

SCIENCE & TECHNOLOGY (PART 1) BOARD'S ACTIVITY SHEET (MARCH 2020) (With Full Solution)

Time : 2 Hours]

[Total Marks : 40

Note : (i) All questions are compulsory.

(ii) Use of a calculator is not allowed.

(iii) The numbers to the right of the questions indicate full marks.

(iv) In case of MCQs (Q. No. 1(A), only the first attempt will be evaluated and will be given credit.

(v) For each MCQ, the correct alternative (A), (B), (C) or (D) with subquestion number is to be written as an answer.

E.g. : (i) (A), (ii) (B), (iii) (C).

(vi) Scientifically correct, labelled diagrams should be drawn wherever necessary.

Q. 1. (A) Write the correct alternative :

5

(i) According to Mendeleev's periodic law, properties of elements are periodic function of their

(A) Atomic numbers (B) Atomic masses

(C) Densities (D) Boiling points

(ii) The vapour content in the air is measured using a physical quantity called

(A) Absolute humidity (B) Relative humidity

(D) Dew point (E) Humidity

(iii) For the normal human eye, the near point is at cm.

(A) 10 (B) 20

(C) 25 (D) 30

(iv) The astronomical object closest to us is in our galaxy.

(A) Mars (B) Venus

(C) Jupiter (D) Moon

(v) In the Wilfley table method, the particles of gangue are separated by separation method.

(A) *Magnetic*

(B) *Froth floatation*

(C) *Hydrauli*

(D) *Gravitational*

Q. 1. (B) Answer the following :

5

(i) Find the odd one out :

Voltmeter, Ammeter, Thermometer, Galvanometer.

(ii) Complete the correlation :

Alkene : $C = C$:: Alkyne :

(iii) State true or false :

The frequency of AC is 50 Hz.

(iv) Match the columns :

Column 'A'	Column 'B'
The wavelength of red light	(a) 600 nm
	(b) 700 nm
	(c) 500 nm

(v) Name the first artificial satellite sent by Russia in space.

Q. 2. (A) Give scientific reasons : (Any two)

4

(i) The weight of an object changes from place to place though its mass is constant.

(ii) Stars twinkle but we do not see the twinkling of planets.

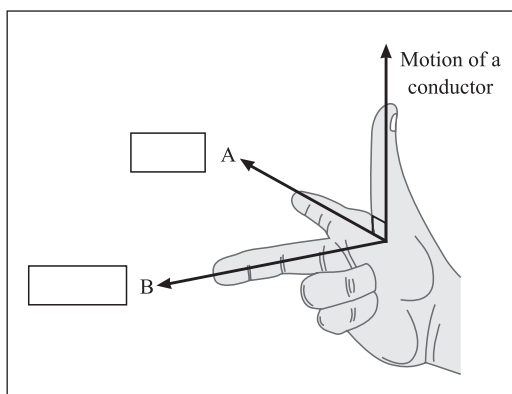
(iii) Elements belonging to the same group have the same valency.

Q. 2. (B) Answer the following : (Any three)

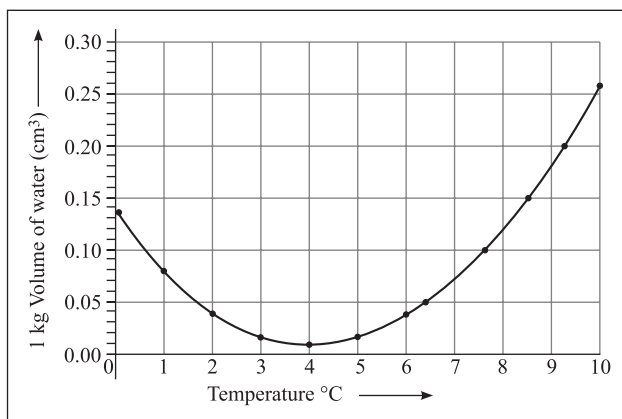
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(i) How much heat energy is necessary to raise the temperature of 5 kg of water from 20°C to 100°C ?

(ii) Observe the given figure of Fleming's Right Hand Rule and write the labels of A and B correctly.



(iii) Observe the given graph and answer the following questions :



(a) Name the process represented in the figure.

(b) At what temperature does this process take place ?

(iv) Complete the given chemical reaction :



Name the type of the reaction.

(v) Write a short note on Alloying.

Q. 3. Answer the following : (Any five)

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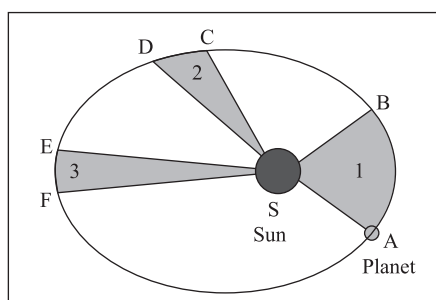
(i) An element has its electronic configuration as 2, 8, 2. Now answer the following questions :

(a) What is the atomic number of this element?

(b) What is the group of this element?

(c) To which period does this element belong?

(ii) Observe the given figure showing the orbit of a planet moving around the Sun and write the three laws related to it:



The orbit of a planet moving around the Sun

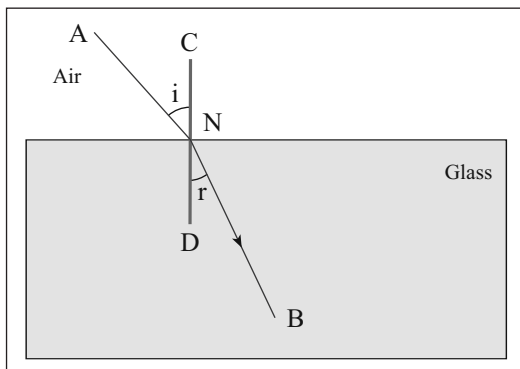
(iii) Read the given passage and answer the following questions :

The home electrical connection consists of 'live', 'neutral' and 'earth' wires. The 'live' and the 'neutral' wires have potential difference of 220 V. The 'earth' is connected to ground. Due to a fault in the equipment or if the plastic coating on the 'live' and the 'neutral' wires gives way the two wires come in contact with each other and a large current flows

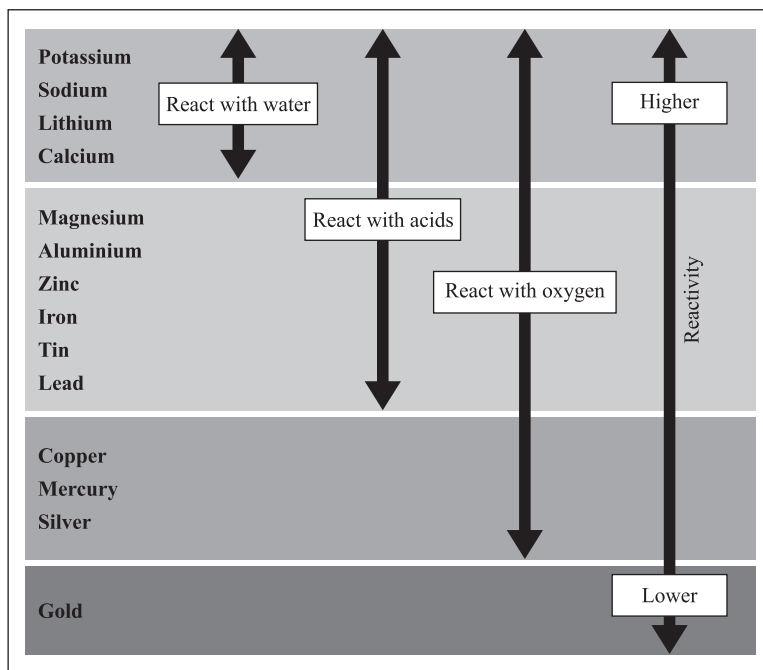
through it producing heat. If any inflammable material (such as wood, cloth, plastic, etc.) exists around that place it can catch fire. Therefore a fuse wire is used as a precautionary measure.

- (a) Name the two wires having potential difference of 220 V.
- (b) What is short circuit ?
- (c) Write the function of a fuse.

(iv) Observe the given figure and answer the following questions :



- (a) Name the process represented by the figure.
 - (b) State the two laws related to the process.
- (v) What is an artificial satellite? Name any two types of artificial satellite and state their functions.
- (vi) Answer the following questions :
- (a) Define Hydrocarbons.
 - (b) Name the types of Hydrocarbons.
 - (c) Name two carbon compounds used in day-to-day life.
- (vii) Observe the given figure of reactivity series of metals and answer the following questions :



Reactivity series of metals

- (a) Name two metals which react with water.
 (b) Name two moderately reactive metals.
 (c) Name the most highly reactive metal and the most less reactive metal.

(viii) Complete the following table :

Straight chain of Carbon compounds	Structural formula	Molecular formula	Name
C	$\begin{array}{c} \text{H} \\ \\ \text{H}-\text{C}-\text{H} \\ \\ \text{H} \end{array}$	CH ₄	Methane
C-C	-----	-----	Ethane
C-C-C	-----	C ₃ H ₈	-----
C-C-C-C	$\begin{array}{cccc} \text{H} & \text{H} & \text{H} & \text{H} \\ & & & \\ \text{H}-\text{C} & -\text{C} & -\text{C} & -\text{C}-\text{H} \\ & & & \\ \text{H} & \text{H} & \text{H} & \text{H} \end{array}$	-----	-----

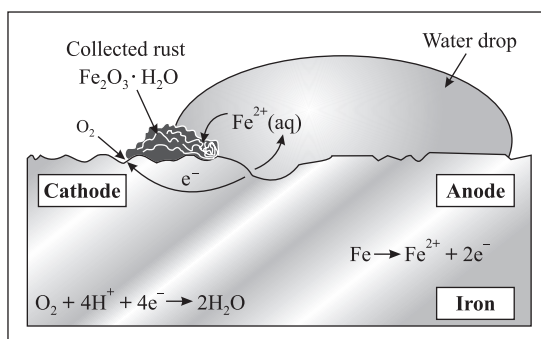
Q. 4. Answer the following : (Any one)

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(i) Draw a scientifically correct labelled diagram of a human eye and answer the questions based on it :

- (a) Name the type of lens in the human eye.
 (b) Name the screen at which the maximum amount of incident light is refracted ?
 (c) State the nature of the image formed of the object on the screen inside the eye.

(ii) Observe the following picture and answer the questions :



- (a) What is a rust?
 - (b) Write the chemical formula of rust.
 - (c) Write the reaction of oxidation of iron at anode.
 - (d) Write the reaction of oxidation of iron at cathode.
 - (e) What is corrosion?
-

SOLUTION : BOARD'S ACTIVITY SHEET (MARCH 2020)

Q. 1. (A)

- (i) (B)
- (ii) (A)
- (iii) (C)
- (iv) (D)
- (v) (D)

Q. 1. (B)

- (i) Thermometer
- (ii) Alkene : $C = C$:: Alkyne : $C \equiv C$
- (iii) True
- (iv) The wavelength of red light = 700 nm
- (v) Sputnik 1 is the first artificial satellite by Russia in space.

Q. 2. (A)

- (i) (1) Weight, being a force, is a vector quantity and its direction is towards the centre of the earth. the value of g is not same everywhere but the weight of an object changes from place to place.
(2) Mass is a scalar quantity. Its value is same everywhere. Its value does not change even when we go to another planet.
- (ii) (1) Further, the apparent position varies with time as the medium is not stationary due to mobility of air and change in temperature. When more light is refracted towards the observer the star appears bright. When less light is refracted towards the observer, the star appears dim.
(2) Compared to stars, planets are relatively closer to the earth. Hence, a planet appears as a collection of a large number of point sources. Due to the changes in the refractive index of air, there is a change in the position and brightness of these point sources. There is an increase in intensity of light coming from some point sources while there is a decrease in intensity of light coming from equal number of other point sources, on an average. The average brightness of a planet remains the same. Also, there is no change in the average position of a star. Hence, a planet does not twinkle.
- (iii) (1) The valency of an element is determined by the number of valence electron in the outermost shell of an atom of an element.
(2) All the elements in a group have the same number of valence electrons. Therefore, elements in the same group should have the same valency.

For example, the elements of group I contain only one valence electron; the valency of elements of group I is one. Similarly for group II, the valency is two.

Q. 2. (B)

(i) Given :

$$m = 5 \text{ kg}, c = 1 \text{ kcal/kg}^\circ\text{C}$$

$$\text{Change in temperature } \Delta T = 100 - 20 = 80^\circ\text{C}$$

Energy to be supplied to water = energy gained by water

$$= \text{mass of water} \times \text{specific heat of water} \times \text{change in temperature of water}$$

$$= m \times c \times \Delta T$$

$$= 5 \times 1 \times 80$$

$$= 400 \text{ kcal}$$

\therefore heat of energy necessary to raise the temperature of water is 400 kcal

(ii)

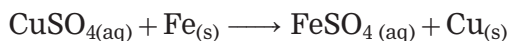
A \longrightarrow Direction of the magnetic field

B \longrightarrow Direction of the induced current

(iii) (a) Given graph depicts Anomalous behaviour of water.

(b) This process takes place at temperature between 0°C to 4°C .

(iv) Chemical reaction :



Type of the reaction : Displacement reaction.

(v) **Alloying** : A homogeneous mixture of two or more metals or a metal and a non-metal in a definite proportion is called an alloy. The physical properties of an alloy are different from those of its constituents. Alloys are corrosion resistant. Alloy decreases the intensity of corrosion of metals.

Examples : Brass is made from copper and zinc. 90 % copper and 10 % tin are used to make an alloy called bronze. Stainless steel is made from 74 % iron, 8 % carbon and 18 % chromium.

Q. 3.

(i) (a) The atomic number of an element is 12.

(b) The group of an element is 2.

(c) This element belongs to period 3.

(ii) (1) The orbit of a planet is an ellipse with the sun at one of foci.

(2) The line joining of the planet and the sun sweeps equal areas in equal intervals of time.

- (3) The square of its period of revolution around the sun is directly proportional to the cube of the mean distance of a planet from the sun.
- (iii) (a) Live wire and Neutral wire are the two wires having potential difference of 220 V.
- (b) When a Live wire and a Neutral wire come in direct contact with each other, the resistance of a circuit becomes very small and hence huge current flows through it. This condition is called short circuit.
- (c) A fuse protects electrical circuits and appliances by stopping the flow of electric current when it exceeds a specified value. For this, it is connected in series with the appliance (or circuit) to be protected. A fuse is a piece of wire made of an alloy of low melting point (e.g. an alloy of lead and tin). If a current larger than the specific value flows through the fuse, its temperature increases enough to melt it. Hence, the circuit breaks and the appliance is protected from damage.
- (iv) (a) The given figure represents the process of refraction of light.
- (b) Laws of refraction of light :
- (1) The incident ray and the refracted ray are on the opposite sides of the normal to the surface at the point of incidence and all the three, i.e., the incident ray, the refracted ray and the normal are in the same plane.
- (2) For a given pair of media, the ratio of the sine of the angle of incidence to the sine of the angle of refraction is constant (Snell's law). This constant is called the refractive index of the second medium with respect to the first medium.
- (v) A man-made object orbiting the earth or any other planet is called an artificial satellite.

The functions of artificial satellites are as follows :

- (1) **Weather satellites :** Weather satellites collect the information regarding weather conditions of the region. It records temperature, air pressure, wind direction, humidity, cloud cover, etc. This information is sent to the space research station on the earth, and then with this information weather forecast is made.
- (2) **Communication satellites :** In order to establish communication between different places on the earth through mobile phones or computer assisted internet, communication satellites are used. Many artificial satellites placed at various locations in the earth's orbit are well interconnected and help us to have communication with any place, from anywhere, at any

time and in any form including voicemail, email, photographs, audio mail, etc.

(vi) (a) The compounds containing only carbon and hydrogen are called hydrocarbons. These compounds are known as organic compounds. e.g. Methane, Ethane.

(b) Hydrocarbons are of two types :

- (1) Saturated hydrocarbons
- (2) Unsaturated hydrocarbons

(c) Carbon compounds used in day-to-day life are :

- (1) Methane
- (2) Cooking gas
- (3) Sugar
- (4) Ethanol

(vii) (a) Sodium and Potassium are the metals which react with water.

(b) Aluminium, Iron, Zinc and Lead are the moderately reactive metals.

(c) The most highly reactive metals are Calcium, Lithium, Sodium, Potassium.

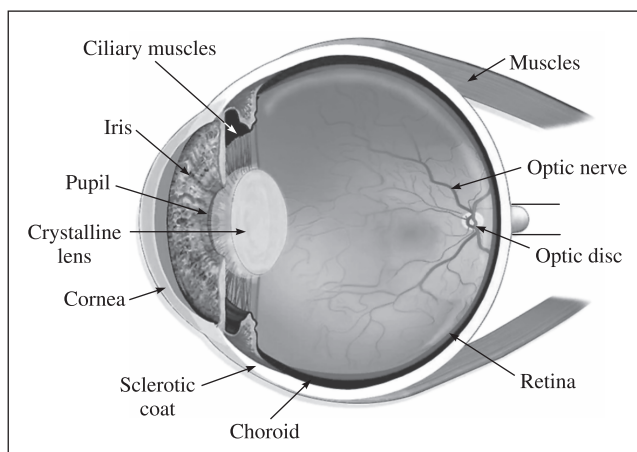
The most less reactive metal is Gold.

(viii)

Straight chain of Carbon compounds	Structural formula	Molecular formula	Name
C	$\begin{array}{c} \text{H} \\ \\ \text{H}-\text{C}-\text{H} \\ \\ \text{H} \end{array}$	CH ₄	Methane
C - C	$\begin{array}{c} \text{H} \quad \text{H} \\ \quad \\ \text{H}-\text{C}-\text{C}-\text{H} \\ \quad \\ \text{H} \quad \text{H} \end{array}$	<u>C₂H₆</u>	Ethane
C - C - C	$\begin{array}{c} \text{H} \quad \text{H} \quad \text{H} \\ \quad \quad \\ \text{H}-\text{C}-\text{C}-\text{C}-\text{H} \\ \quad \quad \\ \text{H} \quad \text{H} \quad \text{H} \end{array}$	C ₃ H ₈	<u>Propane</u>
C - C - C - C	$\begin{array}{c} \text{H} \quad \text{H} \quad \text{H} \quad \text{H} \\ \quad \quad \quad \\ \text{H}-\text{C}-\text{C}-\text{C}-\text{C}-\text{H} \\ \quad \quad \quad \\ \text{H} \quad \text{H} \quad \text{H} \quad \text{H} \end{array}$	<u>C₄H₁₀</u>	<u>Butane</u>

Q. 4.

(i)



Human eye

- (a) The type of lens in the human eye : Double convex transparent crystalline lens.
- (b) The screen at which the maximum amount of incident light is refracted : Cornea.
- (c) The nature of the image formed of the object on the screen inside the eye : Real and inverted image.
- (ii)** (a) When Iron is exposed, moist air forms reddish layer of hydrated ferric oxide, this is called a rust.
- (b) Chemical formula of rust : $\text{Fe}_2\text{O}_3 \cdot \text{H}_2\text{O}$.
- (c) The reaction of oxidation of iron at anode :
- $$\text{Fe}_{(s)} \longrightarrow \text{Fe}_{(aq)}^{2+} + 2e^{-}$$
- (d) The reaction of oxidation of iron at cathode :
- $$\text{O}_{2(g)} + 4\text{H}^{+}_{(aq)} + 4e^{-} \longrightarrow 2\text{H}_2\text{O}_{(l)}$$
- (e) Due to various components of atmosphere, oxidation of metals takes place consequently resulting in their damage, this is called corrosion.
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SCIENCE & TECHNOLOGY (PART 1)
BOARD'S ACTIVITY SHEET (NOVEMBER 2020)

(With Full Solution)

Time : 2 Hours]

[Total Marks : 40

- Note :** (i) All questions are compulsory.
(ii) Use of a calculator is not allowed.
(iii) The numbers to the right of the questions indicate full marks.
(iv) In case of MCQs (Q. No. 1(A), only the first attempt will be evaluated and will be given credit.
(v) For each MCQ, the correct alternative (A), (B), (C) or (D) with subquestion number is to be written as an answer.
E.g. : (i) (A), (ii) (B), (iii) (C).
(vi) Scientifically correct, labelled diagrams should be drawn wherever necessary.
-

Q. 1. (A) Choose the correct option :

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- (i) The minimum velocity of a spacecraft to escape from the Earth's gravitational force must be
(A) 112 km/s (B) 11.2 km/s
(C) 1.12 km/s (D) 0.112 km/s
- (ii) The melting point of pure ethnoic acid is
(A) 17 °C (B) 19 °C
(C) 15 °C (D) 27 °C
- (iii) The process of separation of light into its component colours while it is passing through a medium is called
(A) reflection (B) refraction
(C) dispersion (D) internal reflection
- (iv) The conversion of ferrous sulphate into ferric sulphate is reaction.
(A) oxidation (B) displacement
(C) electrolysis (D) reduction
- (v) Lithium (Li), and potassium (K) is Dobereiner's triad.
(A) magnesium (Mg) (B) aluminium (Al)
(C) sodium (Na) (D) calcium (Ca)

Q. 1. (B) Solve the following subquestions :

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- (i) State true *or* false :
The refractive index depends upon the velocity of light in the medium.
- (ii) Write the correlated answer :
Torch : Concave lens : : Camera :
- (iii) Find odd man out :
Zinc, Iron, Phosphorus, Sodium.
- (iv) Draw the structural formula of C_3H_8 .
- (v) Which satellite is used in educational field among INSAT and GSAT series?

Q. 2. (A) Give scientific reasons : (any two)

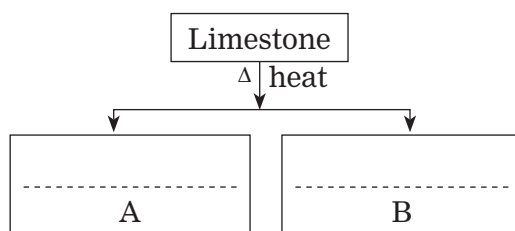
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- (i) Stars appears to be twinkling at night.
- (ii) Simple microscope is used for watch repairs.
- (iii) The copper vessels turn greenish and silver articles turn blackish when kept open in air for a long time.

Q. 2. (B) Answer the following questions : (any three)

6

- (i) An object takes 5 seconds to reach the ground from a height of 5 m on a planet. What is the value of 'g' on that planet?
- (ii) Identify 'A' & 'B' from the following table and complete the table.
Write the chemical equation :



- (iii) Write the modern periodic law and also give the names of 'blocks' in the modern periodic table.
- (iv) Distinguish between 'alternating current' and 'direct current'.
- (v) Define specific heat capacity. Write its SI unit.

Q. 3. Answer the following : (any five)

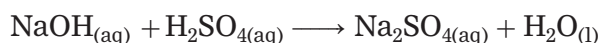
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- (i) An iron ball of mass 3 kg is released from a height of 125 m and falls freely to the ground. Assuming that the value of 'g' is 10 m/s^2 , calculate :
- (a) Time taken by the ball to reach the ground.
- (b) Velocity of the ball on reaching the ground.
- (ii) An element has its electron configuration as (2, 8, 2). Answer the following :
- (a) What is the 'atomic number' of this element?
- (b) What is the 'Group' of this element?
- (c) To which period does this element belong?

(iii) (a) Write the 'endothermic' or 'exothermic' nature of the reaction :



(b) Balance the given chemical equation :



(c) From given reaction, identify the 'oxidant' and 'reductant' :



(iv) A copper sphere of 100 g mass is heated to raise its temperature to 100 °C and is released in water of mass 195 g and temperature 20 °C in a copper calorimeter. If the mass of the calorimeter is 50 g, what will be the maximum temperature of water? (Specific heat of copper = 0.1 cal/g°C)

(v) (a) Draw a neat labelled diagram of 'dispersion of white light through glass prism'.

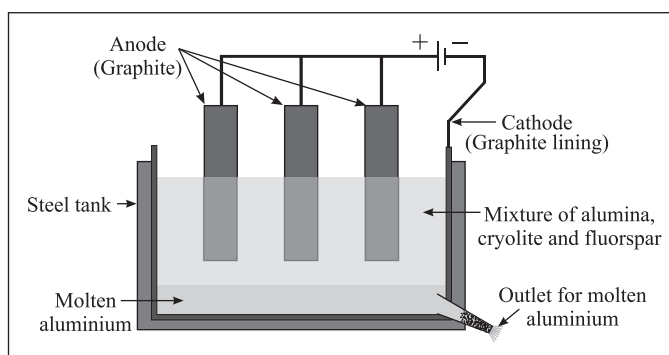
(b) Which coloured ray is the least deviated?

(c) Which coloured ray is the most deviated?

(vi) Complete the following table for convex lens :

Position of object	Position of image	Size of image	Nature of image
(a)	At focus F_2	Point image	Real and inverted
(b) At $2F_1$	At $2F_2$	Real and inverted
(c) Between F_1 and O (within the focal length)	On the same side (object side)	Very large

(vii) Observe the following diagram and answer the questions :



(a) Write the 'anode reaction'.

(b) Write the 'cathode reaction'.

(c) What is the purpose of mixing 'cryolite' and 'fluorspar' with 'alumina' in the electrolytic reduction of alumina?

(viii) (a) What is the principle behind the working of a satellite launch vehicle?

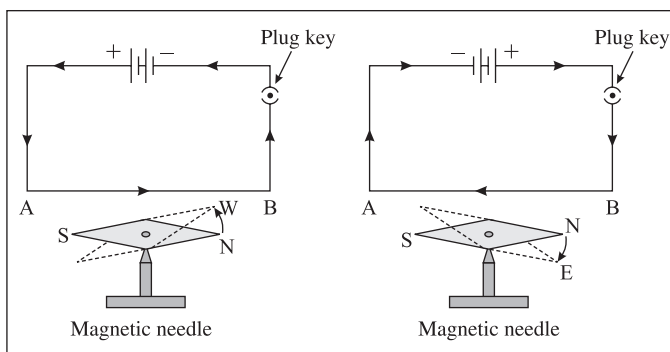
(b) Write the formula for the 'escape velocity'.

(c) Write the long form of 'ISRO'.

Q. 4. Solve the following questions : (any one)

5

(i) Observe the diagrams and answer the questions :



(a) Which effect of electric current is shown in the above figure?

(b) What will happen if the number of electric cells is increased on the magnetic needle?

(c) If the distance between the conductor and magnetic needle is increased, what will be the effect on the intensity of the magnetic field?

(d) If the ends of electric cell are interchanged, what will be the effect on the magnetic needle?

(e) Write the names of any *two* instruments which work on the magnetic effect of electric current.

(ii) Answer the following :

(a) Draw the electron-dot structure of methane.

(b) Define homologous series.

(c) Write the IUPAC names of the following :



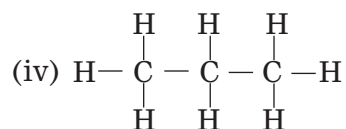
SOLUTION : BOARD'S ACTIVITY SHEET (NOVEMBER 2020)

Q. 1. (A)

- (i) (B)
- (ii) (A)
- (iii) (C)
- (iv) (A)
- (v) (C)

Q. 1. (B)

- (i) True
- (ii) Torch : Concave lens : : Camera : Convex lens
- (iii) Phosphorus (All except phosphorus, others are metals.)



- (v) EDUSAT

Q. 2. (A)

- (i) (1) As a star is far away from the earth, it appears as a point source of light. Air is always in motion. The density and temperature of air change continuously resulting in the change in the refractive index of air in a given region of space. Hence, there is a continuous change in the apparent position and brightness of a star. Hence, the star appears to twinkle.
- (2) Compared to stars, planets are relatively closer to the earth. Hence, a planet appears as a collection of a large number of point sources. Hence, though the refractive index of air in a given region of space changes continuously, there is no change in the average apparent position and brightness of a planet. Hence, we do not see the twinkling of planets.
- (ii) (1) When an object is placed within the focal length of a magnifying glass or simple microscope (convex lens), its larger and erect image is obtained on the same side of the lens as that of the object.
- (2) By adjusting the distance between the object and the lens, the image can be obtained at the minimum distance of distinct vision. Thus, a watch repairer can see the minute parts of a watch more clearly with the aid of a magnifying glass (a simple microscope) than with the naked eye, without any stress on the eye. Hence, watch repairers use a magnifying glass (a simple microscope) while repairing the watches.

- (iii) (1) Copper undergoes oxidation in air to form black copper oxide. Carbon dioxide in air reacts with copper oxide. Thus, copper vessel loses its lustre due to formation of greenish layer of copper carbonate (CuCO_3) on its surface.
- (2) The layer of silver sulphide (Ag_2S) formed by the reaction of silver with hydrogen sulphide in air due to which silver articles turn blackish.

Q. 2. (B)

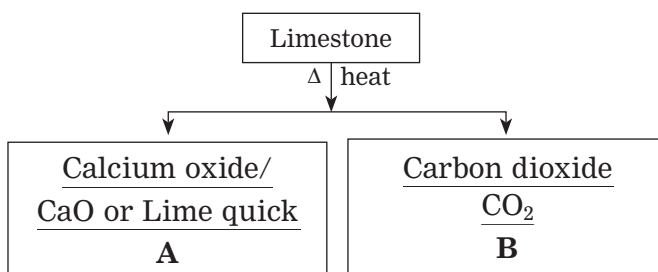
(i) Data : $u = 0 \text{ m/s}$, $s = 5 \text{ m}$, $t = 5 \text{ s}$, $g = ?$

$$\therefore s = \frac{1}{2}gt^2$$

$$\therefore 5 \text{ m} = \frac{1}{2}g \times (5 \text{ s})^2 = \frac{1}{2}g \times 5 \text{ s} \times 5 \text{ s}$$

$$\therefore g = \frac{2}{5} \text{ m/s}^2 = 0.4 \text{ m/s}^2 \text{ (on the planet).}$$

(ii)



(iii) The chemical and physical properties of elements are a periodic function of their atomic numbers.

s-block, *p*-block, *d*-block and *f*-block.

(iv)

Alternating current	Direct current
1. Alternating current flows in periodic manner. In one half cycle it flows in one direction, and, in the other half cycle, it flows in the opposite direction.	1. Direct current flows in one direction only.
2. It can be transmitted over a long distance.	2. It cannot be transmitted over a long distance.

(v) The amount of heat energy required to raise the temperature of a unit mass of an object by 1°C is called the specific heat capacity of that object. Units of the specific heat capacity : J/kg. K(SI units) J/kg. $^\circ\text{C}$, erg/ $^\circ\text{C}$, cal/g. $^\circ\text{C}$, kcal/kg. $^\circ\text{C}$.

Q. 3.**(i)** Data : $s = h = 125$ m, $a = g = 10$ m/s², $u = 0$ m/s, $t = ?$, $v = ?$

(a) According to Newton's second equation of motion,

$$s = ut + \frac{1}{2} at^2$$

$$\therefore 125 = 0 \times t + \frac{1}{2} \times 10 \times t^2$$

$$\therefore 125 = 5 t^2$$

$$\therefore t^2 = \frac{125}{5} = 25$$

$$\therefore t = 5 \text{ s}$$

The ball takes 5 s to reach the ground.

(b) According to Newton's first equation of motion,

$$v = u + at$$

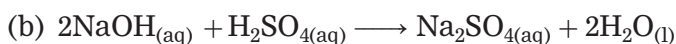
$$\therefore v = 0 + 10 \times 5 = 50 \text{ m/s}$$

The velocity of the ball on reaching the ground is 50 m/s.

(ii) (a) The atomic number of this element is 12.

(b) The group of this element is 2.

(c) This element belongs to a period 3.

(iii) (a) The reaction $2\text{KClO}_{3(s)} \xrightarrow{\Delta} 2\text{KCl}_{(s)} + 3\text{O}_2 \uparrow$ is an Exothermic reaction.

(c) Oxidant : CuO

Reductant : H₂**(iv)** Data : $m_1 = 100$ g, $c_1 = 0.1$ cal/g·°C, $T_1 = 100$ °C, $m_2 = 195$ g, $c_2 = 1$ cal/g·°C, $T_2 = 20$ °C, $m_3 = 50$ g, $c_3 = 0.1$ cal/g·°C, $T_3 = 20$ °C, $T = ?$

Heat lost by the copper sphere,

$$Q_1 = m_1 c_1 (T_1 - T) = 100 \times 0.1 \times (100 - T)$$

Heat absorbed by the water,

$$Q_2 = m_2 c_2 (T - T_2) = 195 \times 1 \times (T - 20)$$

Heat absorbed by the calorimeter,

$$Q_3 = m_3 c_3 (T - T_3) = 50 \times 0.1 \times (T - 20)$$

Now, $Q_1 = Q_2 + Q_3$

$$\therefore 1000 - 10 T = 195 T - 195 \times 20 + 5T - 100$$

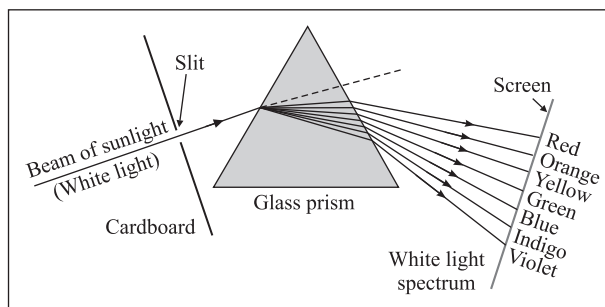
$$\therefore 210 T = 1000 + 3900 + 100 = 5000$$

$$\therefore T = \frac{5000}{210} = \frac{500}{21}$$

$$= 23.8 \text{ }^\circ\text{C}$$

This is the maximum temperature of Water.

(v) (a)



Dispersion of sunlight (white light) by a glass prism

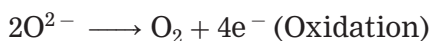
(b) Red ray is the least deviated.

(c) Violet ray is the most deviated.

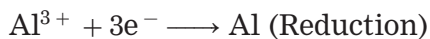
(vi)

Position of object	Position of image	Size of image	Nature of image
(a) <u>At infinity</u>	At focus F_2	Point image	Real and inverted
(b) At $2F_1$	At $2F_2$	<u>Same size</u>	Real and inverted
(c) Between F_1 and O (within the focal length)	On the same side (object side)	Very large	<u>Virtual and erect</u>

(vii) (a) Anode reaction :



(b) Cathode reaction :



(c) Cryolite and fluorspar is added to the molten mixture of alumina to lower its melting point up to $1000^\circ C$.

(viii) (a) The principle behind the working of a satellite launch vehicle is Newton's third law of motion. It states that every action force has an equal (in magnitude) and opposite (in direction) reaction force which acts simultaneously.

(b) Escape velocity,

$$v_{\text{esc}} = \sqrt{\frac{2GM}{R}}, \text{ where}$$

G \equiv the universal gravitational constant,

M \equiv mass of a planet (or star or moon) and

R \equiv radius of the planet (or star or moon).

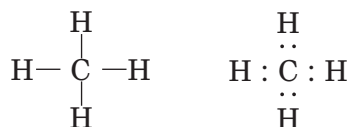
(c) Indian Space Research Organisation.

Q. 4.

- (i) (a) Magnetic effect of electric current.
(b) The deflection of the magnetic needle will increase.
(c) The intensity of the magnetic field will decrease, and hence the deflection of the magnetic needle will decrease.
(d) The magnetic needle will be deflected in the opposite sense.
(e) Electric motor, electric bell.

- (ii) (a) Molecular Formula – CH_4

Electron-dot structure of methane :



- (b) The length of the carbon chains in carbon compounds is different their chemical properties are very much similar due to the presence of the same functional group in them. The series of compounds formed by joining the same functional group in place of a particular hydrogen atom on the chains having sequentially increasing length is called homologous series. Two adjacent members of the series differ by only one $-\text{CH}_2-$ (methylene) unit and their mass differ by 14 units.

- (c) (1) $\text{CH}_3 - \text{CH}_2 - \text{COOH}$

IUPAC name : Propanoic acid

- (2) $\text{CH}_3 - \text{CHOH} - \text{CH}_3$

IUPAC name : Propan-2-ol

- (3) $\text{CH}_3 - \text{CO} - \text{CH}_2 - \text{CH}_3$

IUPAC name : Butan-2-one

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