ICSE 2025 EXAMINATION

Sample Question Paper - 5

Physics

Time Allowed: 2 hours **Maximum Marks: 80**

General Instructions:

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

1. **Choose the correct answers to the questions from the given options. (Do not copy the question, write the correct answers only.)** **[15]**

(a) A particle of mass m is executing a uniform circular motion on a path of radius r. If p is the magnitude of its linear momentum, then what is the radial force acting on the particle? **[1]**

a) $\frac{p}{m}$ b) $\frac{r_m}{p^2}$

c) $\frac{r}{p}$ d) $\frac{p^2}{mr}$

(b) A passenger in an aeroplane will **[1]**

a) may see a rainbow as concentric circles b) may see a rainbow as concentric arcs

c) may see a rainbow as straight bands d) never see a rainbow

(c) Calculate the power of an electric pump in horse power, which can lift 2000 m^3 of water from a depth of 20 m in 25 minutes. [Take g = 10 ms^{-2} and 1 m^3 of water = 10^3 kg] **[1]**

a) 52.45 H.P. b) 218.83 H.P.

c) 165.33 H.P. d) 355.55 H.P.

(d) During β-emmision: **[1]**

a) the mass number and atomic number decrease by 1 amu. b) the mass number remains unchanged, but atomic number decreases by 1 amu.

c) the mass number increases by 1 amu, but atomic number remains same. d) the mass number remains unchanged, but atomic number increases by 1 amu.

(e) **Assertion (A):** The moment of force depends upon magnitude of the force applied and the perpendicular distance of the line of action of force from the axis of rotation. **[1]**
Reason (R): The opening and shutting of the door is possible due to the moment of force.

a) Both A and R are true and R is the b) Both A and R are true but R is not the

correct explanation of A.

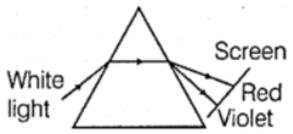
correct explanation of A.

c) A is true but R is false.

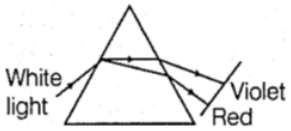
d) Both A and R are true.

(f) Which amongst the given figures below correctly depicts the dispersion of white light by a glass prism? **[1]**

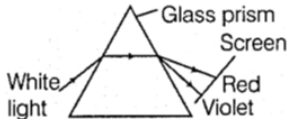
a)



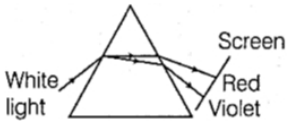
b)



c)



d)



(g) A person fires a gun in front of a building 167 m away. If the speed of sound is 334 ms^{-1}, calculate time in which he hears an echo. **[1]**

a) 4.0 sec

b) 2.0 sec

c) 1.0 sec

d) 3.0 sec

(h) Two notes are produced from a flute and piano, such that they have same loudness and same pitch. The notes so produced differ in their: **[1]**

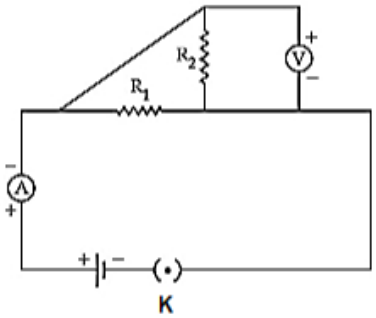
a) speed

b) waveform

c) frequency

d) wavelength

(i) For the given circuit, name the components which are connected in parallel. **[1]**



a) Both R_1 and V

b) Both R_2 and V

c) Both R_1 and R_2

d) R_1, R_2 and V

(j) On reversing the direction of current in a wire the magnetic field produced by it **[1]**

a) decreases in strength

b) get reversed in direction

c) remains unchanged in strength and direction

d) increases in strength

(k) A pulley system has 5 pulley in all. Its velocity ratio is: **[1]**

a) more than 5

b) less than 5

c) both 5 and less than 5

d) 5

(l) A solid of mass 150 g at 200^oC is placed in 0.4 kg of water at 20^oC till a constant temperature is attained. If the S.H.C. of the solid is 0.5 Jg^{-1} K^{-1}, find the resulting temperature of the mixture. **[1]**

a) 27.7^oC b) 37.7^oC

c) 47.7^oC d) 57.7^oC

(m) S.I. unit of thermal capacity is: **[1]**

a) $kJ\ Kg^{-1}$ b) $Jkg^{-1}\ K^{-1}$

c) Jkg^{-1} d) $cal\ ^oC^{-1}$

(n) A convex lens of focal length 40 cm, a concave lens of focal length 40 cm and a concave lens of focal length 15 cm are placed in contact. The power of the combination in dioptre is **[1]**

a) - 1.5 b) + 6.67

c) + 1.5 d) - 6.67

(o) When a beam of light strikes a glass slab a part of it is: **[1]**

a) absorbed b) transmitted

c) refraction d) reflected

2. **Answer the following questions:** **[15]**

(a) i. What is the relationship between the mechanical advantage and the velocity ratio for ideal machine **[1]**

ii. In a single fixed pulley, if the effort moves by a distance x downwards, by what height is the load raised upwards? **[1]**

iii. A pulley system has there pulleys. A load of 120 N is overcome by applying an effort of 50 N. Calculate the mechanical advantage? **[1]**

(b) State the direction of: **[2]**

i. Centripetal force

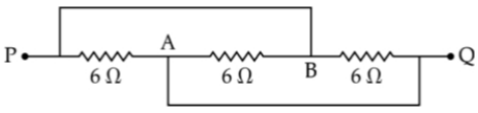
ii. Centrifugal force

(c) A nut which can be broken by applying a force of 60 kgf, is broken by using a nut cracker having its handle 15 cm long by placing it at a distance of 2 cm from the hinge. Calculate the minimum force needed to break the nut. **[2]**

(d) Scissors for cutting cloth have blades much longer than handles. Why? **[2]**

(e) A van of mass 2000 kg is travelling at 10 ms^{-1}. Calculate its kinetic energy. If its speed increases to 20 ms^{-1}, by how much amount does its kinetic energy increases? **[2]**

(f) Find the equivalent resistance of the given network between P & Q **[2]**



(g) If boy fires a gun and hears its echo after 5s. The boy then moves 310 m towards the hill and fires the gun again. This time, he hears the echo after 3s. Calculate the speed of the sound. **[2]**

3. **Answer the following questions;** **[10]**

(a) Briefly mention, why does the sky at noon appear white? **[2]**

(b) Calculate the resistance of 1 km long copper wire of radius 1 mm. **[2]**

(Resistivity of copper is $1.72 \times 10^{-8}\ \Omega$ m).

(c) If the current I through a resistor is increased by 100% (assume that temperature remains unchanged), **[2]**

then find the increase in power dissipated.

(d) A piece of iron of mass 100 g kept inside a furnace for a long time and then put in a calorimeter of water equivalent 10 g containing 240 g of water at 20°C. The mixture attains an equilibrium temperature of 60°C. Find the temperature of the furnace-specific heat of iron = 470 J/kg-K. **[2]**

(e) i. Why is a nuclear fusion reaction called a thermo nuclear reaction? **[2]**

ii. Complete the reaction:

$^{3}_{2}\text{He} + {}^{2}_{1}\text{H} \rightarrow {}^{4}_{2}\text{He}$ + _____ + Energy.

Section B

Attempt any 4 questions

4. **Answer the following questions:** **[10]**

(a) A convex lens has a focal length of 20 cm. At what distance from the lens should the object be placed so that the image is formed at 40 cm on the other side of the lens? Also, state the nature of the image formed. **[3]**

(b) When 8000 J of heat is given to 200 g of copper at 20^{o}C, determine the final temperature, if the specific heat capacity of copper is 0.4 $Jg^{-1}\ {}^{o}C^{-1}$. **[3]**

(c) A student wants to burn a piece of paper using a convex lens in day light, rather than using match stick or any direct flame. Will he be able to, if yes justify your answer with a ray diagram? **[4]**

5. **Answer the following questions:** **[10]**

(a) i. Draw a labelled ray diagram to illustrate (a) critical angle (b) total internal reflection for a ray of light moving from one medium to another. **[3]**

ii. Write a formula to express the relationship between refractive index of the denser medium with respect to rarer medium and its critical angle for that pair of media.

(b) A prism deviates a monochromatic ray of light through an angle δ, where the angle of incidence at the surface of the prism is i. **[3]**

i. Draw a graph showing the variation of δ with i. On your graph, show the angle of minimum deviation.

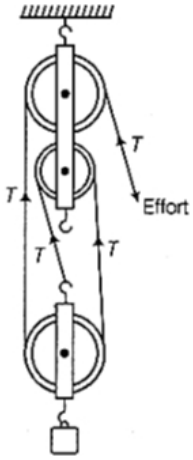
ii. What is the relation between the angle of incidence and the angle of emergence when the ray suffers minimum deviation.

(c) How can we explain the reddish appearance of the sun at sunrise or sunset? Why does it not appear red at noon? **[4]**

6. **Answer the following questions:** **[10]**

(a) A block and tackle system has the velocity ratio 4, labelled diagram of the system indicating the point of application and the directions of load and effort is given below. A man can exert a pull of 500 N. **[3]**

What is the maximum load he can raise with this pulley system if its efficiency



(b) i. Define the term momentum. **[3]**

ii. How is force related to the momentum of a body?

iii. State the condition when the change in momentum of a body depends only on the change in its velocity.

(c) Explain, how the work is related to direction of force and displacement. **[4]**

7. **Answer the following questions:** **[10]**

(a) A submarine produces a ultrasonic waves of velocity 1500 m/s in water. The officer receives signal after 50s of emission of ultrasonic waves. Find the distance of object which is present in the bottom of sea. **[3]**

(b) A nucleus ${}_{Z}X^{A}$ emits an alpha particle followed by γ-emission, there after it emits two β-particles to form X_3 **[3]**

i. Copy and complete the value of A and Z for X_3

$$ {}^{A}_{X}\mathrm{X} \xrightarrow{-\alpha} \mathrm{X}_1 \xrightarrow{-\gamma} \mathrm{X}_2 \xrightarrow{-2\beta} \mathrm{X}_3 $$

ii. Out of α, β and γ radiation.

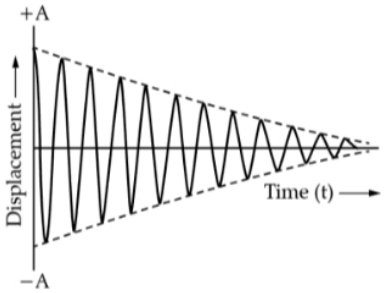
a. Which radiation is the most penetrating?

b. Which radiations are negatively charged?

(c) The following diagram shows the displacement time graph for a vibrating body. **[4]**

i. Name the type of vibration produced by the vibrating body.

ii. Give one example of a body producing such vibrations.



iii. Why is the amplitude of the wave gradually decreasing?

iv. What will happen to the vibrations of the body after sometime?

8. **Answer the following questions:** **[10]**

(a) A copper wire of resistivity $1.63 \times 10^{-8}\ \Omega$-m has cross-section area of $10.3 \times 10^{-4}\ cm^2$. Calculate **[3]**

the length of the wire required to make a 20 Ω coil.

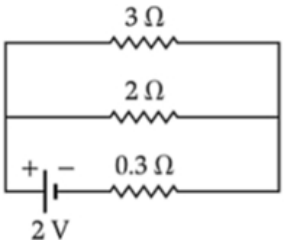
Solution

(b) i. What is meant by radioactivity? **[3]**

ii. What is meant by nuclear waste?

iii. Suggest one effective process for the safe disposal of nuclear waste.

(c) An electrical circuit was set up as shown. Find the current flowing through each of the resistances in the circuit. **[4]**



9. **Answer the following questions:** **[10]**

(a) i. Heat supplied to a solid changes it into liquid. What is this change in the phase called? **[3]**

ii. During the phase change, does the average kinetic energy of the molecules of the substance increase?

iii. What is the energy absorbed during the phase change called?

(b) The melting point of naphthalene is 80°C and the room temperature is 30°C. A sample of liquid naphthalene at 100°C is cooled down to the room temperature. Draw a temperature time graph to represent this cooling. In the graph, mark the region which corresponds to the freezing process. **[3]**

(c) Draw a sketch of an electric bell with electrical connection and label the main parts. Why is the armature made of soft iron and not of steel? **[4]**

Solution

Section A

1. Choose the correct answers to the questions from the given options. (Do not copy the question, write the correct answers only.)

(i) **(d)** $\frac{p^2}{mr}$

Explanation: {

Mass of the particle = m

As, the particle is executing a uniform circular motion, it will be accelerated with $\frac{v^2}{r}$ directed towards the centre as it is moving with a circle of radius r and moving with uniform speed.

According to Newton's second law of motion,

centripetal force, $F_c = \frac{mv^2}{r}$.

Rearranging, it can be written as, $F_c = \frac{mv^2}{r} \cdot \frac{m}{m}$

$= \frac{(mv)^2}{mr} = \frac{p^2}{mr}$

(ii) **(a)** may see a rainbow as concentric circles

Explanation: {

Yes, but may see a rainbow as concentric circles. Sometimes many people confuse this phenomena of rainbow with glory which is caused by interference effects between particles in a cloud, not reflection and refraction in raindrops from a storm.

(iii) **(d)** 355.55 H.P.

Explanation: {

1 m^3 of water = 10^3 kg

$\therefore$ 2000 m^3 of water has mass = m = 2000 $\times$ 10^3 kg

wt. = force = mg = 2000 $\times$ 10^3 $\times$ 10 N

Displacement = depth = 20 m

work done = F $\times$ S t = 25 min = (25 $\times$ 60) S

Power = $\frac{\text{work done}}{t} = \frac{(2000 \times 10 \times 10^3) \times 20}{(25 \times 60)}$

$\therefore$ Power in H.P. = $\frac{2000 \times 10^3 \times 200}{25 \times 60 \times 750}$

$= \frac{3200}{9}$ = 355.55 = 355.55 H.P.

(iv) **(d)** the mass number remains unchanged, but atomic number increases by 1 amu.

Explanation: {

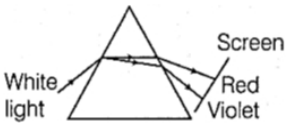
the mass number remains unchanged, but atomic number increases by 1 amu.

(v) **(d)** Both A and R are true.

Explanation: {

The turning effect on the body about its axis is due to the moment of force or torque applied on the body. To open and shut the door the force is applied normally on the door at its handle which provided at the maximum distance from the hinges.

(vi) **(d)**



Explanation: {

When white light comprising of seven colours refract through glass prism, violet refracts or bends maximum and form a band of seven colours known as spectrum in which red bends the least, has maximum velocity.

(vii) **(c)** 1.0 sec

Explanation: {

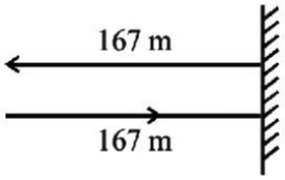
d = 167

$\therefore$ 2d = 167 $\times$ 2 m

Speed of sound = 334 ms^{-1}

t for echo to be heard = ?

t = $\frac{2d}{\text{speed}} = \frac{167 \times 2}{334}$ = 1.0 sec



(viii) **(b)** waveform

Explanation: {

waveform

(ix) **(d)** R_1, R_2 and V

Explanation: {

For the given circuit diagram, the components R_1, R_2 and V are connected in parallel combination. Because terminals of the resistance and voltmeter are connected together.

(x) **(b)** get reversed in direction

Explanation: {

On reversing the direction of current in a wire, the magnetic field produced by it get reversed in direction because magnetic field = $\frac{\mu_0}{4\pi} \frac{Idl \sin\theta}{r^2}$.

The direction of magnetic field is perpendicular to both Idl and r.

where, I is the current flowing through a conductor of length dl, μ_0 = permeability in free space = 4 $\pi \times 10^{-7}$ Tm/A.

(xi) **(d)** 5

Explanation: {

5

(xii) **(a)** 27.7^oC

Explanation: {

Solid

M= 150 g

T = 200^oC

C_1 = 0.5 = $\frac{1}{2}$

Water

m = 0.4 kg = 400 g

t = 20^oC

C_2 = 4.2 = $\frac{42}{10}$

Let θ be the final temp.

$\therefore$ Heat lost by solid = Heat gained by water

M C_1(T - θ) = mC_2(θ - t)

150 $\times$ $\frac{1}{2}$ $\times$ (200 - θ) = 400 $\times$ $\frac{42}{10}$(θ - 20)

15000 - 75 θ = 1680θ - 33600

(1680 + 75) θ = 33600 + 15000

1755θ = 48600

θ = $\frac{48600}{1755} = \frac{9270}{351}$ = 27.7^oC

(xiii) **(b)** Jkg^{-1} K^{-1}

Explanation: {

Jkg^{-1} K^{-1}

(xiv) **(d)** - 6.67

Explanation: {

Given, f_1 of convex lens = 40 cm

f_2 of first concave lens = - 40 cm

f_3 of second concave lens = -15 cm

Hence, total focal lengths of the combination

= f_1 - f_2 - f_3

= 40 - 40 - 15

= - 15 cm

As, P = $\frac{1}{f}$

= -$\frac{1}{15}$ = $-\frac{100}{15}$

= - 6.67 D

(xv) **(d)** reflected

Explanation: {

reflected

2. Answer the following questions:

(i) i. For an ideal machine, the work done by the machine is equal to the work done on the machine. Therefore, mechanical advantage is equal to velocity ratio. i.e., M.A. = V.R.

ii. x

iii. Since, Mechanical Advantage,

MA = $\frac{\text{Load}}{\text{Effort}}$ = 120/50= 2.4

(ii) i. Radially inwards towards the centre.

ii. Radially outwards away from the centre.

(iii) Load = 60 kgf

Load arm = 2 cm

Effort arm = 15 cm

Apply principle of lever,

Load $\times$ Load arm = Effort $\times$ Effort arm

60 $\times$ 2 = E $\times$ 15

$\therefore$ E = $\frac{60\times2}{15}$ = 8 kgf

(iv) Mathematically,

Torque = force $\times$ perpendicular distance from the axis of rotation

For a constant torque, larger blades provides a large perpendicular distance from the axis of rotation for a smaller force being applied. Thus, scissors for cutting clothes have much longer blades than handles.

(v) Given, m = 2000 kg, v_1 = 10 ms $^{-1}$, v_2 = 20 ms^{-1}

Kinetic energy of van at 10 ms $^{-1}$,

$\text{KE}_1 = \frac{1}{2}mv_1^2 \left(\because \text{KE} = \frac{1}{2}mv^2\right)$

$= \frac{1}{2} \times 2000 \text{ kg} \times \left(10 \text{ ms}^{-1}\right)^2$

= 100000 J = 100 kJ

Kinetic energy of van at 20 ms^{-1}

$\text{KE}_2 = \frac{1}{2}mv_2^2 = \frac{1}{2} \times 2000 \text{ kg} \times \left(20 \text{ ms}^{-1}\right)^2$

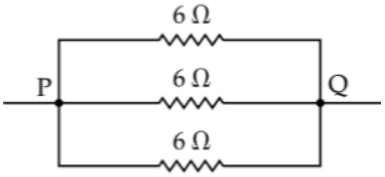
= 400000 J = 400 kJ

The change in kinetic energy = KE_2 - KE_1

= 400 kJ - 100 kJ = 300 kJ

So, the kinetic energy of van increases by 300 kJ when it speeds up from 10 ms^{-1} to 20 ms^{-1}

(vi) The simplified circuit can be redrawn as



All the three resistors are in parallel

$\therefore \frac{1}{R} = \frac{1}{6} + \frac{1}{6} + \frac{1}{6}$

$\frac{1}{R} = \frac{3}{6}$

R = 2 Ω

(vii) Given, time, t_1 = 5s

Let d be the distance of the hill from the boy and v be the velocity of sound which is to be determined.

Using the formula, t = $\frac{2d}{v}$

Substitute the given values, we get

$\Rightarrow 5 = \frac{2d}{v}$

$\Rightarrow d = \frac{5v}{2}$ ...(i)

When the boy moves through a distance 310 m towards the wall, then d' = d - 310 and t' = 3s.

$\Rightarrow 3 = \frac{2(d-310)}{v}$

$\Rightarrow d - 310 = \frac{3v}{2}$ ...(ii)

From Eqs. (i) and (ii), we get v = 310 ms^{-1}

3. Answer the following questions;

(i) During the time of noon, the sun is directly above our head. Due to which the sunlight travels relatively shorter distance as compared to the time when sun is at the horizon. So, we get light rays directly from the sun without much scattering. Therefore, the sky at noon appears white.

(ii) Given, l = 1 km = 1000 m, r = 1 mm = 10^{-3} m,

a = $\pi r^2 = 3.14 \times (10^{-3})^2 = 3.14 \times 10^{-6}$ m^2

Resistivity, $\rho = 1.72 \times 10^{-8}$ Ω m

Resistance, R = $\rho\frac{l}{a} = \frac{(1.72\times10^{-8})\times1000}{3.14\times10^{-6}}$

= 5.5 Ω

(iii) Since, $P = I^2R$

Current after increased by

100% = I + $\frac{100I}{100}$ = 2I

$P' = (2I)^2 R = 4I^2R$

$\therefore$ Percentage increase in power dissipation

$= \frac{P'-P}{P} \times 100$

$= \frac{4I^2R-I^2R}{I^2R} \times 100$

$= \frac{I^2R(4-1)}{I^2R} \times 100$

= 3 × 100 = 300%

(iv) Let temperature of furnace be θ.

Given, m_i = 100 g, m_w = 240 g

Water equivalent, m_w = 10 g

Equilibrium temperature = 60^oC

Then, from principle of calorimetry.

Heat given = Heat taken

$m_ic_i(\theta - 60) = (m_w + m_w)c_w (60 - 20)$

$\Rightarrow 100 \times 470(\theta - 60) = (10 + 240) \times 4200 \times 40$

$\Rightarrow \theta - 60 = \frac{250\times4200\times40}{100\times470} = 893.6$

$\Rightarrow \theta = 953.6^oC$

(v) i. It requires extremely high temperature to take place.

ii. ${}^{3}_{2}\text{He} + {}^{2}_{1}\text{H} \rightarrow {}^{4}_{2}\text{He} + {}^{1}_{1}\text{H} +$ Energy.

Section B

4. Answer the following questions:

(i) Given, f = 20 cm, v = 40 cm, u = ?

Now by using lens formula, $-\frac{1}{u} + \frac{1}{v} = \frac{1}{f}$

We have, $-\frac{1}{u} = \frac{1}{f} - \frac{1}{v} = \frac{1}{20} - \frac{1}{40}$

or $-\frac{1}{u} = \frac{1}{40}$

or u = - 40 cm

So, the object should be placed at a distance of 40 cm in front of the convex lens. a positive sign of image distance shows that the image formed is real and inverted.

(ii) Here, heat supplied = 8000 J

Mass of copper = 200 g

Initial temperature = 20^{o}C

Let the final temperature of copper be T^{o}C

So, the amount of heat needed to raise the temperature of 200 g of copper from 20^{o}C to T^{o}C

= 200 × 0 .4 × (7 - 20°)

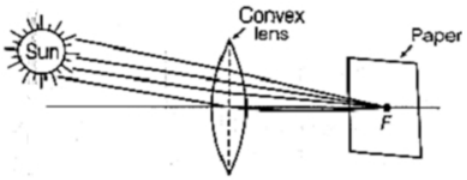
$\Rightarrow$ 200 × 0.4 × (7 - 20°) = 8000

$\Rightarrow$ T = $\frac{8000}{200\times0.4}$ + 20^{o} = 120^{o}C

$\Rightarrow$ T = 120^{o}C

So the final temp. is 120 degree Celsius.

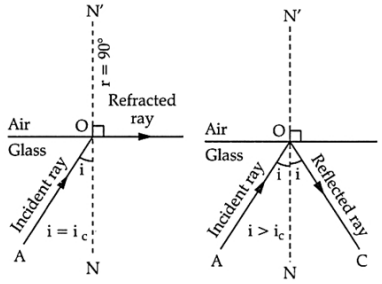
(iii) Yes, he will be able to burn a piece of paper using a convex lens in daylight without using match sticks or any flame. This is due to the reason that all the rays falling on lens get focused on the focus of lens and intense heat is produced at focus as well as on the paper.



When the paper and the lens are held in the same position for some time, then the paper will burn out. This is because of the heat produced by the Sun's rays as they are concentrated on the spot, where these rays are brought to focus at the lens focal point.

5. Answer the following questions:

(i) i. The labelled diagram of critical angle and total internal reflection is given below.

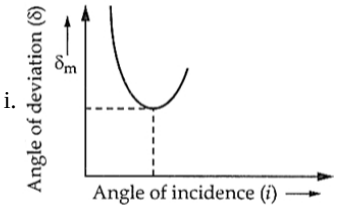


a. Critical angle

b. Total internal reflection

ii. The formula to express the relationship between refractive index of the denser medium with respect to rarer medium and critical angle is given by $\mu = \frac{1}{\sin i_c}$ = cosec i_C

(ii) i.

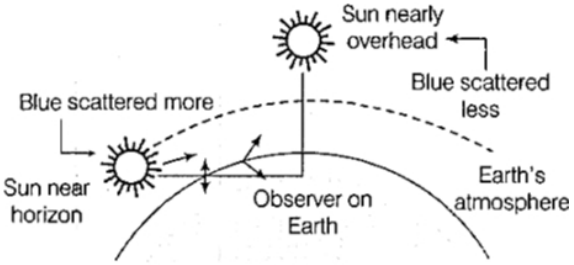


The graph between angle of deviation (δ) and angle of incidence (i) is shown above.

ii. The angle of incidence (i) is equal to the angle of emergence (e) when the ray suffers minimum deviation.

(iii) The sun appears reddish at sunrise or sunset because of the scattering of light by the air molecules and other small particles in the atmosphere which have size smaller than the wavelength of visible light. A light from the sun near the horizon passes through thicker layers of air and covers long distances in the Earth's atmosphere before reaching our eyes.

As the intensity of scattering is inversely proportional to the 4th power of wavelength. Hence, most of the blue light and shorter wavelengths are scattered away by the particles. So, only red light being of higher wavelength reaches us which gives reddish appearance of the sun at sunrise or sunset.



At noon, the sun appears white, not red, as only a little of the blue and violet colours are scattered as light from the sun overhead would travel relatively shorter distance.

6. Answer the following questions:

(i) Given, velocity ratio, VR = 4

Efficiency, η = 80% = $\frac{4}{5}$

as MA = VR $\times$ η

so MA = $4 \times \frac{4}{5} = \frac{16}{5}$ = 3.2

But, MA = $\frac{L}{E}$

$\Rightarrow 3.2 = \frac{L}{500\ \text{N}}$

$\Rightarrow$ L = 500 $\times$ 3.2

$\Rightarrow$ L = 1600 N

Therefore, the maximum load can be raised is 1600 N.

(ii) i. Momentum of a body is the quantity of motion contained in a body. It is given by the product of mass and its velocity. It is a vector quantity. Its S.I. unit is kg ms^{-1}.

p = mv

Where m is the mass of the body and v is it's velocity.

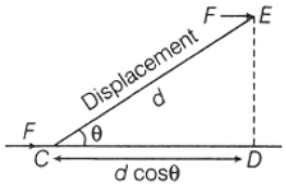
ii. The rate of change of momentum of a body is directly proportional to the force applied, i.e.,

$F \propto \frac{\Delta p}{\Delta t}$

iii. The change in momentum of a body depends only on the change in its velocity while mass remains constant. If the change in velocity is small, change in momentum will be small.

(iii) Let us assume that the force F is acting along CD and it displaces the point of application of force from C to E such that the displacement CF(= d) is at an angle 0 to the direction of the force.

The component of the displacement in the direction of force is CD.



$\therefore$ Work done, W = F $\times$ CD ...(i)

In right angled $\triangle$CDE

$\cos\theta = \frac{CD}{CE} = \frac{CD}{d} \Rightarrow CD = = d\cos\theta$

Substituting this value in Eq. (i), we get

W = E × d cos 0

which is a required relationship between work, force, and displacement.

7. Answer the following questions:

(i) Given, velocity of ultrasonic waves in water, v = 1500 m/s

Time taken = t = 50 s

Distance between object and submarine, s = ?

Using the formula, d = v × t = 1500 × 50 = 75000 m

As, ultrasonic wave travels double the distance between object and submarine, so d = 2s

As, 2s = 75000 m, s = $\frac{75000}{2}$ =37500 = 37.5 km

(ii) i. ${}_{Z}X^{A} \xrightarrow{-\alpha({}_{2}He^{4})} {}_{Z-2}X_{1}^{A-4} \xrightarrow{{}_{0}\gamma^{0}} {}_{Z-2}X_{2}^{A-4} \xrightarrow{-2\beta({}_{-1}\beta^{0})} {}_{Z}X_{3}^{A-4}$

ii. a. The penetration power of γ is maximum.

b. As β is ${}_{-1}\beta^{0}$, these are negatively charged radiations.

(iii) i. Damped vibrations are produced by the vibrating body.

ii. A simple pendulum oscillating in air, tuning fork vibration in air are examples of a body producing such vibrations.

iii. The amplitude of the wave gradually decreasing due to friction as energy is continuously being lost.

iv. Its amplitude decreases and finally becomes zero.

8. Answer the following questions:

(i) Given, resistivity ρ = 1.63 × 10^{-8} Ω-m

A = 10.3 × 10^{-4} cm^2 = 10.3 × 10^{-4} × 10^{-4} m^2

R = 20 Ω, l = ?

Using the formula, R = $\frac{\rho l}{A}$

$\Rightarrow l = \frac{RA}{\rho} = \frac{20\times10.3\times10^{-4}\times10^{-4}\ m^2}{1.63\times10^{-8}\Omega-m}$

$= \frac{20\times10.3\times10^{-8}}{1.63\times10^{-8}}$

= 126.38 m

(ii) i. Radioactivity is the spontaneous disintegration of an unstable nucleus to attain stability. In the decay of unstable nuclei, alpha or beta and gamma radiations are emitted.

ii. Nuclear waste is the waste radioactive material which remains after the use of radioactive material.

iii. Nuclear waste must be put in a thick casks (dumbbell-shaped structure), these are buried in the specially deep constructed underground stores.

(iii) The 3 Ω and 2 Ω resistors are in parallel. If R be their equivalent resistance, then

$\frac{1}{R} = \frac{1}{3} + \frac{1}{2} = \frac{2+3}{6} = \frac{5}{6}$

Or R = $\frac{6}{5}$ Ω = 1.2 Ω

∴ Total resistance of the circuit = (1.2 + 0.3) Ω = 1.5 Ω

∴ Current drawn from the cell = $\frac{2\ V}{1.5\Omega} = \frac{4}{3}$ A

∴ Current through the 0.3 Ω resistor = 1.33 A

This is also the total current flowing through the parallel combination of the 2 Ω and the 3 Ω resistors. It will be divided in the ratio 3 : 2 in the two resistors (of 2 Ω and 3 Ω). Thus we have

Current through the 2 Ω resistor = $\frac{3}{5} \times \frac{4}{3}$ A = $\frac{4}{5}$ A = 0.8 A

Current through the 3 Ω resistor = $\frac{2}{5} \times \frac{4}{3}$ A = $\frac{8}{15}$ A = 0.53 A

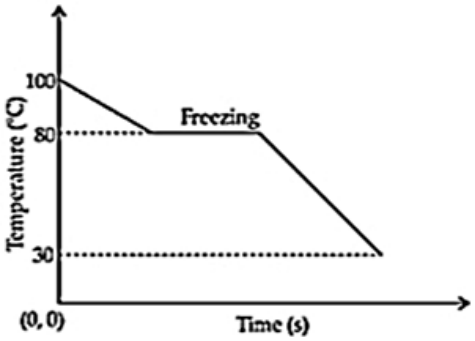
9. Answer the following questions:

(i) i. Melting

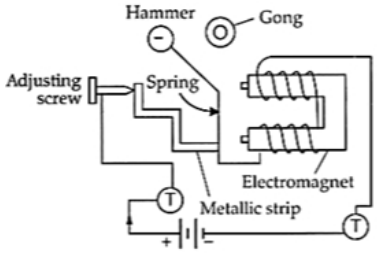
ii. No.

iii. Latent heat of melting/fusion.

(ii)



(iii)The sketch of an electric bell is shown as below:



An armature is made of soft iron because it gets easily demagnetized as soon as the current is switched off.