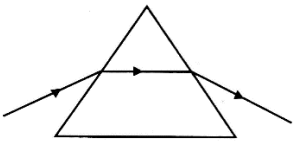
Time : 2 Hrs. **Marks : 40**

Q.1 Choose the correct alternative from the given options:

(A)

1. (c) CO_2
2. (b)



3. a) all distances in direction of incident ray are taken positive.
4. c) Chandrayaan-1
5. b) biconcave

Q.1 (B) Answer the following.

1. False
2.

Group A		Group B	
i)	At infinity	a)	Very large
ii)	At F_2	b)	Point image

3. Dispersion of light
4. Sputnik.
   Sputnik is a satellite sent to space by Soviet Union while, others are Indian satellites.
5. Free fall.

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

1. 1. When oil is left aside for a long time, it undergoes air oxidation and becomes rancid.
   2. If food is cooked in such oil, it's odour and taste changes.
   3. The process of oxidation of oil or rancidity can be slowed down by stopping the contact of food with air.
   4. Therefore, it is recommended to use air tight container for storing oil for long time.
2. i) Bulb works on the principle of heating effect of electric current.
   ii) Heat produced in unit time is product of square of current flowing in the circuit and resistance, i.e., for t = 1 unit, $H = I^2 R$.
   iii) For series connection, current flowing in both the bulbs is same.
   iv) As a result, heat produced in a bulb is directly proportional to its resistance value.
   v) Higher the resistance of the bulb, it would get heated more and glow brighter.
   Hence, two bulbs identical except for their resistance values when connected in series, bulb with higher resistance glows brighter.
3. i) Mass is a fundamental quantity whose value remains same everywhere. Hence, the mass of an object on earth will be same as its value on Mars.
   ii) Weight of an object is product of mass and gravitational acceleration, i.e., W = F = mg
   iii) As the weight depends on the value of acceleration due to gravity (g) which changes from place-to-place, and is different for earth and Mars, the weight of the object on earth will be different than its value on mars.

Q.2 (B) Answer the following. (Any 3)

1. 1. Consumption of alcohol harms health in a number of ways.
   2. It adversely affects the physiological processes and the central nervous system.
   3. Consumption of even a small quantity of pure ethanol called absolute alcohol can be lethal.
2. ***Given:*** Speed of light in medium $(v_2) = 1.5 \times 10^8$ m/s
   velocity of light in vacuum, $c = 3 \times 10^8$ m/s
   To find: Absolute refractive index (n)

Formula: $n = \frac{v_1}{v_2}$

Calculation: Here, $v_1 = c = 3 \times 10^8$ m/s, $v_2 = v$

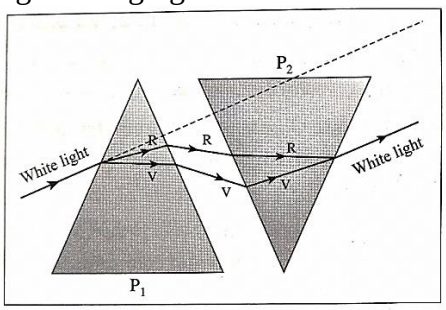
$\therefore n = \frac{c}{v} = \frac{3\times10^8}{1.5\times10^8} = 2$

Ans: The absolute refractive index of the medium is 2.

3. Any one of the following tests can be done to identify the liquids.
   (i) Ethanol has no reaction on litmus paper; whereas ethanoic acid turns blue litmus paper to red.
   (ii) Ethanol has no reaction with sodium bicarbonate, but ethanoic acid gives a brisk effervescence with sodium bicarbonate.
4. The importance of Newton's universal law of gravitation:
   This law explains successfully, i.e., with great accuracy,
   (1) the force that binds the objects on the earth to the earth
   (2) the motion of the moon and artificial satellites around the earth
   (3) the motion of the planets, asteroids, comets, etc., around the Sun
   (4) the tides of the sea due to the moon and the Sun.
5. If a bare live wire (phase wire) and a bare neutral wire touch each other (come in direct contact) or come very close to each other, the resistance of the circuit becomes very small and hence huge (very high) electric current flows through it. This condition is called a short circuit or short circuiting.
   In this case, a large amount of heat is produced and the temperature of the components involved becomes very high. Hence, the circuit catches fire.

Q.3 Answer the following questions. (Any 5)

1. (a) It is an addition reaction in which unsaturated carbon compound is converted into saturated hydrocarbon.
   Definition: When a carbon compound combines with another compound to form a product that contains all the atoms in both the reactants, it is called an addition reaction.
   (b) Platinum or Nickel is used as the catalyst.
   (c) This reaction is used for hydrogenation of vegetable oil. The molecules of vegetable oil contain long and unsaturated carbon chains. Hydrogenation transforms them into saturated chains and thereby vansapati ghee is formed.
2. Take a prism. Allow white light to fall on it. Obtain a spectrum. Take a second identical prism. Place it parallel to the first prism in an upside down position with the first prism [as shown in figure]. Allow the colours of the spectrum to pass through the second prism. Obtain the beam of light emerging from the other side of the second prism.



   The beam of light emerging from the other side of the second prism is a beam of white light.
   Explanation: White light is made up of seven colours. The first prism produces dispersion of white light while the second prism combines light of different colours to produce white light again. The net deviation of a ray of light is zero.
3. 1) It is an exothermic reaction.
   2) It is an endothermic reaction.
   3) It is an exothermic reaction.
4. When an electric <u>conductor</u> is kept in a magnetic field such that direction of the current flowing through the conductor is <u>perpendicular</u> to the magnetic field, then a <u>force</u> is exerted on the conductor. As a result, the conductor <u>moves</u>. But if an electric conductor is moving in a magnetic field or the magnetic field around a stationary conductor is <u>changing</u>, then, <u>electric current</u> can be produced in a conductor with the help of a moving magnet.
5. (i) The reactivity decreases in the order of Al > Zn > Fe > Pb > Cu
   (ii) Metal Aluminium reacted vigorously with dil. HCl.

(iii) $\underset{\text{Aluminium}}{Al} + \underset{\text{Hydrochloric acid}}{6\,HCl} \rightarrow \underset{\text{Aluminium chloride}}{2\,AlCl_3} + \underset{\text{Hydrogen}}{3\,H_2\uparrow}$

$\underset{\text{Zinc}}{Zn} + \underset{\text{Hydrochloric acid}}{HCl} \rightarrow \underset{\text{Zinc chloride}}{ZnCl_2} + \underset{\text{Hydrogen}}{H_2\uparrow}$

6. (a) The froth floatation method is based on the two opposite properties, i.e., hydrophilic and hydrophobic properties of the particles.
(b) Here the particles of the metal sulphides, due to their hydrophobic property, get wetted mainly with oil, while due to the hydrophilic property the gangue particles get wetted with water. By using these properties certain ores are concentrated by froth floatation method.
(c) This method is used for the concentration of zinc blend (ZnS) and copper pyrite ($CuFeS_2$)
7. i) Optical center ii) Concave iii) Power of accommodation
8. **Given:** Height of the satellite above the earth's surface (h) = 35780 km = 35780×10^3 m, Gravitational constant (G) = 6.67×10^{-11} N m^2/kg^2, mass of earth (M) = 6×10^{24} kg, radius of earth (R) = 6400 km = 6400×10^3 m,

To find: Tangential velocity of satellite (v_c)

Formula: $v_c = \sqrt{\frac{GM}{R+h}}$

Calculation: From formula,

$v_c = \sqrt{\frac{(6.67\times10^{-11})\times(6\times10^{24})}{(6400+35780)\times10^3}}$

$= \sqrt{\frac{40.02\times10^{13}}{42180\times10^3}} = \sqrt{\frac{40.02}{42180}\times10^{10}}$

$= \sqrt{0.0009487909\times10^{10}}$

$= \sqrt{9487909}$

$= 3080.245$ m/s

$= 3.08$ km/s

Ans: The tangential velocity of the satellite is 3.08 km/s.

Q.4 Answer the following questions. (Any 1)

1. a. Newlands law of Octaves is illustrated by the above arrangement of element.
b. The English scientist John Newlands proposed such a classification of elements.
c. Classification of elements is compared with the characteristics of a musical scale because the repetition in the properties of element is just like the repetition of eighth note in an octave of music.
d. Limitations:
(1) This law was found to be applicable only up to calcium (Ca).
(2) The properties of the new elements discovered later did not fit in the Newlands law of Octaves.
2. i) Heat is transferred from hot object to cold object.
ii) Principle of heat exchange.
iii) 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.
iv) Specific heat capacity of object is measured using this principle.
v) A system in which no energy can flow out of the system or enter into the system is said to be isolated system.