

# Board Activity Sheet Solution: March 2022

## Science and Technology Part – 1

Q.1  
(A)

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

**Hint:**

$$\text{Power of lens} = \frac{1}{\text{focal length in metre}} = \frac{1}{0.25} = 4.0 \text{ D}$$

As, focal length of convex lens is always positive, power of convex lens is also positive.

- v. (A)

Q.1  
(B)

- i. PSLV
- ii. Group 1 : Alkali metals : : Group 17 : Halogens.

iii.

Column 'A'	Column 'B'
Refractive index of water	(c) 1.33

- iv. False
- v. Propan-2-ol

Q.2  
(A)

- i.
  - a. As we move from top to bottom in a group, number of shells increases.
  - b. The outermost electrons go farther and farther from the nucleus, extending the radius and ultimately increasing the size of the atom even though the nuclear charge increases.

Hence, atomic radius goes on increasing down a group.

- ii.
  - a. A magnification of about 20 times is obtained by simple microscope.
  - b. When an object is placed within the focal length of convex lens, one gets a magnified and erect image of the object.
  - c. Thus, the watch repairer can see the minute parts of the watch more clearly with the help of simple microscope than the naked eye, without any strain on the eye.

Hence, simple microscope is used for watch repairs.

### SMART TIP

Although compound microscope gives the magnification of almost 40 to 1000 times, it will give an over-enlarged image of tiny parts of watch. Hence, it cannot be used for watch repairs.

- iii.
  - a. When edible oil is left aside for long time, it undergoes air oxidation.
  - b. Due to this, the taste and smell of oil changes and it becomes rancid. If food is cooked in this oil, its taste also changes.
  - c. Thus, the oil will become unfit for consumption.
  - d. The process of oxidation reaction of oil can be slowed down by storing it in air tight container.

Hence, it is recommended to use air tight container for storing oil for long time.

Q.2  
(B)

i.

**Solution:****Given:** Time ( $t$ ) = 5 s, height ( $s$ ) = 5 m**To find:** Gravitational acceleration ( $g$ )**Formula:**  $s = ut + \frac{1}{2}gt^2$ **Calculation:** From formula,

$$5 = 0 \times t + \frac{1}{2}g(5)^2$$

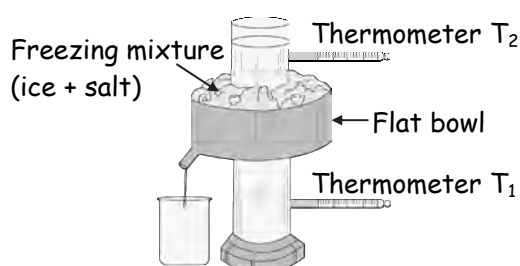
$$\therefore 5 = \frac{1}{2}g \times 25$$

$$\therefore g = \frac{2}{5}$$

$$\therefore g = 0.4 \text{ m/s}^2$$

**Ans:** The gravitational acceleration of the planet is  $0.4 \text{ m/s}^2$ .

ii.

**Hope's Apparatus**

iii.

- The incident ray and the refracted ray are on the opposite sides of the normal at the point of incidence, and all three lie in same plane.
- 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.

iv.

- The main ore of aluminium is bauxite.
- Silica ( $\text{SiO}_2$ ), ferric oxide ( $\text{Fe}_2\text{O}_3$ ) and titanium oxide ( $\text{TiO}_2$ ) are the impurities present in bauxite.

v.

A = Direction of magnetic field  
B = Direction of current

Q.3

i.

**Demerits of Mendeleev's periodic table:**

- The whole number atomic mass of the elements cobalt (Co) and nickel (Ni) is the same, that is, 59. Therefore, there was an ambiguity regarding the sequence of these elements in the Mendeleev's periodic table.
- Isotopes were discovered long time after Mendeleev developed the periodic table. Isotopes have same chemical properties but different atomic masses. Therefore, isotopes could not be given a proper place in Mendeleev's periodic table.
- In Mendeleev's periodic table, elements are arranged in an increasing order of atomic masses. However, the rise in atomic mass is not uniform. Hence, it was not possible to predict the number of elements that could be discovered between two heavy elements.
- No fixed position was given to hydrogen in Mendeleev's periodic table because it resembled alkali metals (group I) as well as halogens (group VII).

(Any three points)



- ii. a. **Kepler's first law:** The orbit of a planet is an ellipse with the sun at one of the foci.  
 b. **Kepler's second law:** The line joining the planet and the sun sweeps equal areas in equal intervals of time.  
 c. **Kepler's third law:** The square of orbital period of revolution of a planet around the Sun is directly proportional to the cube of the mean distance of the planet from the Sun.
- iii. a. Displacement reaction  
 b. Combination reaction (or Oxidation reaction)  
 c. Decomposition reaction
- iv. **Solution:**  
*Given:* Speed of light in medium ( $v_2$ ) =  $1.5 \times 10^8$  m/s,  
 velocity of light in vacuum ( $v_1$ ) =  $3 \times 10^8$  m/s  
*To find:* Absolute refractive index ( $n$ )  
*Formula:*  $n = \frac{v_1}{v_2}$   
*Calculation:* From formula,  $n = \frac{3 \times 10^8}{1.5 \times 10^8} = 2$   
**Ans:** The absolute refractive index of the medium is 2.
- v. a. Heat is transferred from hot object to cold object.  
 b. Principle of heat exchange.  
 c. As inside the heat resistant box, the heat lost by hot object exactly equals heat gained by cold object, principle of heat exchange is stated as:  
 In an isolated system,  
 Heat lost by hot object = Heat gained by cold object.
- vi.
- | Sr. No. | Position of the object   | Position of the image    | Nature of the image                |
|---------|--------------------------|--------------------------|------------------------------------|
| 1.      | Beyond $2F_1$            | Between $F_2$ and $2F_2$ | Real, inverted and diminished      |
| 2.      | At focus $F_1$           | At infinity              | Real, inverted and highly enlarged |
| 3.      | Between $F_1$ and $2F_1$ | Beyond $2F_2$            | Real, inverted and enlarged        |
- vii. a. **Metallurgy:** The extraction of metals from their ores and then refining them for use is known as metallurgy.  
 b. **Ores:** The minerals from which metals can be profitably extracted are called ores.  
 c. **Gangue:** The unwanted impurities of sand, soil, rocky substances, etc., present in the ore are called gangue.
- viii. a. Due to space missions, the world has come closer. It has become very easy to contact a person in any part of the world within seconds.  
 b. Due to internet, every information is available at our fingertips. We can gather information about worldwide events sitting at home.  
 c. Use of satellites can give us advance alerts about various natural calamities, so that, we can take proper precautions.



- d. During war, the aerial surveillance can be used to get information about the enemy actions.
- e. It is also possible to explore the fossil reserves and minerals in the earth. In this way, due to its innumerable applications, the space mission or space technology has become an inevitable part of development of a nation.

Q.4

i. a. The instrument shown in the figure is AC generator.

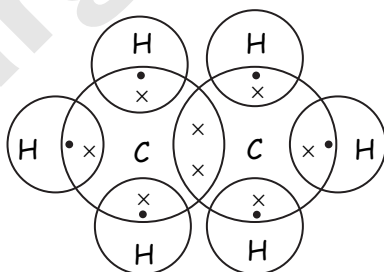
b. Electric generator works on the principle of electromagnetic induction. When the coil of electric generator rotates in a magnetic field, magnetic field induces a current in this coil. This induced current then flows into circuit connected to the coil.

c. **Working:**

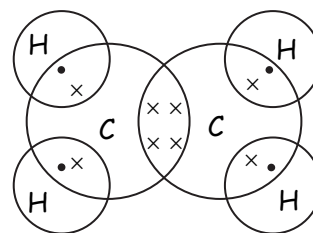
1. When the axle is rotated with the help of a machine from outside, the coil ABCD starts rotating.
2. On rotating the axle, the branch AB move upwards and branch CD move downwards hence coil ABCD rotates clockwise.
3. According to Fleming's right hand rule, electric current flows in the direction  $A \rightarrow B \rightarrow C \rightarrow D$ . Therefore, current flows from  $B_2$  to  $B_1$  in the external circuit through galvanometer.
4. After half rotation, the branch AB and CD exchange their position and the induced current flows as  $D \rightarrow C \rightarrow B \rightarrow A$ .
5. Since, branch BA is in contact with brush  $B_1$  and branch DC is in contact with  $B_2$ , current flow from  $B_1$  to  $B_2$  in the external circuit i.e., in the direction opposite to the previous half rotation.
6. This repeats after every half rotation and in this way, alternate current is produced using AC generator.

d. Uses of AC generator: Power plants, electric coffee machine

- ii. a. 1. Saturated hydrocarbon  
2. Unsaturated hydrocarbon
- b. Electron-dot structure for (1):



Electron-dot structure for (2):



- c. **Homologous series:** The series of carbon compounds formed by joining the same functional group in the place of a particular hydrogen atom on the carbon chains having sequentially increasing length is called **homologous series**.