MT

2017 ___ ___ 1100

MT - SCIENCE & TECHNOLOGY - I (72) - SEMI PRELIM - I : PAPER - 1

Time : 2 Hours **Semi Prelim - I : Model Answer Paper** **Max. Marks : 40**

SECTION - A

A.1. (A) Fill in the blanks :

(1) Sodium or potassium salts of higher fatty acids are termed as **soaps**. **1**

(2) The phenomenon of change in the **direction** of light when it passes from one transparent medium to another is called refraction. **1**

(3) In India, the frequency of A.C is **50** cycles per second. **1**

A.1. (B) True or False :

(1) False : Methyl orange turns red in acid. **1**

(2) False : Magnetic lines of force never cross each other. **1**

A.2. Rewrite the following statements by selecting the correct alternative:

(1) (a) pH = 6 **1**

(2) (c) CO_2 **1**

(3) (c) passes without bending **1**

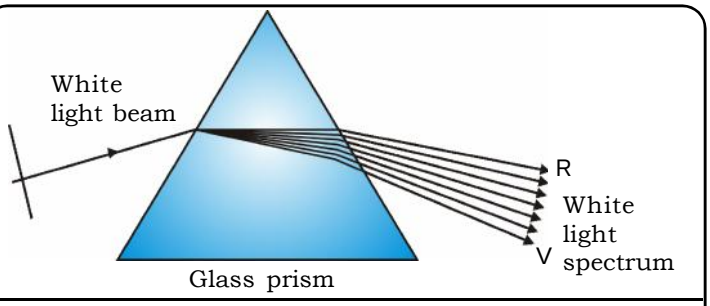
(4) (c) 40° **1**

(5) (a) increases **1**

A.3. Answer the following in short : (Any 5)

(1) **2**

Washing soda	Baking soda
(i) It is sodium carbonate.	(i) It is sodium bicarbonate or sodium hydrogen carbonate.
(ii) It's molecular formula is $Na_2CO_3 \cdot 10H_2O$	(ii) It's molecular formula is $NaHCO_3$.
(iii) It is a crystalline substance.	(iii) It is an amorphous powder.
(iv) It is used in manufacturing soaps and detergent.	(iv) It is used in bakery for making cakes and bread lighter and spongy.

(2)	(i) Jaggery is basic in nature and tamarind which contains tartaric acid, is acidic in nature. (ii) When both jaggery and tamarind are used while cooking, pH of our body is maintained as they neutralize each other. This prevents suffering from acidity.	**2**
(3)	When bleaching powder is exposed to air, CO_2 from air decomposes the powder slowly to produce chlorine. $CaOCl_{2(s)} + CO_{2(g)} \rightarrow CaCO_3 \downarrow + Cl_{2(g)}$ Bleaching powder — Carbon dioxide — Calcium carbonate — Chlorine	**2**
(4)	(i) If we touch the wire bare footed, a large current may pass through our body. (ii) As a result, we may receive a severe shock. This shock may sometimes cause death. (iii) Therefore, while working with electricity we must wear gloves made of insulated material and rubber soled shoes. (iv) Hence wires carrying electricity should not be touched bare footed.	**2**
(5)	(i) The blue colour of the sky is due to scattering of light by the atmosphere. (ii) At higher altitudes, there is no atmosphere, hence, the scattering of light does not take place at all. Hence, in space the sky appears dark instead of blue.	**2**
(6)	The direction of induced current in a coil moving perpendicular to the magnetic field can be obtained by Flemming's Right Hand Rule. It states that "Stretch the forefinger, the middle finger and the thumb of your right hand mutually perpendicular to each other. If the thumb represents the direction of motion of conductor and forefinger, the direction of magnetic field then the middle finger gives the direction of induced current".	**2**
(7)	 Dispersion of Light through prism	**2**

A.4. Answer the following in brief : (Any 5)

(1) (i) It is defined as fixed number of water molecules present in crystal structure. It is responsible for crystalline structure (shape) and colour in certain compounds. **3**

(ii) The salts that contain water of crystallization is called as hydrated salt.

Eg. : $CuSO_4.5H_2O$: Copper sulphate pentahydrate, it contains 5 molecules of water of crystallization.

$Na_2CO_3.10H_2O$: Sodium carbonate decahydrate, it contains 10 molecules of water of crystallization.

$FeSO_4.7H_2O$: Ferrous sulphate heptahydrate, it contains 7 molecules of water of crystallization.

$ZnSO_4.7H_2O$: Zinc sulphate heptahydrate, it contains 7 molecules of water of crystallization.

(2) (i) It is a mixture of many different indicators(or dyes) which give different colours at different pH values. Just like litmus, universal indicator can be used in the form of solution or in the form of pH paper. **3**

(ii) When an acid or a base solution is added to the universal indicator, the indicator produces a new colour. The colour produced by universal indicator is used to find the pH value of acid or base by matching the colour with colours on pH colour chart which determines the strength of acid and bases.

(iii) $Mg(OH)_2$ does not react with sodium hydroxide because both are basic in nature.

(3) (i) It is used to disinfect water. **3**

(ii) It is used for bleaching cotton and linen in textile industry and bleaching wood pulp in paper industry. It is also used for bleaching washed clothes in laundry, the bleaching action is due to chlorine released by it.

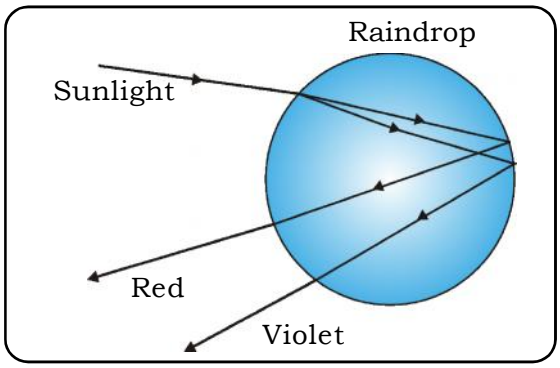
(iii) It is used as an oxidizing agent in many chemical industries.

(iv) It is used to prepare organic solvent chloroform which is also used as an anaesthetic.

(4) (i) A rainbow appears in the sky during a rain shower. **3**

(ii) The water droplets act as small prisms. When sunlight enters the water droplets present in the atmosphere, they refract and disperse the incident sunlight.

(iii) Then they reflect it internally inside the droplet and finally again refract it. As a collective effect of all these phenomenon, the seven coloured rainbow is observed.



(5) (i) Magnetic lines of force are closed continuous curves, which start from north pole and end at the south pole. **3**
(ii) The tangent at any point in the magnetic lines of force gives the direction of the magnetic field at that point.
(iii) Two magnetic lines of force can not intersect each other.
(iv) Magnetic lines of force are crowded where the magnetic field is strong and far from each other where the field is weak.

(6) (i) The phenomenon of splitting of light into its component colours is called as dispersion. **3**
(ii) The band of coloured components of light beam is called spectrum. The colours in the order from bottom to top are violet, indigo, blue, green, yellow, orange, red (VIBGYOR).

(7) (a) It works on the principle of electromagnetic induction. **3**
(b) X -Armature coil, Y- Slip ring
(c) It generates alternating current.

A.5. **Anwser in detail: (Any 1)**

(1) (a) A device which converts electrical energy into mechanical energy is called an electric motor. **5**
(b) **Working of the electric motor :**
(i) When current is passed through the coil ABCD, arms AB and CD experience force.
(ii) According to Fleming's left hand rule the force experienced by arm AB is in the upward direction and arm CD in the downward direction. Both these forces are equal and opposite.
(iii) This force rotates the coil in clockwise direction until the coil is vertical. At this position, the contact between commutator and brushes break. So the supply to the coil is cut off. Thus no force acts on the coil.

(iv) But the coil does not stop due to inertia. It goes on rotating until the commutator again comes in contact with the brushes B_1 and B_2. Again the current starts passing through the coil and the arm AB rotates through 90°, 180°, 270° and 360 degrees.

(v) Now the force acting on arm AB is upward and CD is downward. Again this force moves the coil in clockwise direction.

(vi) Thus, the coil rotates with the help of electrical energy. The coil of DC motor continues to rotate in the same direction.

(2) (a) $Al_2(CO_3)_3 + 6HCl \rightarrow 2AlCl_3 + 3H_2O + 3CO_2 \uparrow$ **2**

During this reaction carbon dioxide gas is released, this gas when passed through decanted solution of chalk with H_2O it turns milky due to formation of calcium carbonate.

(b) When dil. HCl is added to red oxide i.e. (primer used before paint). We observe that the colour of the solution becomes blue. This is due to the formation of copper chloride. **2**

$CuO + 2HCl \rightarrow CuCl_2 + H_2O$

(c) The bases which produce less number of OH^- ion in aqueous solution are termed as weak bases. **1**

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