



## PHYSICS

### Sample Paper - 1 Solutions

Time : 2 Hours

Max. Marks : 40

- Note :**
1. Answers to this paper must be written on the paper provided separately.
  2. You will not be allowed to write during the first 15 minutes.
  3. This time is to be spent in reading the question paper.
  4. The time given at the head of the paper is the time allotted for writing the answers.
  5. Attempt all questions from Part I (compulsory) and any five questions from Part II, two out of three questions from Section A and three out of five questions from Section B.
  6. The intended marks of questions or parts of questions are given in brackets [ ].

**Q.1 (A) Choose the correct alternative and rewrite the statement:** [5]

- i. Option (c)  
The SI unit of weight is Newton.
- ii. (a) 2
- iii. Option (c)  
Tungsten is used to make a solenoid-type coil in an electric bulb.
- iv. Option (a)  
A ray of light changes its path when it passes obliquely from one medium to another because the speed of light changes.
- v. (b)  $\begin{array}{c} \text{O} \\ || \\ -\text{C}-\text{H} \end{array}$

**(B) Solve the following questions :** [5]

- i. Acceleration due to gravity is the highest at poles.
- ii. Al – 2, 8, 3
- iii. NaOH
- iv. True.
- v. Electric iron : Heating effect of electric current : : Electric generator : Electromagnetic induction.

**Q.2 (A) Solve the following questions (Any 5)** [10]

- i. a. Atomic Radii :
  - i. Left to right, it decreases.
  - ii. Top to bottom, it increases.
- b. Metallic property :
  - i. Left to right decreases.
  - ii. Top to bottom increases.

- ii.  $v_1 = 3 \times 10^8$  m/s

We know

$${}_1 n_2 = \frac{v_1}{v_2}$$

$${}_2n_1 = \frac{3 \times 10^8 \text{ m/s}}{2 \times 10^8 \text{ m/s}}$$

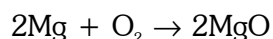
$$\therefore {}_2n_1 = 1.5$$

Thus, the refractive index of the medium w.r.t. air is 1.5.

- iii. a) Radii of curvature of a lens: The radii of the spheres whose parts form surfaces of a lens are called the radii of curvature of a lens.
- b) Principal axis of a lens: The imaginary straight line passing through the two centres of curvature is called the principal axis of a lens.

**2. (B) Solve the following questions (Any 3)**

- i. It is an equation in which the number of atoms for each element in the reactant and product is same.



Balancing is required to satisfy law of conservation of mass.

- ii. Navigational satellites:
  - a) These satellites assist surface, water and air transportation and coordinate their busy schedules.
  - b) These satellites assist users with current live maps.
  - c) These satellites also guide with real-time traffic conditions.
- iii. Vinegar is a liquid which consist of acetic acid (Ethanoic acid).

Uses :

- i. Preparation of food.
- ii. Used in pickling.
- iii. Used as folk medicine material.
- iv. Household cleaning.

Gasohol : Mixture of 90% gasoline and 10% anhydrous alcohol (Ethyl alcohol)

Uses :

- i. Fuel and petroleum industry.
- ii. Automobile industry.
- iii. Used as gasoline or hydrous around the world.
- iv. A lens is a transparent material bounded by two surfaces, out of which at least one surface is spherical.  
Hypermetropia is corrected using a convex lens.
- v. (a) A satellite orbiting at a height between 2000 km and 35780 km above the Earth's surface is called a medium earth orbit satellite.  
(b) The orbital path of such a satellite is normally elliptical and passes through the North and South Polar Regions.  
(c) These satellites are used in navigation.

**Q.3 Solve the following questions (Any 5)**

**[15]**

- i.  $v = \text{circumference of the circle/period of revolution of the planet}$

$$v = \frac{2\pi r}{T}$$

Let the mass of the planet be  $m$ , then the centripetal force exerted on the planet by the Sun

is

$$F = \frac{mv^2}{r}$$

$$\therefore F = \frac{m(2\pi r / T)^2}{r}$$

$$\frac{4\pi^2 mr^2}{T^2 r} = \frac{4\pi^2 m}{T^2}$$

According to Kepler's third law,

$$T^2 = Kr^3.$$

$$\therefore F = \frac{4\pi^2 mr}{Kr^3} = \frac{4\pi^2 m}{K} \left( \frac{1}{r^2} \right)$$

$$\therefore \frac{4\pi^2 m}{K} \rightarrow \text{constant}$$

Thus,

$$F \propto \frac{1}{r^2}$$

- ii. According to the principle of heat exchange,  
heat lost by hot water = heat gained by cold water

$$\therefore m_1 c (T_1 - T) = m_2 c (T - T_2)$$

$$\therefore m_1 T_1 - m_1 T = m_2 T - m_2 T_2$$

$$\therefore m_1 T_1 + m_2 T_2 = (m_1 + m_2) T$$

Thus, the maximum temperature of the mixture

$$T = \frac{m_1 T_1 + m_2 T_2}{m_1 + m_2}$$

$$T = \frac{40 \times 55^\circ\text{C} + 10 \times 20^\circ\text{C}}{40 + 10}$$

Thus, the maximum temperature of the mixture,  $T = 48^\circ\text{C}$ .

- iii. a) When an object is placed between the lens and the focus of a convex lens, the image formed by the lens is virtual, erect and magnified. When an object is placed between  $F_1$  and  $2F_1$ , the image formed by lens will be real, inverted and magnified.  
b) In the given case, if the image is virtual, erect and magnified, the image formed is on the same side as that of the object. If the image is real, inverted and magnified, the image will be formed beyond  $2F_2$ .
- iv. When light travels from a denser medium to a rarer medium, the angle of incidence for which the angle of refraction becomes  $90^\circ$  is called the critical angle.

$${}_w n_a = 0.5$$

We know,

$${}_w n_a \frac{\sin i}{\sin r}$$

$$\left( \frac{1}{50} \right)$$

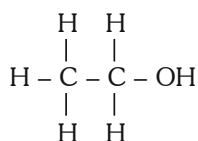
$$\frac{\sin i_c}{\sin 90^\circ} = 0.5$$

Thus,

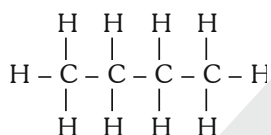
$$i_c = \sin^{-1}(0.5)$$

$$i_c = 30^\circ.$$

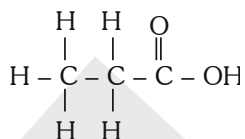
v. a. Ethanol



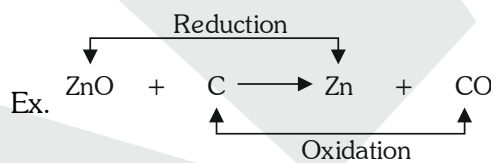
b. Butane



c. Propanoic acid



vi. Reaction in which oxidation and reduction take place simultaneously is called as redox reaction.



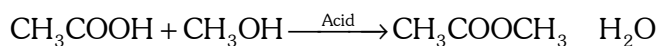
ZnO – Oxidizing agent

C – Reducing agent

vii. Esterification :

Process of formation of ester is called as esterification reaction.

Esters are sweet smelling compounds.



Uses : i. Used in synthetic flavours.

ii. Perfumes.

viii.

Short circuiting	Overloading
i. If a bare live wire and bare neutral wire come in contact with each other, then the resistance of the circuit becomes very small, and hence, very huge current flows through the circuit. This is called short circuiting.	i. A flow of a large amount of current in a circuit beyond its permissible value is called overloading
ii. A large amount of heat is produced and the components involved become very high and the circuit catches fire.	ii. It occurs when many electrical appliances are connected to the same supply of power.
iii. Short circuiting can be prevented by using a fuse in the circuit.	iii. Overloading can be avoided by not connecting many appliances of high power rating to the same supply.

**Q.4 Solve the following questions (Any 1)**

[5]

- i. a. Combination reaction :  $\text{H}_2\text{O}_{(l)} + \text{CO}_{2(g)} \rightarrow \text{H}_2\text{CO}_{3(g)}$
- b. Double displacement reaction :  $\text{BaCl}_{2(aq)} + \text{ZnSO}_{4(aq)} \rightarrow \text{BaSO}_4\downarrow + \text{ZnCl}_{2(aq)}$
- c. Decomposition reaction :  $2\text{AgCl}_{(s)} \xrightarrow{\text{Sunlight}} 2\text{Ag}(s) + \text{Cl}_{2(g)}$
- d. Exothermic reaction :  $\text{CaO}_{(s)} + \text{H}_2\text{O}_{(l)} \rightarrow \text{Ca}(\text{OH})_{2(aq)} + \text{Heat}$
- e. Endothermic reaction :  $\text{NH}_4\text{Cl}_{(s)} \rightarrow \text{NH}_4^+(aq) + \text{Cl}^-(aq)$

ii. A) The periodic time in India is  $\left(\frac{1}{50}\right) = 0.02 \text{ s}$ .

B) Potential difference,  $V = 220 \text{ V}$

$$R = 1200 \Omega$$

$$t = 10 \text{ s}$$

(a)  $V = IR$

$$I = \frac{V}{R}$$

$$I = \frac{220 \text{ V}}{1200 \Omega} = 0.18 \text{ A}$$

(b)  $H = I^2 R t$

$$H = (0.18)^2 \times 1200 \times (10)$$

$$H = 388.8 \text{ J}$$