

**Class- X Session - 2022-23**

**Subject - Science (086)**

**Sample Question Paper - 9**

**with Solution**

**Max. Marks: 80**

**Time Allowed: 3 hours**

**General Instructions:**

- i. *This question paper consists of 39 questions in 5 sections.*
- ii. *All questions are compulsory. However, an internal choice is provided in some questions. A student is expected to attempt only one of these questions.*
- iii. **Section A** consists of 20 objective type questions carrying 1 mark each.
- iv. **Section B** consists of 6 Very Short questions carrying 02 marks each. Answers to these questions should in the range of 30 to 50 words.
- v. **Section C** consists of 7 Short Answer type questions carrying 03 marks each. Answers to these questions should in the range of 50 to 80 words
- vi. **Section D** consists of 3 Long Answer type questions carrying 05 marks each. Answer to these questions should be in the range of 80 to 120 words.
- vii. **Section E** consists of 3 source-based/case-based units of assessment of 04 marks each with sub-parts.

**Section A**

1. Which of the following enzyme helps in breaking sucrose into glucose and fructose? [1]  

a) Invertase	b) Diastase
c) Zymase	d) Maltase
2. The unit of resistivity is [1]  

a) ohm-m	b) mho
c) ohm	d) ohm/m
3. Who is called the father of genetics? [1]  

a) Stanley and miller	b) Gregor Mendel
c) Lamarck	d) Darwin
4. Find the incorrect statement [1]  
A. Field lines emerge from the south pole and merge at north pole.  
B. Magnetic field lines can intersect each other.  
C. A wire with a red insulation is usually the neutral wire of an electric supply.  
D. All of these  

a) D	b) C
c) A	d) B

5. While cooking if the bottom of the vessel is getting blackened on the outside, it means that: [1]
- a) The fuel is burning completely.      b) The food is not cooked completely.
- c) The fuel is not burning completely.      d) The fuel is wet.
6. Galvanization is a method of protecting iron from rusting by coating with a thin layer of [1]
- a) Silver      b) Gallium
- c) Zinc      d) Aluminium
7. **Statement A:** Fertilization is possible if ovulation has taken place during the middle of the menstrual cycle. [1]  
**Statement B:** Fertilization is not possible if ovulation has taken place during the middle of the menstrual cycle.
- a) Statement A is true, B is false      b) Both the statement A and B are true
- c) Statement B is true, A is false      d) Neither statement A nor statement B is true
8. The compounds used to prepare  $\text{NaHCO}_3$  are: [1]
- a)  $\text{NaCl}$ ,  $\text{NH}_3$ ,  $\text{CO}_2$ ,  $\text{H}_2\text{O}$       b)  $\text{Na}_2\text{CO}_3$ ,  $\text{CO}_2$ ,  $\text{H}_2\text{O}$ ,  $\text{O}_2$
- c)  $\text{NaCl}$ ,  $\text{NaOH}$ ,  $\text{CO}_2$ ,  $\text{H}_2\text{O}$       d)  $\text{NaCl}$ ,  $\text{Ca(OH)}_2$ ,  $\text{H}_2\text{O}$ ,  $\text{CO}_2$
9. Reproduction is essential for living organisms in order to [1]
- a) maintain growth      b) continue the species generation after generation
- c) keep the individual organism alive      d) fulfill their energy requirement
10. Match the following with correct response. [1]

(1) Metal oxides	(A) Hydroxyl Ions
(2) Non-metal oxides	(B) Acidic
(3) Salts	(C) Basic
(4) Bases	(D) Neutral

- a) 1-C, 2-B, 3-D, 4-A      b) 1-B, 2-D, 3-A, 4-C
- c) 1-A, 2-C, 3-B, 4-D      d) 1-D, 2-A, 3-C, 4-B

11. The genetic constitution of an organism is called [1]
    - a) Genome
    - b) Trait
    - c) Genotype
    - d) Phenotype
  12. The image formed by a concave mirror is real, inverted, and of the same size as the object. The position of the object must then be: [1]
    - a) beyond the centre of curvature
    - b) at the centre of curvature
    - c) at the focus
    - d) between the centre of curvature and focus
  13. A resistance of 20 ohms has a current of 2 amperes flowing in it. What potential difference is there between its ends? [1]
    - a) None of these
    - b) 20 V
    - c) 35 V
    - d) 40 V
  14. Fountain experiment demonstrates: [1]
    - a) Manufacturing of  $\text{NH}_3$
    - b) The solubility of  $\text{NH}_3$  in  $\text{H}_2\text{O}$
    - c) None of these
    - d) The solubility of  $\text{SO}_2$  in water
  15. Which among the following statements are true for unisexual flowers? [1]
    - i. They possess both stamen and pistil
    - ii. They possess either stamen or pistil
    - iii. They exhibit cross pollination
    - iv. Unisexual flowers possessing only stamens cannot produce fruits
    - a) (iii) and (iv)
    - b) (ii), (iii) and (iv)
    - c) (i) and (iv)
    - d) (i), (iii) and (iv)
  16. The internal (cellular) energy reserve in autotrophs is [1]
    - a) Glycogen
    - b) Starch
    - c) Protein
    - d) Fatty acid
  17. **Assertion (A):** A neutral body may experience a net nonzero magnetic force. **Reason (R):** The net charge on a current-carrying wire is zero, but it can experience a force in a magnetic field. [1]
    - a) Both A and R are true and R is the correct explanation of A.
    - b) Both A and R are true but R is not the correct explanation of A.
    - c) A is true but R is false.
    - d) A is false but R is true.



18. **Assertion (A):** Cyton region of nerve fibre collects information for the brain. [1]  
**Reason (R):** Nerve fibres can either have or lack the myelin sheath.
- a) Both A and R are true and R is the correct explanation of A.      b) Both A and R are true but R is not the correct explanation of A.  
c) A is true but R is false.      d) A is false but R is true.
19. **Assertion (A):** Weak acids have low electrical conductivity. [1]  
**Reason (R):** Strong acids and weak acid have an equal concentration of hydrogen ions in their solutions.
- a) Both A and R are true and R is the correct explanation of A.      b) Both A and R are true but R is not the correct explanation of A.  
c) A is true but R is false.      d) A is false but R is true.
20. **Assertion (A):** CFCs deplete the ozone layer. [1]  
**Reason (R):** CFCs are used as refrigerants and in fire extinguishers.
- a) Both A and R are true and R is the correct explanation of A.      b) Both A and R are true but R is not the correct explanation of A.  
c) A is true but R is false.      d) A is false but R is true.

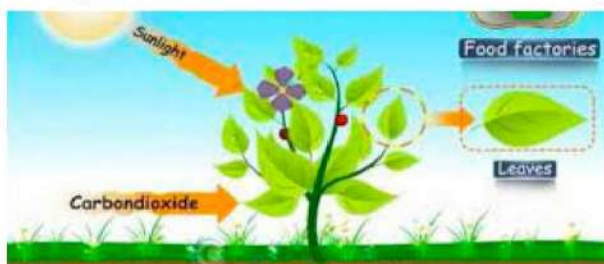
### Section B

21. Explain reflex arc or reflex path [2]  
.OR  
What will happen, if you step accidentally on a nail?
22. i. Name the property of ethanol which makes it useful in medicines. [2]  
ii. Name the organic compound which is used in pickles. Mention its composition.  
iii. Mention any two uses of alcohol in medicines.
- OR
- What change will you observe if you test soap with litmus paper (red and blue)?
23. What is biomass? How is the energy related to it? [2]
24. A concave mirror produces three times magnified (enlarged) real image of an object 10 cm in front of it. Where is the image located? [2]

OR

State the mirror formula for determining the focal length of spherical mirrors write the meanings of the symbols used An object is placed at a distance of 25 cm. from a concave mirror of focal length 15 cm. Calculate the distance of the image from the mirror.

25. Mention the amount of solar energy captured by the green plants out of the total energy that reaches on the earth from the Sun and mention the percentage of energy, which is transferred from one trophic level to next higher one. [2]



26. i. Write the formula and draw the electron dot structure of carbon tetrachloride. [2]  
ii. What is saponification? Write the reaction involved in this process.

### Section C

27. What is atmospheric refraction? Explain with the help of a labelled diagram that the position of a star as seen by us is not its true position. [3]
28. A student burns a metal **A** found in the form of ribbon. The ribbon burns with a dazzling flame & a white powder **B** is formed which is basic in nature. Identify **A** & **B**. Write the balanced chemical equation for the reaction involved. [3]
29. Mention three important features of fossils which help in the study of evolution. [3]

OR

Fertilization is possible if copulation has taken place during middle of menstrual cycle. Give reason.

30. i. State two main causes of a person developing near-sightedness. With the help of a ray diagram, suggest how he can be helped to overcome his disability? [3]  
ii. The far point of myopic person is 100 cm in front of the eye. Calculate the focal length and power of a lens required to enable him to see distant objects clearly.
31. An individual inherits different traits from his parents. On what basis classification of traits as dominant and recessive is done? [3]

OR

In pea plant, round seed is dominant over the wrinkled. If a cross is carried out between these two plants, give answer to the following questions.

- i. Mention the genes for the traits of parents.  
ii. State the trait of  $F_1$  hybrids.  
iii. Write the ratio of  $F_2$  progeny obtained from this cross. What is the name of the cross?
32. 2g of silver chloride is taken in a china dish and the china dish is placed in sunlight for some time. What will be your observation in this case? Write the [3]



chemical reaction involved in the form of a balanced chemical equation. Identify the type of chemical reaction.

33. For a class, the physics teacher told her students that our eyes can live even after our death. She told them that by donating our eyes after we die, one pair of our eyes can give vision to two corneal blind people. Eye donors may belong from either sex or any age group. People who are suffering from diabetes, hypertension, asthma or any other non-communicable disease can donate eyes. Eye banks have been established for this purpose, where you can pledge to donate your eyes after your death? Read the given passage and answer the following questions: [3]
- Is it possible that people using spectacles or those who have been operated for cataract donate their eyes?
  - Why is the pledge necessary?
  - Do you intend to make such a pledge? Why?

#### Section D

34.
  - Write the steps involved in the extraction of pure metals in the middle of the activity series from their carbonate ores.
  - How is copper extracted from its sulphide ore? Explain the various steps supported by chemical equations. Draw labelled diagram for the electrolytic refining of copper. [5]

OR

- What is meant by the reactivity series of metals? Arrange the following metals in an increasing order of their reactivities towards water : Zinc, iron, magnesium, Sodium
  - Hydrogen is not a metal but still it has been assigned a place in the reactivity series of metals. Why?
  - Name one metal more reactive and another less reactive than hydrogen.
  - Name one metal which displaces copper from copper sulphate solution and one which does not.
  - Name one metal which displaces silver from silver nitrate solution and one which does not.
35. Explain the three pathways of breakdown in living organisms. [5]

OR

Why and how does water enter continuously into the root xylem of plants?

36.
  - Draw the magnetic field lines through and around a single loop of wire carrying electric current.
  - State whether an alpha particle will experience any force in a magnetic field, if :
    - It is placed in the field at rest.
    - It moves in the magnetic field parallel to field lines. [5]

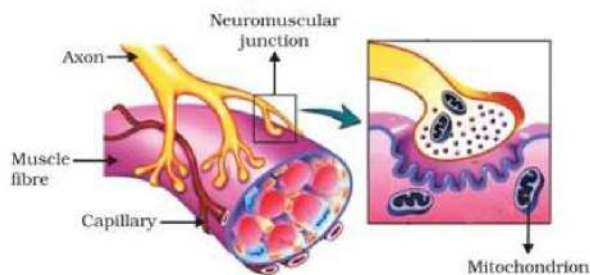
c. It moves in the magnetic field perpendicular to field lines.  
Justify your answer in each case.

### Section E

37. **Read the text carefully and answer the questions:**

[4]

In animals, control and coordination are provided by nervous and muscular tissues. Touching a hot object is an urgent and dangerous situation for us. We need to detect it and respond to it. How do we detect that we are touching a hot object? All information from our environment is detected by the specialised tips of some nerve cells. These receptors are usually located in our sense organs, such as the inner ear, the nose, the tongue, and so on. So gustatory receptors will detect taste while olfactory receptors will detect the smell. This information, acquired at the end of the dendritic tip of a nerve cell sets off a chemical reaction that creates an electrical impulse. This impulse travels from the dendrite to the cell body, and then along the axon to its end. At the end of the axon, the electrical impulse sets off the release of some chemicals. These chemicals cross the gap, or synapse, and start a similar electrical impulse in the dendrite of the next neuron. This is a general scheme of how nervous impulses travel in the body. A similar synapse finally allows the delivery of such impulses from neurons to other cells, such as muscles cells or glands.



- (i) Why does the flow of signals in a synapse from axonal end of one neuron to dendritic end of another neuron take place but not in the reverse direction?
- (ii) From where the electrical impulse travels?
- (iii) Name the chemical which released at the end of axon to transmit the signal to the other neuron.

**OR**

What happens at the synapse between 2 neurons?

38. **Read the text carefully and answer the questions:**

[4]

The electrical energy consumed by an electrical appliance is given by the product of its power rating and the time for which it is used. The SI unit of electrical energy is Joule. Actually, Joule represents a very small quantity of energy and therefore it is inconvenient to use where a large quantity of energy is involved. So for commercial purposes, we use a bigger unit of electrical energy which is called kilowatt-hour. 1 kilowatt-hour is equal to  $3.6 \times 10^6$  joules of electrical energy.

- (i) The energy dissipated by the heater is E. When the time of operating the heater is doubled, what would be the energy dissipated?



- (ii) The power of a lamp is 60 W. What will be the energy consumed in 1 minute?

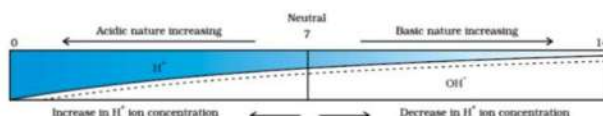
**OR**

The electrical refrigerator rated 400 W operates 8 hours a day. The cost of electrical energy is ₹5 per kWh. Find the cost of running the refrigerator for one day.

39. **Read the text carefully and answer the questions:**

**[4]**

A scale for measuring hydronium ion in a solution is called the pH scale. The pH of a neutral solution is 7. A value of less than 7 on the pH scale represents an acidic solution. As the pH value, increases from 7 to 14 it represents OH<sup>-</sup> ion concentration in solution i.e a basic solution.



- (i) What is the pH range of the Human Body?
- (ii) The strength of acid and bases depends on which factor?
- (iii) If the pH of soil X is 7.5 while that of soil Y is 4.5, then which soil should be treated with powdered chalk to adjust its pH?

**OR**

Tooth decay starts when the pH of the mouth is lower than which pH?



## Solution

### Section A

1. (a) Invertase

**Explanation:** Invertase helps in breaking sucrose into its component parts - glucose and fructose. Zymase converts starch into glucose. Diastase transforms starch into maltose and after that, it converts it into glucose. Maltase is an enzyme that can break down disaccharide maltose.

2. (a) ohm-m

**Explanation:** Electrical resistivity (also known as resistivity, specific electrical resistance, or volume resistivity) is an intrinsic property that quantifies how strongly a given material opposes the flow of electric current. A low resistivity indicates a material that readily allows the flow of electric current. Resistivity is commonly represented by the Greek letter  $\rho$  (rho). The SI unit of electrical resistivity is the ohm-metre ( $\Omega \cdot m$ )

3. (b) Gregor Mendel

**Explanation:** Gregor Mendel is called the father of genetics because he was the first person in the world to observe the fact that characteristics were passed on from the parents to the children.

4. (a) D

**Explanation:** Magnetic field emerges from north pole to south pole and has only one direction, thus no two field lines overlap.

A wire with red insulation is usually the live wire of electric supply.

So, all statements are incorrect.

5. (c) The fuel is not burning completely.

**Explanation:** When the fuel does not burn completely, some carbon particles remain un-oxidised and form soot. The soot gets deposited to the bottom of the vessels and the vessels get blackened on the outside.

6. (c) Zinc

**Explanation:** Iron, when exposed to air and moisture, gets rapidly rusted and rusting can be prevented by coating iron with a thin layer of zinc. This process of coating iron and steel with a coating of zinc is called galvanization.

7. (a) Statement A is true, B is false

**Explanation:** Fertilization is possible if ovulation has taken place during the middle of the menstrual cycle.

Hence, statement A is true.

8. (a) NaCl, NH<sub>3</sub>, CO<sub>2</sub>, H<sub>2</sub>O

**Explanation:** Sodium hydrogen carbonate is produced on a large scale by reacting a cold and concentrated solution of sodium chloride with ammonia and carbon dioxide:  
$$\text{NaCl} + \text{NH}_3 + \text{H}_2\text{O} + \text{CO}_2 \rightarrow \text{NaHCO}_3 + \text{NH}_4\text{Cl}$$

9. (b) continue the species generation after generation

**Explanation:** Reproduction is essential to continue the species forever generations after generations. It is essential for the survival of a species.

10. (a) 1-C, 2-B, 3-D, 4-A

**Explanation:** Metal oxides are basic in nature because they release hydroxyl ions after hydrolysis and non-metals oxides are acidic in nature because they release hydrogen

ions after hydrolysis. Salts formed by acids and bases of equal strengths are neutral in nature. Bases release hydroxyl ions on hydrolysis.

11. **(c)** Genotype

**Explanation:** The genotype is the part (DNA sequence) of the genetic makeup of a cell, and therefore of an organism or individual, which determines a specific characteristic of that cell/organism/individual.

12. **(b)** at the centre of curvature

**Explanation:** at the centre of curvature

13. **(d)** 40 V

**Explanation:** Given,

Resistance,  $R = 20 \text{ Ohms}$

Current,  $I = 2 \text{ amp}$

We know that,

$V = IR$

Therefore,  $V = 2 \times 20 = 40V$

14. **(b)** The solubility of  $\text{NH}_3$  in  $\text{H}_2\text{O}$

**Explanation:** The ammonia fountain demonstrates the solubility of ammonia in water.

15. **(b)** (ii), (iii) and (iv)

**Explanation:** Unisexual flowers have either male or female sexual organs. Therefore, they cannot self-pollinate and, thus, show cross-pollination. The ovary of the female organ develops into a fruit after fertilization, therefore flowers having stamens cannot produce fruits.

16. **(b)** Starch

**Explanation:** Glycogen is the stored energy in animals, and Plants stores energy in the form of Starch.

17. **(a)** Both A and R are true and R is the correct explanation of A.

**Explanation:** Both A and R are true and R is the correct explanation of A.

18. **(d)** A is false but R is true.

**Explanation:** A is false but R is true.

19. **(c)** A is true but R is false.

**Explanation:** Weak acids have low electrical conductivity because the number of ions furnished by weak acids is less as compared to strong acids in their aqueous solution.

20. **(a)** Both A and R are true and R is the correct explanation of A.

**Explanation:** The ozone layer is getting depleted at the higher levels of the atmosphere due to the effect of chlorofluorocarbons (CFCs) which are used as refrigerants and in fire extinguishers.

### Section B

21. If we step accidentally on a nail, the foot is withdrawn immediately. It is due to reflex action or spinal reflex. In such case the stimulus of a pointed object like nail is carried to the spinal cord by the sensory (afferent) nerve fibres to the grey matter of spinal cord through dorsal root. Now after the interpretation, the stimulus is transmitted to motor nerve fibres at the synapse. The motor (efferent) impulse is carried by motor nerve fibre through ventral root to the effector organ and response is made. In this case it is in the form of withdrawal of foot by the contraction of voluntary muscles. They behave involuntarily during reflex action.

22. i. Ethanol is good solvent, so it is used to make medicines. It is also used as antiseptic and sedative.



- ii. Vinegar is widely used as a preservative in pickles. It is 5-8% solution of ethanoic acid (acetic acid) in water.
- iii. Alcohol is used in tincture of iodine and cough syrups.

OR

Soap solution will turn red litmus paper blue because soap is alkaline in nature.

23. The amount of organic matter present in an organism is called biomass. Biomass is living matter in any organism. Truly speaking, biomass represents the quantity of living tissue as energy available in the form of food for organisms of next trophic level.
24. Let magnification,  $m = -3 = \frac{-v}{u}$

Image distance,  $v = 3u$

focal length,  $f = ?$

Object distance,  $u = -10\text{cm}$

$$\frac{1}{f} = \frac{1}{u} + \frac{1}{v}$$

$$v = 3(-10)$$

$$v = -30\text{cm}.$$

As value of  $v$  is -ve therefore position of image is in front of the mirror by 30cm.

OR

$$\frac{1}{f} = \frac{1}{u} + \frac{1}{v}$$

Where  $f$  is the focal length of the mirror

$U$  is the object distance

$V$  is the Image distance

$$U = -25\text{ cm}$$

$$F = -15\text{ cm}$$

$$V = ?$$

$$\frac{1}{f} = \frac{1}{v} + \frac{1}{u}$$

$$\frac{1}{-15} = \frac{1}{v} + \frac{1}{-25}$$

$$\frac{1}{v} = \frac{-1}{15} + \frac{1}{25}$$

$$\frac{1}{v} = \frac{-1}{15} + \frac{1}{25}$$

$$\frac{1}{v} = \frac{-5+3}{75}$$

$$\frac{1}{v} = \frac{-2}{75}$$

$$v = \frac{-75}{2} = -37.5\text{cm}$$

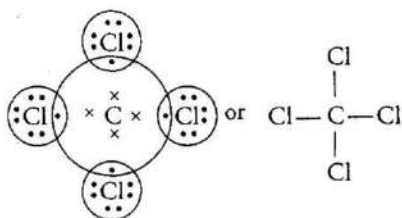
25. In terrestrial ecosystem green plants capture about 1% of the energy of sunlight falling on earth into food by photosynthesis. On an average 10% energy is transferred from one trophic level to next higher one.

26. i. Electronic configuration of carbon,  $C(6)$  is  $\overset{K}{2}, \overset{L}{4}$

Electronic configuration of chlorine,  $Cl(17)$  is  $\overset{K}{2}, \overset{L}{8}, \overset{M}{7}$

To attain octet configuration, carbon needs 4 electron and chlorine needs 1 electron.

So, carbon forms carbon tetra chloride( $CCl_4$ )

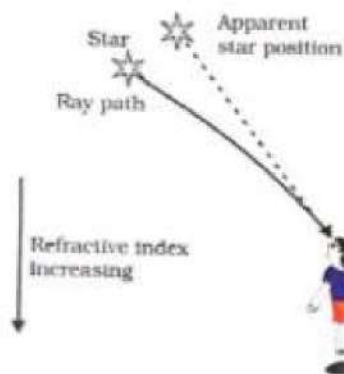


- ii. The reaction of an ester in the presence of base to give sodium salt of carboxylic acid and alcohol is known as saponification and this process is used in the preparation of soap



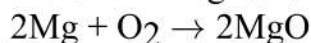
### Section C

27. **Atmospheric refraction:-** The refraction of light caused by the earth's atmosphere (having their layers of varying optical densities) is called atmospheric refraction. Light from a star is refracted as it leaves space and enters the earth's atmosphere. Air higher up in the sky is rare but that near the Earth's surface is denser. So, as the light from a star comes down the dense air bends the light more. Therefore, the apparent position to the star is slightly different from its actual position.



28. Magnesium, on reaction with oxygen, forms Magnesium oxide which is a white powder and is basic in nature.

Metal A - Magnesium (Mg) ; White powder B - Magnesium oxide (MgO)

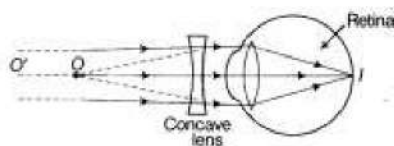


29. i. Fossils represent modes of preservation of ancient species.  
 ii. Fossils help in establishing evolutionary traits among organisms and their ancestors that is their phylogeny.  
 iii. The age of the fossil helps in determining the time period in which that species lived and how old are the fossils.

OR

Fertilization takes place in the fallopian tube only if mature ovum is released. In a normal menstrual cycle, ovulation occurs during middle of sexual cycle. Thus if copulation occurs only during this period only then fertilization is possible.

30. i. Near sightedness (myopia) defect arises either because of :  
 (a) decrease in focal length of eye lens.(b) elongation of the eye ball  
 ii. To correct this defect of vision, he must use a concave lens of suitable focal length. The concave lens of suitable focal length will bring the image back to the retina as shown in the given figure.



- iii. Given,  $v = -100 \text{ cm}$  ,  $u = \infty$

Using lens formula,

$$\frac{1}{f} = \frac{1}{v} - \frac{1}{u} \Rightarrow \frac{1}{-100} - \frac{1}{\infty} = \frac{1}{f}$$

$$f = -100 \text{ cm} = -1 \text{ m.}$$



∴ Power of lens,

$$P = \frac{1}{f(m)} = \frac{1}{-1} = -1D.$$

31. A trait which is able to express itself both in homozygous condition as well as heterozygous conditions is called a dominant trait.

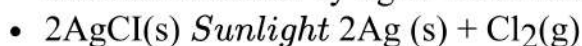
A trait which expresses itself only in homozygous condition is called recessive trait.

OR

- i. RR for homozygous pure round. And rr for homozygous pure wrinkle pea plant.
- ii. Rr (hybrid) - heterozygous. All are round since round is dominant over wrinkled.
- iii. 3:1 (phenotypic ratio), 1:2:1 (genotypic ratio) The name of this cross is monohybrid cross.

32.

- In this reaction, we will observed that the white colour of Silver chloride changes to Greyish white due to the formation of Silver metal. The decomposition of silver chloride is caused by light. This reaction is used in black and white photography.



- Decomposition reaction / Photolytic decomposition.

33. i. Yes, it is possible that people using spectacles or those who have been operated for cataract can donate their eyes.
- ii. The eyes have to be removed from your dead body and then implanted in two corneal blind people. Your permission in the form of a pledge is essential. In fact, the pledge is to be signed in the presence of your near and dear ones, who will be in charge of the body after you die.
- Eyes of a dead person can be donated to a person having corneal blindness. It will help him/her see the world. We can also register ourselves to donate our eyes. The organisations that put up eye donation camps preserve our eyes after our death and donate them to the needy.
- iii. Yes, I want to make a pledge for such a noble cause. Because after my death both my eyes will be used to give vision to two corneal blind people.

#### Section D

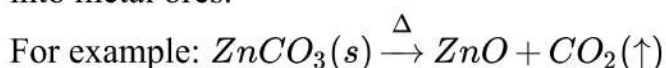
34. i. Pure metals are extracted from their carbonate ores through the following steps:

a. **Concentration of Ore:**

Gangue first needs to be removed from the ore keeping in mind the differences in physical and chemical properties of gangue and ore.

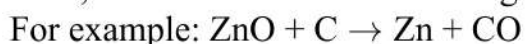
b. **Calcination:**

The carbonate ores must be heated strongly in the absence of air to convert them into metal ores.



c. **Reduction:**

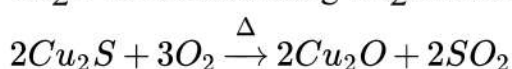
Next, reduction is carried out using a more reactive metal or carbon.



This happens because carbon has a greater binding affinity for oxygen than Zinc does.

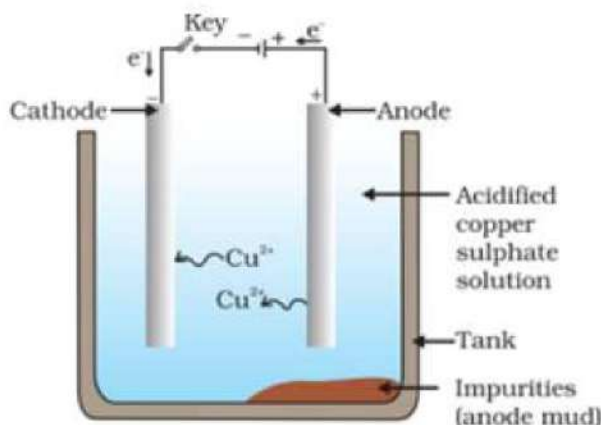
Finally, the obtained metal is refined by electrolysis of their salt solutions.

- ii. Copper glance is the ore of copper sulphide. It is first roasted and then the remaining  $Cu_2O$  is reduced using  $Cu_2S$  in the tank.



$$2\text{Cu}_2\text{O} + \text{Cu}_2\text{S} \xrightarrow{\Delta} 6\text{Cu} + \text{SO}_2$$

This way, copper metal is extracted.

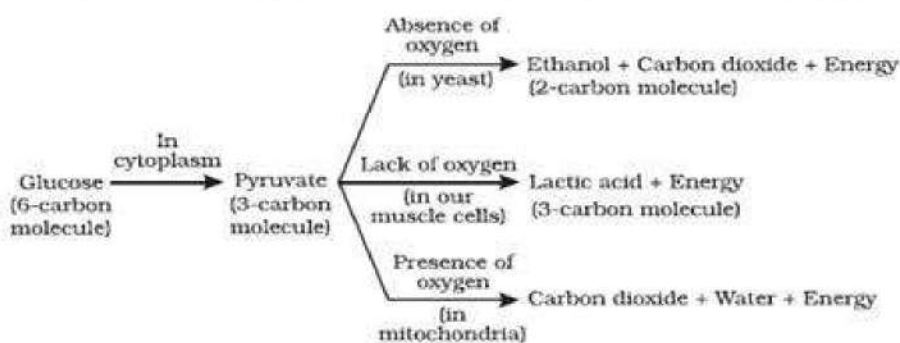


**Electrolytic refining of copper:** The electrolyte is a solution of acidified copper sulphate. The anode is impure copper, whereas, the cathode is a strip of pure copper. On passing electric current, pure copper is deposited on the cathode.

OR

- The arrangement of metals in the order of decreasing reactivities is called reactivity series. Increasing order of reactivity of metal toward water: Iron < zinc < magnesium < sodium
- Hydrogen can lose electrons and forms positive ions like metals. Therefore, it has been placed in the reactivity series of metals.
- Lead is more reactive than hydrogen and copper is less reactive than hydrogen.
- Zinc displaces copper from copper sulphate solution and mercury does not displace copper from copper sulphate solution.
- Copper displaces silver from silver nitrate solution and gold does not displace silver from silver nitrate solution.

35. The breakdown of glucose can be shown by following diagram:



In all organisms, a molecule of glucose (6 carbon molecule) is first converted into 2 molecules of pyruvate (3 carbon molecule) in cytoplasm and is termed GLYCOLYSIS. Further breakdown of pyruvate can take any of three pathways:

**In Yeast:** In yeast, breakdown of pyruvate take place in absence of oxygen. Due to this, it is called anaerobic respiration. Pyruvate is broken down into ethanol and carbon dioxide and energy. This process is also named fermentation process.

**In muscle cells:** During strenuous physical activity, the energy demand from muscle cells suddenly increases. This is compensated by anaerobic respiration in muscle cells. In such a situation, pyruvate is broken down into lactic acid and energy.

**In mitochondria:** In this case, breakdown of pyruvate takes place in presence of oxygen. Due to this, it is called aerobic respiration. Pyruvate is broken down into carbon dioxide

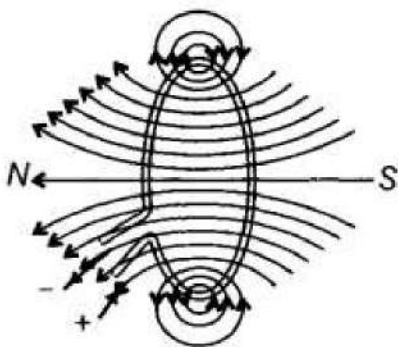


and water and energy. Aerobic respiration occurs in most of the living beings, producing, more ATP as compared to other process of anaerobic respiration.

OR

Xylem transports water and minerals to the plant body. The roots of a plant have hair called root hairs. The root hairs are directly in contact with the film of water in between the soil particles. Water and minerals get into the root hair by the process of diffusion. The water and minerals absorbed by the root hair form the soil pass from cell to cell by osmosis through the epidermis root cortex, endodermis and reaches the root xylem. The xylem vessels of the root the plant are connected to the xylem vessels into stem. Therefore the water containing dissolved minerals enter the root xylem vessels into stem xylem vessels. The xylem vessels of the stem branch into the leaves of the plants. So the water & minerals carried by the xylem vessels in the stem reach the leaves through the branched xylem vessels which enter from the petiole into the leaf. Thus the water and minerals from the soil reach through the root and stem to the leaves of the plants. Evaporation of water molecules from the cells of a leaf creates a suction which pulls water from the xylem cells of roots. The loss of water in the form of vapour from the aerial parts of the plants is known as transpiration.

36. i. The magnetic fields lines due to a circular coil are shown in the figure given below. At every point on a current carrying circular loop, the magnetic field is in the form of concentric circles around it. As we move away from it, the radii of the circle tend to increase. When we reach the center of the loop, the field appears to be a straight line.



- ii. a. No, it will not experience any force. As, magnetic field exerts force on a moving charged particle only.  
b. No, it will not experience any force because magnetic field exerts a force in perpendicular direction to motion of the particle.  
c. Yes, it will experience a force in a direction perpendicular to the direction of its own motion and the direction of magnetic field can be determined by Fleming's left hand rule.

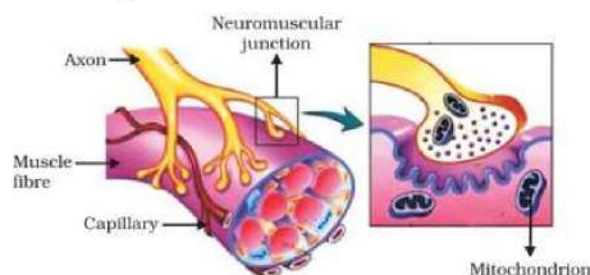
### Section E

**37. Read the text carefully and answer the questions:**

In animals, control and coordination are provided by nervous and muscular tissues. Touching a hot object is an urgent and dangerous situation for us. We need to detect it and respond to it. How do we detect that we are touching a hot object? All information from our environment is detected by the specialised tips of some nerve cells. These receptors are usually located in our sense organs, such as the inner ear, the nose, the tongue, and so on. So gustatory receptors will detect taste while olfactory receptors will detect the smell. This information, acquired at the end of the dendritic tip of a nerve cell sets off a chemical reaction that creates an electrical impulse. This impulse travels from the dendrite to the cell body, and then along the axon to its end. At the end of the axon, the electrical impulse sets off the release of some chemicals. These chemicals cross the



gap, or synapse, and start a similar electrical impulse in the dendrite of the next neuron. This is a general scheme of how nervous impulses travel in the body. A similar synapse finally allows the delivery of such impulses from neurons to other cells, such as muscles cells or glands.



- (i) At the synapse, (functional junction between neurons) axon terminal comes in close proximity to the dendron terminal of next neuron. Axon terminal is expanded to form pre-synaptic knob and the other dendrite terminal forms post- synaptic depression.
- (ii) The electrical impulse travels form the dendrite to the cell body, then along the axon to its end.
- (iii) Acetylcholine is released at the end of the axon to transmit the signal to the other neuron.

OR

A synapse is a gap between two neurons. At the synapse, the electrical signals are converted into chemicals that can easily cross over the gap and pass on to the next neurons where it again converted into electrical signals.

### 38. Read the text carefully and answer the questions:

The electrical energy consumed by an electrical appliance is given by the product of its power rating and the time for which it is used. The SI unit of electrical energy is Joule. Actually, Joule represents a very small quantity of energy and therefore it is inconvenient to use where a large quantity of energy is involved. So for commercial purposes, we use a bigger unit of electrical energy which is called kilowatt-hour. 1 kilowatt-hour is equal to  $3.6 \times 10^6$  joules of electrical energy.

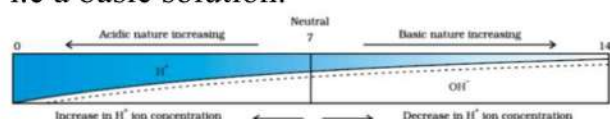
- (i)  $E \propto t$   
When the time of operating the heater is doubled, the energy dissipated is doubled.
- (ii) Given:  $P = 60 \text{ W}$ ,  $t = 1 \text{ min}$   
 $E = 60 \times 1 \times 60 = 3600 \text{ J}$

OR

Given:  $P = 400 \text{ W}$ ,  $t = 8 \text{ hour}$   
 $E = 400 \times 8 = 3200 \text{ Wh} = 3.2 \text{ kWh}$   
 Cost =  $3.2 \times 5 = ₹16$

### 39. Read the text carefully and answer the questions:

A scale for measuring hydronium ion in a solution is called the pH scale. The pH of a neutral solution is 7. A value of less than 7 on the pH scale represents an acidic solution. As the pH value, increases from 7 to 14 it represents  $\text{OH}^-$  ion concentration in solution i.e a basic solution.





- (i) The pH range of the Human Body is 7 to 7.8.
- (ii) The strength of acids and bases depends on the number of  $H^+$  ions produced and the number of  $OH^-$  ions produced.
- (iii) Soil Y is acidic. Hence, it should be treated with powdered chalk to reduce its acidity.

OR

When the pH in the mouth falls below 5.5, tooth decay starts. Bacteria present in the mouth produce acid by degradation of sugar and food particles which remain in the mouth after eating.