ICSE 2024 EXAMINATION

PHYSICS

SAMPLE PAPER - 9

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 atoms of same element having same atomic number, but different atomic masses are called:
(a) Isotopes (b) Isobars (c) Isotones (d) Both (b) and (c)

(ii) When an element gives out high energy radiations, the change which takes place is:
(a) chemical change (b) bio-chemical change (c) nuclear change (d) physical change

(iii) The direction of current in a conductor placed in a magnetic field is obtained by:
(a) Lenz's law (b) Fleming's left hand rule (c) Fleming 'right hand' rule (d) Maxwell's cork screw rule

(iv) A voltmeter is connected in parallel to a cell placed in an electric circuit when no current is flowing through circuit. The reading on voltmeter shows:
(a) potential difference (b) electromotive force (c) either (a) or (b) (d) none of these

(v) The average rating of lighting circuit of poor family is:
(a) 10A (b) 15A (c) 5A (d) 2A

(vi) In a three pin plug the live pin is
(a) thinner and is towards left (b) thicker and towards left
(c) thinner and is towards right (d) thicker and is towards right

(vii) In a parallel circuit:
(a) p.d across all resistors is same;
(b) current flowing through all resistors is same
(c) equivalent resistance of all resistors is more than any of the individual resistors.
(d) p.d across different resistors is different.

(viii) A charge of 100C flows through a conductor for 3 min and 20 s. The magnitude of current flowing through conductor is
(a) 0.50 A (b) 0.05 A (c) 5.0 A (d) 50.0 A

(ix) A tuning fork has a frequency of 256 Hz. It will produce resonance in a wooden board of frequency
(a) 512 Hz (b) 256 Hz (c) 238 Hz (d) Both (a) and (b)

(x) Visible light is a mixture of electromagnetic waves, having wavelengths between:
(a) 8000 Å and 6000 Å (b) 8000 Å and 1000 Å (c) 8000 Å and 4000 Å (d) 8000 Å and 2000 Å

(xi) A convex lens can be regarded as a set of prisms and a glass slab, such that the refracting angle of the prisms
(a) continuously decreases in the outward direction (b) continuously increases in the outward direction
(c) remains same in the outward direction (d) none of these

(xii)

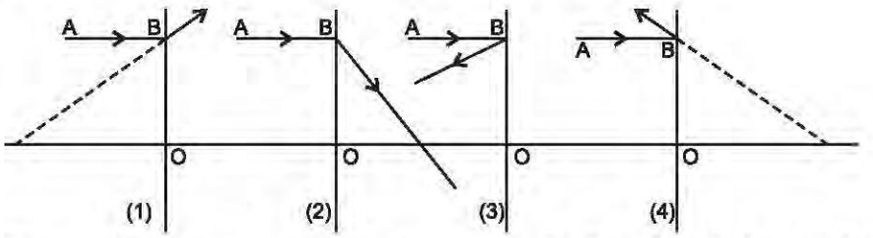


Diagram above show a **concave lens** and the path of ray AB which is parallel to principal axis. Which diagram shows the correct path of ray through lens?

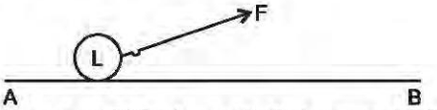
(a) Fig 1 (b) Fig 2 (c) Fig 3 (d) Fig 4

(xiii) The specific latent heat capacity of fusion of ice in SI system is:

(a) 80 cal g^{-1} (b) 336×10^3 Jkg^{-1} (c) 2260×10^3 Jkg^{-1} (d) 336 Jg^{-1}

(xiv) A boy drags a load 'L' along horizontal plane AB by applying force F on a rope. The boy does:

(a) no work
(b) some positive work
(c) negative work
(d) none of these



(xv) Two equal and unlike parallel forces of magnitude 16 N act on a rigid body, such that moment of couple is 12 Nm. The arm of couple is:

(a) 0.75 m (b) 1.50 m (c) 0.40 m (d) 0.25 m

ANSWERS

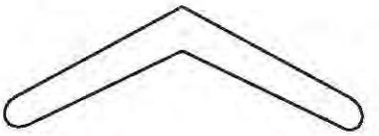
(i) (a)	**(ii)** (c)	**(iii)** (b)	**(iv)** (b)	**(v)** (c)	**(vi)** (c)	**(vii)** (a)	**(viii)** (a)	**(ix)** (d)	**(x)** (c)
(xi) (a)	**(xii)** (a)	**(xiii)** (b)	**(xiv)** (b)	**(xv)** (a)					

Question 2

(i) (a) What do you understand by following terms? [3]

1. Couple 2. Arm of couple 3. Moment of couple

(ii) Figure alongside shows an L-shaped piece of wood. Copy the diagram and locate its centre of gravity by drawing suitable lines. [2]



(iii) A body is moving in a circular path with uniform speed. [2]

(a) Does this body do any work?
(b) Give a reason for your answer in (a).

(iv) A pulley system has 5 pulleys in all [2]

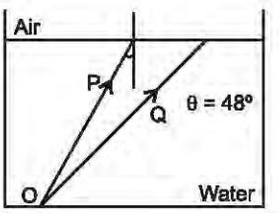
(a) How many pulleys are in the movable block of system?
(b) If the pulley system is ideal what is its mechanical advantage?

(v) Water is coolant commonly used in motor car radiators. Explain. [2]

(vi) (a) What is calorimeter.? [2]

(b) Why is it made of copper?

(vii) Rays of light starting from point 'O' meet the water air interface at angle of 48°. The critical angle for water is 48°. Copy the diagram and trace the course of rays P and Q. [2]



Question 3

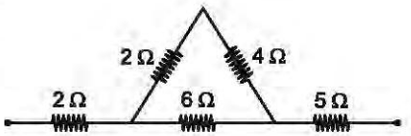
(i) (a) On which side of visible spectrum is formed ultraviolet spectrum? [2]

(b) What is the range of ultraviolet spectrum in terms of angstom units?

(ii) (a) What is sonar? [2]

(b) What kind of mechanical waves are used in sonar?

(iii) [2]



Calculate the equivalent resistance of the resistors shown in diagram.

(iv) Which coil of a step up transformer is made thicker and why? [2]

(v) (a) What is the nature of gamma radiations? [2]

(b) How is it possible for the nucleus of an atom to decay into another element of higher atomic number?

SECTION - B (40 Marks)

(Attempt *any four* questions from this Section)

Question 4

(i) (a) A boy of mass 30 kg is sitting at a distance of 1 m from the middle of a sea-saw. Where must a boy of mass 40 kg sit to balance the sea-saw? [5]

(b) Is it possible to have accelerated motion with constant speed? Explain.

(c) Two forces of 2 N each act in opposite directions at the ends of a metre-scale. Calculate the resultant moment of force about 50 cm.

(ii) (a) State the energy conversions taking place in a solar cell. [5]

(b) A body of mass 0.5 kg falls from a height of 20 m to a height of 12 m above the ground level. Find the loss of potential energy taking place in a body. [Take g = 10 ms^{-2}]

(c) A moving body weighing 400 N possesses 500 J of kinetic energy. Calculate the velocity with which body is moving. [Take g = 10 ms^{-2}]

Question 5

(i) Differentiate between (a) heat capacity and (b) specific heat capacity. [2]

(ii) A hot solid of mass 60 g at 100°C is placed in 150 g of water at 20°C. The final steady temperature recorded is 25°C. Calculate the specific heat capacity of solid. [sp. heat capacity of water is 4200 J $kg^{-1}°C^{-1}$] [4]

(iii) (a) Water in the lakes and ponds do not freeze at once in cold countries. Give a reason in support of your answer.

(b) What is the principle of calorimetry? [4]

(c) Name the law on which this principle is based.

(d) State the effect of increase in impurities on the melting point of ice.

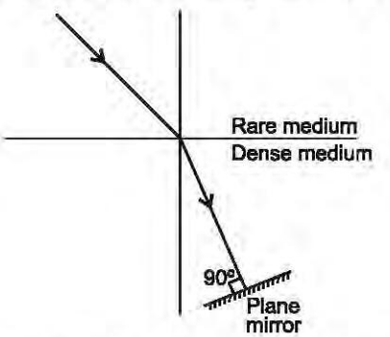
Question 6

(i) A converging lens is used to obtain the image of an object placed in front of it. The inverted image formed between F_2 and $2F_2$. [3]

(a) Where is the object placed?

(b) Draw a ray diagram to illustrate the formation of image.

(ii) A ray of light is moving from a rare medium to a dense medium, strikes a plane mirror placed at an angle of 90° to the direction of ray of light as shown in diagram alongside. [2]



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

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

(iii) (a) The refractive index of glass with respect to air is 1.5. What is the value of refractive index of air with respect to glass? [2]

(b) A ray of light is incident as a normal ray on the surface of separation of two different media. What is the value of angle of incidence in this case?

(iv) What do you understand by the term scattering of light? Which colour of white light is scattered the least and why [3]

Question 7

(i) (a) What is meant by dispersion of light? [4]

(b) Name the radiation used for night photography.

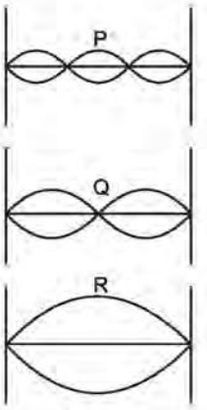
(c) Name the radiation for detecting fracture in bones.

(d) Name the radiation whose wavelength is between 10 nm to 400 nm.

(ii) (a) Name one factor which affects the frequency of sound emitted due to the vibrations in air column. [2]

(b) Name the unit used for measuring sound level.

(iii) The diagram alongside shows three different modes of vibration P, Q and R for the same string [4]



(a) Which vibration will produce louder sound and why?

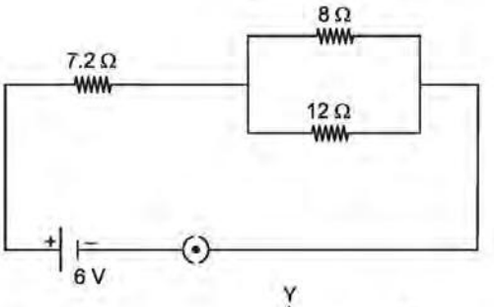
(b) The sound of which vibration will have maximum shrillness?

(c) State ratio of wavelength P and R.

Question 8

(i) (a) A cell is sending current in external circuit. How does terminal voltage compare with the e.m.f. of cell? [4]

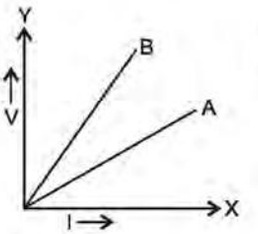
(b) Three resistors are connected to a 6 V battery as shown in figure alongside. Calculate.



1. The equivalent resistance of circuit.
2. Total current in circuit.
3. P.d across 7.2 Ω resistor.

(ii) Define specific resistance and state its SI unit. [2]

(iii) (a) The V–I graph for series combination and for parallel combination of two resistors is shown in figure alongside. Which of the two A or B represents parallel combination and why? [4]



(b) A music system draws a current of 400 mA when connected to 12 V battery.

1. What is the resistance of music system?
2. The music system is left playing for several hours and finally battery voltage drops and the music system stops playing when current drops to 320 mA. What is the voltage of music system when it stops playing?

Question 9

(i) (a) State any two advantages of electromagnets over permanent magnets. [2]

(b) The diagram alongside shows a coil wound around a U-shaped soft iron bar AB. [3]

1. What polarity is induced at ends A and B when the current is switched on?
2. Suggest one way to strengthen the magnetic field of electromagnet.
3. What will be the polarities at A and B, if the direction of current is reversed?

(ii) (a) Which of the radioactive radiation: [5]

1. can cause severe genetical disorders?
2. are deflected by electric field.

(b) A nucleus of $_{11}Na^{24}$ emits a beta particle to change into magnesium(Mg)

1. Write symbolic equation of nuclear process.
2. What are the numbers 24 and 11 signify?
3. What is the general name of $^{24}_{12}Mg$ with respect to $^{24}_{11}Na$?

❖ ❖ ❖

SOLUTION

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

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SECTION - A (40 Marks)

(Attempt *all* questions from this Section)

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

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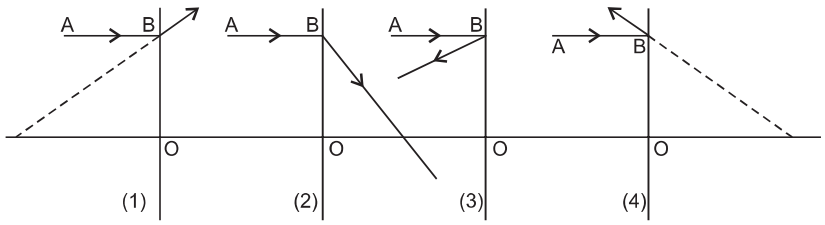

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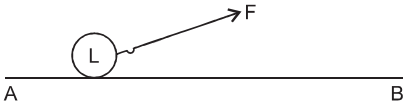


(xv) Two equal and unlike parallel forces of magnitude 16 N act on a rigid body, such that moment of couple is 12 Nm. The arm of couple is:

(a) 0.75 m (b) 1.50 m (c) 0.40 m (d) 0.25 m

ANSWERS

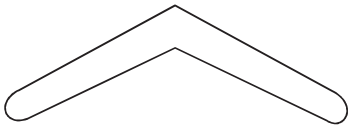
(i) (a) **(ii)** (c) **(iii)** (b) **(iv)** (b) **(v)** (c) **(vi)** (c) **(vii)** (a) **(viii)** (a) **(ix)** (d) **(x)** (c)
(xi) (a) **(xii)** (a) **(xiii)** (b) **(xiv)** (b) **(xv)** (a)

Question 2

(i) (a) What do you understand by following terms? [3]

1. Couple 2. Arm of couple 3. Moment of couple

(ii) Figure alongside shows an L-shaped piece of wood. Copy the diagram and locate its centre of gravity by drawing suitable lines. [2]



(iii) A body is moving in a circular path with uniform speed. [2]

(a) Does this body do any work?
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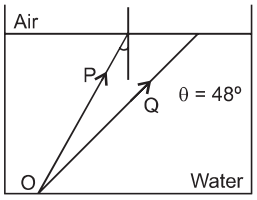
(iv) A pulley system has 5 pulleys in all [2]

(a) How many pulleys are in the movable block of system?
(b) If the pulley system is ideal what is its mechanical advantage?

(v) Water is coolant commonly used in motor car radiators. Explain. [2]

(vi) (a) What is calorimeter.? [2]
(b) Why is it made of copper?

(vii) Rays of light starting from point 'O' meet the water air interface at angle of 48°. The critical angle for water is 48°. Copy the diagram and trace the course of rays P and Q. [2]



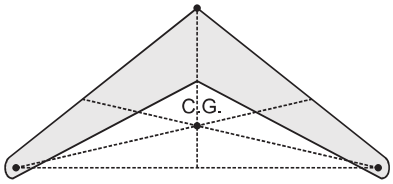
Solution :

(i) (a) 1. Two equal and unlike parallel forces acting on a rigid body, such that they act along different lines of action of force, constitute a couple.

2. The perpendicular distance between two unlike parallel forces, constituting a couple is called arm of couple.

3. The turning effect produced by a couple around a fixed point is called moment of couple.

(ii) C.G is shown in adjoining diagram. It is the intersection of medians and situated outside the body.



(iii) (a) No work is done by the body moving with a uniform speed along circular path.

(b) The body moving with a uniform circular speed, experiences change of direction at every point and hence is moving with a variable velocity and is acted upon by acceleration. The displacement of body in always at right angles to the applied force and hence no work in done.

(iv) (a) There are **two** pulleys in the movable block.

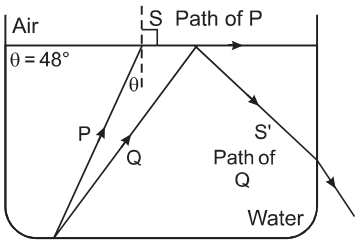
(b) Mechanical advantage of the system is **5**.

(v) Water has the highest specific heat capacity of 4200 $Jkg^{-1}°C^{-1}$. As water absorbs maximum amount of heat, but its temperature does not rise appreciably, therefore it is a commonly used as coolant and is inexpensive.

(vi) (a) A copper beaker along with a copper stirrer of a copper wire, which is commonly used in calculating measurement of heat energy is called calorimeter.

(b) Copper has a very low specific heat capacity of 0.4 $Jg^{-1}°C^{-1}$. Thus, a copper calorimeter absorbs negligible amount of heat from the materials used in calorimeter and at the same time rapidly attains the temperature of the contents within it.

(vii) Diagram alongside shows the paths of rays P and Q.



Question 3

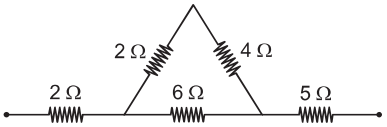
(i) (a) On which side of visible spectrum is formed ultraviolet spectrum? [2]

(b) What is the range of ultraviolet spectrum in terms of angstom units?

(ii) (a) What is sonar? [2]

(b) What kind of mechanical waves are used in sonar?

(iii) [2]



Calculate the equivalent resistance of the resistors shown in diagram.

(iv) Which coil of a step up transformer is made thicker and why? [2]

(v) (a) What is the nature of gamma radiations? [2]

(b) How is it possible for the nucleus of an atom to decay into another element of higher atomic number?

Solution :

(i) (a) Ultraviolet spectrum is formed below the violet light of visible spectrum.

(b) The range of ultraviolet radiation is 4000 Å to 100 Å.

(ii) (a) A device mounted on ships and used for finding the depth of ocean is called sonar.

(b) Ultrasonic waves are used in sonar.

(iii) Resistance of 4Ω and 2Ω in series, $R_s = (4 + 2) = 6\Omega$

$\therefore$ Resistance of parallel circuit, $\frac{1}{R_p} = \frac{1}{6} + \frac{1}{6} = \frac{2}{6} = \frac{1}{3}$.

$\therefore R_p = 3\Omega$

$\therefore$ Equivalent resistance of complete circuit in series, $R_s = (2 + 3 + 5) = \mathbf{10\Omega}$

(iv) The primary coil of step up transformer is made thicker. It is because a current of higher magnitude flows in the coil, which in turn made melt it on account of resistance. Thus, in order to lower resistance it is made thicker.

(v) (a) Gamma radiations are electromagnetic waves emitted by the nucleus of radioactive element. They obey the laws of reflection and refraction and are highly penetrating.

(b) If the nucleus of an atom decays by ejecting beta particle, then the daughter nuclei formed in higher in atomic number.

$${}_{Z}X^{A} - \beta \longrightarrow {}_{Z+1}X_{1}^{A}.$$

SECTION - B (40 Marks)

(Attempt *any four* questions from this Section)

Question 4

(i) (a) A boy of mass 30 kg is sitting at a distance of 1 m from the middle of a sea-saw. Where must a boy of mass 40 kg sit to balance the sea-saw? [5]

(b) Is it possible to have accelerated motion with constant speed? Explain.

(c) Two forces of 2 N each act in opposite directions at the ends of a metre-scale. Calculate the resultant moment of force about 50 cm.

(ii) (a) State the energy conversions taking place in a solar cell. [5]

(b) A body of mass 0.5 kg falls from a height of 20 m to a height of 12 m above the ground level. Find the loss of potential energy taking place in a body. [Take g = 10 ms^{-2}]

(c) A moving body weighing 400 N possesses 500 J of kinetic energy. Calculate the velocity with which body is moving. [Take g = 10 ms^{-2}]

Solution :

(i) (a) By the principle of moments.

Moments due to 40 kg boy = Moments due to 30 kg boy

$$40 \text{ kg} \times x = 30 \text{ kg} \times 1 \text{ m}$$

$\therefore$ x (Distance of boy from the middle of see-saw) $= \frac{30}{40}\text{m} =$ **0·75 m**.

(b) Yes, it is possible when a body moves in circular path with a uniform speed. As the body moves along circular path its direction continuously changes and hence, it is moving with a variable velocity and hence, has an accelerated motion.

(c) As the forces are equal and act in opposite direction, therefore they constitute couple.

$\therefore$ Moment of couple = Force × Arm of couple = 2N × 1m = **2 Nm**

(ii) (a) In a solar cell, the solar energy is directly converted into electric energy.

(b) $$\text{Loss of P.E} = mgh = 0{\cdot}5 \text{ kg} \times \frac{10\,\text{m}}{s^2} \times 8\text{m} = \textbf{40 J}.$$

(c) $$\text{Mass of body} = 400 \text{ N} \div 10 \text{ m/s}^2 = 40 \text{ kg}$$

$$\Rightarrow \text{K.E of body} = \frac{1}{2}mv^2 = \frac{1}{2} \times 40 \text{ kg} \times v^2$$

$$\therefore \quad 500 \text{ J} = 20 \text{ kg } v^2$$

$$\Rightarrow v^2 = \frac{500 \text{ J}}{20 \text{ kg}} = 25\frac{\text{m}^2}{s^2}$$

$$\therefore v = \sqrt{25\frac{\text{m}^2}{s^2}} = \textbf{5 m/s}.$$

Question 5

(i) Differentiate between (a) heat capacity and (b) specific heat capacity. [2]

(ii) A hot solid of mass 60 g at 100ºC is placed in 150 g of water at 20ºC. The final steady temperature recorded is 25ºC. Calculate the specific heat capacity of solid. [sp. heat capacity of water is 4200 J $kg^{-1}{}^{o}C^{-1}$] [4]

(iii) (a) Water in the lakes and ponds do not freeze at once in cold countries. Give a reason in support of your answer.
(b) What is the principle of calorimetry? [4]
(c) Name the law on which this principle is based.
(d) State the effect of increase in impurities on the melting point of ice.

Solution :

(i)

S.No.	Heat Capacity	Specific Heat Capacity
1.	It is the amount of heat energy required to raise the temperature of given mass of substance through 1°C.	It is the amount of heat energy required to raise the temperature of 1 gram of substance through 1°C.
2.	It is a variable quantity and changes with the mass of substance.	It is a constant quantity and a fundamental characteristic of a given substance.

(ii)

Substance	Mass	S.H.C	Initial Temp.	Final Temp. = 25°C
Water	150 g	4·2 $Jg°C^{-1}$	20°C	$\theta_R = (25 - 20) = 5°C$
Hot solid	60 g	?	100°C	$\theta_F = (100 - 25) = 75°C$

Heat energy absorbed by water = $mc\theta_R$

$$= 150\ g \times 4{\cdot}2\ \frac{J}{g} \times 5°C = 3150\ J$$

Heat energy given out by hot solid = $mc\theta_f$

$$= 60\ g \times c \times 75\ °C$$

By the principle of calorimetry,

$$60 \times 75\ c\ \frac{g}{°C} = 3150\ J$$

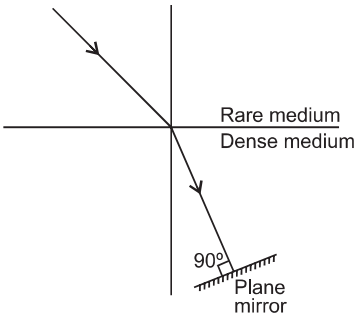
$$\therefore \quad c = \frac{3150}{60 \times 75} \cdot \frac{J}{g°C} = \mathbf{0{\cdot}7\ Jg^{-1}\ °C^{-1}.}$$

(iii) (a) Ice has highest specific latent heat capacity of fusion, *i.e.*, 336 Jg^{-1}. Thus, water bodies have to lose huge amount of heat energy before they start solidifying. So the water bodies freeze over number of days and hence do not freeze at once.
(b) According to principle of calorimetry,
Heat energy given out by a hot body = Heat energy absorbed by cold body.
(c) The law for above principle is based on "Law of conservation of energy".
(d) The soluble impurities lower the melting point of ice, i.e., the ice instead of melting at 0°C melts at a temperature less then 0°C.

Question 6

(i) A converging lens is used to obtain the image of an object placed in front of it. The inverted image formed between F_2 and $2F_2$. [3]
(a) Where is the object placed?
(b) Draw a ray diagram to illustrate the formation of image.

(ii) A ray of light is moving from a rare medium to a dense medium, strikes a plane mirror placed at an angle of 90° to the direction of ray of light as shown in diagram alongside. [2]



(a) Copy the diagram and mark arrows to show the path of ray of light after it is reflected in a mirror.
(b) Name the principle you have used to mark arrows to show the direction of ray.

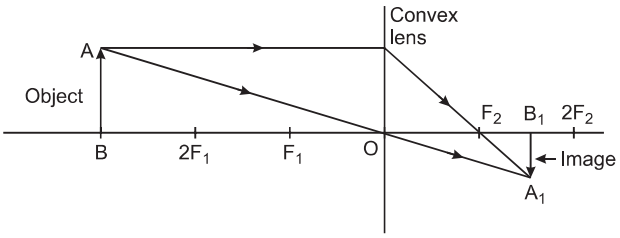
(iii) (a) The refractive index of glass with respect to air is 1.5. What is the value of refractive index of air with respect to glass? [2]
(b) A ray of light is incident as a normal ray on the surface of separation of two different media. What is the value of angle of incidence in this case?

(iv) What do you understand by the term scattering of light? Which colour of white light is scattered the least and why [3]

Solution :

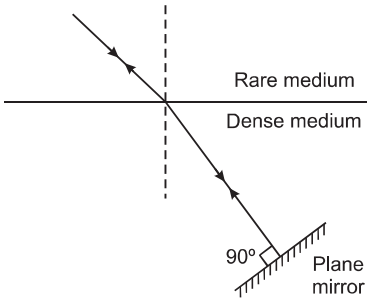
(i) (a) Object is placed between infinity and $2F_1$.

(b) Diagram alongside shows the formation of image for (i) a



(ii) (a) Path of light on striking plane mirror is shown in diagram alongside.

(b) The principle is "Reversibility of light".



(iii) (a) $^{a}\mu_{g} = \frac{1}{^{g}\mu_{a}}$

$\therefore\ ^{g}\mu_{a} = \frac{1}{^{a}\mu_{g}} = \frac{1}{1{\cdot}5} = \frac{2}{3} = 0{\cdot}6666 = \mathbf{0{\cdot}67}.$

(b) During normal incidence, the angle of incidence is zero.

(iv) Scattering of light is the phenomenon due to which a particle having diameter greater than the wavelength of light incident on it, absorbs the light and then transmits it in all possible directions.

Red colour of white light is scattered least. It is because has red light has the largest wavelength in visible spectrum and hence, meets very few particles bigger in diameter than its own wavelength.

Question 7

(i) (a) What is meant by dispersion of light? [4]

(b) Name the radiation used for night photography.

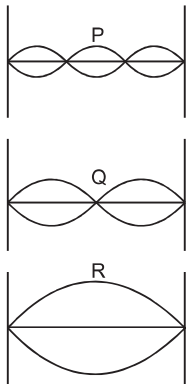
(c) Name the radiation for detecting fracture in bones.

(d) Name the radiation whose wavelength is between 10 nm to 400 nm.

(ii) (a) Name one factor which affects the frequency of sound emitted due to the vibrations in air column. [2]

(b) Name the unit used for measuring sound level.

(iii) The diagram alongside shows three different modes of vibration P, Q and R for the same string [4]



(a) Which vibration will produce louder sound and why?

(b) The sound of which vibration will have maximum shrillness?

(c) State ratio of wavelength P and R.

Solution :

(i) (a) The phenomenon due to which white light (or compound light) splits into component colours on passing through an equilateral triangular prism is called dispersion of light.

(b) Infrared radiation is used for night photography.

(c) X-rays are used for detection of bone fracture.

(d) The radiation having wavelength between 10 nm and 400 nm is ultraviolet radiation.

(ii) (a) The length of enclosed air column determines the frequency of sound, *i.e*, less the length more is the frequency.

(b) Unit for measuring the sound level is decibel.

(iii) (a) 'R' will produce louder sound as it has the largest amplitude.

(b) 'P' will have maximum shrillness.

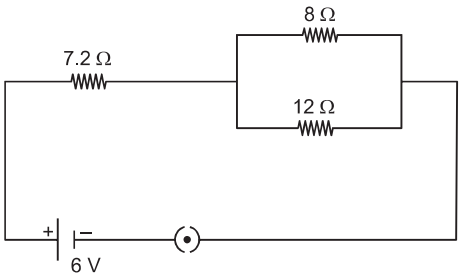
(c) Wavelength of P : R = 3 : 1.

Question 8

(i) (a) A cell is sending current in external circuit. How does terminal voltage compare with the e.m.f. of cell? [4]

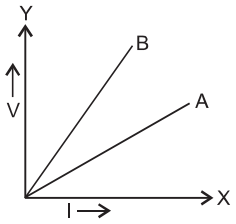
(b) Three resistors are connected to a 6 V battery as shown in figure alongside. Calculate.

1. The equivalent resistance of circuit.
2. Total current in circuit.
3. P.d across 7.2 Ω resistor.



(ii) Define specific resistance and state its SI unit. [2]

(iii) (a) The V–I graph for series combination and for parallel combination of two resistors is shown in figure alongside. Which of the two A or B represents parallel combination and why? [4]



(b) A music system draws a current of 400 mA when connected to 12 V battery.

1. What is the resistance of music system?
2. The music system is left playing for several hours and finally battery voltage drops and the music system stops playing when current drops to 320 mA. What is the voltage of music system when it stops playing?

Solution :

(i) (a) Terminal voltage < *e.m.f* of the cell.

(b) 1. Resistance of 8Ω and 12Ω in parallel

$$\frac{1}{R_p} = \frac{1}{8} + \frac{1}{12} = \frac{3+2}{24} = \frac{5}{24}$$

$$\therefore R_p = \frac{24}{5} = 4{\cdot}8\,\Omega$$

$\therefore$ Equivalent resistance of circuit in series, R_s = (7.2 + 4·8) Ω = **12·0 Ω**

2. Current in circuit, $I = \frac{V}{R} = \frac{6\text{ V}}{12\,\Omega}$ = **0·5 A**

3. P.D across 7·2 Ω resistor, V = IR = 0·5 A × 7·2 Ω = **3·60 V**

(ii) The resistance offered by a conductor having a unit length and unit area of cross-section, such that current enters and leaves from its opposite faces is called specific resistance.
S.I unit of specific resistance is ohm-metre.

(iii) (a) A represents parallel combination of resistors. It is because in parallel circuit, equivalent resistance decreases and hence, magnitude of current increases.

(b) 1. Resistance of music system 'R' = $\frac{V}{I} = \frac{12\,V}{400\,mA} = \frac{12V}{0{\cdot}4A}$ = **30 Ω**

2. When the current drops to 320 mA,

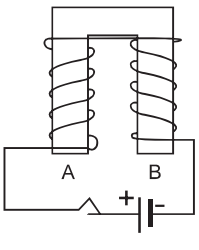
$$V = I.R = \frac{320}{1000}A \times 30\Omega = \textbf{9·6 V}$$

Question 9

(i) (a) State any two advantages of electromagnets over permanent magnets. [2]

(b) The diagram alongside shows a coil wound around a U-shaped soft iron bar AB. [3]

1. What polarity is induced at ends A and B when the current is switched on?
2. Suggest one way to strengthen the magnetic field of electromagnet.
3. What will be the polarities at A and B, if the direction of current is reversed?



(ii) (a) Which of the radioactive radiation: [5]

1. can cause severe genetical disorders?
2. are deflected by electric field.

(b) A nucleus of $_{11}Na^{24}$ emits a beta particle to change into magnesium(Mg)

1. Write symbolic equation of nuclear process.
2. What are the numbers 24 and 11 signify?
3. What is the general name of $^{24}_{12}Mg$ with respect to $^{24}_{11}Na$?

Solution :

(i) (a) 1. Electromagnets can be made of any desired shape or size but not the permanent magnets.

2. The magnetic intensity of an electromagnet can be increased or reduced by adjusting current flowing through it. The magnetic intensity of permanent magnet cannot be changed as desired.

(b) 1. On the passage of current north polarity is induced at end A and south polarity at end B.

2. By increasing the current flowing through the coil of electromagnet the magnetic field can be strengthed.

3. South polarity is created at end A and north polarity at the end B.

(ii) (a) 1. Gamma radiations can cause severe genetical disorder.

2. Alpha and beta radiations are deflected by an electric field.

(b) 1. $_{11}Na^{24} \longrightarrow {}_{12}Mg^{24} + {}_{-1}e^{0}$ (or β particle)

2. 24 signifies mass number, where 11 signifies atomic number.

3. $^{24}_{11}Na$ is known as parent nuclide.

$^{24}_{12}Mg$ is known as daughter nuclide.

V V V