Std. : 10 | **QUESTION PAPER - 1** | Duration : 3 hour

Sub.: Science | **(Annual Examination)** | Total Marks : 80

Student's Name : .....

Batch No. ..... Roll No. ..... Date ..... / ..... / 20.....

Marks Obtained

SECTION - A

Do as directed. (Que. 1 to 24) (each carries 1 mark) [24]

- **Choose the correct alternative and write the answer.**

1. What happens when a solution of an acid is mixed with a solution of a base in test tube?

(i) The temperature of the solution increases

(ii) The temperature of the solution decreases

(iii) The temperature of the solution remains the same.

(iv) Salt formation takes place. *(Ch.2)*

(A) only (i) (B) (i) and (iii)

(C) (ii) and (iii) (D) (i) and (iv)

2. The name of the compound $CH_3 - CH_2 - CHO$ is _____. *(Ch.4)*

(A) propanal (B) propanone

(C) ethanol (D) ethanal

3. During which process is energy released from absorbed food ? *(Ch.5)*

(A) Digestion (B) Respiration

(C) Excretion (D) None of these

4. In the house wiring, which coloured insulation does neutral wire have ? *(Ch.12)*

(A) Red (B) Black

(C) Green (D) White

5. Which one of the following materials can not be used to make a lens ? _____ *(Ch.9)*

(A) Clay (B) Water

(C) Glass (D) Plastic

6. Among violet, yellow and red colour light, which light has greatest wavelength ? *(Ch.10)*

(A) violet (B) red

(C) yellow (D) none of above

- **Fill in the blanks by choosing the correct option from the bracket.**

7. _____ is an unsaturated compound.

(CH_4, C_2H_4, C_3H_8) *(Ch.4)*

8. Magnetic effect of electric current was discovered by scientist, _____. (Oersted, Fleming's, Ferade) *(Ch.12)*

9. In _____ form is cellular energy stored in autotrophic organisms. (Glycogen, Protein, Starch) *(Ch.5)*

10. Asexual reproduction takes place through budding in _____. (amoeba, yeast, plasmodium) *(Ch.7)*

11. Image obtained by plane mirror is always _____ (virtual and erect, virtual and inverted, real and erect) *(Ch.9)*

12. Copper metal surface reacts with air and basic _____ layer is formed on it.

(zinc oxide, copper carbonate, copper oxide) *(Ch.3)*

- **State whether the following statements are True or False.**

13. Ionic compounds are insolubie in water and soluble in petrol *(Ch.3)*

14. Traits which are not inherited over generations do not cause evolution. *(Ch.8)*

15. Optic nerves send electrical signals to brain. *(Ch.10)*

16. pH=4 indicates basic nature. *(Ch.2)*

- **Answer in short.**

17. Write the full form of the CNS & PNS. *(Ch.6)*

18. Who is the father of Genetics? *(Ch.8)*

19. Mention different parts of human eye. *(Ch.10)*

20. How much is the equivalent resistance of a series connection ? *(Ch.11)*

- **Match the following.** *(Ch.6,13)*

	'A'	'B'	
21.	Auxin	(a)	Cell division test in plant
22.	Gibberellin	(b)	Avena curvature test
		(c)	Divarb corn test

	'A'	'B'	
23.	Polythene	(a)	Biodegradable waste
24.	Dry wood	(b)	Nondegradable waste
		(c)	Autotrophic nutrition

SECTION-B

Answer any 9 questions from question no. 25 to 37 in about 40 to 50 words as asked.
(each carries 2 marks) **[18]**

25. Chemical changes observed in daily life. Discuss. *(Ch.1)*

26. Define the following terms. (i) Mineral (ii) Ore (iii) Gangue. *(Ch.3)*

27. How do guard cells regulate the opening and closing of stomatal pore ? *(Ch.5)*

28. What is the importance of DNA copying in reproduction ? *(Ch.7)*

29. Explain reproduction by budding in yeast with diagram. *(Ch.7)*

30. Mention in brief about "cataract" and its remedy *(Ch.10)*

31. What does a switch do in the working of a torch ? *(Ch.11)*

32. Define unit of electric current ? *(Ch.11)*

33. Draw magnetic field lines around a bar magnet. *(Ch.12)*

34. Describe two types of waste based on their decomposition. *(Ch.13)*

35. Distinguish between : Biodegradable waste Non biodegradable waste. *(Ch.13)*

36. Explain the importance of mucus in digestive system. *(Ch.5)*

37. Show a schematic diagram of an electric circuit comprising of cell, electric bulb, ammeter and plug key. Also mention about direction of electric current. *(Ch.11)*

SECTION-C

Answer any 6 questions from question no. 38 to 46 in about 60 to 80 words as asked.
(each carries 3 marks) **[18]**

38. Translate the following statements into chemical equations and then balance them.

(a) Hydrogen gas combines with nitrogen to form ammonia.

(b) Hydrogen sulphide gas burns in air to give water and sulphur dioxide.

(c) Barium chloride reacts with aluminium sulphate to give aluminium chloride and a precipitate of barium sulphate.

(d) Potassium metal reacts with water to give potassium hydroxide and hydrogen gas. *(Ch.1)*

39. Give reasons *(Ch.3)*

(a) Platinum, gold and silver are used to make jewellery.

(b) Sodium, potassium and lithium are stored under oil.

(c) Aluminium is a highly reactive metal, yet it is used to make utensils for cooking.

40. What is meant by metals ? List their physical properties.? *(Ch.3)*

41. Draw the structure of a neuron and explain its function. *(Ch.6)*

42. Explain Binary fission in amoeba and multiple fission in Plasmodium. *(Ch.7)*

43. Explain the reproductive organs of Flowering plants. *(Ch.7)*

44. What is called reflection of light ? Using a proper diagram, explain about incident ray, reflected ray, angle of incidence, angle of reflection and plane of incidence. *(Ch.9)*

45. What is called a spherical mirror ? Describe its two types with proper diagrams. *(Ch.9)*

46. How is electric current expressed ? Describe about its SI unit also. *(Ch.11)*

SECTION-D

Answer any 5 questions from question no. 47 to 54 in about 90 to 120 words as asked.
(each carries 4 marks) **[20]**

47. Reaction of zinc granules with dilute sulphuric acid and how test of hydrogen gas by burning can be done ? Discuss this experiment. *(Ch.2)*

48. (a) Why does dry HCl gas not change the colour of the dry litmus paper ?

(b) While diluting an acid, why is it recommended that the acid should be added to water and not water to the acid ? *(Ch.2)*

49. Explain the tetravalency of carbon. *(Ch.4)*

50. What is Autotrophic Nutrition ? Explain the process of photosynthesis in short. *(Ch.5)*

51. Explain the process of nutrition in an unicellular organism. *(Ch.5)*

52. Draw cross-sectional lebelled diagram of human eye. Describe its construction and function of each part. Also describe how we can see through our eyes. *(Ch.10)*

53. To study the pattern of magnetic field lines around a straight current carrying wire. *(Ch.12)*

54. Explain the components of ecosystem. *(Ch.13)*

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SCIENCE | QUESTION PAPER - 1 | FULL SOLUTION

SECTION - A

Do as directed. (Que. 1 to 24) (each carries 1 mark) [24]

- **Choose the correct alternative and write the answer.**

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(iii) The temperature of the solution remains the same.

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(2) The name of the compound $CH_3 - CH_2 - CHO$ is _____. *(Ch.4)*

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- **Fill in the blanks by choosing the correct option from the bracket.**

(7) **C_2H_4 is an unsaturated compound.**

(CH_4, C_2H_4,C_3H_8) *(Ch.4)*

(8) Magnetic effect of electric current was discovered by scientist, **Oersted** . *(Ch.12)*

(Oersted, Fleming's, Ferade)

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(11) Image obtained by plane mirror is always **virtual and erect** (virtual and erect, virtual and inverted, real and erect) *(Ch.9)*

(12) Copper metal surface reacts with air and basic **copper carbonate** layer is formed on it. *(Ch.3)*

(zinc oxide, copper carbonate, copper oxide)

- **State whether the following statements are True or False.**

(13) Ionic compounds are insolubie in water and soluble in petrol *(Ch.3)*

(14) Traits which are not inherited over generations do not cause evolution. *(Ch.8)*

(15) Optic nerves send electrical signals to brain. *(Ch.10)*

(16) pH=4 indicates basic nature. *(Ch.2)*

Ans. **13.** False **14.** True **15.** True **16.** False

- **Answer in short.**

(17) Write the full form of the CNS & PNS. *(Ch.6)*

Ans. CNS : Central Nervous System

PNS : Peripheral Nervous System

(18) Who is the father of Genetics? *(Ch.8)*

Ans. Gregor Johann Mendel is the father of genetics.

(19) Mention different parts of human eye. *(Ch.10)*

Ans. Cornea, iris, pupil, crystalline lens, ciliary muscles, retina, optic nerves..

(20) How much is the equivalent resistance of a series connection ? *(Ch.11)*

Ans. Equal to summation of individual resistances and it is greater than greatest among all the resistances in that connection.

- **Match the following.** *(Ch.6,13)*

	'A'		'B'
(21)	Auxin	(a)	Cell division test in plant
(22)	Gibberellin	(b)	Avena curvature test
		(c)	Divarb corn test

	'A'	'B'	
(23)	Polythene	(a)	Biodegradable waste
(24)	Dry wood	(b)	Nondegradable waste
		(c)	Autotrophic nutrition

Ans. **21.** (b) **22.** (c) **23.** (b) **24.** (a)

SECTION-B

➥ **Answer any 9 questions from question no. 25 to 37 in about 40 to 50 words as asked.**

(each carries 2 marks) **[18]**

(25) Chemical changes observed in daily life. Discuss. *(Ch.1)*

Ans.
- ➥ Milk get spoiled at room temperature during summer.
- ➥ An iron tawa / pan / nail when left exposed to humid atmosphere get corroded.
- ➥ grapes get fermented
- ➥ food is cooked
- ➥ food gets digested in our body.
- ➥ we respire.

(26) Define the following terms. (i) Mineral (ii) Ore (iii) Gangue *(Ch.3)*

Ans. **(i) Mineral :** The compound which occur naturally in the crust crust are known as minerals.

(ii) Ores : At some places, minerals contain a very high percentage of a particular metal and the metal can be profitably extracted from it. These minerals are called ores.

(iii) Gangue : Ores mined from the earth are usually contaminated with large amounts of impurities such as soil, sand etc are called gangue.

(27) How do guard cells regulate the opening and closing of stomatal pore ? *(Ch.5)*

Ans. Guard cells protect the stomata. The guard cells swell when water flows into them, causing the stomatal pore to open. Similarly the pore closes if the guard cells shrink. Thus guard cells swell and shrink to regulate the opening and closing of stomatal pore.

(28) What is the importance of DNA copying in reproduction ? *(Ch.7)*

Ans. (1) By replication an organism inherits its anatomy to its offspring.

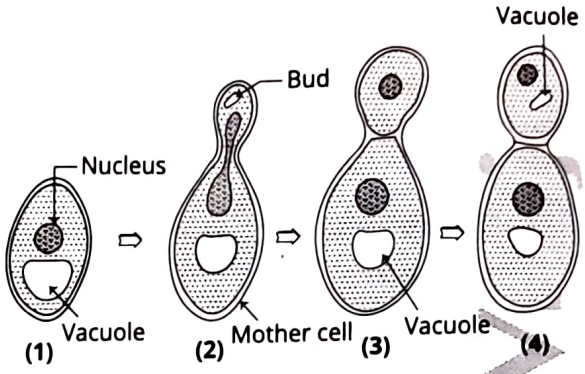
(2) The same anatomy may be maintained with slight variations in the offspring of each generation.

(3) Variation occurs from generation to generation by the process of differentiation which takes place during the formation of foetus. This variation further adapts the organism to the environment.

(4) It explains the theory of long term development.

(29) Explain reproduction by budding in yeast with diagram. *(Ch.7)*

Ans.
- ➥ First of all a small part is emerged from a parentcell. After that nucleus is then divided into two daughter cell. From that daughter nucleus is separated.
- ➥ Gradually it separates from the parent cell as its reaches its proper size. See the figure.



(30) Mention in brief about "cataract" and its remedy *(Ch.10)*

Ans. Crystalline lens of some people becomes milky and cloudy at old age. Such condition of eye is called "cataract."
- ➥ Person having cataract, may lose vision partially or completely.
- ➥ Nowadays it is quite possible to replace such lens by an artificial lens through "cataract surgery" to restore the vision.

(31) What does a switch do in the working of a torch ? *(Ch.11)*

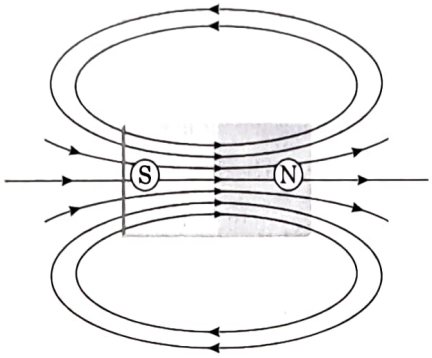
Ans. In the working of a torch, a switch provides conducting link between the cell (or a battery) and the bulb. When torch is made "on", current flows through the bulb and so it glows.
- ➥ When the switch is made "off", current stops flowing through the bulb and so it does not glow anymore.

(32) Define unit of electric current ? *(Ch.11)*

Ans. When 1 C net charge passes through any cross-section of a conductor in 1s, amount of electric current flowing through that conductor is said to be 1 A.

(33) Draw magnetic field lines around a bar magnet. *(Ch.12)*

Ans.



(34) Describe two types of waste based on their decomposition. *(Ch.13)*

Ans. (1) Biodegradable waste : The waste, which can be degraded / decomposed by biological process, is called biodegradable waste eg. Vegetables fruits peels etc.

(2) Non-biodegradable Waste : The waste, which can not be degraded / decomposed by any biodegradable waste. eg. Glass, plastic, polythene etc.

(35) Distinguish between : Biodegradable waste Non-biodegradable waste. *(Ch.13)*

Ans.

Biodegradable	Non-biodegradable
1. The are decomposed (broken down) by biological processes	1. They can not be decomposed (broken down) by biological processes
2. There are not pollutants. They are eco-friendly.	2. There are pollutants They are not eco-friendly
3. Eg. Wool, paper cotton fruits, leaves, vegetable, peels, etc.	3. Eg. DDT, polythene bags, plastic, Metals, synthetic fibers etc.

(36) Explain the importance of mucus in digestive system. *(Ch.5)*

Ans. (1) Mucus present in saliva is useful in chewing, forming morsle and swallowing the food.

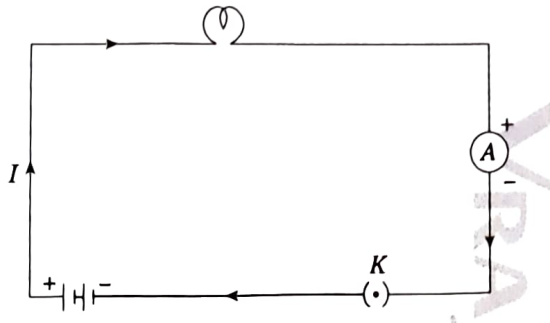
(2) Mucus present in the wall of stomach protects the stomach from acidic effect caused due to HCl and pepsin.

(3) Mucus present in the intestine helps in the transportation and absorption of food.

(4) It is also helpful in removing undigested particles from the anus.

(37) Show a schematic diagram of an electric circuit comprising of cell, electric bulb, ammeter and plug key. Also mention about direction of electric current. *(Ch.11)*

Ans.



➳ Required schematic diagram is shown in above figure.

➳ Outside the cell, direction of electric current in above circuit is from positive terminal of cell to negative terminal of the cell through the bulb and the ammeter. (Inside the cell, direction of electric current is from negative terminal to positive terminal of cell.)

Note

In every circuit, electrons always flow in a direction, opposite to that of electric current.

SECTION-C

➳ **Answer any 6 questions from question no. 38 to 46 in about 60 to 80 words as asked.**
(each carries 3 marks) **[18]**

(38) Translate the following statements into chemical equations and then balance them.

(a) Hydrogen gas combines with nitrogen to form ammonia.

(b) Hydrogen sulphide gas burns in air to give water and sulphur dioxide.

(c) Barium chloride reacts with aluminium sulphate to give aluminium chloride and a precipitate of barium sulphate.

(d) Potassium metal reacts with water to give potassium hydroxide and hydrogen gas. *(Ch.1)*

Ans. (a) $3H_{2(g)} + N_{2(g)} \rightarrow 2NH_{3(g)}$

(b) $2H_2S_{(g)} + 3O_{2(g)} \rightarrow 2H_2O_{(g)} + 2SO_{2(g)}$

(c) $3BaCl_{2(aq)} + Al_2(SO_4)_{3(aq)} \rightarrow 2AlCl_{3(aq)} + 3\ BaSO_{4(g)}$

(d) $2K_{(s)} + 2H_2O_{(g)} \rightarrow 2KOH_{(aq)} + H_{2(g)}$

(39) Give reasons *(Ch.3)*

(a) Platinum, gold and silver are used to make jewellery.

(b) Sodium, potassium and lithium are stored under oil.

(c) Aluminium is a highly reactive metal, yet it is used to make utensils for cooking.

Ans. (a) Pt, gold and silver are used to make jewellery because they are highly lustrous malleable and ductile and are least reactive metals means they are unreactive metals.

(b) Sodium, potassium and lithium are stored under oil because if these metals are kept open in air they react strongly with air, and catch fire. Therefore they are stored under kerosene oil that prevents its oxidation.

(c) Aluminium is highly reactive metal, yet it is used to make utensils for cooking because it reacts with oxygen of air and forms a protective layer of Aluminium oxide (Al_2O_3) on its surface which protects it from corrosion.

(40) What is meant by metals ? List their physical properties.? *(Ch.3)*

Ans. **"Elements which loses electrons to become positive ions are called metals."**

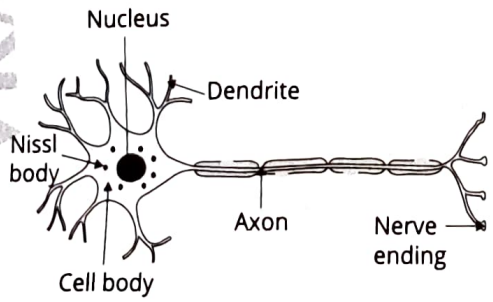
Example : Mg is metal which loses 2 electrones and forms Mg^{2+}ion.

Physical properties of Metal

1. Luster, 2. Hardness, 3. Malleability, 4. Ductility, 5. Conductivity of heat, 6. Electrical conductivity, 7. Sonorous and 8. Alloys.

(41) Draw the structure of a neuron and explain its function. *(Ch.6)*

Ans.



➳ **Functions of Neurons**

(1) Neurons form an organised reticular structure which forms nervous tissue.

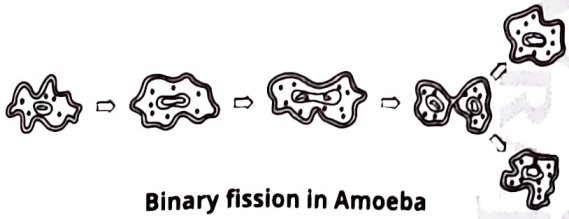
(2) Neurons carry sensations or instructions from receptors.

(3) From their sensations or instructions are carried as electric impulse.

(4) Further this impulse is converted into chemical signal so that it can be spread further.

(42) Explain Binary fission in amoeba and multiple fission in Plasmodium. *(Ch.7)*

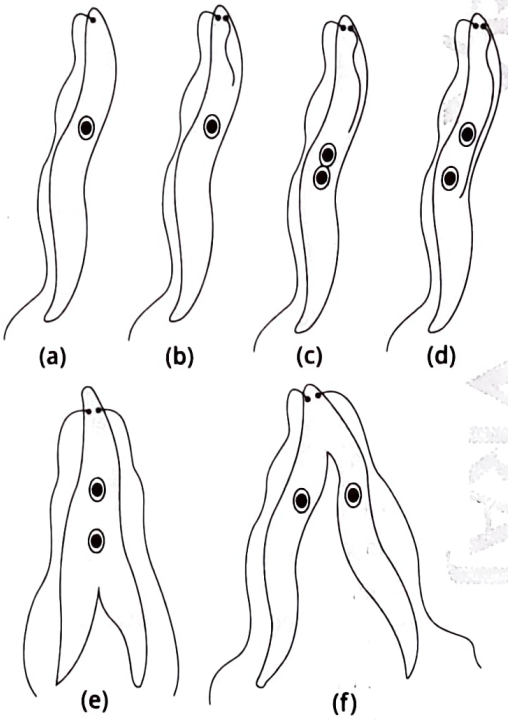
Ans. For unicellular organisms, cell division or fission leads to the creation of new individuals. Many different patterns of fission have been observed. Many bacteria and protozoa simply split into two equal halves during cell division. In organisms such as Amoeba, the splitting of the two cells during division can take place in any plane.



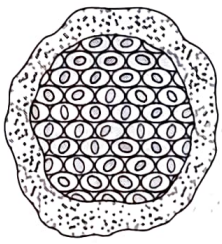
Binary fission in Amoeba

➳ However, some unicellular organisms show somewhat more organisation of their bodies such as seen in Leishmania (which cause Kala azar), which have a whip-like structure at one end of the cell. In such organisms, binary fission occurs in a definite orientation in relation to these structures.

➳ Other single - celled organisms such as the malarial parasite, Plasmodium, divide into many daughter cells simultaneously by multiple fission.



(a) Binary fission in Leishmania

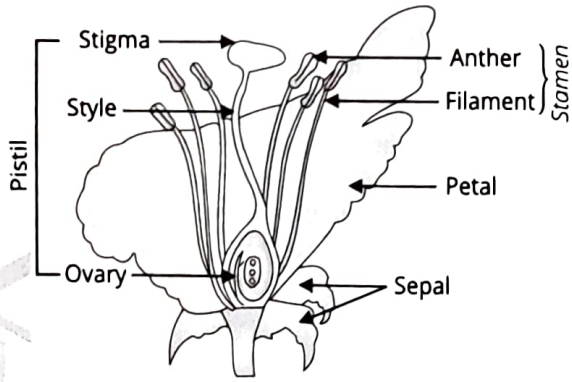


(b) Multiple fission in Plasmodium

(43) Explain the reproductive organs of Flowering plants. *(Ch.7)*

Ans.

- The reproductive parts of angiosperms are located in the flower. We have already studied the different parts of a flower - sepals, petals, stamens and pistil. Stamens and pistil are the reproductive parts of a flower which contain the germ cell.
- Petals and sepals protect the flower in budding stage. They do not take part in reproduction.
- The flower may be unisexual (papaya, watermelon) when it contains either stamens or pistil or bisexual (Hibiscus, mustard) when it contains both stamen and pistil.

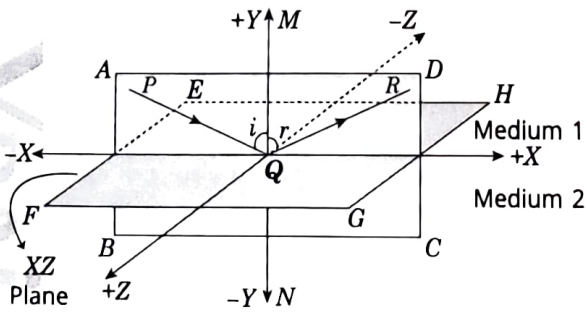


Longitudinal section of flower

- Stamen is the male reproductive part and it produces pollen grains that are yellowish in colour. You must have seen this yellowish powder that often sticks to our hands if we touch the stamen of a flower.
- Pistil is present in the centre of a flower and is the female reproductive part. It is made of three parts.
  (1) The swollen bottom part is the ovary.
  (2) Middle elongated part is the style.
  (3) Terminal part which may be sticky is the stigma.
- Stigma is usually sticky. The ovary contains ovules and each ovule has an egg cell. The male germ-cell produced by pollen grain fuses with the female gamate present in the ovule. This fusion of the germ-cells or fertilisation gives us the zygote which is capable of growing into a new plant.

(44) What is called reflection of light ? Using a proper diagram, explain about incident ray, reflected ray, angle of incidence, angle of reflection and plane of incidence. *(Ch.9)*

Ans.

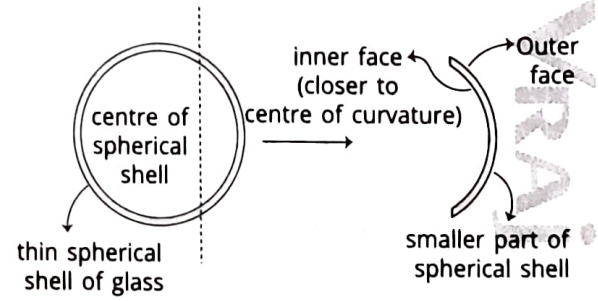


- As shown in the figure, above XZ plane, there is optical medium 1 and below this plane there is optical medium 2.
- When a ray of light PQ travelling in medium 1 strikes on the surface of medium 2 at point Q, it gets bounced and then it travels along QR. Here this process of bouncing is called reflection of light, ray PQ is called **incident ray**, ray QR is called **reflected ray**, point Q is called point of incidence (or point of reflection). In short striking ray is called incident ray and bouncing ray is called reflected ray.
- Angle made by incident ray with the normal drawn at the point of incidence is called angle of incidence. It is shown by symbol i. In above figure , $i = \angle PQM$.
- Angle made by reflected ray with the normal drawn at the point of incidence is called angle of reflection. It is shown by symbol r. In above figure, $r = \angle MQR$.
- Plane passing through incident ray, normal drawn at the point of incidence and reflected ray is called plane of incidence. In above figure, $ABCD$ is a part of plane of incidence.

(45) What is called a spherical mirror ? Describe its two types with proper diagrams. *(Ch.9)*

Ans. When reflecting face of a mirror is made spherical, it is called a spherical mirror.

> **Note**
> For some specific purpose, parabolic mirrors are also used in practice. In our syllabus, we have to study only about spherical mirrors.



- To prepare a spherical mirror, a thin spherical shell of glass is cut, parallel to any of its diameters.
- Then we separate the smaller part. Now if its inner face is made reflecting then we get a concave mirror and if its outer face is made reflecting then we get a convex mirror.

(46) How is electric current expressed ? Describe about its SI unit also. *(Ch.11)*

Ans. Electric current is expressed as net amount of electric charge passing through the cross-section of a conductor in unit time.

- In other words, electric current is the time rate of flow of electric charge.
- If net charge Q passes through the cross-section of a given conductor in time t then electric current I passing through that conductor is given by,

$$I = \frac{Q}{t} \quad \ldots\ldots (1)$$

- SI unit of electric charge is coulomb, shown by symbol C.
- SI unit of electric current is ampere, shown by symbol A.
- From above equation

$$1\ A = 1\ \frac{C}{s} \quad \ldots\ldots (2)$$

- **Definition of 1 ampere :**
- In equation (1), if $Q = 1\ C$ and $t = 1s$ then $I = 1\ \frac{C}{s} = 1\ A$ and so SI unit of electric current can be defined as follows.
- "When net electric charge passing through cross-section of a given conductor in $1s$ is $1\ C$ then electric current passing through that conductor is said to be $1\ A$."

SECTION-D

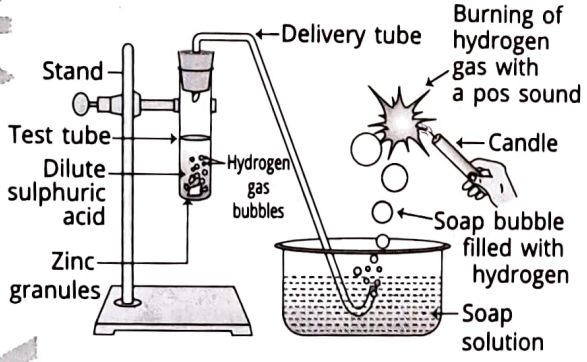
- **Answer any 5 questions from question no. 47 to 54 in about 90 to 120 words as asked. (each carries 4 marks)** **[20]**

(47) Reaction of zinc granules with dilute sulphuric acid and how test of hydrogen gas by burning can be done ? Discuss this experiment. ***(Ch.2)***

Ans. Experiment

Aim :

- Reaction of zinc granules with dilute sulphuric acid, test of Hydrogen gas produced by burning reaction.



Reaction of zinc granules with dilute sulphuric acid and testing hydrogen gas by burning

Process :

- Set the apparatus as shown in figure
- Take about 5 ml of di l H_2SO_4 in a test tube and add few pieces of zn-gragules to it.
- During this a certain observation is seen on the surface of zinc granules.
- During this H_2 gas is produced it passed from the soap solution, During this bubbles rise in soap solution.
- For doing test of arising gas, a burning candle is taken near to bubble filled with gas, certain observation is seen.

Observation :

- Here, we can observe during experiment that H_2 gas is produced by reaction of H_2SO_4 on the surface of zinc granules. For testing it is passed from soap solution and H_2 gas produces bubbles which shows origin of H_2 gas.
- When burning burning candle is taken near to the bubbles filled with gas, hydrogen gas produced by popping sound burns.
- Now, similar experiment is repeated with HCl HNO_3 and CH_3COOH or more acids. observations are found to be tested and note that whether observations in all cases are equal or different ?

Conclusion :

- Therefor from given experiment, we can conclude that.....
- **Metal displaces H_2 gas from acid** in a reaction which can be seen **as a dihydrogen** gas.
- So, Any **metal** which combines **with acids** and form a compound is called **a salt.**
- **Reaction of a metal with an acid :**

Acid + Metal ⟶ Salt + Hydrogen gas

- This matter can be written below in an equation form for zinc sulphate.

$$\underset{\text{Sulphuric acid}}{H_2SO_4} + \underset{\text{Zinc}}{Zn_{(s)}} \longrightarrow \underset{\text{Zinc sulphate}}{ZnSO_{4(aq)}} + \underset{\text{Hydrogen}}{H_{2(g)}}$$

- Similarly equations with other acids can be written as follows.

$$\underset{\text{Hydrochloric acid}}{2HCl} + \underset{\text{Zinc}}{Zn_{(s)}} \longrightarrow \underset{\text{Zinc chloride}}{ZnCl_{2(aq)}} + \underset{\text{Hydrogen}}{H_{2(g)}}$$

$$\underset{\text{Nitric acid}}{2HNO_3} + \underset{\text{Zinc}}{Zn_{(s)}} \longrightarrow \underset{\text{Zinc Nitrate}}{Zn(NO_3)_2} + \underset{\text{Hydrogen}}{H_{2(g)}}$$

$$\underset{\text{Acetic acid}}{2CH_3COOH_{(l)}} + \underset{\text{Zinc}}{Zn_{(s)}} \longrightarrow \underset{}{Zn(CH_3COO)_{2(aq)}} + \underset{\text{Hydrogen}}{H_{2(g)}}$$

In can be said...

- **Zinc produces hydrogen gas with all types of acids.**

(48) (a) Why does dry HCl gas not change the colour of the dry litmus paper ?

(b) While diluting an acid, why is it recommended that the acid should be added to water and not water to the acid ? *(Ch.2)*

Ans. (a) Because dry HCl gas doesn't possess H^+ ion *or* H_3O^+ ion. Therefore it doesn't show any acidic property. As a result dry HCl gas does not change colour of dry litmus paper.

(b) When water is added to a concentrated acid for dilution, the heat generated may cause the mixture to splash out an may cause burns. The glass container may also break due to excessive local heating.

Therefore, for dilution of concent rated acid, instead of adding water to acid, acid is added slowly to water with constant stirring. Hence liberated heat energy during dilution will spread in water and does not cause harm.

(49) Explain the tetravalency of carbon. *(Ch.4)*

Ans. ➤ The atomic number of carbon is 6.

$$C_{(Z=6)} = \begin{matrix} K & L \\ 2 & 4 \end{matrix}$$

Hence, there are 2 electrons in its first (K) shell and 4 in second (L) shell i.e. outer most shell. Thus, carbon has 6. protons and 6 electrons.

➤ The reactivity of an element is explained by its tendency to attain a completely filled outer shell to attain noble gas configuration.

➤ Elements forming ionic compounds achieve noble gas configuration by either losing or gaining electrons from the outer most shell. The ease of carbon is different since it has 4 electrons in its outermost shell.

➤ Carbon has to either gain or lose 4 electrons to attain noble gas configuration. The problem in doing this is discussed below :

(1) Carbon can gain 4 electrons to form C^{4-} anion. If carbon does this, it will be difficult for the nucleus with 6 protons to hold 10 electrons (6 existing + 4 borrowed) i.e. 4 extra electrons.

(2) Carbon can lose 4 electrons to form C^{4+} cation. This would require a large amount of energy to remove 4 electrons leaving behind a carbon cation with 6 protons in its nucleus holding on to just 2 electrons.

Solution :

➤ To overcome these problems, carbon neither accepts, nor gains but shares its valence electrons with other atoms of carbon or with atoms of other elements. The shared electrons belong to the outer shells of both the atoms. This way both the atoms attain noble gas configuration.

➤ The bond formed by sharing of electrons in this manner is known as covalent bond.

➤ Not only carbon but many other elements form molecules by sharing electrons and forming covalent bonds.

(50) What is Autotrophic Nutrition ? Explain the process of photosynthesis in short. *(Ch.5)*

Ans. In Autotrophic Nutrition, plants use chlorophyll and in presence of sunlight use inorganic substances such as carbon dioxide and water and converts into carbohydrates. Generally starch is a concentrated organic compound. When plants need energy they make use of the starch. These whole process is known as photosynthesis. It can be explained with the help of below equation.

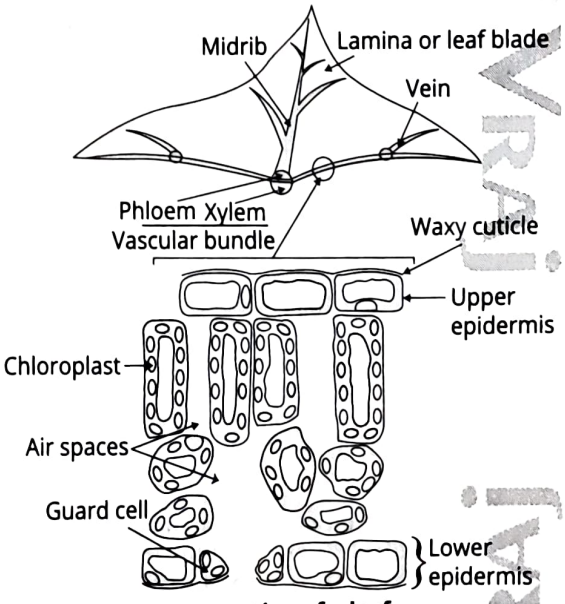
$$6CO_2 + 12\ H_2O \xrightarrow[\text{Sunlight}]{\text{Chlorophyll}} \underset{\text{(Glucose)}}{C_6H_{12}O_6} + 6O_2 + 6H_2O$$

➤ The main stages of photosynthesis process are as follows :

(1) Absorption of light energy by chlorophyll.

(2) Conversion of light energy to chemical energy and splitting of water molecules into hydrogen and oxygen.

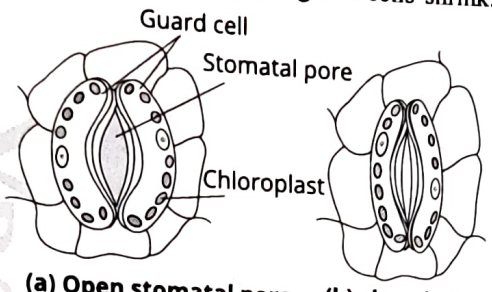
(3) Reduction of carbon dioxide to carbohydrates.



Cross-section of a leaf

➤ Plant cells contain chloroplast and chloroplast contains chlorophyll which absorbs light energy and converts it into chemical energy.

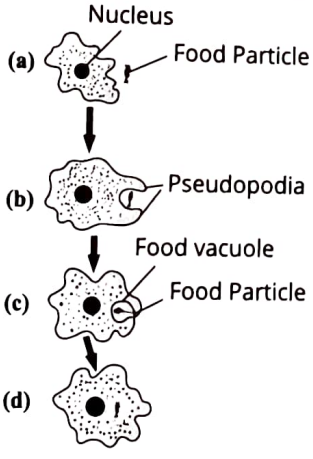
- Plants obtain carbon dioxide necessary for the process of photosynthesis through stomata. In day time as CO_2 is required so the stomatal pores open up. In some desert plants these stomatal pores open at night. They take CO_2 at night and at daytime use it in the presence of sunlight.
- This is seen in such plants because transpiration also occurs through this pores. Plant closes these pores when it does not need carbon dioxide for photosynthesis.
- Apart from gas exchange, stomata also performs the function of transpiration. The opening and the closing of stomatal pore is carried out by guard cells. The guard cells swell when water flows into them, causing the stomatal pore to open. Similarly the pore closes if the guard cells shrink.



(a) Open stomatal pore **(b) closed stomatal pore**

(51) Explain the process of nutrition in an unicellular organism. *(Ch.5)*

Ans. **Nutrition in Unicellular organism :** In single - celled organisms the food may be taken in by the entire surface. Amoeba takes in food using temporary finger-like extensions of the cell surface which fuse over the food particle forming a food vacuole. Fig (c)



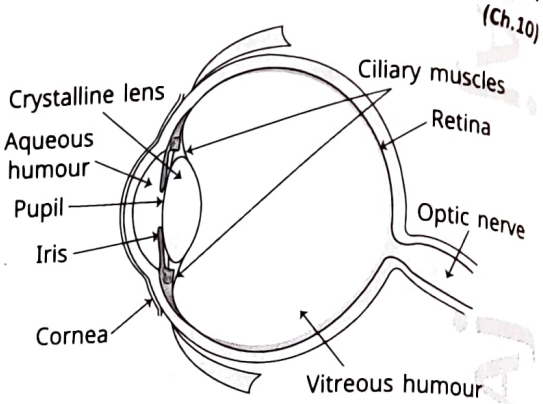
Nutrition in Amoeba

- Inside the food vacuole, complex substances are broken down into simpler ones which then diffuse into the cytoplasm. fig. (d)
- The remaining undigested material is moved to the surface of the cell and thrown out.

- **Nutrition in Paramoecium :**
- Paramoecium is also an unicellular organism. Its cell has a definite shape and food is taken in at a specific spot. Food is moved to this spot by the movement of cilia which cover the entire surface of the cell. After that food particle make food vacuole and food is digested there. After that undigested food is removed out of the body.

(52) Draw cross-sectional lebelled diagram of human eye. Describe its construction and function of each part. Also describe how we can see through our eyes. *(Ch.10)*

Ans.



- Human eye is like a camera. Its lens system forms a real and inverted image on the rear light sensitive screen, called "retina."
- Light enters the eye through a thin transparent membrane called the "cornea." If forms the transparent bulge on the front surface of an eye ball as shown in above figure.
- Eyeball is nearly spherical in shape with diameter approximately 2.3 *cm*. Most of the refraction of light rays entering the eye takes place at the outer surface of cornea. The crystalline lens merely provides fine adjustment of focal length which is required to produce images of objects located at different distances, on the retina.
- Just behind the cornea, there is a dark muscular diaphragm, called "iris" which controls the size of "pupil" (an opening in the center of iris which gives colour to our eyes.)
- The pupil regulates and controls the amount of light which enters in our eye.
- The eye lens forms an inverted real image of every object on the retina (inner back surface of eye). The retina is a delicate membrane having enormous no. of light sensitive cells, which get activated upon the incidence of light and then they generate electrical signals. These signals are immediately sent to brain via optic nerves. The brain interprets (understands) these signals, processes the information and finally we see the objects as they are.

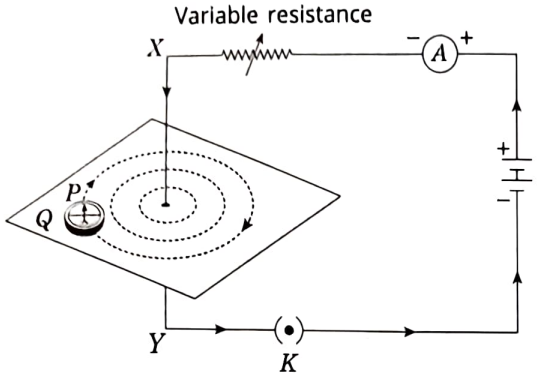
- There are two types of cells in the retina

(i) **Rods** : These cells are sensitive to low intensity light.

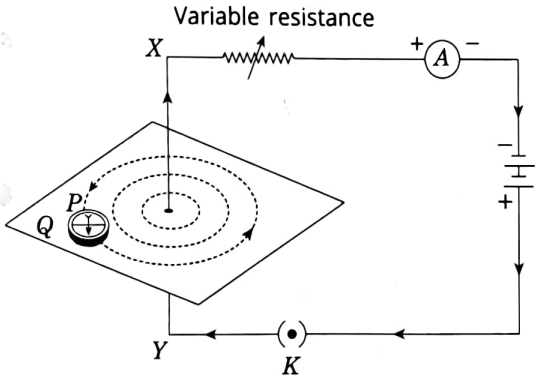
(ii) **Cones** : These cells are sensitive to high intensity light. They help us to identify different colours.

(53) To study the pattern of magnetic field lines around a straight current carrying wire. *(Ch.12)*

Ans. Procedure with explanation :



(Figure 1)



(Figure 2)

- As shown in figure 1, consider a straight thick wire, passed through the centre of big size square shaped card board.
- Now connect a 12 V battery, variable resistance (in the form of rheostat), an ammeter with a range of 0 to 5 A with above wire as shown in figure 1 (keeping wire XY vertical)
- Now, sprinkle iron filings on above card board uniformly around the wire.
- Now, when key is closed, current starts passing through the vertical wire from X to Y.
- Now tap the card board gently few times. We notice that iron filings get aligned in the form of concentric circles.
- These circles represent circular magnetic field lines. When a compass is placed at any point on any of these circles, its north pole points along the tangent to that circle at that point, which gives direction of magnetic field at that point.
- When current in the wire increases, deflection of needle in the compass increases proportionally. But when distance of compass from the wire is increased, deflection of needle in the compass decreases.
- As shown in figure 2, when direction of current passing through the wire is reversed, north pole of needle in the compass points in opposite direction.

Conclusion :

- If strength of magnetic field is B, current through the wire is I, radius of circular field line is r then we conclude that :

  (i) $B \propto I$

  (ii) $B \propto \frac{1}{r}$

- Also, when direction of current is reversed, direction of magnetic field also gets reversed.

(54) Explain the components of ecosystem. *(Ch.13)*

Ans. Ecosystem consists of 2 components.

(1) Biotic components (2) Abiotic components

- **Biotic components** : All the living organism constitute biotic component of ecosystem. It includes three types of organisms.
- **Producers** : The organism which can prepare their own food material from inorganic substances using solar energy are called as produces, they can also be called as autotrophs. eg Blue green algae, all green plants.
- **Consumers** : These organisms consumers other organisms or their products as food. All animals are included in this category. They can be further classified as

  (a) Herbivores : These animals consumer plants eg. Goat, Cow etc.

  (b) Carnivores : These animals consumer herbivores eg. Lion, Shake, frog etc.

  (c) Omnivores : These animals consumer both plants and animals eg. Human.

  (d) Parasites : Line & on feed on host body and causes harm to them. eg Plasmodium, head lice etc.

- **Decomposers** : The organisms which converts complex compounds of dead plants and animals into simpler form. They are also called as reducers. eg. Bacteria, Fungi.
- **Abiotic Components** : They are non-living components which includes physical environment like Air, temperature, soil texture, water etc.

❑❑❑