ICSE 2026 EXAMINATION
Sample Question Paper - 3
Physics

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

General Instructions:

1. Answers to this Paper must be written on the paper provided separately.
2. You will not be allowed to write during first 15 minutes. This time is to be spent in reading the question paper.
3. The time given at the head of this Paper is the time allowed for writing the answers.
4. Section A is compulsory. Attempt any four questions from Section B.
5. 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) For how long must an electric motor pump of 2 HP operate, so as to pump 5 m^3 of water from a depth of 15 m. [Take g = 10 N/kg, 1 m^3 of water = 10^3 kg] **[1]**

a) 10 min 55 s b) 8 min 20 s

c) 6 min 15 s d) 4 min 35 s

(b) An electric bulb draws a current of 0.8 A and works on 250 V on an average 8 hrs a day. If energy costs ₹ 1.50 per board of trade unit, calculate the monthly bill. **[1]**

a) ₹ 78 b) ₹ 112

c) ₹ 72 d) ₹ 83

(c) A lever which always has mechanical advantage less than 1 has: **[1]**

a) Effort between the load and the fulcrum. b) Effort and load act at same point.

c) Fulcrum between the load and effort. d) Load between effort and the fulcrum.

(d) A body is describing a uniform cicular motion. Which of the following quantities is/are constant **[1]**

a) speed b) acceleration

c) velocity d) both speed and acceleration

(e) The sound level at a point is increased by 30 dB. By what factor is the pressure amplitude increased? **[1]**

a) 10 times b) 16 times

c) 32 times d) 8 times

(f) **Assertion (A):** The moment of force for force 10 N applied at a distance of 20cm from the pivot will be 0.02 Nm. **[1]**

Reason (R): The moment of force is ratio of perpendicular distance of the line of action of the force for axis of rotation and magnitude of force.

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 false.

(g) Which is not a greenhouse gas: **[1]**

a) chlorofluorocarbons
b) carbon dioxide
c) methane
d) ozone

(h) During sun rise or sun set, the sun appears bigger because the rays of light coming from it pass through **[1]**

a) the earth gets closer to sun
b) larger length of atmosphere
c) smaller length of atmosphere
d) the earth moves away from the sun

(i) In fission of one uranium-235 nucleus, the loss in mass is 0.2 amu. Calculate the energy released. **[1]**

a) 156.4 MeV
b) 182.6 MeV
c) 189.1 MeV
d) 186.2 MeV

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

a) by increasing number of turns in its coil
b) all of these
c) by laminating its soft iron core
d) by increasing the strength of current flowing through it

(k) A lever which always have mechanical advantage more than 1 is: **[1]**

a) Lever of first order
b) Lever of third order
c) Lever of fouth order
d) Lever of second order

(l) Calculate the resistance of nichrome wire, which will bring 200 g of water at 20^{o} C to its boiling points in 7 minutes, when current flowing through wire is 4 A. **[1]**

a) 5Ω
b) 3Ω
c) 10Ω
d) 2Ω

(m) Heat energy is given to 80 g of alcohol (sp. heat capacity 2200 J^{-1} Kg^{-1}) when its temperature rises by 20 K. If the same heat energy is given to 200 g of mercury of sp. heat capacity 140 J kg^{-1} K^{-1}, what is the rise in temperature. **[1]**

a) 152.7 K
b) 215.7 K
c) 251.7 K
d) 125.7 K

(n) A lead pallet of mass 10 g leaves an air gun with a velocity of 40 ms^{-1}. What is the magnitude of potential energy stored by its spring? **[1]**

a) 37 J
b) 8 J
c) 2 J
d) 25 J

(o) The angle of deviation is maximum for _____ when the dispersion of polychromatic light takes **[1]**

place.

a) violet b) blue

c) red d) green

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

(a) i. Name the subjective property of sound related to its frequency and of light related to its wavelength. **[1]**

ii. Name one factor which affects the frequency of sound emitted due to vibrations in an air column. **[1]**

iii. Calculate the minimum distance at which a person should stand infront of a reflecting surface so that he can hear a distinct echo. (Take speed of sound in air = 350 m/s). **[1]**

(b) Mention two possible sources of background radiations. **[2]**

(c) What is the relationship between the mechanical advantage and the velocity ratio for. **[2]**

i. Ideal Machine

ii. Practical Machine

(d) A brass ball is hanging from a stiff cotton thread. Draw a neat labelled diagram showing the forces acting on the brass ball and the cotton thread. **[2]**

(e) A body of mass 10 Kg is kept at a height of 5 m. It is allowed to fall and reach the ground. **[2]**

i. What is the total mechanical energy possessed by the body at the height of 2 m assuming it is a frictionless medium?

ii. What is the kinetic energy possessed by the body just before hitting the ground? Take g = 10 m/s^2.

(f) i. What is the colour code for the insulation on the earth wire? **[2]**

ii. Write an expression for calculating electrical power in terms of current and resistance.

(g) A pulley system has four pulleys in all and is 75% efficient. Calculate **[2]**

i. MA

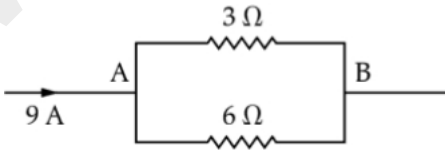
ii. effort required to lift a load of 1000 N.

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

(a) How will you use two identical prisms so that a narrow beam of white light incident on one prism emerges out of the second prism as white light? Draw the diagram. **[2]**

(b) Give any two effects of a force on a non-rigid body. **[2]**

(c) Find the current through the 3 Ω resistor **[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.

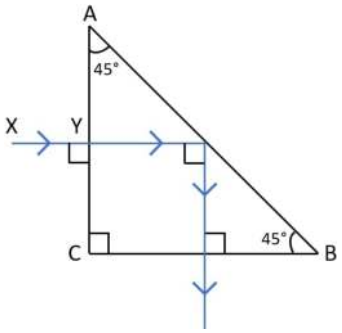
(e) Explain different ways to induce current in a coil. **[2]**

Section B

Attempt any 4 questions

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

(a) A ray of light XY passes through a right angled isosceles prism as shown below. **[3]**



i. What is the angle through which the incident ray deviates and emerges out of the prism?

ii. Name the instrument where this action of prism is put into use.

iii. Which prism surface will behave as a mirror?

(b) A body of mass $\mathbf{m_1}$ of a substance of specific heat capacity $\mathbf{c_1}$, at a temperature t_1 is mixed with another body of mass $\mathbf{m_2}$ of specific heat capacity $\mathbf{c_2}$ at a lower temperature t_2. Deduce an expression for the temperature of the mixture t_3. **[3]**

(c) A uniform meter scale of mass 60 g, carrier masses of 20 g, 30 g and 80 g from points 10 cm, 20 cm and 90 cm marks. Where must be the scale hanged with string to balance the scale. **[4]**

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

(a) State one example which demonstrates that, when liquid evaporates, it takes heat from the surroundings. **[3]**

(b) A 5 cm tall object is placed perpendicular to the principal axis of a convex lens of focal length 20 cm. The distance of the object from lens is 30 cm. Determine the **[3]**

i. position

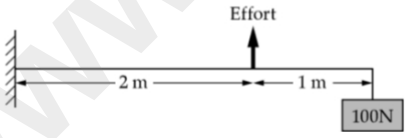
ii. nature

iii. size of image formed

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

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

(a) In the given figure, find the effort required to balance the arm horizontal. **[3]**

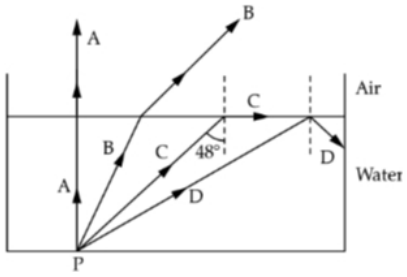


(b) State one point of similarity and one point of difference between an AC generator and a DC motor. **[3]**

(c) The diagram below shows a point source P inside a water container. Four rays A, B, C, D starting from the source P are shown upto the water surface. **[4]**

i. Show in the diagram the path of these rays after striking the water surface. The Critical Angle for water air surface is 48°.

ii. Name the phenomenon which the rays B and D exhibit.



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

(a) A boy is standing in the middle of a big square field. There is a tall building on one side of the field. He explodes a cracker and hears its echo 0.4 s later. What is the size of the square field? (Given, speed of sound in air is 330 m/s) **[3]**

(b) A heater coil connected to 200 V has a resistance of 80 Ω. If the heater is plugged in for the time t such that 1 kg of water at 20°C attains a temperature of 60°C. Find **[3]**

i. the power of heater.

ii. the heat absorbed by water.

iii. the value of t in seconds.

(c) i. What is meant by the terms: **[4]**

a. amplitude

b. frequency of a wave?

ii. Explain, why stringed musical instruments, like the guitar, are provided with a hollow box.

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

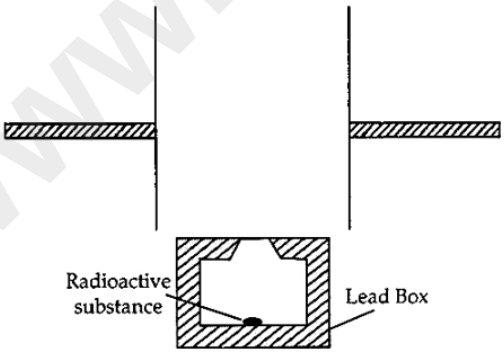
(a) Arrange α, β and γ rays in ascending order with respect to their **[3]**

i. Penetrating power.

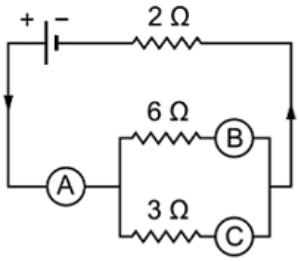
ii. Ionising power.

iii. Biological effect.

(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]**



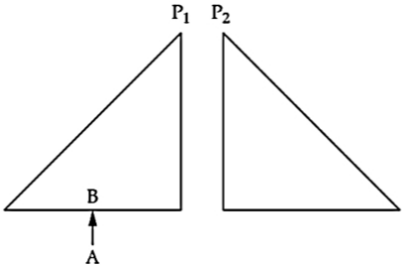
Calculate:

i. the readings in the ammeters A and C.

ii. the resistance of the circuit.

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

(a) i. Two isosceles right-angled prisms are arranged as shown in the figure. Copy the diagram and complete the path of the ray AB along which it passes through the prisms and comes out. **[3]**



ii. Name the phenomenon being displayed by the path of the ray in the diagram.

(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]**

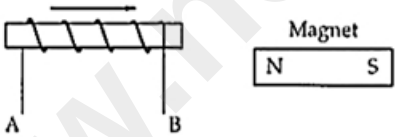
i. Which of the two is good conductors of heat?

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) i. Name two factors on which magnitude of an induced emf in the secondary coil depends. **[4]**

ii. In the following diagram an arrow shows the motion of the coil towards the bar magnet.



a. State in which direction the current flows, A to B or B to A?

b. Name the law used to come in the conclusion.

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) **(b)** 8 min 20 s

Explanation:

t = ?

power = 2 HP = 2 × 750 w

p × t = work done

2 × 750 × t = (mass × g) × displacement

2 × 750 × t (5×10^3 kg) × 10 × 15 m

t = $\frac{750 \times 10^3}{2 \times 750}$ = $\frac{1000}{2}$ = 500 s = $\frac{500}{60}$ = 8 min 20 s

(ii) **(c)** ₹ 72

Explanation:

I = 0.8 A V = 250 V

Power = VI = 250 × $\frac{8}{10}$ = 200 W

Energy consumed per day = 200 × 8 = 1600 Wh

= $\frac{1600}{1000}$ = 1.6 kWh

Energy consumed in 30 days = 1.6 × 30 = 48 kWh

Cost per kWh = ₹ 1.5

∴ Monthly bill = 48 × 1.5 = ₹ 72

(iii) **(a)** Effort between the load and the fulcrum.

Explanation:

Effort between the load and the fulcrum.

(iv) **(a)** speed

Explanation:

speed

(v) **(c)** 32 times

Explanation:

The sound level in dB is

$\beta = 10 \log_{10}\left(\frac{I}{I_0}\right)$

If β_1 and β_2 are the sound levels; l_1 and l_2 are the intensities in the two cases,

$\beta_2 - \beta_1 = 10\left[\log_{10}\left(\frac{I_2}{I_0}\right) - \log_{10}\left(\frac{I_1}{I_0}\right)\right]$

or $30 = 10 \log_{10}\left(\frac{I_2}{I_1}\right)$ or $\frac{I_2}{I_1} = 10^3$

As, the intensity is proportional to the square of the pressure amplitude, we have

$\frac{p_2}{p_1} = \sqrt{\frac{I_2}{I_1}}$

$= \sqrt{1000} \approx 32$

Relation between intensity and pressure amplitude of sound waves $I \propto p_0^2$

where, p_0 = pressure amplitude.

(vi) **(d)** Both A and R are false.

Explanation:

The moment of force is the product of perpendicular distance of the line of action of the force for axis of rotation and magnitude of force.

F = 10N, r = 20cm = 0.2m

F = F × r = 10 × 0.2 = 2Nm

Thus, both assertion and reason are false.

(vii) **(d)** ozone

Explanation:

ozone

(viii) **(b)** larger length of atmosphere

Explanation:

larger length of atmosphere

(ix) **(d)** 186.2 MeV

Explanation:

In fission of U-235 nucleus, the loss of mass,

$\Delta m = 0.2$ amu.

Energy released, $\Delta E = \Delta mc^2$

$= 0.2 \times 931.5$ MeV $= 186.2$ MeV

(x) **(b)** all of these

Explanation:

all of these

(xi) **(d)** Lever of second order

Explanation:

Lever of second order

(xii) **(c)** 10Ω

Explanation:

I = 4 A, R = ? t = 7 min = 420 s

Energy required to heat water E = Q = mc(T - t)

or E = mc(T - t) = I^2 Rt

$200 \times 4.2 \times (100 - 20) = 4 \times 4 \times R \times 420$

$\therefore R = 200 \times \frac{42}{10} \times 80 \times \frac{1}{420 \times 16} = 10\Omega$

(xiii) **(d)** 125.7 K

Explanation:

Heat energy given to $\left(\frac{80}{1000}\ kg\right)$ of alcohol

$= mC\ \Delta t$

$= \frac{80}{1000} \times 2200 \times 20 = 3520$ J

Energy given to $\frac{200}{1000}$ kg of mercury

$\left(\frac{200}{1000}\right) \times 140 \times \Delta t = 3520$

$\Delta = \frac{3520}{28} = 125.7$ K

(xiv) **(b)** 8 J

Explanation:

mass of lead pallet m = $\frac{10}{1000}$

vel. v = 40 ms^{-1}; m = $\frac{1}{100}$ kg

K.E. = $\frac{1}{2}$ mv^2

$\frac{1}{2} \times \frac{1}{100} \times 40 \times 40 = 8$ J

$\therefore$ P.E. = K.E. = 8 J

(xv) **(a)** violet

Explanation:

violet

2. Answer the following questions:

(i) i. Property of sound related to frequency is pitch and property of light related to its wavelength is colour.

ii. The frequency of sound emitted due to vibrations in air column is affected by the length of air column.

iii. Speed of sound, v = 350 m/s

Distance, d = ?

Time, t = 0.1 s [persistence of hearing]

$2d = vt$

$= 350 \times 0.1$

$= 35$

$d = \frac{35}{2} = 17.5$ m

(ii) The two possible source are:

i. **Internal sources:** Such as carbon (C-14) and radium in our body.

ii. **External source:** Cosmic radiations and solar radiations.

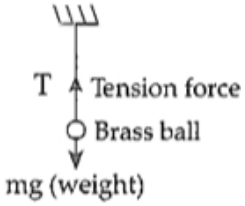
(iii) i. For an ideal machine, the work done by the machine is equal to the work done on the machine. Therefore, mechanical advantage is equal to velocity ratio.

i.e., M.A. = V.R.

ii. For a practical machine, mechanical advantage is less than velocity ratio as efficiency is less than 1.

M.A. < V.R.

(iv) Weight of the ball acting vertically downwards and tension in the thread acting vertically upwards to balance the weight.



(v) i. Total mechanical energy possessed by the body at the height 2 m

= P.E. at the maximum height (Applying principle of conservation of energy implied.)

$= 10 \times 10 \times 5 = 500$ J

ii. K.E. possessed by the body just before hitting the ground

= P.E. at the maximum height = 500 J

(vi) i. The colour code for the insulation on the earth wire is green or yellow.

ii. The expression for calculating electrical power (P) in terms of current (I) and resistance (R) is given by $P = I^2 R$.

(vii) Given, $\eta = 75\%$

VR = 4 (as the system has 4 pulleys)

i. Since, $\eta = \frac{MA}{VR}$

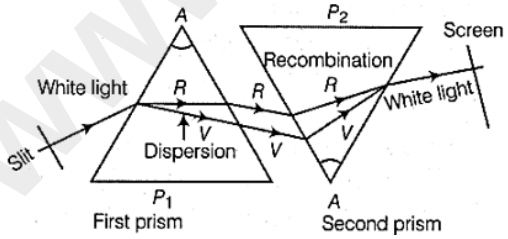
$\therefore$ MA = $\eta \times$ VR = $\frac{75}{100} \times 4 = 3$

ii. Also, MA = $\frac{\text{Load}}{\text{Effort}}$

Effort = $\frac{\text{Load}}{\text{MA}} = \frac{1000}{3} = 333.33$ N

3. Answer the following questions;

(i) A narrow beam of white light incident on one of the prisms emerges out of the identical prism placed in an inverted position with respect to the first prims, as shown in the figure given below.



(ii) The two main effects of a force on a non-rigid body are

i. It can change the state of rest or of motion of the body.

ii. It can change the size or shape of the body.

(iii) Let the current through 3 Ω resistor be I

$\therefore$ the current through 6 Ω resistor will be (9 - I)

Since 3 Ω and 6 Ω resistor are in parallel combination, the potential drop across each will be same

$\Rightarrow 3 \times I = 6(9 - I)$

$\Rightarrow 3I = 54 - 6I$

$\Rightarrow 9I = 54$

$\Rightarrow I = 6$ A

(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) Current is induced in a coil in following ways

i. When a magnet is moved towards or away from coil or there is a relative motion between coil and magnet, a current is induced in the coil circuit.

ii. When a current passing through a coil changes, then a current is induced in a coil placed near to it.

Section B

4. Answer the following questions:

(i) i. 90°

ii. Refracting periscope

iii. Surface AB

(ii) Heat is lost by body at higher temperature.

Heat lost = $mc\Delta t$

= $m_1c_1 (t_1 - t_3)$

Heat will be gained by body at lower temperature.

Heat gained = $mc\Delta t$

= $m_2c_2 (t_3 - t_2)$

According to principle of calorimetry,

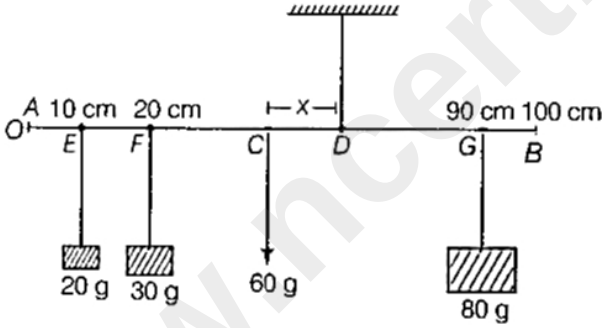
Heat lost = Heat gained

= $m_1c_1 (t_1 - t_3) = m_2c_2 (t_3 - t_2)$

$m_1c_1t_1 + m_2c_2t_2 = (m_1c_1 + m_2c_2)t_3$

$t_3 = \frac{m_1c_1t_1+m_2c_2t_2}{m_1c_1+m_2c_2}$

(iii) Let D is the position of tied hanged string, so that the meter scale and various masses are balanced.



Since, the meter scale is balanced.

$\therefore$ using the principle of moment of forces

Taking moments about D, we get

$80 \times GD = 20 \times ED + 30 \times FD + 60 \times CD$

or $80 \times (40 - x) = 20 \times (40 + x) + 30 \times (30 + x)$

$\Rightarrow 3200 - 80x = 800 + 20x + 900 + 30x + 60x$

$\Rightarrow 1500 = 190x$

$\Rightarrow x = \frac{1500}{190} = 7.9$ cm

Hence, the string must be tied at 50 + 7.9 = 57.9 cm to maintain balance of meter scale.

5. Answer the following questions:

(i) Let us take an example of surahi in which water gets cooled in summer. surahi is made of clay and has pores through which water seeps out and gets evaporated. The latent heat required for evaporation process is taken from the water inside the surahi. Therefore, the temperature of water decreases and it gets cooled.

(ii) Given, size of object, $h_0 = 5$ cm

distance of object, u = -30 cm Focal length, f = + 20 cm

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

$\Rightarrow \frac{1}{v} = \frac{1}{u} + \frac{1}{f} \Rightarrow \frac{1}{v} = -\frac{1}{30} + \frac{1}{20} = \frac{1}{60} \Rightarrow v = 60$ cm

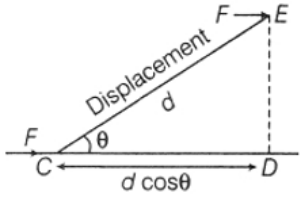
Since, magnification, m = $\frac{h_i}{h_0} = \frac{v}{u}$

$\Rightarrow$ m = $\frac{h_i}{5} = \frac{60}{-30} \Rightarrow h_i = -10$

Therefore, the image is real, inverted and magnified.

(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 $\times$ d cos 0

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

6. Answer the following questions:

(i) In the given figure,

Load = 100 N

Load arm = (2 + 1) m = 3 m

Effort arm = 2 m

Applying principle of levers,

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

Effort $\times$ 2 = 100 $\times$ 3

$\Rightarrow$ Effort = $\frac{300}{2}$

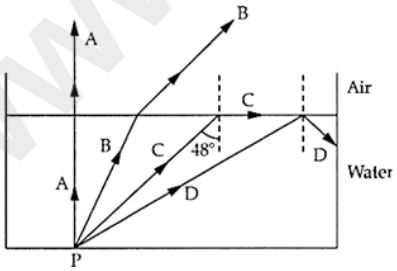
= 150 N

(ii) **Similarity:** In both, the coil or armature moves or rotate in uniform magnetic field.

The two differences between a DC motor and an AC generator are:

DC Motor	AC generator
It converts electrical energy into mechanical energy.	It converts mechanical energy into electrical energy.
It is based on the principle that when a coil carrying current is held in a magnetic field, it experiences a torque which rotates the coil.	It is based on the phenomenon of electromagnetic induction.

(iii)

i. 

ii. Ray B exhibits refraction.

Ray D exhibits total internal reflection.

7. Answer the following questions:

(i) Given, speed of sound in air, v = 330 ms^{-1}

Time for hearing the echo, t = 0.4 s

As, distance travelled by the sound,

2d = v $\times$ t = 330ms^{-1} $\times$ 0.4s = 132m

As in 0.4 s, sound has to travel twice the distance between the boy and the building.

Hence, the distance of the building from boy is

$= \frac{d}{2} = \frac{132}{2} = 66$m

Side of the square field = doble the distance between the boy and the building = 2×66m = 132m

So, size of the square field = (side of the field)^2

= $(132 \text{ m})^2 = 132 \text{ m} \times 132 \text{ m} = 17424 \text{ m}^2$

(ii) i. ∴ Power of heater is given as

$P = \frac{V^2}{R} = \frac{200 \times 200}{80}$ = 500 W

ii. ∴ Heat absorbed by water, H = $mC\theta_R$

= $1 \times 4200 \times 40$

($\because \theta_R = 60^o - 20^o = 40^o$C, C = 4200 J/kg ^{o}C)

= 168000 J

= 168 kJ

iii. ∴ Energy consumption of heater, H = P × t

168000 = 500 × t ⇒ t = $\frac{168000}{500}$ = 336 s

(iii) i. a. The maximum displacement of the particle of medium on either side of its mean position is known as amplitude of wave. It is denoted by A.

b. The number of vibrations made by the particle in one second is known as frequency of wave. It is denoted by f or ν.

ii. The musical instruments like guitar are provided with a hollow box, because vibrating strings of the instrument produces a very weak sound which cannot be heard, but strings set the large volume of air filled in hollow box into forced vibrations and thus a loud sound matching with the frequency of the vibrating string is produced.

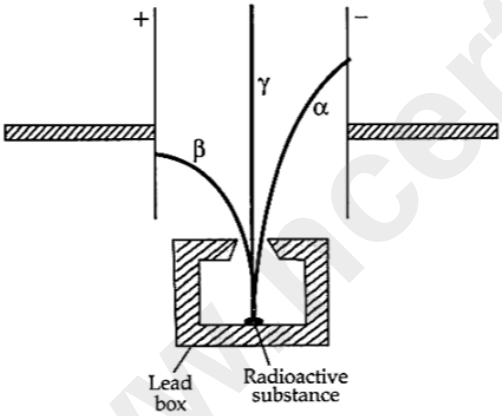
8. Answer the following questions:

(i) i. $\alpha < \beta < \gamma$

ii. $\gamma < \beta < \alpha$

iii. $\alpha < \beta < \gamma$

(ii)



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

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

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

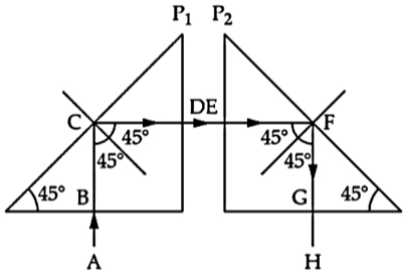
ii. Total resistance of the circuit

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

= $2 + \frac{18}{9} = 4\ \Omega$

9. Answer the following questions:

(i)

i. 

ii. The phenomenon of total internal reflection takes place in both the prisms.

(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. The two factors on which magnitude of an induced emf in the secondary coil depends are:

a. The change in magnetic flux.

b. The time in which magnetic flux changes

ii. a. The current flows from B to A.

From B to A

If current is flowing from A to B, it would create a south pole on the bar magnet side of the solenoid. It would attract the solenoid towards the bar magnet. As per Lenz's law, it should oppose the motion of the solenoid. If the current is flowing from B to A, it would create a north pole on the side of the solenoid towards the bar magnet. This would cause a repulsion between solenoid and bar magnet preventing it from moving towards bar magnet and hence oppose the cause of e.m.f. as per the Lenz's law.

b. The law used to come to the conclusion is Lenz's law.