# LIBERTY PAPER SET

## STD. 10 : Science [N-011(E)]

## Full Solution

**Time : 3 Hours** **ASSIGNMENT PAPER 3**

## Section-A

**1.** (A) 3:1 **2.** (B) 1 **3.** (C) Lactic **4.** (D) Purple **5.** (D) vas deferens **6.** (C) Ammeter **7.** Ethanol **8.** fat **9.** voltmeter **10.** DNA **11.** Water **12.** Blue **13.** False **14.** False **15.** True **16.** True **17.** Sex Determination **18.** Calcium Sulphate Hemi Hydrate ($CaSO_2 \frac{1}{2} H_2O$) **19.** Galium & Cesium **20.** Atmospheric Refraction **21.** (c) Pancreas **22.** (a) Ovary **23.** (b) Green vegetation **24.** (a) Deer

## Section-B

**25.**
- ➤ It turns yellow, the resultant product is lead iodide ($PbI_2$).
- ➤ **Note :** The equation of the above reaction is

$$Pb(NO_3)_2(s) + 2KI(aq) \rightarrow PbI_2(aq) + 2KNO_3(s)$$

This is double displacement Reaction.

**26. The common properties of metals are listed below:**

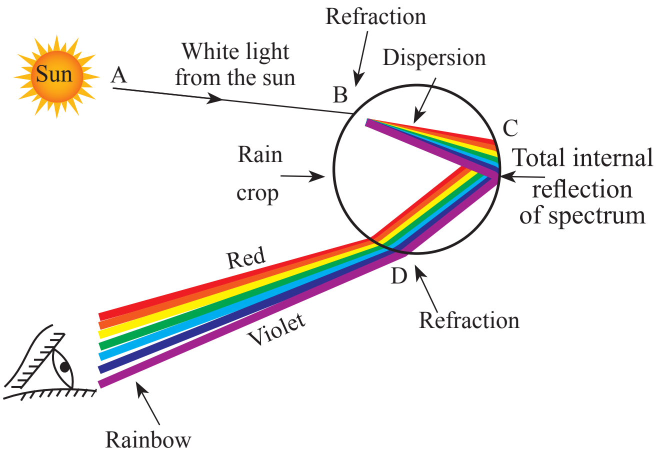
(i) Metals in their pure state, have a shining surface.
(ii) They are hard and solid in nature.
(iii) They have characteristic of ductility.
(iv) They have characteristic of malleability.
(v) Metals are good conductors of electricity and heat.
(vi) Metals have high melting point.
(vii) Metals produce ringing sound.

**27.**
- ➤ Saliva contains an enzyme called salivary amylase, which converts complex molecules of starch food into sugar (maltose)
- ➤ Pancreas secrete pancreatic juice which contains enzymes such as amylase, trypsin and lipase enzymes.
- ➤ Amylase digest starch
- ➤ Trypsin digests proteins.
- ➤ Lipase digests fat
- ➤ The walls of the small intestine contain glands which secrete intestinal juice.
- ➤ The enzymes present in it finally convert the proteins to amino acid, complex carbohydrates into glucose and fats into fatty acid and glycerol.

**28.**
- ➤ **Bacterial Diseases :** Gonorrhea and Syphilis
- ➤ **Viral Disease :** Wart and HIV-AIDS

**29.**
- ➤ Menstruation occurs when a girl becomes 10 to 12 years old.
- ➤ The eggs become mature due to sex hormones.
- ➤ After every 28 days one mature egg is released from the ovary into the fallopian tube which is known as ovulation.
- ➤ Before ovulation, the uterus; inner wall becomes thickened and spongy with capillaries.
- ➤ If there is a fertilization at this stage then the fetus must be nourished.
- ➤ If the egg is not fertilized then this lining is not needed any longer.
- ➤ So lining slowly breaks and comes out through the vagina as blood and mucous.
- ➤ This cycle takes place roughly every month and is known as menstruation.
- ➤ It usually lasts for about two to eight days.

**30.**



- **Formation of the rainbow:**
- Light rays reach the drop near its top level. At first, there is refraction, then the dispersion of white light into colours of a different wavelength.
- Violet is the most deviated and red is the least deviated colour.
- Reaching the opposite side of the drop, each colour is refracted back into the drop due to complete internal reflection that hits the drop surface.
- Every colour is refracted to the air again.
- We experience the rainbow when we observe in between 42-40 degrees.

**31.** Given voltage = 220V

operated voltage = 110V

Rated Power = 100W

Let, $P = \frac{V^2}{R}$

$\therefore \quad R = \frac{V^2}{P}$

$= \frac{220^2}{100}$

$= \frac{48400}{100}$

R = 48452

$P = \frac{V^2}{R} = \frac{1102}{484}$

$= \frac{12100}{484}$

P = 25W

**32.** $V \alpha I$

Or, $\frac{V}{I} = R$ (Constant)

Where, R is the resistance of the given metallia wire at a given temperature.

Thus, $R = \frac{V}{I} = \frac{\text{Volt}}{\text{Ampere}} = \text{V/A} = \text{ohm} = \Omega$

The unit of resistance is ohm (Ω)

**33.**
- Earth wire is a safety measure that provides a low resistance conducting path to the current. Sometimes due to excess heat or wear and tear, the live wire comes in direct contact with the metallic cover of the appliances, which can give an electric shock on touching them. To prevent then from the shock, the metallic part is connected to the earth through a three-pin plug due to which the current flows to the earth the movment there is a short circuit.

- It is necessary to earth metallic appliances because it ensures that if there is any current leakage in the metallic cover, the potential of the appliance becomes equal to that of the earth. The potential of the earth is zero. As a result, the person handling the appliance will not get an electric shock.

**34.**
- Decomposers help in decomposing the dead bodies of plants and animals and hence act as cleansing agents of the environment.
- Decomposers also help in putting back the various elements of which dead plants and animals are made, back into the soil, air and water for reuse by producers like crop plants.
- They help in recycling of the nutrients.
- They decompose dead remains thereby providing space for new life to settle in the biosphere.

**35.**
- All the interacting organisms in an area together with the non-living constituents of the environment form an ecosystem.
- Thus, an ecosystem consists of biotic components comprising living organisms and abiotic components comprising physical factors like temperature, rainfall, wind, soil and minerals.

**36.**
- Plants consume water for their life processes; however, they do not utilize it completely. The excess water is expelled through the process of transpiration.
- Other excretory wastes get accumulated in the cell vacuoles, eventually forming resin and gum. This is usually observed in old xylem tissues. Some of these wastes are stored in the leaves which later droop and wither away.
- Carbon dioxide or gaseous wastes are eliminated through stomata.
- Some other forms of wastes can be excreted into the soil. Excretory products can also be stored as oils and latex in the barks of trees.

**37.**
- Maximum force is applied on the rod when the direction of current flowing through the conductor rod is perpendicular to the direction of the magnetic field.
- No force is applied on the rod when the direction of current flowing through the conductor rod and the direction of the magnetic field are uniform.

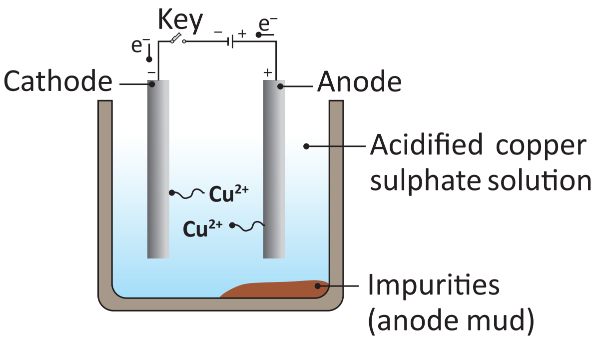
## Section-C

**38.**
- A Reaction in which two different reactants combine to form single product, a reaction is called combination reaction.
- When quicklime or calcium oxide (CaO) reacts with water, slakedlime [$Ca(OH)_2$] is formed.

$$CaO(s) + H_2O(l) \rightarrow Ca(OH)_2(aq) + \text{Heat}$$

- During the reaction a large amount of heat is released and hence, it is also an exothermic reaction.

**39.**
- The metals produced by various reductions processes are not very pure.
- They contain impurities, which must be removed to obtain pure metals. The most widely used method for refining impure metals is electrolysis refining.
- Many metals Copper, Zin, Tin, Nickel, Silver, Gold etc. are refined electrolytically.
- In this process the impure metal is made the anode and a thin strip of pure metal is made the cathode.
- A solution of the metal Salt is used as an electrolyte.



- The apparatus is set up as shown in figure.
- On passing the current through the electrolyte, the pure metal from the anode dissolves into the electrolyte.
- An equivalent amount of pure metal from the electrolyte is deposited on the cathode.
- The soluble impurities go into solution, whereas the insouble impurities settle at the bottom of the anode and are known as anode mud.

**40.**
- Sodium, magnesium, calcium, aluminum, etc., are towards the top of the reactivity series.
- Metals falling under the top of the reactivity series cannot be obtained from their compound by the reducing agent carbon.

- This is because metals like sodium, calcium, aluminum etc. have more affinity for oxygen than carbon. They are more reactive than carbon.
- So, metals that fall at the top of the reactivity series are obtained by the process of electrolysis of their molten chlorides.
- **Example :**
- Extraction of sodium metal from sodium chloride when electric current is passed through molten sodium chloride sodium metal is liberated at cathode and chlorine is liberated at anode :

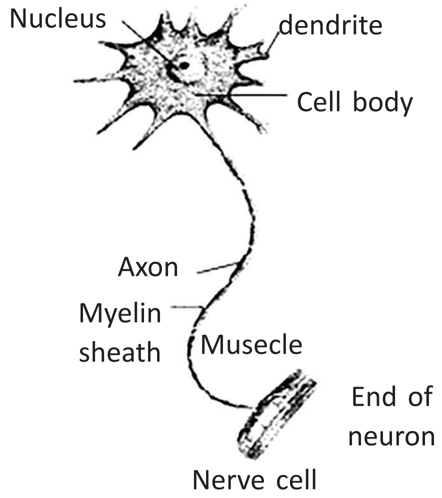
  At Cathode : $Na^+ + e^- \rightarrow Na$

  At Anode : $2Cl^- \rightarrow Cl_2 + 2e^-$

  $2NaCl(l) \xrightarrow{\text{electric current}} 2Na(s) + Cl_2(g)$

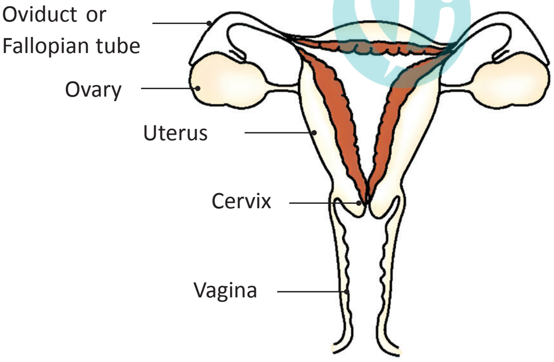
  Sodium Chloride — Sodium (at cathode) — Chlorine

**41.**



- Nerve cell or neuron is the functional unit of nervous system. A nerve cell has three parts-
- (i) cell body (ii) dendrite (iii) axon
- **Function :** The function of nerve cells is to carry information in the form of electrical signals which are called nerve impulses. Cells receive stimulus to send it to spinal cord and brain and carry the message from brain to the target organ.

**42.**

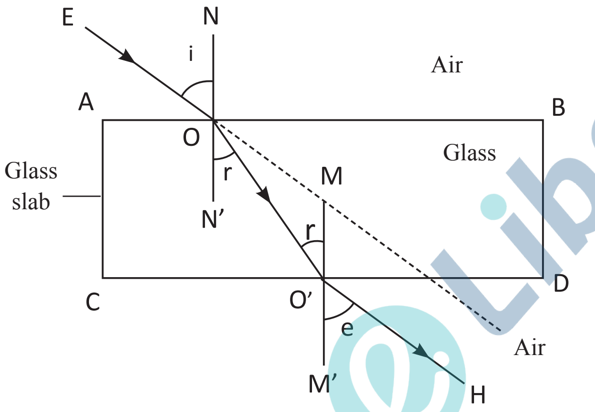


- Female reproductive organs are listed below.
- Ovary, Fallopian tube, Uterus, Cervix, Vagina
- **Ovary :**
- They are in pair.
- The ovaries contain thousands of immature eggs from the time a girls is born.
- On reaching puberty, some of these start maturing. One egg is produced every month by one of the ovaries.
- **Fallopian Tube :**
- They are in pair.
- The egg is carried from the ovary to the womb through a thin oviduct or fallopian tube.
- **Uterus :**
- The two oviducts unite into an elastic bag like structure known as the uterus.

- It is delicate and resilient.
- It is shaped like an upside down pear.
- The embryo is implanted and developed in the uterus.
- **Cervix :**
- The lower end of the uterus is known as the cervix.
- **Vagina and Vaginal Passage :**
- The uterus opens into the vagina through the cervix, which receives sperm through the penis.
- Vagina opens through the vaginal passage outside the body.

**43.**
- New organism are formed from the body part (pieces) of individual organism that is known as regeneration.
- For example, simple animals like hydra and planaria can be cut into any number of pieces, and each pieces grows into a complete organism.
- Regeneration is carried out by specialized cells. These cells proliferate and make large numbers of cells.
- Different cells undergo changes to become various cell-types and tissues.
- These changes take place in an organised sequence referred to as development.
- However, regeneration is not the same as reproduction.
- Since most organisms would not normally depend on being cut up to be able to reproduce.

**44.**



- The points O and O' lie on surfaces separating two transparent media.
- The light ray has changed its direction at points O and O'.
- Draw a perpendicular NN' to AB at O and another perpendicular MM' to CD at O'.
- The light ray at point O has entered from a rare medium to a denser medium that is from air to glass the light ray has bent towards the normal.
- At O' the light ray has entered from glass to air, that is from denser medium to rarer medium. The light has bent away from the normal.
- In diagram a ray EO is Incident ray, OO' is the refracted ray and O'H is emergent ray.
- The emergent ray is parallel to the direction of the incident ray.
- The extent of bending of the ray of light at the opposite parallel faces AB and CD.
- This is why the ray emerges parallel to the incident reay. However, the light ray is shifted sideward slightly.

**45.** We know that,

Magnification in mirror = $\frac{-v}{u}$

$\therefore \; m = \frac{-v}{u}$

$\therefore \; -3 = \frac{-v}{-10}$

$\therefore\ -3 \times -10 = -v$

$\therefore\ 30 = -v$

$\therefore\ v = -30$ cm

$\therefore$ Image is located 30 cm in front of the mirror

**46.** $R_1 = 25\Omega$ $\quad I = 0.4A$

$R_2 = ?$ $\quad V = 12V$

$R = R1 + R2$ but $R = \frac{V}{I}$

$= \frac{12}{0.4}$

$= 30\Omega$

$\therefore\ 30 = 25 + R_2$

$\therefore\ R_2 = 30 - 25 = 5\Omega$

$V_1 = IR_1 = 0.4 \times 25 = 10V$

$V_2 = IR_2 = 0.4 \times 5 = 2V$

## Section-D

**47.** Chemeical formula : $CaOCl_2$

- **Bleaching Powder :**
- **Preparation :** Bleaching powder is synthesized by the action of chlorine gas (produced from the chlor-alkali process) on dry slaked lime $Ca(OH)_2 \rightarrow Ca(OH)_2 + Cl_2 \rightarrow CaoCl_2 + H_2O$
- **Uses of bleaching powder**
- It is used for bleaching dirty clothes in the laundry, as a bleaching agent for cotton and linen in the textile industry.
- It is a strong oxidizing agent, hence used as an oxidizer in many industries.
- It is used as a disinfectant for disinfecting water to make potable water.

**48.**

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Nacl | + $H_2O$ | + | $CO_2$ + | $NH_3$ | $\rightarrow$ | $NaHCo_3$ | + | $NH_4Cl$ |
| Sodium Chloride | Water | | Carbon dioxiede | Amonia | | Sodium Hydrogen Carbonite | | Ammonium Chloride |

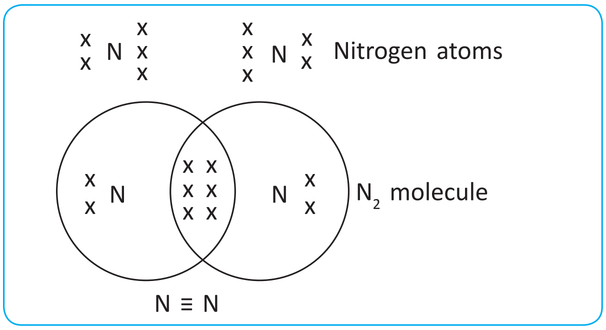
CaCO3 + H2O + CO2 $\rightarrow$ Ca $(HCo3)_2$
Calcium Carbonate → Calcium Hydrocarbite

| | |
|---|---|
| CaCO3 + H2O + CO2 $\rightarrow$ | Ca $(HCo3)_2$ |
| Calcium Carbonate | Calcium Hydrocarbite |

$2NaOH + Zn \rightarrow Na_2ZnO_2 + H_2$

$2NaHCO_3 \xrightarrow{\Delta} Na_2CO_3 + H_2O + CO_2$

**49.**

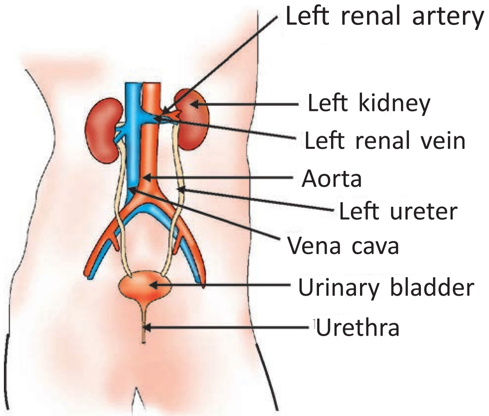


- Nitrogen has the atomic number 7.

- Its electronic configuration is 2, 5. In order to attain an octet, each nitrogen atom in a molecule of nitrogen contributes three electrons giving rise to three shared pairs of electrons.
- This is said to constitute a triple bond between the two atoms.
- The electron dot structure of $N_2$ and its triple bond can be depicted as in Figure.
- A molecule of ammonia has the formula $NH_3$.

**50.** The excretions system of human beings includes a pair of kidneys, a pair of ureter, a urinary bladder and a urethra.

- Kidneys are located in the abdomen one on either side of the backbone.
- Urine produced in the kidneys passes through the ureters into the urinary bladder where it is stored until it is released through the urethra.



*Excretory system in human beings*

**51.** The different ways to release energy from food in various organism are as follows :

- In all of these methods, the first six carbon atom of glucose decomposes into a three carbon atom pyruvate.
- The various organism then releases energy from food through various methods.
- **(i) In absence of Oxygen ($O_2$) :**
- Here pyruvate is converted in ethanol and carbon-dioxide.
- This action occurs during fermentation in yeast.
- This action takes place in the absence of oxygen, which is called anaerobic respiration.
- Very little energy during this action is produced.
- **(ii) In the presence of Oxygen ($O_2$) :**
- Here, pyruvate decomposes into particles using oxygen in mitocondria.
- This action decomposes the molecules of three carbon pyruvate into three molecules of carbon dioxide and water.
- This process which takes place in the presence of oxygen it is called Aerobic respiration.
- More energy released in Aerobic respiration comparing anaerobic respiration.
- **(iii) In lack of Oxygen :**
- When our muscle cells are deficient in oxygen, pyruvate decomposes and converts into three carbon atoms lactic acid.
- Energy is generated during this action.

**52.** The child is suffering from myopia.

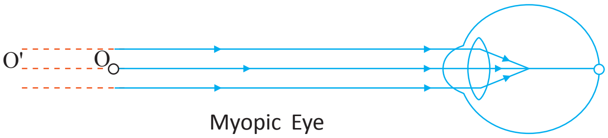
This defect may arise due to

(i) Excessive curvature of the eye-lens

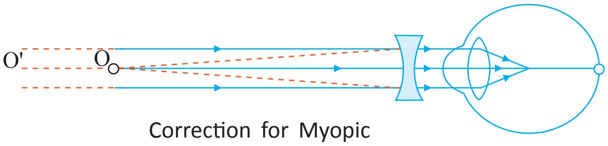
(ii) Elongation of eye-ball

This defect can be corrected by using a concave lens of suitable power.

A concave lens of suitable power will bring the image back on to the retina and thus the defect is corrected.



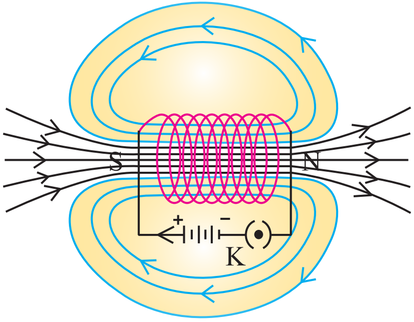
Myopic Eye



Correction for Myopic

**53.** **Solenoid :**

- Solenoids are cylinders formed by many circular loops wrapped very close to a separated copper wire.
- The pattern of magnetic field lines formed due to electric current solenoid is shown in the figure.



- It is clear from the figure that the magnetic field of a solenoid is similar to that of a magnetic field of bar magnet.
- Thus, one end of the solenoid acts as a magnetic north pole and the other end as a magnetic south pole.
- The magnetic field lines in the area inside the solenoid are parallel lines.
- That is the magnetic field in the area inside the solenoid is the same.
- The magnetic field of a solenoid is strengthened by placing an iron-like metal inside the area.
- A magnet formed in this way is called an electromagnet.

**54.** The series of organisms taking part at various biotic level form the food chain.

- Each level of the food chain forms a trophic level.
- The autotrophs or the producers are at the first trophic level. They fix up the solar energy and make it available for heterotrophs or the consumers.
- Herbivores or the primary consumers form the second level.
- Small carnivores or the secondary consumers at the third.
- Larger carnivores or the tertiary consumers form the fourth trophic level.

| **First Trophic Level** | | **Second Trophic Level** | | **Third Trophic Level** | | **Tertiary Trophic Level** |
|---|---|---|---|---|---|---|
| Autotrophs<br>Or<br>Producers | → | Herbivores<br>or<br>Primary Consumers | → | Small Carnivores<br>Or<br>Secondary Consumers | → | Large Carnivores<br>Or<br>Tertiary Consumers |

- Different food chains are formed in nature. For example,
- Green plants in forest → Deer → Tiger
- Green plants in grass land → Grass hopper → Frog → Snake → Eagle.
- Green plants in lake → Scorpion → Fish → Duck.