ICSE 2025 EXAMINATION

Sample Question Paper - 3

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 [ ].

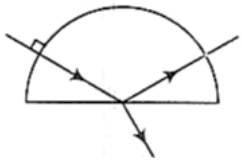
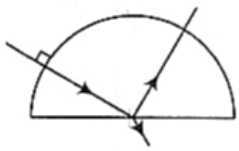
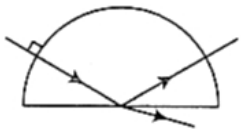
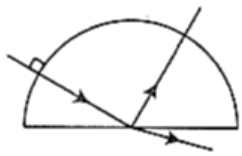
Section A

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

(a) Essential characteristic of equilibrium is **[1]**

a) velocity equals to zero
b) KE equals to zero
c) acceleration equals to zero
d) momentum equals to zero

(b) A ray of red light enters a semi-circular glass block normal to the curved surface. **[1]**
Which diagram shows the partial reflection and refraction of the ray?

a) 
b) 
c) 
d) 

(c) What force must be applied to a body through a distance of 10 m, such that it does a work of 4000 J. **[1]**
If the mass of the body is 20 kg, what is the acceleration of the body?

a) $40\ ms^{-2}$
b) $20\ ms^{-2}$
c) $10\ ms^{-2}$
d) $30\ ms^{-2}$

(d) When an element gives out high energy radiations on its own, the change which takes place is: **[1]**

a) chemical change
b) physical change
c) both physical change and chemical change
d) nuclear change

(e) **Assertion (A):** Uniform circular motion is an accelerated motion. **[1]**

Reason (R): In uniform circular motion, an object moves with constant speed but variable velocity.

a) Both A and R are true and R is the correct explanation of A.

b) Both A and R are true but R is not the correct explanation of A.

c) A is true but R is false.

d) Both A and R are true

(f) The angle of refraction in a glass block of refractive index 1.5 is 19^o. Calculate the angle of incidence. **[1]**

a) 3.5 sin 19

b) 2.5 sin 19

c) 4.5 sin 19

d) 1.5 sin 19

(g) An echo is heard by a radar in 0.08 s. If velocity of radio waves is 3×10^8 ms^{-1}, how far is the enemy plane? **[1]**

a) 1200 km

b) 120000 km

c) 120 km

d) 12000 km

(h) The speed of sound is 310 ms^{-1}. A person fires a gun. An echo is heard after 1.5 s. Calculate the distance of person from the cliff from which echo is heard. **[1]**

a) 432.5 m

b) 332.5 m

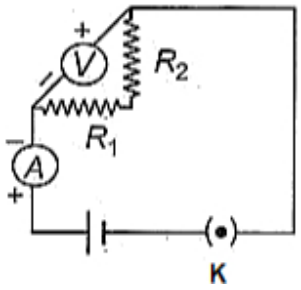
c) 132.5 m

d) 232.5 m

(i) I. The resistors R_1 and R_2 have not been correctly connected in parallel. **[1]**

II. The voltmeter has not been correctly connected in the circuit.

III. The ammeter and the key have not been correctly connected in the circuit.



Out of these three, the actual fault in this circuit is/are

a) Only II

b) Only I

c) Both I and II

d) Both II and III

(j) The power of a d.c. motor can be increased: **[1]**

a) by increasing number of turns in its coil

b) by laminating its soft iron core

c) by increasing the strength of current flowing through it

d) all of these

(k) Which of the statement is not true for an actual machine? **[1]**

a) Its mechanical advantage is greater than velocity ratio.

b) Its mechanical advantage is less than velocity ratio.

c) Its efficiency is always less than 100%.

d) Output of machine is always less than input.

(l) The base of cooking pans is made thicker and heavy because: **[1]**

a) it lowers the heat capacity of pan

b) it increases the heat capacity of pan

c) the food does not get charred and keeps hot for long time

d) both it lowers the heat capacity of pan and the food does not get charred and keeps hot for long time

(m) A burner, supplies heat energy at a rate of 20 Js^{-1}. Find the specific heat capacity of a solid of mass 25 g, if its temperature rises by 80^oC in one minute. **[1]**

a) $1.2\ Jg^{-1o}C^{-1}$

b) $0.6\ Jg^{-1o}C^{-1}$

c) $1.6\ Jg^{-1o}C^{-1}$

d) $0.8\ Jg^{-1o}C^{-1}$

(n) When a ray of light passes through an equilateral glass prism: **[1]**

a) it suffers refraction on both the refracting surfaces

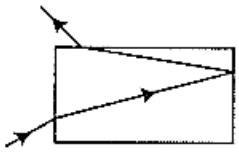
b) it bends towards the base on both refracting surfaces

c) it suffers refraction on the first refracting surfaces

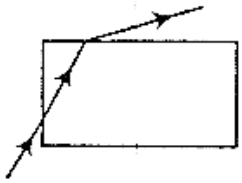
d) both it suffers refraction on both the refracting surfaces and it bends towards the base on both refracting surfaces

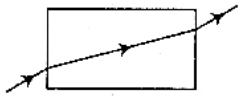
(o) A ray of light is incident on one side of a rectangular glass block. Its path is plotted through the block and out through another side. **[1]**

Which path is not possible?

a) 

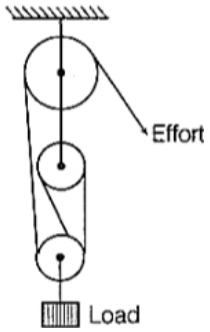
b) 

c) 

d) 

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

(a) i. Diagram given in below is representing a pulley system having a velocity ratio 3 and an efficiency of 80%. Calculate the mechanical advantage and efficiency. **[1]**



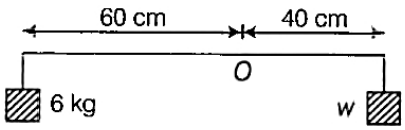
ii. Name a machine which can be used to **[1]**

i. Multiply force.

ii. Change the direction of force applied.

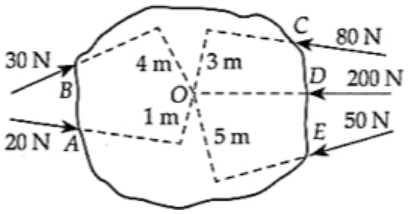
iii. Why is a jack screw provided with a long arm? **[1]**

(b) A meter scale is balanced in horizontal position as shown in figure given below. Find the value of w. **[2]**



(c) A woman draws water from a well using a fixed pulley. The mass of the bucket and water together is 6 kg. The force applied by the woman is 70 N. Calculate the mechanical advantage. (take g = 10 ms^{-2}) **[2]**

(d) Calculate the resultant torque from the following diagram: **[2]**



(e) A girl of mass 35 kg climbs up from the first floor of a building at a height 4 m above the ground to the third floor at a height 12 m above the ground. What will be the increase in her gravitational potential energy? (g = 10 m^{-2}) **[2]**

(f) Calculate the amount of charge that flows through a conductor when a current of 5A flows through it for 2 min. **[2]**

(g) i. What do you understand by free vibrations of a body? **[2]**

ii. Why does the amplitude of a vibrating body continuously decrease during damped vibrations?

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

(a) State Snell's law of refraction of light. **[2]**

(b) What is internal resistance of a cell? Write two factors on which it depends. **[2]**

(c) The equivalent resistance of the following circuit diagram is 4 Ω. Calculate the value of x. **[2]**

(d) i. Define specific heat capacity of a substance. State its SI unit. **[2]**

ii. Give one example of each, where high specific heat capacity of water is used

a. In cooling

b. As heat resistor.

(e) Point out the comparison for **[2]**

i. the ionising powers and

ii. penetrating powers of α, β and γ-radiations.

Section B

Attempt any 4 questions

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

(a) A concave lens has a focal length 15 cm. At what distance should an object be placed from the lens so that it forms an image at 10 cm from the lens? What is the nature of the image **[3]**

(b) 250 g of water at 30°C is present in a copper vessel of mass 50 g. Calculate the mass of ice required to bring down the temperature of the vessel and its contents to 5°C. (Specific latent heat of fusion of ice = 336 $\times$ 10^3 J kg^{-1}, specific heat capacity of copper vessel = 400 J kg^{-1} $°C^{-1}$, specific heat capacity of water = 4200 J kg^{-1} $°C^{-1}$) **[3]**

(c) A lens of focal length 20 cm forms an inverted image at a distance 60 cm form the lens. **[4]**

i. Identify the lens.

ii. How far is the lens present in front of the object?

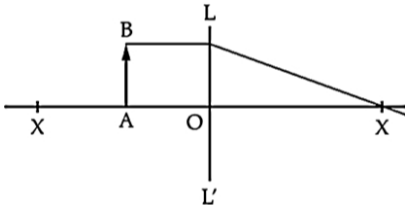
iii. Calculate the magnification of the image.

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

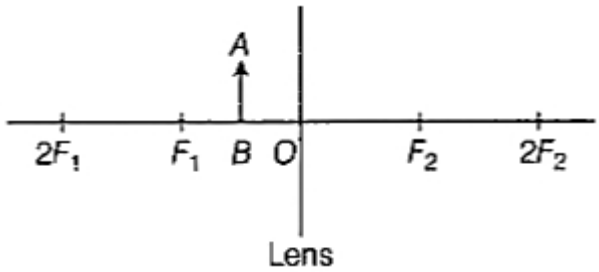
(a) i. Copy and complete the ray diagram to show the information of the image of the object AB. **[3]**

ii. Name the lens LL'.

iii. Name a device in which this principle is used.



(b) An object AB is placed between O and F_1 on the principal axis of a converging lens as shown in the diagram. **[3]**



Copy the diagram and by using three standard rays starting from point A, obtain an image of the object AB.

(c) What is meant by scattering of light? Mention the factor on which it depends. Explain why **[4]**

i. the colour of the clear sky is blue and

ii. for astronauts sky appears darker?

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

(a) A long rod of length 200 cm has its fulcrum situated at a distance of 25 cm from the load. Calculate the mechanical advantage of the rod. **[3]**

(b) i. Why does a rope walker hold a long pole in his hands? **[3]**

ii. The passengers in a boat are not allowed to stand while crossing a river. Why?

iii. The screw drivers have long handles. Why?

(c) If a body of mass m is moving with velocity v, then derive an expression for its kinetic energy. **[4]**

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

(a) It is observed that during march-past we hear a base drum distinctly from a distance compared to the side drums. **[3]**

i. Name the characteristic of sound associated with the above observation.

ii. Give a reason for the above observation.

(b) It is known that $^{238}_{92}U$ (uranium nucleus) decays to finally form the stable lead nucleus $^{206}_{82}Pb$. What is the number of alpha particles and beta particles emitted in this decay process? **[3]**

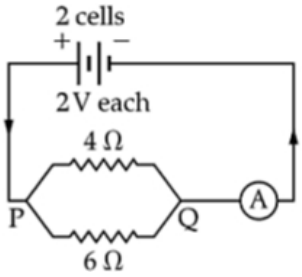
(c) i. A person is tuning his radio set to a particular station. What is the person trying to do to tune it? **[4]**

ii. Name the phenomenon involved, in tuning the radio set.

iii. Define the phenomenon named by you in part (ii).

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

(a) With reference to the diagram given below, **[3]**



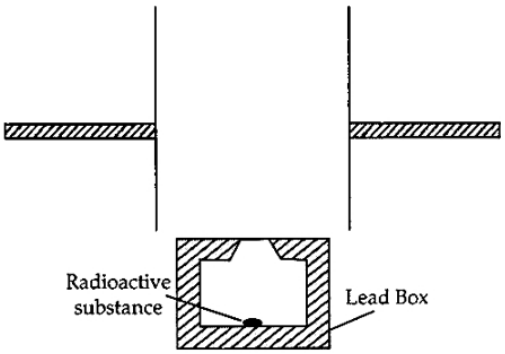
Calculate

i. The equivalent resistance between P and Q.

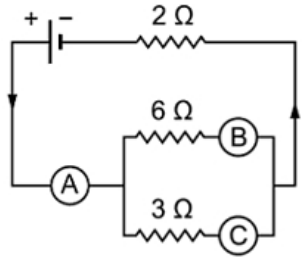
ii. The reading of the ammeter.

iii. The electrical power between P and Q.

(b) Complete the diagram as given below by drawing the deflection of radioactive radiations in an electric field. **[3]**



(c) In the figure given below A, B and C are three ammeters. The ammeter B reads 0.5 A (All the ammeters have negligible resistance). **[4]**



Calculate:

i. the readings in the ammeters A and C.

ii. the resistance of the circuit.

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

(a) A copper block of mass 2.5 kg is heated in a furnace to a temperature of 500° C and then placed on a large ice block. What is the maximum amount of ice that can melt? (Take, specific heat of copper = 0.39 $Jg^{-1}\,{}^{o}C^{-1}$ and heat of fusion of water = 335 Jg^{-1}). **[3]**

(b) Specific heat capacity of substance A is 3.8 J/gK, whereas the specific heat capacity of substance B is 0.4 J/gK. **[3]**

i. Which of the two is good conductors of heat?

ii. How does one lead to the above conclusion?

iii. If substances A and B are liquids, then which one would be more useful in car radiators?

(c) **[4]**

i. What is the function of the split rings in a DC motor?

ii. State two ways by which the magnetic field of a solenoid can be made stronger.

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.)

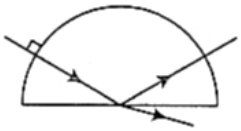
(i) **(c)** acceleration equals to zero

Explanation: {

Essential characteristics of equilibrium is the total force i.e., the vector sum of all forces acting on the rigid body is r.

i.e., $\sum_{i=1}^{n} F_i = 0 = F_1 + F_2 + ... + F_n$

As, mass cannot be 0, hence acceleration equals to zero.

(ii) **(c)** 

Explanation: {

As the ray of light is entering a semi-circular glass block normal to curved surface, part of the light will be reflected following laws of reflections i.e., $\angle i = \angle r$.

Part of the light will be refracted following laws of refraction at the glass-air interface.

(iii) **(b)** 20 ms^{-2}

Explanation: {

Force F = $\frac{\text{work done}}{\text{displacement}}$

F = $\frac{4000\ \text{J}}{10\ \text{m}}$ = 400 N

acc. $\frac{F}{m} = \frac{400}{20}$ = 20 ms^{-2}

(iv) **(d)** nuclear change

Explanation: {

nuclear change

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

Explanation: {

In uniform circular motion, the body moves with constant speed in circular path, but its direction of motion keeps on changing continuously. Thus, the velocity of the object in uniform circular motion is variable and such motion is called accelerated motion.

(vi) **(d)** 1.5 sin 19

Explanation: {

Refractive index of glass = $\frac{\sin i}{\sin r}$

1.5 = $\frac{\sin i}{\sin 19^\circ}$

sin i = 1.5 sin 19

(vii) **(d)** 12000 km

Explanation: {

t = 0.08 s v = 3 $\times$ 10^8 ms^{-1}

d = $\frac{vt}{2} = \frac{3\times10^8\times0.08}{2} = \frac{3\times10^8}{2} \times \frac{8}{100}$ = 12000000 m

= $\frac{12000000}{1000}$ = 12000 km

(viii) **(d)** 232.5 m

Explanation: {

Speed of sound = 310 ms^{-1}

time after which echo is heard t = 1.5 s

distance from cliff d = ?

$2d = \text{Speed} \times t$

$d = \frac{310 \times 1.5}{2} = 232.5$ m

(ix) **(b)** Only I

Explanation: {

Only statement I because resistances are connected in series not in parallel.

(x) **(d)** all of these

Explanation: {

all of these

(xi) **(a)** Its mechanical advantage is greater than velocity ratio.

Explanation: {

Its mechanical advantage is greater than velocity ratio.

(xii) **(d)** both it lowers the heat capacity of pan and the food does not get charred and keeps hot for long time

Explanation: {

both it lowers the heat capacity of pan and the food does not get charred and keeps hot for long time

(xiii) **(b)** $0.6\ Jg^{-1o}C^{-1}$

Explanation: {

Heat supplied by burner in

1 minute $H = (60 \times 20)$ J

Mass of solid m = 25 g

Rise in temp. $\Delta t = 80^oC$

C = ?

$mc\ \Delta t = H$

$25 \times c \times 80 = 1200$

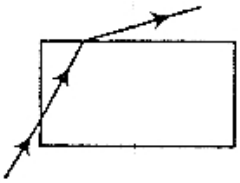
$C = \frac{1200}{25 \times 80} = \frac{3}{5} = 0.6\ Jg^{-1o}C^{-1}$

(xiv) **(d)** both it suffers refraction on both the refracting surfaces and it bends towards the base on both refracting surfaces

Explanation: {

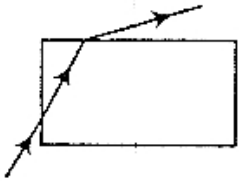
both it suffers refraction on both the refracting surfaces and it bends towards the base on both refracting surfaces

(xv) **(c)**



Explanation: {

As glass is an optically denser medium, it bends the light rays towards the normal. After refraction, when light emerge out of the denser medium like glass to the rarer medium like air, it bends away from the normal which is not shown in figure. Hence, it is not following rules of refraction.



2. Answer the following questions:

(i) i. Since, Mechanical Advantage,

$MA = \frac{\text{Load}}{\text{Effort}} = VR \times \eta = 3 \times \frac{80}{100} = 2.4$

or efficiency = $\frac{\text{load}}{2.4} = \frac{300}{2.4} = 125$ N

ii. i. Nut cracker.

ii. Handpump.

iii. Jack screw is provided with a long arm so that by applying less effort to this long arm, a heavy load can be lifted.

(ii) Given, load, F_1 = 6 kg

Load arm, d_1 = 60 cm

Effort, F_2 = w

Effort arm, d_2 = 40 cm

According to the principle of moments in equilibrium,

$F_1d_1 = F_2d_2$

$\Rightarrow 6 \times 60 = w \times 40$

$\Rightarrow w = \frac{6\times60}{40} = 9$ kg

(iii) Given, Load, L = mg

$= 6 \times 10$

= 60 N

Effort, E = 70 N

Mechanical Advantage M.A. = $\frac{\text{Load}}{\text{Effort}}$

M.A. = $\frac{60}{70} = 0.857$

(iv) Total torque acting in clockwise direction.

$= -(30 \times 4 + 50 \times 5) = -(120 + 250) = -370$ N-m.

Total torque acting in anti-clockwise direction

$= +(20 \times 1 + 80 \times 3) = +(20 + 240) = +260$ N-m.

Torque due to 200 N will be zero because it is passing through point O about which torque is being calculated.

Resultant torque = (-370 + 260) N-m = -110 N-m (Clockwise direction)

(v) Given, Mass, m = 35 kg

Height of first floor, h_1 = 4m

Height of third floor, h_2 = 12 m

Gravitational potential energy at first floor

$P.E._1 = mgh$

$= 35 \times 10 \times 4$

= 1400J

Gravitational potential energy at third floor

$P.E._2 = 35 \times 10 \times 12$

= 4200 J

Gain in potential energy = $P.E._2$ - $P.E_1$

= (4200 - 1400) J

= 2800 J

(vi) Given, I = 5A, t = 2 min = 2×60 s = 120 s, q = ?

We know that, charge, $q = I \times t$

$\Rightarrow q = 5 \times 120 = 600$ C

Thus, the amount of charge flowing through conductor is 600 C.

(vii) i. Vibrations of a body in absence of any external periodic force with constant frequency and amplitude.

ii. The energy is lost to the surrounding due to the friction of the surrounding medium.

3. Answer the following questions;

(i) Snell's law of refraction of light states that the ratio of the sine of the angle of incidence i to the sine of the angle of refraction r is a constant for the same pair of media. This constant ratio is called refractive index of the second medium with respect to the first medium. It is expressed as $_1\mu_2 = \frac{\sin i}{\sin r}$.

(ii) Internal resistance of a cell is the obstruction offered by the cell to the flow of current through it.

Factors on which internal resistance of a cell depends:

i. Surface area of electrode plates.

ii. Distance between the electrodes.

(iii) $\frac{1}{R_{AB}} = \frac{1}{R_1} + \frac{1}{R_2}$

$\Rightarrow \frac{1}{4} = \frac{1}{5+x} + \frac{1}{8+4}$

$\Rightarrow \frac{1}{4} = \frac{1}{5+x} + \frac{1}{12}$

$\Rightarrow \frac{1}{5+x} = \frac{1}{4} - \frac{1}{12} = \frac{3-1}{12} = \frac{2}{12} = \frac{1}{6}$

$\Rightarrow$ 5 + x = 6 $\Rightarrow$ x = 6 - 5

$\Rightarrow$ x = 1 Ω

(iv) i. It can be defined as the total amount of heat required to raise the temperature of a unit mass of substance by 1°C. Its SI unit is J/kg°C.

ii. a. Water is used as a coolant.

b. Heat resistor is used in car radiators.

(v) i. The ionising power of α-radiations is nearly 100 times that of β-radiations and nearly 10000 times that of γ-radiations. The ionising power for the three particles (a, P, γ respectively) is the order of $10^4 : 10^2 : 1$.

ii. The penetrating power of α-particle is $\frac{1}{100}$th times that of a β-particle and $\frac{1}{10000}$ times that of γ-radiation.

Section B

4. Answer the following questions:

(i) Given, focal length, f = - 15 cm

distance of image, v = - 10 cm

distance of object, u = ?

Using the lens formula, $\frac{1}{v} - \frac{1}{u} = \frac{1}{f}$

i.e., $\frac{1}{-10} - \frac{1}{u} = \frac{1}{-15}$

$\therefore \frac{1}{u} = \frac{-1}{10} + \frac{1}{15} = \frac{-1}{30} \Rightarrow$ u = - 30 cm

As, it is a concave lens, the image is virtual erect and diminished.

(ii) According to the principle of calorimetry,

Heat gained = Heat lost by water + Heat lost by copper vessel

So, m $\times$ L + m $\times$ c_w $\times$ (5 - 0) = $m_1 c_w \Delta t_1 + m_2 c_c \Delta t_2$

$\Rightarrow m \times$ 336000 + m $\times$ 4200 $\times$ 5 = $\frac{250}{1000} \times$ 4200 $\times$ (30 - 5) + $\frac{50}{1000} \times$ 400 $\times$ (30 - 5)

$\Rightarrow m \times$ 336000 + m $\times$ 21000 = 26250 + 500

$\Rightarrow m = \frac{26750}{357 \times 10^3}$ = 74.93 g = 0.07493 kg

(iii) i. The given lens is a convex lens because the formed image is inverted.

ii. f = 20

v = 60 cm

Applying lens formula

$\frac{1}{v} - \frac{1}{u} = \frac{1}{f}$

Or, $\frac{1}{60} - \frac{1}{u} = \frac{1}{20}$

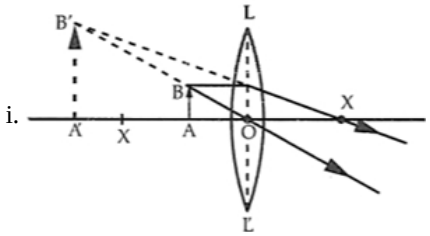
$\therefore$ u = -30 cm

iii. Magnification = $\frac{v}{u} = \frac{60}{-30}$ = -2

5. Answer the following questions:

(i) X is the focus of lens and object is placed within the focus of the lens. The refracted ray is converging, so the lens is a convex lens.

i.



ii. The lens LL' is a convex lens.

iii. This principle is used in magnifying glass.

(ii)

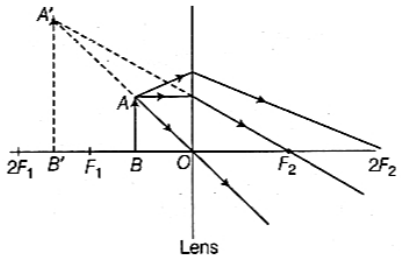


image is virtual and erect.

(iii) The reflection of light from an object in all directions is called scattering of light.

The intensity of scattered light depends on the size of scattering articles and colour or wavelength of light.

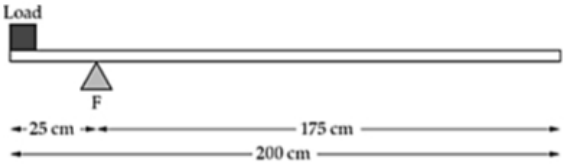
i.e., Scattering $\propto d^6$ (where, d = diameter of particle) and scattering $\propto \frac{1}{\lambda^4}$ (where, λ = wavelength of particle)

i. During the day time, the size of particles of the atmosphere is smaller than the wavelength of visible light. So, they are more effective in scattering the light of shorter wavelengths i.e., blue light.So sky appears blue in colour.

ii. As at greater heights, there is no atmosphere i.e., no particles and hence no scattering of light takes places in the space. Hence, for astronauts the sky appears dark.

6. Answer the following questions:

(i)



Mechanical advantage = $\frac{\text{Effort arm}}{\text{Load arm}}$

Here effort arm = 175 cm

Load arm = 25 cm

$\therefore$ M.A. = $\frac{175}{25}$ = 7

Hence mechanical advantage = 7

(ii) i. The rope walker holds a long pole in his hands to adjust the centre of gravity. When he feels that he is falling towards right, he shifts the pole towards left so that his centre of gravity remains at same place and he can balance himself without falling downwards.

ii. This is because, if the passengers stand, then the centre of gravity of the boat gets raised up. This may cause the boat to overturn as well as producing imbalance.

iii. Torque = Force $\times$ Perpendicular distance = F $\times$ d. If the handle is long, then force acts at large distance so d is more, hence more torque is produced.

(iii) Let a body of mass m is moving with velocity v. It is brought to rest by an opposing force F. Let it travels a distance s before stopping and a is the uniform retardation produced by the force. By the principle of conservation of energy, kinetic energy of the body = Work done by the retarding force to stop it.

Kinetic energy = force $\times$ displacement ...(i)

Retarding force, F = ma ...(ii)

Initial velocity, u = v, final velocity, v = 0

From the relation, $v^2 = u^2 + 2as$

$0 = v^2 - 2as$

$\therefore$ Displacement, s = $\frac{v^2}{2a}$ ...(iii)

Put the values of E and s from Eqs. (ii) and (iii) in Eq. (i), we get

Kinetic energy, K = F $\times$ s = $ma \times \frac{v^2}{2a} = \frac{1}{2}mv^2$

Kinetic energy = $\frac{1}{2} \times$ mass $\times$ (velocity)^2

7. Answer the following questions:

(i) i. Loudness

ii. Base drum has greater surface area compared to the side drums.

Loudness is increased with the increase in surface area of vibration.

(ii) Total change in mass number = 238 - 206 = 32.

It is only the emission of alpha particles that changes the mass number (by 4 unit per emission) hence number of α-

particles emitted = $\frac{32}{4}$ = 8.

Also,

Total decrease in atomic number = 92 - 82 = 10 units.

If only 8α particles were emitted, the atomic number should decrease by 8 $\times$ 2 = 16 unit. A smaller (by 6 units) decrease in atomic number may come about only if 6β-particles are also emitted. The emission of a negative β-particle increase the atomic number by 1 unit)

$\therefore$ Number of α-particles emitted = 8

Number of β-particles emitted = 6

(iii) i. The person is trying to change the frequency of his radio set to receive a particular station.

ii. The phenomenon of resonance is involved in tuning the radio set.

iii. Resonance is a special case of forced vibrations. When the frequency of an externally applied periodic force on a body is equal to its natural frequency, the body readily begins to vibrate with an increased amplitude. This phenomenon is known as resonance. The vibrations of large amplitude are called the resonant vibrations.

8. Answer the following questions:

(i) i. $\frac{1}{R_{eq}} = \frac{1}{4} + \frac{1}{6} = \frac{3+2}{12} = \frac{5}{12}$

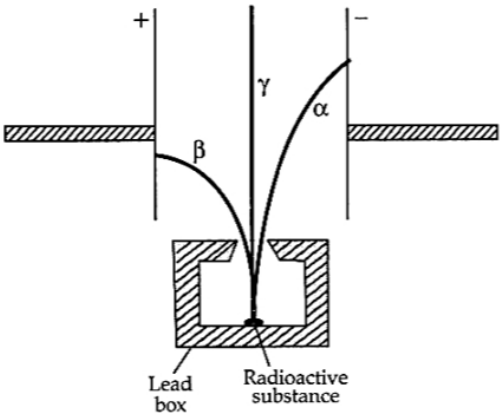
$\Rightarrow R_{eq} = \frac{12}{5}$ = 2.4 Ω

ii. Emf, E = 2 $\times$ 2 = 4 V, $E = IR_{eq}$

$\Rightarrow I = \frac{E}{R_{eq}} = \frac{4}{2.4}$ = 1.67 A

iii. Power, $P = I^2R_{eq} = (1.67)^2 \times 2.4 = 6.69$ W

(ii)



(iii) i. As 6 Ω and 3 Ω resistance are in parallel, so the potential difference across these resistances will be same.

So, $I_B \times 6 = I_C \times 3$

$\Rightarrow 0.5 \times 6 = I_C \times 3 \Rightarrow I_C = 1.0$ A

Reading of ammeter at C, I_C = 1.0 A

Reading of ammeter at A

$= I_B + I_C = 0.5 + 1.0 = 1.5$ A

ii. Total resistance of the circuit

$R = 2 + \frac{6\times3}{6+3}$

$= 2 + \frac{18}{9}$ = 4 Ω

9. Answer the following questions:

(i) Given, mass of copper block, m = 2.5 kg = 2.5 $\times$ 10^3 g

Specific heat of copper, c = 0.39 $Jg^{-1}\ {}^oC^{-1}$

Heat lost by copper block on cooling down= $mc\Delta T$

= 2.5 $\times$ 10^3 $\times$ 0.39 $\times$ 500 J

Let mass of ice melted = mg

Heat gained during fusion of ice = m $\times$ 335 J

($\because$ L = 335 Jg^{-1})

$\therefore$ by the principle of calorimetry,

Heat gained = Heat lost

$\therefore m \times 335 = 2.5 \times 10^3 \times 0.39 \times 500$

or $m = \frac{2.5 \times 10^3 \times 0.39 \times 500}{335}$

= 1455.2 g

= 1.455 kg

(ii) i. B is a good conductor of heat.

ii. Since the specific heat capacity of B is less than A. So, B is a good conductor of heat.

iii. Since the specific heat capacity of A is higher than that of B, so it can absorb more heat. Therefore, A is useful in car adiators.

(iii) i. In DC motor, when the coil rotates, the split ring also rotates with the coil so that the current flow in the armature coil in such a way that it always keep on rotating in the same manner.

ii. Magnetic field of a solenoid can be increased by the following ways

a. the current in the solenoid.

b. the number of turns in the solenoid.