass half filled with water is held above eye level when its top surface appears silvery. The above phenomenon is due to:
(a) reflection of light (b) refraction of light
(c) total internal reflection of light (d) dispersion of light

(viii) A mixture of red and green light is passed through a triangular prism such that they disperse. Dispersion takes place because in glass
(a) Red light travels faster than green light. (b) Green light travels faster than red light
(c) Green light and red light travel at same speed (d) None of these

(ix) An object is held 5 cm in front of a convex lens of focal length 8 cm. Its image is:
(a) virtual; erect and enlarged (b) virtual; diminished and erect
(c) real; diminished and erect (d) virtual ; enlarged and inverted.

(x) A string stretched between two nails is plucked in the middle. The vibrations produced in the string are:
(a) forced vibrations (b) free vibrations
(c) damped vibrations (d) resonant vibrations

(xi) A graph between V/I for a conductor is a straight line. The slope of the graph represents:
(a) resistivity of conductor (b) resistance of conductor
(c) electrical power of conductor (d) electric work done by conductor

(xii) In a series circuit

(a) p.d at the ends of all resistors is same

(b) current flowing through all resistors is same

(c) The equivalent resistance of all resistors is more than any of individual resistors

(d) Both (b) and (c)

(xiii) A wire carrying current is held over freely suspended magnetic needle, such that the current in the wire flows from south to north. The direction in which the north end of a freely suspended needle will point toward.

(a) West (b) East (c) North (d) South

(xiv) The important source background radiation is:

(a) radio waves emitted by cell phone towers (b) decay of radio-active materials

(c) The radiations (cosmic) coming from deep space (d) Both (b) and (c)

(xv) Which can cause severe genetical disorders?

(a) alpha radiation (b) beta radiation (c) Gamma radiation (d) all of these

ANSWERS

(i) (b) **(ii)** (b) **(iii)** (c) **(iv)** (d) **(v)** (d) **(vi)** (c) **(vii)** (c) **(viii)** (a) **(ix)** (a) **(x)** (b)
(xi) (b) **(xii)** (d) **(xiii)** (a) **(xiv)** (d) **(xv)** (c)

Question 2

(i) (a) What is meant by the term moment of force? [3]

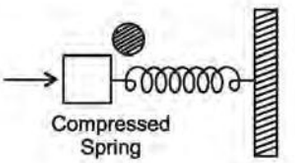
(b) If the moment of force is assigned a positive sign, the tendency of turning force be clockwise or anticlock wise.

(c) Which of the following remain constant in a uniform circular motion: Speed or velocity?

(ii) (a) Where is the centre of gravity of uniform ring situated? [2]

(b) The position of centre of gravity remains unchanged, even when the body is deformed. State whether the statement is true or false.

(iii) A ball is placed on a compressed spring. When the spring is released, the ball is observed to fly away. [2]



(a) What form of energy does the compressed spring possess?

(b) Why does the ball fly away?

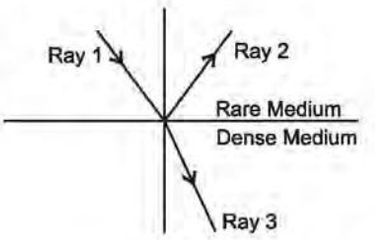
(iv) (a) In what way does an ideal machine' differ from "practical machine"? [2]

(b) Can a simple machine can act as a force multiplier and speed multiplier at the same time?

(v) Differentiate between heat capacity and specific heat capacity. [2]

(vi) (a) Define refractive index of a medium in terms of velocity of light. [2]

(b) A ray of light moves from a rare medium to a dense medium as shown in diagram alongside. Write down the number of ray which gets partially reflected.

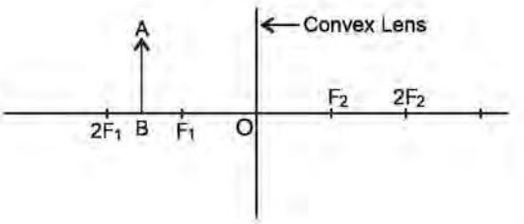


(vii) (a) A ray of light passes from water to air. How does speed of light change? [2]

(b) Which colour of light travels fastest in any medium except air?

Question 3

(i) An object is placed in between F_1 and $2F_1$ of a convex lens as shown in diagram. Copy the diagram and using three rays starting from point A, obtain the image formed by lens. [2]

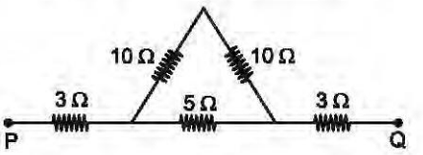


(ii) Which characteristic of sound will change, if there is a change in: [2]

(a) its amplitude (b) in its waveform.

(iii) What is meant by noise pollution? Write the name of one source of sound that causes noise pollution. [2]

(iv) Calculate the equivalent resistance between points P and Q. [2]



(v) (a) What is meant by radioactivity?

(b) What is meant by nuclear waste? [2]

SECTION - B (40 Marks)

(Attempt *any four* questions)

Question 4

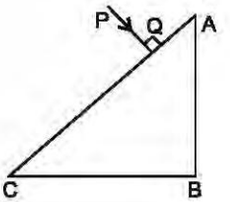
(i) You are provided with a printed piece of paper. Using this paper how will you differentiate between a convex lens and concave lens. [2]

(ii) A ray of light incident at angle of incidence '*i*' passes though an equilateral glass prism, such that the refracted rays inside the prism is parallel to the base of prism and emerges from the prism at an angle of emergence '*e*' ?. [2]

(a) How is the angle of incidence '*i*' is related to angle of emergence '*e*'?

(b) What can you say about the value of angle of deviation in such a situation?

(iii) A ray of light is incident on the hypotense of a right angle prism ABC as shown in diagram. [4]



(a) Copy the diagram and complete the path of ray PQ, till emerges from prism.

(b) What is the value of angle of deviation for this prism?

(c) Name the instrument where this action of prism is used.

(iv) A converging lens is placed at a distance of 8 cm from a converging lens of focal length 10 cm. [2]

(a) What kind of image is produced by the converging lens?

(b) Can this image be taken on the screen. If not why?

Question 5

(i) (a) Name one factor that affects the lateral displacement of light as it passes through a rectangular glass block. [3]

(b) Speed of light in glass is 2×10^5 km/s. If speed of light in air is 3×10^5 km/s, what is the refractive index of glass?

(ii) (a) Where should an object be placed so that a real and inverted image of same size as object is obtained using a convex lens? [3]

(b) Draw a ray diagram to show the formation of image as specified in **ii(a)**.

(iii) (a) What do you understand by the term critical angle? [2]

(b) Name a factor which determines the critical angle for a pair of media.

(iv) State laws of refraction when a ray of light passes through a glass slab. [2]

Question 6

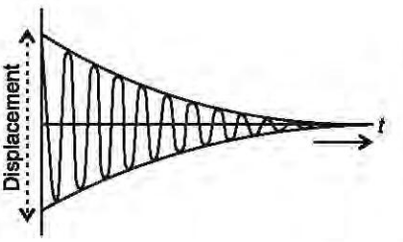
(i) (a) What is meant by resonance? [3]

(b) State two ways in which resonance differs from forced vibrations.

(ii) (a) A man standing between two cliffs produces a sound and hears two successive echoes at intervals of 3 seconds and 4 seconds respectively. If speed of sound is 330 ms^{-1}, what is distance between two cliffs? [3]

(b) Why will an echo not be heard when distance between source of sound and reflecting surface is 10 m?

(iii) The diagram alongside shows a displacement-time graph for a vibrating body: [4]



(a) Name the type of vibrations produced by a body.

(b) Give one example of a body producing such vibrations.

(c) Why is the amplitude of wave gradually decreasing?

(d) What will happen to vibrations of body after some time?

Question 7

(i) (a) When does a force do work? [2]

(b) What is work done by a moon when it revolves around earth?

(ii) Calculate the change in kinetic energy of a moving body, if its velocity is reduced to 1/3 of initial velocity. [2]

(iii) State the energy changes in following devices while in use: [2]

(a) a loud speaker

(b) a glowing electric bulb.

(iv) A radioactive substance is oxidised. What change would you expect to take place in the nature of radioactivity and why? [2]

(v) A radioactive nucleus undergoes series of decays according to sequence $X \xrightarrow{-\beta} X_1 \xrightarrow{-\alpha} X_2 \xrightarrow{-\alpha} X_3$. If the mass number and atomic number of X_3 are 172 and 69 respectively, What is the mass number and atomic number of X? [2]

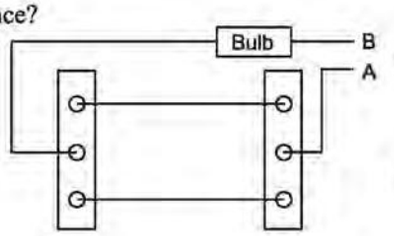
Question 8

(i) (a) State one advantage of connecting electrical appliances in parallel combination. [3]

(b) What characteristics should a fuse wire have?

(c) Which wire in power circuit is connected to the metallic body of an appliance?

(ii) The diagram alongside shows a dual control switch circuit connected to a bulb. [3]



(a) Copy the diagram and complete it so that the bulb is switched on.

(b) Out of A and B, which one is live wire and which one is neutral wire?

(iii) An electric oven is marked 1000W–200V. Calculate: [4]

(a) Resistance of its element.

(b) Energy consumed by oven in joules in 1/2 hour.

(c) Time in which it will consume 15kWh energy.

Question 9

(i) (a) Draw a neat and labelled diagram to show the structure of an a.c. generator. [4]

(b) State the energy conversion taking place in the generator when it is working.

(ii) What would be result when 600g of iron clips (SHC 0.48 $Jg^{-1}°C^{-1}$) at 600 °C are placed over 800 g of ice at 0°C. [SLH of ice is 336 Jg^{-1}] [4]

(iii) Why does the weather becomes moderate in cold countries when freezing of lakes and other water bodies start? [2]

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SOLUTION

Time Allowed : 2 hours *Max. Marks* : **80**

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***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 (40 Marks)

(Attempt *all* questions from this Section)

Question 1 : Choose the correct answers to the questions from the given options: [15]

(i) The turning effect produced in a rigid body around a fixed point by the application of force is called:
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(iii) Which of the following has centre of gravity outside the body?
(a) A triangular lamina (b) A hollow cylinder (c) An L-shaped body (d) A circular lamina

(iv) S.I. unit of work is joule. It is expressed in terms of mass, length and time as:
(a) kgm^2s^{-3} (b) kg m^3s^{-2} (c) $kg^2m^2s^{-2}$ (d) kg m^2s^{-2}

(v) A single fixed pulley is used because:
(a) its effeciency is 100% (b) it multiplies effort
(c) it multiplies speed (d) it changes the direction of effort applied.

(vi) Amount of heat energy required to melt a given mass of a substance at its melting point without any rise in temperature is called:
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(vii) A glass half filled with water is held above eye level when its top surface appears silvery. The above phenomenon is due to:
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(a) West (b) East (c) North (d) South

(xiv) The important source background radiation is:

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ANSWERS

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Question 2

(i) (a) What is meant by the term moment of force? [3]

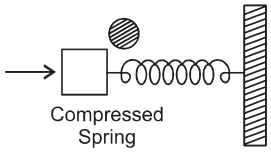
(b) If the moment of force is assigned a positive sign, the tendency of turning force be clockwise or anticlock wise.

(c) Which of the following remain constant in a uniform circular motion: Speed or velocity?

(ii) (a) Where is the centre of gravity of uniform ring situated? [2]

(b) The position of centre of gravity remains unchanged, even when the body is deformed. State whether the statement is true or false.

(iii) A ball is placed on a compressed spring. When the spring is released, the ball is observed to fly away. [2]



(a) What form of energy does the compressed spring possess?

(b) Why does the ball fly away?

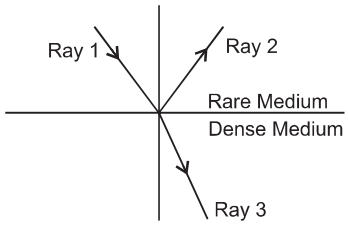
(iv) (a) In what way does an ideal machine' differ from "practical machine"? [2]

(b) Can a simple machine can act as a force multiplier and speed multiplier at the same time?

(v) Differentiate between heat capacity and specific heat capacity. [2]

(vi) (a) Define refractive index of a medium in terms of velocity of light. [2]

(b) A ray of light moves from a rare medium to a dense medium as shown in diagram alongside. Write down the number of ray which gets partially reflected.



(vii) (a) A ray of light passes from water to air. How does speed of light change? [2]

(b) Which colour of light travels fastest in any medium except air?

Solution :

(i) (a) The turning effect of the force acting on a rigid body about a point is called moment of force.

(b) Tendency of turning force will be anticlockwise.

(c) Speed remain constant during a circular uniform motion.

(ii) (a) Centre of gravity is the geometric centre of ring.

(b) It is a false statements as centre of gravity of body changes when it gets deformed.

(iii) (a) Compressed spring has potential energy.

(b) When the spring is released the potential energy changes to kinetic energy. The kinetic energy is transferred to the ball and hence ball flies away.

(iv) (a) An ideal machine is the one whose parts are weightless as well as frictionless and its MA = V.R.
A practical machine is one whose parts are neither weightless, nor frictionless, such that its MA<V.R.

(b) No, a simple machine can be either force multiplier or speed multiplier.

(v) Heat capacity is the amount heat energy required to raise the temperature of a given mass of a substance through 1° C, whereas specific heat capacity is the amount of heat energy required to raise the temperature of 1 gram of a substance through 1° C.

(vi) (a) Refractive index, $\mu = \frac{\text{Velocity of light in vacuum or air}}{\text{Velocity of light in a given medium}}$.

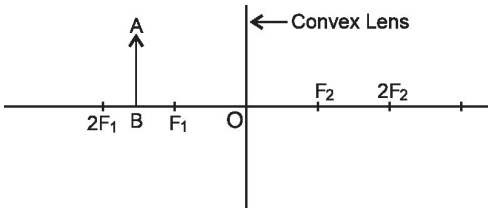
(b) Ray 2 gets partially reflected.

(vii) (a) The speed of light increases on emerging out in air.

(b) Red coloured light travels fastest.

Question 3

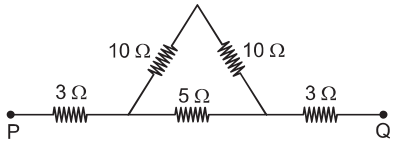
(i) An object is placed in between F_1 and $2F_1$ of a convex lens as shown in diagram. Copy the diagram and using three rays starting from point A, obtain the image formed by lens. [2]



(ii) Which characteristic of sound will change, if there is a change in: [2]
(a) its amplitude (b) in its waveform.

(iii) What is meant by noise pollution? Write the name of one source of sound that causes noise pollution. [2]

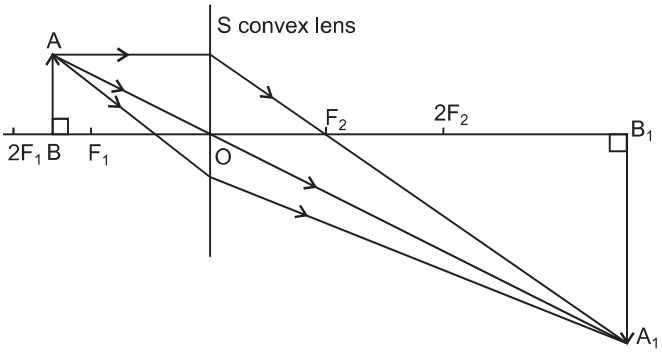
(iv) Calculate the equivalent resistance between points P and Q. [2]



(v) (a) What is meant by radioactivity?
(b) What is meant by nuclear waste? [2]

Solution

(i)



(ii) (a) With the increase in amplitude the loudness will increase and vice-versa.

(b) With the change in waveform the quality of sound changes.

(iii) The disturbance produced in the environment by undesirable loud and harsh sound from various sources is called noise pollution.

On roads, the vehicles of various kinds and unnecessary blowing of horns cause noise pollution.

(iv) Resistance in parallel circuit,

$\frac{I}{R_p} = \frac{1}{20} + \frac{1}{5} = \frac{5}{20} = \frac{1}{4} \quad \Rightarrow R_p = 4\Omega.$

$\therefore$ Equivalent resistance of circuit = (3 + 4 + 3) Ω = **10** Ω.

(v) (a) The phenomenon due to which nucleus of certain elements decays on its own ejecting alpha or beta particles and gamma radiations is called ratioactivity.

(b) The material left after the fuel in nuclear reactor gets exhausted is called nuclear waste. It is radioactive and highly dangerous.

SECTION - B (40 Marks)

(Attempt *any four* questions)

Question 4

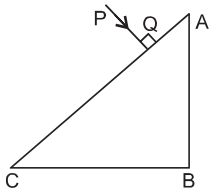
(i) You are provided with a printed piece of paper. Using this paper how will you differentiate between a convex lens and concave lens. [2]

(ii) A ray of light incident at angle of incidence '*i*' passes though an equilateral glass prism, such that the refracted rays inside the prism is parallel to the base of prism and emerges from the prism at an angle of emergence '*e*' ?. [2]

(a) How is the angle of incidence '*i*' is related to angle of emergence '*e*'?

(b) What can you say about the value of angle of deviation in such a situation?

(iii) A ray of light is incident on the hypotense of a right angle prism ABC as shown in diagram. [4]



(a) Copy the diagram and complete the path of ray PQ, till emerges from prism.

(b) What is the value of angle of deviation for this prism?

(c) Name the instrument where this action of prism is used.

(iv) A converging lens is placed at a distance of 8 cm from a converging lens of focal length 10 cm. [2]

(a) What kind of image is produced by the converging lens?

(b) Can this image be taken on the screen. If not why?

Solution

(i) View the printed paper through convex as well as concave lens, holding the lens about 5 cm from the printed paper. In case of convex lens the print will appear enlarged where as in case of concave lens the print appears smaller.

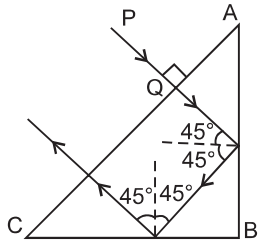
(ii) (a) In such a situation $\angle i = \angle e$. It possible only when refracted ray is parallel to the base of prism.

(b) The angle of deviation in such a case is minimum and is called angle of minimum deviation.

(iii) (a) Completed diagram shown alongside.

(b) The angle deviation is 180°.

(c) Prism binoculars used the above prism action.



(iv) (a) The converging lens produces virtual and magnified image.

(b) Their image cannot be taken on screen, because the rays coming out of lens actually diverge, but appear to meet at same point behind the lens.

Question 5

(i) (a) Name one factor that affects the lateral displacement of light as it passes through a rectangular glass block. [3]

(b) Speed of light in glass is 2×10^5 km/s. If speed of light in air is 3×10^5 km/s, what is the refractive index of glass?

(ii) (a) Where should an object be placed so that a real and inverted image of same size as object is obtained using a convex lens? [3]

(b) Draw a ray diagram to show the formation of image as specified in **ii(a)**.

(iii) (a) What do you understand by the term critical angle? [2]

(b) Name a factor which determines the critical angle for a pair of media.

(iv) State laws of refraction when a ray of light passes through a glass slab. [2]

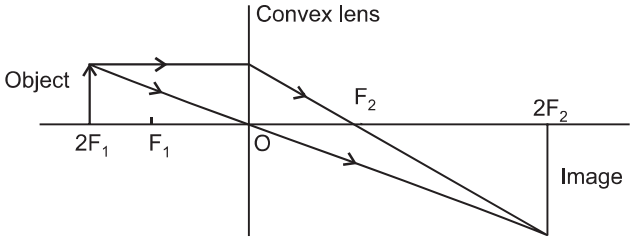
Solution

(i) (a) The thickness of glass slab determines lateral displacement, i.e., more the thickness of glass slab, more is the lateral displacement.

(b) Refractive index (μ) $= \dfrac{\text{Velocity of light in air or vacuum}}{\text{Velocity of light in a medium}} = \dfrac{3 \times 10^5 \text{ km/s}}{2 \times 10^5 \text{ km/s}} =$ **1.5**.

(ii) (a) The object should be placed at $2F_1$ of the convex lens where its image is formed a $2F_2$ of the convex lens which of the same size as is the object.

(b)



(iii) (a) The angle of incidence in a denser medium for which the corresponding angle of refraction in rear medium is 90° is called critical angle.
(b) The refractive indices of the pair of media determine the magnitude of critical angle.

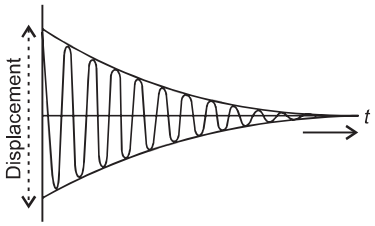
(iv) 1. Incident ray, refracted ray and the normal lie in the same plane of two media.
2. The ratio of sine of angle of incidence in rare medium to the sine of angle of refraction in dense medium is a constant quantity and is commonly called refractive index of dense medium.

Question 6

(i) (a) What is meant by resonance? [3]
(b) State two ways in which resonance differs from forced vibrations.

(ii) (a) A man standing between two cliffs produces a sound and hears two successive echoes at intervals of 3 seconds and 4 seconds respectively. If speed of sound is 330 ms^{-1}, what is distance between two cliffs? [3]
(b) Why will an echo not be heard when distance between source of sound and reflecting surface is 10 m?

(iii) The diagram alongside shows a displacement-time graph for a vibrating body: [4]
(a) Name the type of vibrations produced by a body.
(b) Give one example of a body producing such vibrations.
(c) Why is the amplitude of wave gradually decreasing?
(d) What will happen to vibrations of body after some time?



Solution

(i) (a) The phenomenon due to which the frequency of an applied external force is equal to natural frequency of a body on which force is applied, such that it readily takes up vibrations and begin to vibrate with an increased amplitude.

(b)

S.No.	Forced Vibrations	Resonant Vibrations
1.	The amplitude of forced vibrations is generally less than vibrations of external source.	The amplitude of forced vibrations is very large, compared to the amplitude of vibrations of external force.
2.	The vibrations last for a very small interval of time, when the external periodic force is removed.	Vibrations last for a very long in interval of time, when external periodic force is removed.

(ii) (a) Distance between cliffs $= \frac{\text{Velocity of sound} \times \text{total time}}{2} = \frac{330\,\text{m/s} \times (3 + 4)\text{s}}{2} = \frac{330 \times 7}{2}\ \text{m} = 1155\ \text{m}$

(b) The minimum distance required to hear an echo is 17 m.
So, if a person is at a distance less than 17 m (10 m in present), then the reflected sound will reach the ear before original sound fades away. Thus no echo is heard.

(iii) (a) Damped Vibrations.
(b) When a string of musical instrument is plucked it produces damped vibrations.
(c) The energy of the vibrations is dissipated in the surrounding medium.
(d) The vibration will die, i.e., the body will stop vibration.

Question 7

(i) (a) When does a force do work? [2]
(b) What is work done by a moon when it revolves around earth?

(ii) Calculate the change in kinetic energy of a moving body, if its velocity is reduced to 1/3 of initial velocity. [2]

(iii) State the energy changes in following devices while in use: [2]
(a) a loud speaker
(b) a glowing electric bulb.

(iv) A radioactive substance is oxidised. What change would you expect to take place in the nature of radioactivity and why? [2]

(v) A radioactive nucleus undergoes series of decays according to sequence $X \xrightarrow{-\beta} X_1 \xrightarrow{-\alpha} X_2 \xrightarrow{-\alpha} X_3$. If the mass number and atomic number of X_3 are 172 and 69 respectively, What is the mass number and atomic number of X? [2]

Solution

(i) (a) When a force causes displacement in its own direction, then work is said to be done.

(b) No work is done by moon as its displacement is not in the direction of gravitational force applied by earth.

(ii) (a) **Case** (i) $(K.E)_1 = \frac{1}{2} mv^2 = \frac{mv^2}{2}$

Case (ii) $(K.E.)_2 = \frac{1}{2} m \left(\frac{v}{3}\right)^2 = \frac{1}{2} mv^2 \times \frac{1}{9} = \frac{mv^2}{18}$

$\therefore$ Change in K.E = $(K.E)_1 - (K.E)_2 = \frac{mv^2}{2} - \frac{mv^2}{18} = \frac{9mv^2 - mv^2}{18} = \frac{8}{18} mv^2 = \frac{4}{9} mv^2$.

(iii) (a) The varying electric energy changes into sound energy.

(b) The electric energy first changes into heat energy and then light energy.

(iv) There will be no change in the rate of radioactivity. It is because oxidation of radioactive material involves valence electrons and does not affect nucleus. So no change in radioactivity.

(v) $_zX^A \xrightarrow{-\beta} {}_{z+1}X_1^A \xrightarrow{-\alpha} {}_{z-1}X_2^{A-4} \xrightarrow{-\alpha} {}_{z-3}X_3^{A-8}$

Now, A – 8 = 172 $\therefore$ A = 172 + 8 = 180 $\therefore$ Mass number of X = 180

Also Z – 3 = 69 $\therefore$ Z = 69 + 3 = 72 Atomic number of X = 72

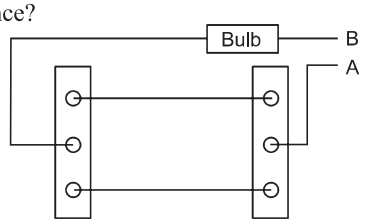
Question 8

(i) (a) State one advantage of connecting electrical appliances in parallel combination. [3]

(b) What characteristics should a fuse wire have?

(c) Which wire in power circuit is connected to the metallic body of an appliance?

(ii) The diagram alongside shows a dual control switch circuit connected to a bulb. [3]



(a) Copy the diagram and complete it so that the bulb is switched on.

(b) Out of A and B, which one is live wire and which one is neutral wire?

(iii) An electric oven is marked 1000W–200V. Calculate: [4]

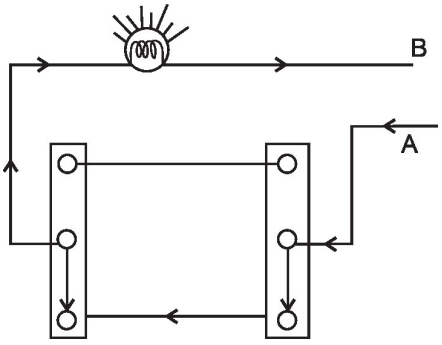
(a) Resistance of its element.

(b) Energy consumed by oven in joules in 1/2 hour.

(c) Time in which it will consume 15kWh energy.

Solution

(i) (a) The appliances in parallel can be operated independently from one another.



(b) Fuse wire should have a high resistance, but low melting point.

(c) Earth wire is connected to metallic body.

(ii) (a) Diagram shown alongside.

(b) A is live wire. B is neutral wire.

(iii) (a) $P = \frac{V^2}{R}$

$\therefore R = \frac{V^2}{P} = \frac{200 \times 200}{1000} = 400\,\Omega.$

(b) Energy consumed in $\frac{1}{2}$ hour = P × t

= 1000 J/s × 1800 s = 1,800,000 J

(c) E = P × t

$\therefore \quad t = \frac{E}{P} = \frac{15\text{kWh}}{1000\text{W}} = \frac{15\text{kWh}}{1\text{kW}} = 15h.$

Question 9

(i) (a) Draw a neat and labelled diagram to show the structure of an a.c. generator. [4]

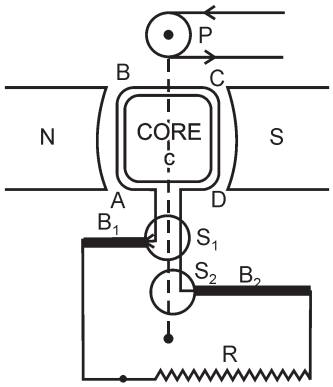
(b) State the energy conversion taking place in the generator when it is working.

(ii) What would be result when 600 g of iron clips (SHC 0.48 $Jg^{-1}{}^{o}C^{-1}$) at 600 ºC are placed over 800 g of ice at 0ºC. [SLH of ice is 336 Jg^{-1}] [4]

(iii) Why does the weather becomes moderate in cold countries when freezing of lakes and other water bodies start? [2]

Solution

(i) (a)



Construction of ac generator

NS = Concave cylindrical magnet
P = Prime rotor
C = Core
ABCD = Insulated copper coil
S_1, S_2 = Slip rings
B_1, B_2 = Carbon brushes
R = External load

(b) In ac generator the mechanical energy is converted into electric energy.

(ii) Assuming iron clips attains final temperature of zero degree celsius.

Heat given out by iron clips = $mc\theta_f = 600 \times 0.48 \times 600 = 172800$ J.

In the above heat melts 'm' gram of ice then

$$^{m}\text{ice} \times 336 = 172800 \qquad \therefore \quad ^{m}\text{ice} = \frac{172800}{336} = 514.30\,\text{g}.$$

Now, amount of ice left without melting = (800 – 514.30) g = **285.70 g**.

(iii) Every one gram of water at 0°C on freezing will liberate 336 joules of heat energy into the atmosphere. As billions of tons of water starts freezing enormous amount of heat energy is released in the atmosphere. It is the heat energy which, moderates weather.

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