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GRAND TEST	SSC EXAMINATION SCIENCE & TECHNOLOGY (72) PAPER - I (SET-A)	SOLUTION

Q.1A **Fill in the blanks:** **[3M]**

Ans.1 1000 **[1M]**

Ans.2 Electric Generator **[1M]**

Ans.3 $\frac{\rho l}{A}$ **[1M]**

Q.1B **Write the co-relation and fill in the blanks:** **[2M]**

Ans.1 Oxidation **[1M]**

Ans.2 Volume : gm/cm^3 **[1M]**

Q.1C **Choose the correct alternative:** **[5M]**

Ans.1 (c) green

Ans.2 (b) decrease

Ans.3 (a) concave mirror

Ans.4 (a) 28^{th} Feb

Ans.5 (c) Concave

Q. 2 **Solve any five questions:** **[10M]**

Ans.1 Dobereiner's found some groups of there elements which showed semilar properties. These groups are called as traids. **[1M]**

For eg. : In traid of Lithium [Li = 6.9], Sodium [Na=23] and Potassium [K = 39]. The Atomic mass of sodium (23) is the mean of the atomic masses of Lithium and Potassium. **[1M]**

Ans.2

1. During refraction of starlight from the atmosphere, as starlight bends towards the normal the apparent position of the star is slightly higher than its actual position. **[1/2M]**
2. Also this apparent position of star is not stationary but changes slightly. **[1/2M]**
3. Because of mobility of air and changes in the temperature, the atmosphere is not steady. **[1/2M]**
4. Hence refractive index of air in the given region goes on changing continuously and randomly.

5. When the atmosphere refracts more light towards us, the star is seen bright when the atmosphere refracts less light towards us, the star is seen dim. **[1/2M]**

6. Thus, due to change in the refractive index of atmosphere star appears twinkling at night. **[1/2M]**

Ans.3 Suppose I is the current and V is the PD across points C and D. R_1, R_2 and R_3 are C and D. Then R_s is the effective resistance in the circuit and V_1, V_2 and V_3 are the potentials across the three resistors such that, **[1/2M]**

$$V = V_1 + V_2 + V_3 \text{ ———— (1)}$$ **[1/2M]**

But by using Ohm's law, total potential difference

$$V = IR_S$$ **[1/2M]**

And $IR_s = IR_1 + IR_2 + IR_3$ **[1/2M]**

Ans.4 1. in pH scale we can measure pH from 0 (very acidic) to 14 (very alkaline). **[1/2M]**

2. The scale is used in measuring the hydronium ion concentration in a given solution. pH is a number which indicates the acidic or basic nature of a solution.

3. When pH value is in between 0 to 7 the solution is acidic in nature and when pH is in between 7 to 14, the solution is basic / alkaline in nature.

4. Neutral solution has pH equal to 7.

Ans.5 The number of valence electron of an element X is 2 and the valency of an element Y is (8 – 5) is 3.**[1M]** and all are non - metals. **[1M]**

Ans.6 Given : $1\eta_2 = \frac{4}{3}$

$$V_1 = 3\times10^8 \text{ m/s}$$

To find : V_2=?

Formula : $1\eta_2 = \frac{V_1}{V_2}$

Solution : $1\eta_2 = \frac{V_1}{V_2}$ ..... **[1/2M]**

$$\frac{4}{3} = \frac{3\times10^8}{V_2}$$ ..... **[1/2M]**

$$V_2 = \frac{3\times10^8 \times 3}{4}$$

$$V_2 = \frac{9\times10^8}{4}$$

$$V_2 = 2.25\times10^8 \text{ m/s.}$$ ..... **[1M]**

Ans. ∴ The speed of light in water is 2.25×10^8 m/s.

Q. 3 Answer any five questions of the following: **[15M]**

Ans.1 1. Calcium reacts less vigorously with water. **[1/2M]**

2. Calcium reacts with cold water to form calcium hydroxide. **[1/2M]**

$$Ca_{(s)} + 2H_2O_{(l)} \longrightarrow Ca(OH)_{2(aq)} + H_2\uparrow_{(g)}$$ **[1M]**

3. The head produced is not sufficient and is less to burn the hydrogen gas. **[1/2M]**
4. Instead, calcium starts floating, because the bubbler of hydrogen gas formed stick to the surface of metal. **[1/2M]**
5. So calcium floats over water during the reaction with water.

Ans.2 1. The formation of ions of a substance in presence of water is called as ionisation. **[1M]**

2. For eg. :

(a) When HCl is dissolved in water, it ionizes to form H^+ and Cl^- ions.

(b) $HCl + \text{Water} \longrightarrow H^+_{(aq)} + Cl^-_{(aq)}$ **[1M]**

When NaOH is dissolved in water, it ionized to form Na^+ and OH^- ions.

$NaOH + \text{Water} \longrightarrow Na^+_{(aq)} + OH^-_{(aq)}$ **[1M]**

Ans.3 1. The phenomenon of change in the direction of light when it passes from one transparent medium to another is called as refraction of light. **[1M]**

2. eg. : Refraction of light through a glass slab. Refraction of light takes place twice in a glass slab. First refraction takes place when the ray of light enters from air medium to glass medium
The second refraction takes place when the ray of light enters from glass medium to air medium. **[1M]**

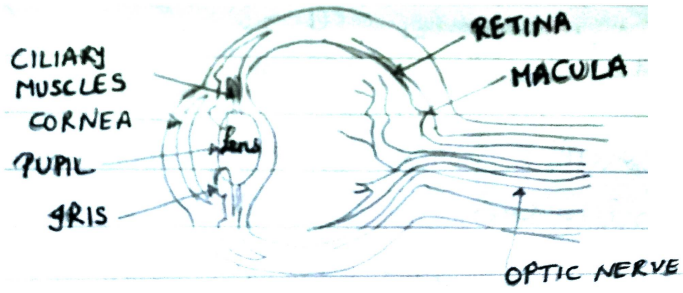
3. The extent of change in direction of the ray of light at the apposite parallel faces of the glass slab is equal and opposite. Due to this the ray emerges parallel to incident ray. But the light ray is shifted slightly to the left side. **[1M]**

Ans.4 The rules for drawing ray diagrams of spherical mirrors are :

1. If the incident ray is parallel to the principal axis, then the reflected ray (i) passes through the focus of the concave mirror (ii) appears to diverge from the focus of the convex mirror when extended backwards. **[1M]**
2. If the incident rays (i) passes through the fours of the concave mirror (ii) is directed towards the focus of the convex mirror, then the reflected ray is parallel to the principal axis. **[1M]**
3. If the incident ray (i) passes through the centre of curvature of concave mirror (ii) is directed towards the centre of curvature of a convex mirror, the reflected ray traces the same path. **[1M]**

Ans.5 The four uses of heating effect of eelectric current is as follows :
It is used in (a) a electric bulb, (b) an electric iron (c) on electric furnace (d) a fuse.

Ans.6

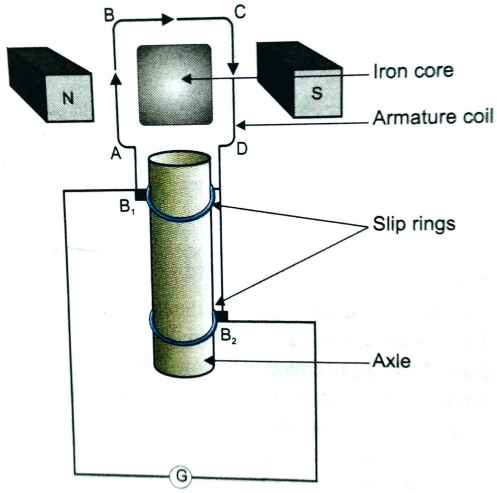


[Dia.1M, Label 1M]

Function of iris : When the incident light is bright, the muscles of the iris stretch to reduce the size of the pupil. When the incident light is dim, the muscles of the iris relax to increase the size of the pupil. Thus, the iris controls the size of the pupil and thereby regulates the amount of light entering the eye. **[1M]**

Q. 4 Attempt any one of the following: **[5M]**

Ans.1 (a)



[2M]

(b) **Principle of electric generator:**

Electric generator works on the principle of electromagnetic induction. When the coil of electric generator rotates in a magnetic field, the magnetic field induces a current in this coil. **[1M]**

(c) **Function of slip rings :**

The two ends of the armature coil are connected to two brass slit rings R_1 and R_2. These rings rotate along the armature coil. **[1M]**

(d) **Any two uses of generator :**

(i) Aircraft auxiliary power generation. **[½M]**

(ii) Wind generators. **[½M]**

(iii) High speed gas turbine generators.

Ans.2

1. The advanced sunrise and delayed sunset can be explained on the basis of atmospheric refraction.
2. The observer should see the sun when it reaches the horizon, but it is seen two minutes before that. **[1M]**
3. As a ray of light from the sun enters the earth's atmosphere, it follows a curved path due to refraction before reaching the observer. **[1M]**
4. It appears to the observer as if the rays are coming from the position where the sun is seen by the observer. **[1M]**
5. Hence, the sun is seen earlier before the sun reaches the horizon. **[1M]**
6. Hence, advanced sunrise and delayed sunset increases duration of day by four minutes. **[1M]**