Physics Questions with Solutions ICSE 2024

Question 2

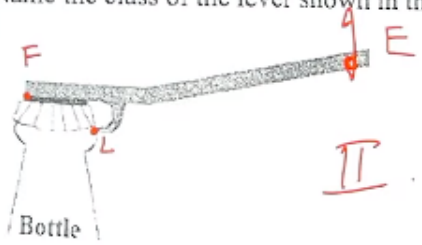
Question 2

(i) (a) In the following atoms, which one is a radioisotope? Give *one* use of this isotope. [3]

O^{16}, C^{14}, N^{14}, He^4

carbon date.

(b) Name the class of the lever shown in the picture below:



II

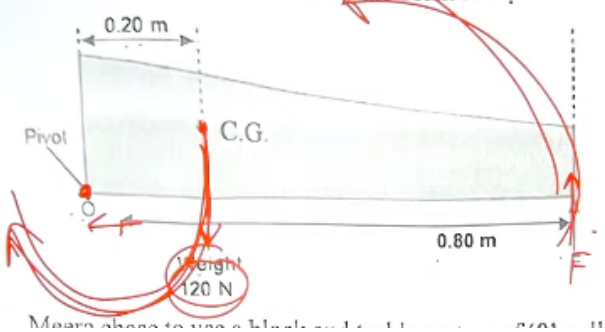
(ii) Fill in the blanks: [2]

(a) When a stone tied to a string is rotated in a horizontal plane, the tension in the string provides centripetal force necessary for circular motion.

(b) Work done by this force at any instant is zero

(iii) A non uniform beam of weight 120 N pivoted at one end is shown in the diagram below.

Calculate the value of F to keep the beam in equilibrium.



POM

ACM = CW

F × 0.8 = 120 × 0.2

F = 30 N

(iv) Meera chose to use a blank ... instead of a single movable [2]

(V) Sumit does 600 J of work in 10 min and Amit does 300 J of work in 20 min. Calculate the ratio of the powers delivered by them.[2]

(vi) 5 bulbs are connected in series in a room. One bulb is fused. It is removed and remaining 4 bulbs are again connected in series to the same circuit. What will be the effect on the following physical quantities? (Increases, Decreases, Remain Same)[2]

(a) Resistance

(b) Intensity of light

vii) Rohan conducted experiments on echo in different media. He observed that a minimum distance of 'x' meters is required for the echo to be heard in oxygen and 'y' meters in benzene. Compare 'x' and 'y' Justify your answer.[2]

Speed of sound in oxygen. 340 ms

Speed of sound in benzene. 200 ms

Answers -

Sumit does 600 J of work in 10 min and Amit does 300 J of work in 20 min. Calculate the ratio of the powers delivered by them. [2]

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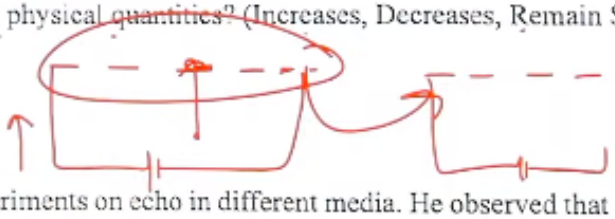


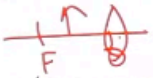
Rohan conducted experiments on echo in different media. He observed that a minimum distance of '*x*' meters is required for the echo to be heard in oxygen and '*y*' meters in benzene. Compare '*x*' and '*y*'. Justify your answer. [2]

Speed of sound in oxygen: 340 ms^{-1}

Speed of sound in benzene: 200 ms^{-1}

Question 3

(i) (a) In a reading glass what is the position of the object with respect to the convex lens used? [2]



(b) Why can we **not** use concave lens for the same purpose?

(ii) A fuse is rated 5 A. Can it be used with a geyser rated 1540 W, 220 V. Write Yes or No. Give supporting calculations to justify your answer. [2]

(iii) State *two* factors affecting the speed of rotation of the coil in a D.C. motor. [2]

(iv) How much heat is required to convert 500 g of ice at 0°C to water at 0°C? The latent heat of fusion of ice is 330 Jg^{-1}. [2]

(v) Copy and complete the nuclear reaction by filling in the blanks. [2]

$$^{92}_{0}U^{235} + {}_{0}n^{1} \longrightarrow {}_{56}Ba^{x} + {}_{y}Kr^{92} + 3\,{}_{0}n^{1}$$

ion 4

The image of a **candle flame** placed at a distance of 36 cm from a spherical lens, is formed on a screen placed at a distance of 72 cm from the lens. Calculate the focal length of the lens and its power. [3]

Below is an incomplete table showing the arrangement of **electromagnetic spectrum** in the increasing order of their wavelength. Complete the table.

Gamma ray	X – ray	U V rays	Visible rays	Infrared	A	Radio waves

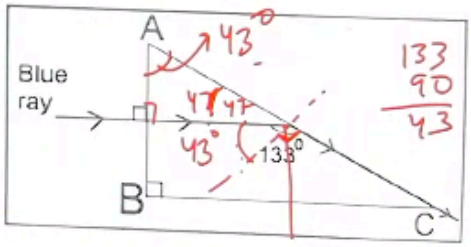
(a) Identify the radiation A.

(b) Name the radiation used to detect fracture in bones.

(c) Name *one* property common to both A and Radio waves.

(iii) (a) Why do we use red colour as a danger signal on the top of a skyscraper? [4]

(b) The diagram below shows the path of a blue ray through the prism:



1. Calculate the critical angle of the material of the prism for blue colour.

2. What is the measure of the angle of this prism (A)?

3. Which colour should replace the blue ray, for the ray to undergo Total Internal Reflection?

Question 5

(i)

(a) Refractive index of glass with respect to water is $\frac{9}{8}$.

Find the refractive index of water with respect to glass.

(b) Name the principle used to find the value in part (a).

(c) If we change the temperature of water, then will the ratio $\frac{9}{8}$ remain the same? Write **Yes** or **No**.

(ii) Light travels a distance of '*10x*' units in time 't_1' in vacuum and it travels a distance of 'x' units in time 't_2' in a denser medium. Using this information answer the question that follows:

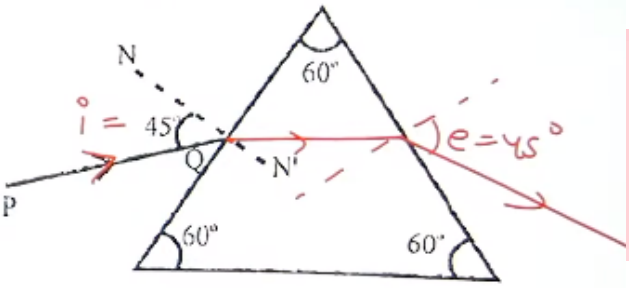
(a) '*Light covers a distance of '20x' units in time 't_1' in diamond.*' State true or false.

(b) Calculate the refractive index of the medium in terms of 't_1' and 't_2'.

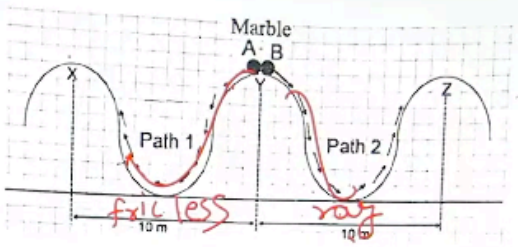
(iii) A monochromatic ray of light is incident on an equilateral prism placed at **minimum deviation position** with an angle of incidence 45° as shown in the diagram. [4

(a) Copy the diagram and complete the path of the ray PQ.

(b) State *two* factors on which the angle of deviation depends.



(ii)



[3]

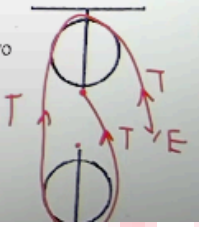
Two identical marbles A and B are rolled down along Path 1 and Path 2 respectively. Path 1 is **frictionless** and Path 2 is **rough**.

(a) Which marble will **surely** reach the next peak?

(b) Along which path/s the **mechanical energy** will be conserved?

(c) Along which path/s is the law of **conservation of energy** obeyed?

(iii) Given are two pulleys.



[4]

(a) Copy and complete the labelled diagram connecting the two pulleys with a tackle to obtain Velocity Ratio = 2.

(b) If Load = 48 kgf and efficiency is 80% then calculate:

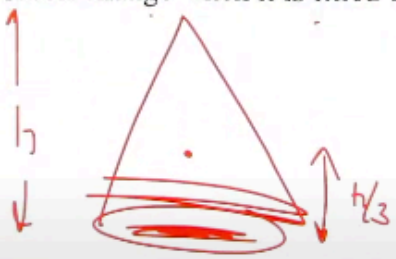
1. Mechanical Advantage.
2. Effort needed to lift the load.

6

) Define Centre of Gravity. [3]

) A hollow ice cream **cone** has height 6 cm.

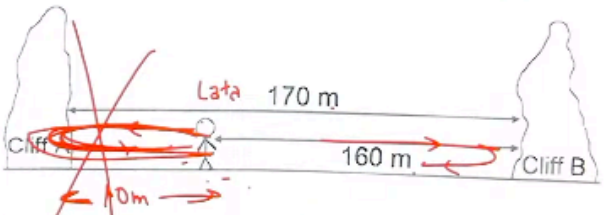
1. Where is the position of its centre of gravity from the **broad base**?
2. Will its position change when it is filled completely with honey? Write **Yes** or **No**.



Question 7

(i) (a) Name the waves used in SONAR. [3]

(b)

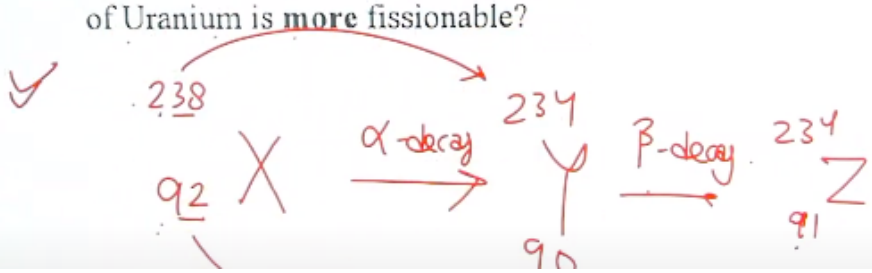


In the above diagram Lata stands between two cliffs and claps her hands. Determine the time taken by her to hear the **first** echo.

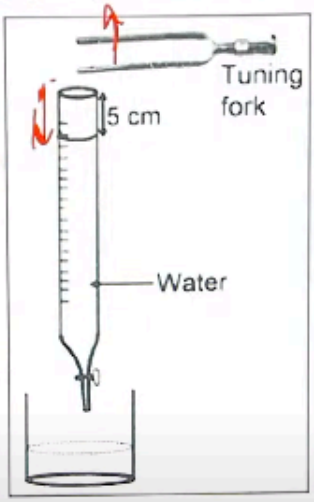
Speed of sound in air 320 ms^{-1}.

(a) Complete the following radioactive reaction:

(b) Uranium is available in two forms U-235 and U-238. Which of the two isotopes of Uranium is **more** fissionable?



(iii) In the given diagram, a vibrating tuning fork is kept near the mouth of a burette filled with water. The length of the air column is adjusted by opening the tap of the burette. At a length of 5 cm of the air column, a **loud sound** is heard. [4]



(a) Name the phenomenon illustrated by the above experiment. resonance

(b) Why is a loud sound heard at this particular length?

(c) If the present tuning fork is replaced with a tuning fork of higher frequency, should the length of the air column increase or decrease to produce a **loud sound**? Give

tion 8

The voltage - current readings of a certain material are shown in the table given below: [3]

Voltage (V)	10 V	20 V	30 V
Current (I)	2 A	3 A	4 A

R = 5Ω 20/3 = 6.3 7.5

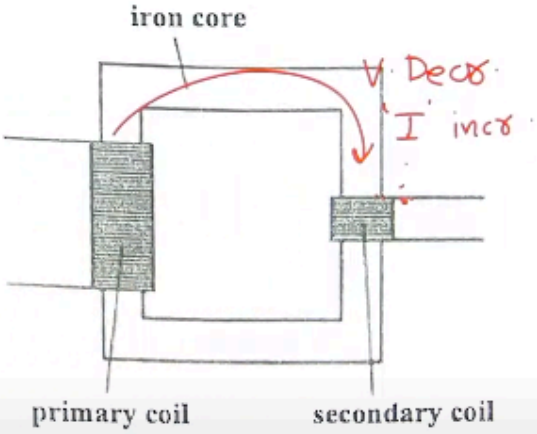
Study the table.

(a) State whether the conductor used is ohmic or non-ohmic.

(b) Justify your answer.

(c) State Ohm's law.

Below is the diagram of a transformer: [3]



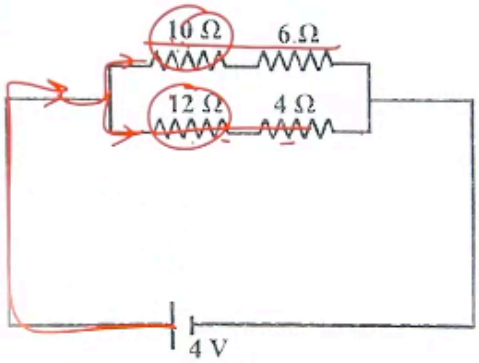
$P_{in} = P_{out}$

$VI =$

(a) Identify the type of transformer. STEP DOWN

(b) In this type of transformer which of the wire is **thicker**, the primary or the secondary? Give a reason.

Study the diagram: [4]



(a) Calculate the total resistance of the circuit. 8Ω

(b) Calculate the current drawn from the cell. $I = \frac{V}{R} = \frac{4}{8} = 0.5A$

(c) State whether the current through 10 Ω resistor is greater than, less than or equal to the current through the 12 Ω resistor. same

Question 9

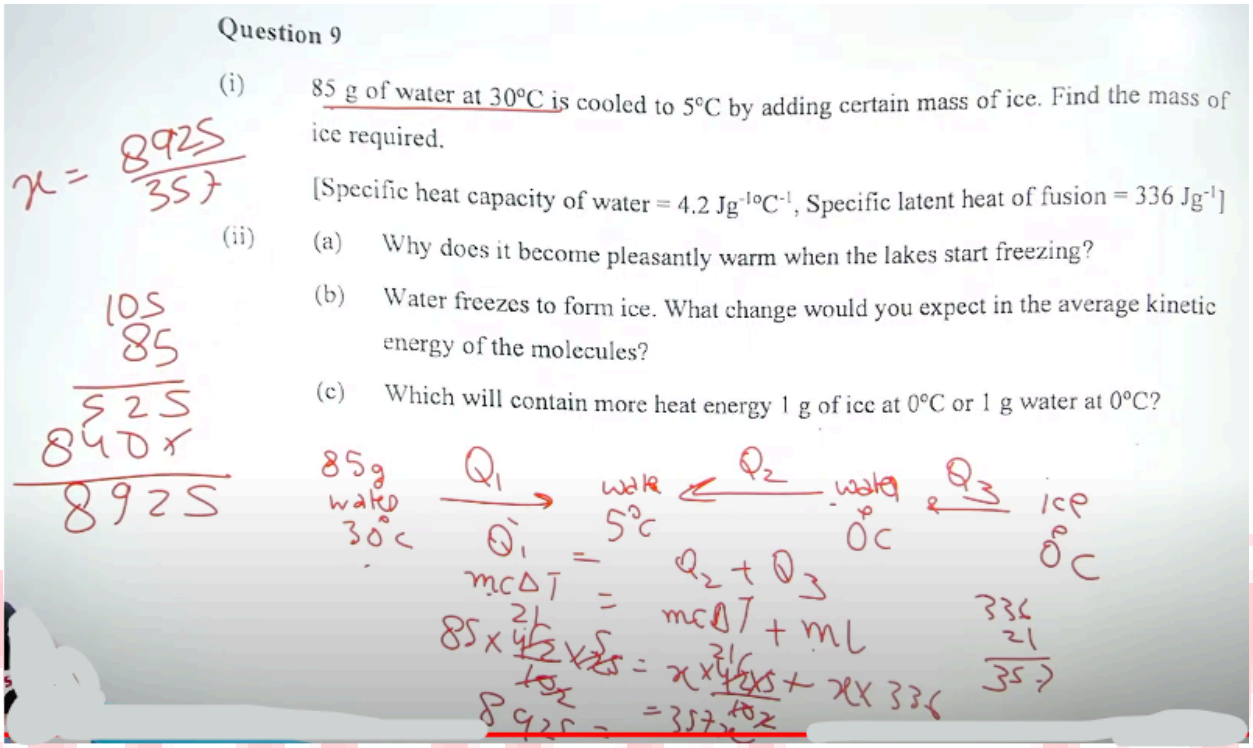
(i) 85 g of water at 30°C is cooled to 5°C by adding certain mass of ice. Find the mass of ice required.

[Specific heat capacity of water = 4.2 $Jg^{-1}{}^{o}C^{-1}$, Specific latent heat of fusion = 336 Jg^{-1}]

(ii) (a) Why does it become pleasantly warm when the lakes start freezing?

(b) Water freezes to form ice. What change would you expect in the average kinetic energy of the molecules?

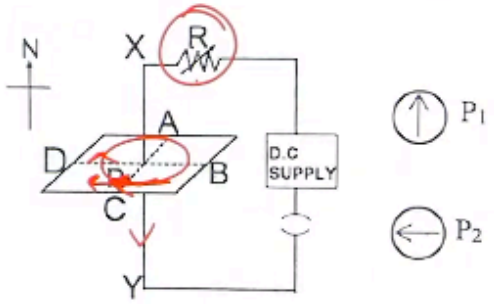
(c) Which will contain more heat energy 1 g of ice at 0°C or 1 g water at 0°C?



x= 25 gm

(iii) (a) State one factor that affects the magnitude of induced current in an AC generator.

(b) Given below is a circuit to study the magnetic effect of electric current. ABCD is a cardboard kept perpendicular to the conductor XY. A magnetic compass is placed at the point **P** of the cardboard. P_1 and P_2 are the positions of the magnetic compass, before and after passing a current through XY respectively.



1. Name the **rule** that is used to predict the direction of deflection of the magnetic compass.
2. State the direction of current in the conductor (X to Y or Y to X) when the circuit is complete.

X to Y

3. If resistance R is increased, then what will be the effect on the magnetic lines of force around the conductor?