

Student's Name :

Marks
Obtained

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

SECTION - A

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

• Choose the correct alternative and write the answer.

- Sodium carbonate is a basic salt because it is a salt of (Ch.2)
 - Strong acid and strong base
 - Weak acid and weak base
 - Strong acid and weak base
 - weak acid and strong base
- What is the melting point of chloroform (CHCl_3) ? (Ch.4)
 - 290 K
 - 209 K
 - 156 K
 - 90 K
- The opening and closing of stomata depends on what ? (Ch.5)
 - Proportion of O_2
 - Temperature
 - Water in guard cells
 - Concentration of CO_2 in stomata
- Choose the correct option. The magnetic field inside a long, straight current carrying solenoid, (Ch.12)
 - is zero.
 - decreases as we move towards its end.
 - increases as we move towards its end.
 - is the same at all points.
- Value of magnification of image obtained in the rear view mirror fitted in the vehicles is _____. (Ch.9)
 - less than 1
 - more than 1
 - equal to 1
 - less than 1 or more than 1, depending upon the position of object
- Far point of a normal eye is at _____. (Ch.10)
 - 1 cm
 - 1 m
 - infinity
 - 25 cm
- Fill in the blanks by choosing the correct option from the bracket.
 - _____ part of soap is hydrophobic. (Tail and Head, head, Tail) (Ch.4)
 - _____ SI unit of magnetic field. (coulomb, ampere, Tesla) (Ch.12)

9. The action of losing water through the aerial parts of the plant is known as _____.

(Reduction, Transpiration, Watershed) (Ch.5)

10. In peas, a pure tall plant (TT) is crossed with a pure short plant (tt). The ratio of pure tall plants to pure short plants in F_2 generation will be: _____.

(3 : 1, 1 : 3, 1 : 1) (Ch.8)

11. Complete image of a distant object can be seen using _____ mirror. (concave, convex, plane) (Ch.9)

12. The Colour of copper (II) oxide is _____. (green, black, red) (Ch.3)

• State whether the following statements are True or False.

13. Mg and Mn can react with dilute HNO_3 . (Ch.3)

14. New species may be formed. If DNA undergoes significant changes in germs cells or chromosome number changes in the gamete. (Ch.8)

15. Passengers flying at high altitudes see the sky with intense blue colour. (Ch.10)

16. A stain of curry on a white cloth becomes reddish brown when soap is scrubbed on it. (Ch.2)

• Answer in short.

17. What is the main work of cytokinins ? (Ch.6)

18. In F_1 generation what does F_1 stand for ? (Ch.8)

19. Definitions of cornea. (Ch.10)

20. Give symbol of variable resistance. (Ch.11)

• Match the following. (Ch.13,6)

	'A'		'B'
21.	Accumulation of non degradable substances in human	(a)	Water pollution
22.	Ultraviolet radiations	(b)	Biological magnification
		(c)	Skin cancer

	'A'		'B'
23.	Medullar oblongata	(a)	Centre for Coordination of reflex actions
24.	Spinal cord	(b)	Desision making
		(c)	Control of involuntun activities

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. What is meant by exothermic reactions ? Explain with examples. (Ch.1)
26. Of the three metals X, Y and Z, X reacts with cold water, Y with hot water and Z with steam only. Identify X, Y and Z and also arrange them in order of increasing reactivity. (Ch.3)
27. Explain in detail bile juice. (Ch.5)
28. What is the difference in fission between Amoeba and Leishmania ? (Ch.7)
29. What is the difference in the method of reproduction between unicellular and multicellular organism ? (Ch.7)
30. Though planets are closer to us compared to stars, they do not twinkle. Why ? (Ch.10)
31. What is the magnitude of charge of one electron ? How many electrons have magnitude of charge 1 C ? (Ch.11)
32. When does an electric short circuit occur ? (Ch.12)
33. On which factors does the resistance of a conductor depend ? (Ch.11)
34. Explain the types of an ecosystem. (Ch.13)
35. Explain following words.
(1) Producers (2) Consumers (Ch.13)
36. Match the following columns. (Ch.5)

Column-I	Column-II
(1) Autotrophic Nutrition	(A) Leeches
(2) Heterotrophic Nutrition	(B) Paramecium
(3) Parasitic Nutrition	(C) Deer
(4) Digestion in Vacuole	(D) Green plants

37. A battery of 9 V is connected in series with resistors of $0.2\ \Omega$, $0.3\ \Omega$, $0.4\ \Omega$, $0.5\ \Omega$ and $12\ \Omega$, respectively. How much current would flow through the $12\ \Omega$ resistor ? (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. Write the balanced chemical equation for the following reactions and identify the type of reaction in each case.
- (a) In Thermite reaction, iron (III) oxide reacts with aluminium and gives molten iron and aluminium oxide.
- (b) Magnesium ribbon is burnt in an atmosphere of nitrogen gas to form solid magnesium nitride.

- (c) Chlorine gas is passed in an aqueous potassium iodide solution to form potassium chloride solution and solid iodine.
- (d) Ethanol is burnt in air to form carbon dioxide, water and releases heat. (Ch.1)
39. Explain : Alloys (Ch.3)
40. What are the methods to prevent corrosion ? (Ch.3)
41. Give examples of reflex arc. (Ch.6)
42. Explain : Process of Regeneration. (Ch.7)
43. (a) What is unisexual and bisexual flower ? Give its example. (Ch.7)
- (b) What are the changes in flower after fertilisation ?
44. Give Four points of difference between concave mirror and convex mirror. (Ch.9)
45. Define magnification produced by a spherical mirror. What does its value indicate ? Also mention its formula. Discuss about its sign for real and virtual image. (Ch.9)
46. Which law gives relation between potential difference across a metallic wire and current through it ? Describe it in brief. (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. The dilution test of strong acid like H_2SO_4 and strong base like NaOH is exothermic ? Explain it by an example. (Ch.2)
48. What is universal indicator ? Give its uses.
49. (a) Why is the conversion of ethanol to ethanoic acid an oxidation reaction ?
- (b) A mixture of oxygen and ethyne is burnt for welding. Can you tell why a mixture of ethyne and air is not used ? (Ch.4)
50. Explain the circulation path of blood in human heart (Figure is necessary) (Ch.5)
51. Write the structure of a nephron and its work. (Ch.5)
52. Make a diagram to show how hypermetropia is corrected. The near point of a hypermetropic eye is 1 m . What is the power of the lens required to correct this defect? Assume that the near point of the normal eye is 25 cm . (Ch.10)
53. (1) Mention in brief about "Right Hand Thumb Rule"
- (2) Explain in brief about Fleming's left hand rule. (Ch.12)
54. Describe : Various food chains. (Ch.13)

SCIENCE | QUESTION PAPER - 3 | FULL SOLUTION

SECTION-A

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

● Choose the correct alternative and write the answer.

(1) Sodium carbonate is a basic salt because it is a salt of (Ch.2)

- (A) Strong acid and strong base
- (B) Weak acid and weak base
- (C) Strong acid and weak base
- (D) weak acid and strong base

(2) What is the melting point of chloroform (CHCl₃) ? (Ch.4)

- (A) 290 K (B) 209 K (C) 156 K (D) 90 K

(3) The opening and closing of stomata depends on what ? (Ch.5)

- (A) Proportion of O₂
- (B) Temperature
- (C) Water in guard cells
- (D) Concentration of CO₂ in stomata

(4) Choose the correct option. The magnetic field inside a long, straight current carrying solenoid, (Ch.12)

- (A) is zero.
- (B) decreases as we move towards its end.
- (C) increases as we move towards its end.
- (D) is the same at all points.

(5) Value of magnification of image obtained in the rear view mirror fitted in the vehicles is _____ (Ch.9)

- (A) less than 1
- (B) more than 1
- (C) equal to 1
- (D) less than 1 or more than 1, depending upon the position of object

(6) Far point of a normal eye is at _____ (Ch.10)

- (A) 1 cm (B) 1 m (C) infinity (D) 25 cm

● Fill in the blanks by choosing the correct option from the bracket.

(7) Tail part of soap is hydrophobic. (Ch.4)
(Tail and Head, head, Tail)

(8) Tesla SI unit of magnetic field. (Ch.12)
(coulomb, ampere, Tesla)

(9) The action of losing water through the aerial parts of the plant is known as Transpiration.

(Reduction, Transpiration, Watershed) (Ch.5)

(10) In peas, a pure tall plant (TT) is crossed with a pure short plant (tt). The ratio of pure tall plants to pure short plants in F₂ generation will be: 3 : 1

(3 : 1, 1 : 3, 1 : 1) (Ch.8)

(11) Complete image of a distant object can be seen using convex mirror

(concave, convex, plane) (Ch.9)

(12) The Colour of copper (II) oxide is black.

(green, black, red) (Ch.3)

● State whether the following statements are True or False.

(13) Mg and Mn can react with dilute HNO₃. (Ch.3)

(14) New species may be formed. If DNA undergoes significant changes in germs cells or chromosome number changes in the gamete (Ch.8)

(15) Passengers flying at high altitudes see the sky with intense blue colour. (Ch.10)

(16) A stain of curry on a white cloth becomes reddish brown when soap is scrubbed on it. (Ch.2)

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

● Answer in short.

(17) What is the main work of cytokinins ? (Ch.6)

Ans. Cytokinins promotes cell division.

(18) In F₁ generation what does F₁ stand for? (Ch.8)

Ans. It stands for first filial generation that is generation of hybrids.

(19) Definitions of cornea. (Ch.10)

Ans. A thin transparent membrane through which light enters in our eyes, is called cornea.

(20) Give symbol of variable resistance. (Ch.11)

Ans. 

● Match the following. (Ch.13,6)

	‘A’	‘B’
(21)	Accumulation of non degradable substances in human	(a) Water pollution
(22)	Ultraviolet radiations	(b) Biological magnification
		(c) Skin cancer

	'A'	'B'
(23)	Medullar oblongata	(a) Centre for Coordination of reflex actions
(24)	Spinal cord	(b) Desision making (c) Control of involuntun activities

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

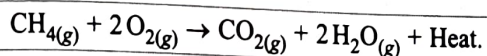
SECTION-B

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

(25) What is meant by exothermic reactions ? Explain with examples. (Ch.1)

Ans. → "A reaction in which heat is released along with the formation of products are called exothermic reactions."

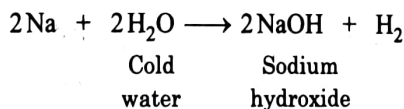
Example : Burning of natural gas. OR
Combustion of natural gas.



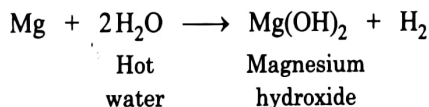
→ combustion of natural gas is an exothermic reaction because during this process heat is released along with formation of products.

(26) Of the three metals X, Y and Z, X reacts with cold water, Y with hot water and Z with steam only. Identify X, Y and Z and also arrange them in order of increasing reactivity. (Ch.3)

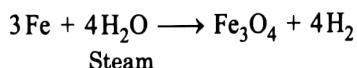
Ans. X is sodium or potassium (Na or K) as it reacts with cold water.



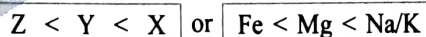
Y is magnesium (Mg) as it reacts with hot water.



Z is iron (Fe)



Increasing order of reactivity



(27) Explain in detail bile juice. (Ch.5)

Ans. Liver releases bile juice It is yellowish green color alkaline digestive juice and is stored in 5 gall bladder.

→ Bile juice released from bile duct and liver goes into small intestine and helps in the process of

digestion. It converts the acidic food from stomach into alkaline.

→ Enzymes present in pancreatic juice provide a medium for alkaline.

→ Bile salts convert large fat globules into small fat globules. So it increases surface area for digestion of fat and making the process of digestion easier.

(28) What is the difference in fission between Amoeba and Leishmania ? (Ch.7)

Ans. Cell division in Amoeba can occur in any plane whereas is Leshmania, there is a whip - like structure at one end so binary fission occurs in a definite plane.

(29) What is the difference in the method of reproduction between unicellular and multicellular organism ? (Ch.7)

Ans. Unicellular organism reproduce mostly through asexual mode of reproduction only some organism undergo sexual reproduction. Where as multicellular organism almost undergo sexual mode of reproduction.

In unicellular organism, asexual reproduction by the method of regenerative reproduction is not possible, whereas it is possible for simple multicellular organism.

(30) Though planets are closer to us compared to stars, they do not twinkle. Why ? (Ch.10)

Ans. As compared to stars, planets are much closer to us. That is why they appear bigger.

Light coming from planet is like a beam of light, coming from cluster of point like sources of light (a collection of large no. of point sized sources of light). Here resultant variation in the amount of light entering our eyes from all the individual and independent point-like sources comes out to be zero on average. Hence twinkling effects of individual sources are getting nullified. That is why planets do not twinkle.

(31) What is the magnitude of charge of one electron ? How many electrons have magnitude of charge 1 C ? (Ch.11)

Ans. Magnitude of charge of one electron is

$$1.6 \times 10^{-19} \text{ C} \quad (\text{Because charge of one electron is } -1.6 \times 10^{-19} \text{ C})$$

If magnitude of charge of one electron is e then N no. of electrons will have total charge Q given by:

$$Q = Ne$$

$$\therefore N = \frac{Q}{e} = \frac{1}{1.6 \times 10^{-19}} \approx 6.25 \times 10^{18}$$

(32) When does an electric short circuit occur? (Ch.12)

Ans. Due to damage to the insulation or due to some fault in the appliance, if live wire and neutral wire happen to come in direct contact, current increases abruptly in the circuit. Here current gets a path of very low resistance (or in other words, path of current is made very short.) Such a phenomenon is called short circuiting.

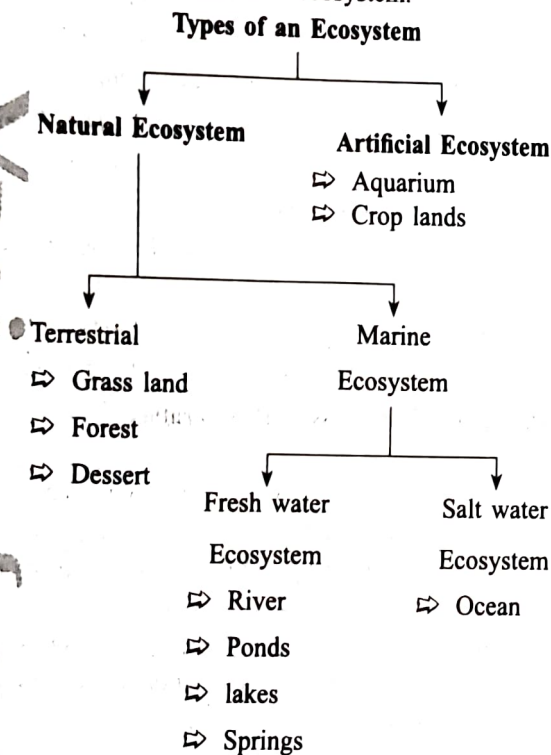
(33) On which factors does the resistance of a conductor depend? (Ch.11)

- Ans. (i) length of a conducting wire.
(ii) cross-sectional area of a conducting wire.
(iii) resistivity of material of a conducting wire.

(34) Explain the types of an ecosystem. (Ch.13)

Ans. ➤ There are two major types of an ecosystem.

- (1) Natural ecosystem
- (2) Artificial or man-made ecosystem.



(35) Explain following words.

- (1) Producers
 - (2) Consumers
- (Ch.13)

Ans. (1) **Producers** : Green plants, cyanobacteria (Blue-green algae) contain chlorophyll. They perform photosynthesis using the sun-light. They produce food (organic compounds). So they are called autotrophs. They store extra organic compounds.

(2) **Consumers** : They are dependent on stored food of producers. So they are called consumers. They are directly or indirectly dependent on food produced by producers.

➤ Consumers are mainly classified into herbivores, carnivores, omnivores and parasites.

(36) Match the following columns. (Ch.5)

Column-I		Column-II	
(1)	Autotrophic Nutrition	(A)	Leeches
(2)	Heterotrophic Nutrition	(B)	Paramoecium
(3)	Parasitic Nutrition	(C)	Deer
(4)	Digestion in Vacuole	(D)	Green plants

Ans. (1 - D) (2 - C) (3 - A) (4 - B)

(37) A battery of 9 V is connected in series with resistors of 0.2 Ω, 0.3 Ω, 0.4 Ω, 0.5 Ω and 12 Ω, respectively. How much current would flow through the 12 Ω resistor? (Ch.11)

Ans. Here, $V = 9$ volt

➤ Equivalent resistance of series connection of given resistors is,

$$R_S = R_1 + R_2 + R_3 + R_4 + R_5 \\ = 0.2 + 0.3 + 0.4 + 0.5 + 12.$$

$$\therefore R_S = 13.4 \Omega$$

➤ Now, current passing through given circuit, is

$$I = \frac{V}{R_S} = \frac{9}{13.4} \approx 0.67 A$$

➤ Since given resistances are connected in series, same current passes through each resistance. Hence, though 12 Ω which is the biggest among given resistances, current passing through it is also $I = 0.67 A$. (It is so because current starting from battery does not see any individual resistance in the circuit but it sees the net (or equivalent or effective or resultant) resistance offered to the battery.)

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) Write the balanced chemical equation for the following reactions and identify the type of reaction in each case.

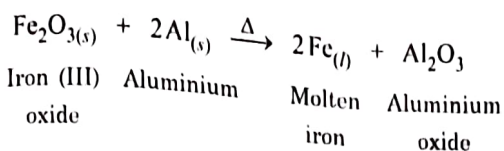
(a) In Thermite reaction, iron (III) oxide reacts with aluminium and gives molten iron and aluminium oxide.

(b) Magnesium ribbon is burnt in an atmosphere of nitrogen gas to form solid magnesium nitride.

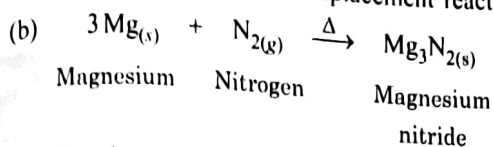
(c) Chlorine gas is passed in an aqueous potassium iodide solution to form potassium chloride solution and solid iodine.

(d) Ethanol is burnt in air to form carbon dioxide, water and releases heat. (Ch.1)

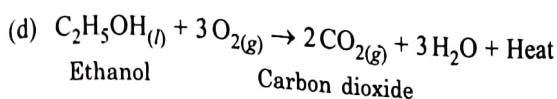
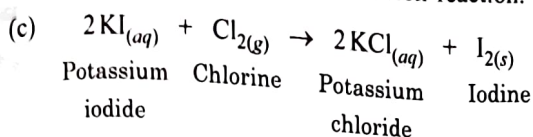
Ans. (a) Thermite reaction.



This is an example of displacement reaction.



This is an example of combination reaction.



(39) Explain : Alloys

(Ch.3)

Ans. "A metal made by mixing two types of metal together is called Alloy."

- Alloying is a good method to improve the properties of a metal.
- With this method we can obtain a metal with desired properties.

Example :

Iron is most widely used metal but it is never used in its pure state because of rusting property.

- Pure iron is very soft and stretches easily when hot. But if it is mixed with a small amount of carbon it becomes hard and strong.
- When iron is mixed with Ni and Cr, we get stainless steel, which is hard and doesn't rust.
- Thus, if iron is mixed with some other substance its properties change.
- The substance added may be a metal or a non-metal.

An Alloy is a homogeneous mixture of two or more metals *or* a metal and a non-metal.

- It is prepared by first melting the primary metal and then dissolving the other elements in definite proportions. It is then cooled to room temperature.
- If one metal of the alloy is mercury then the alloy is known as an amalgam.
- The electrical conductivity and melting point of an alloy is less than that of pure metals.

- (1) Brass is an alloy of Cu and Zn.
- (2) Bronze is an alloy of Cu and Sn.

➤ Brass and Bronze are not good conductors of electricity whereas copper is used for making electrical circuit.

(3) Solder : It is an alloy of Pb (Lead) + Sn (Tin) and has a low melting point and is used for welding electrical wires together.

(40) What are the methods to prevent corrosion ? (Ch.3)

Ans. We can use methods given below to prevent corrosion.

- (1) By painting, oiling, greasing, galvanizing, chrome plating and anodising or making alloys.
- (2) Galvanization is the most proper method to prevent rusting of Iron.
- (3) Galvanization is a method of protecting steel and Iron from rusting by coating them with a layer of zinc. The galvanized article is protected against rusting even if the zinc coating is broken.

(41) Give examples of reflex arc.

(Ch.6)

Ans. Examples of reflex arc are :

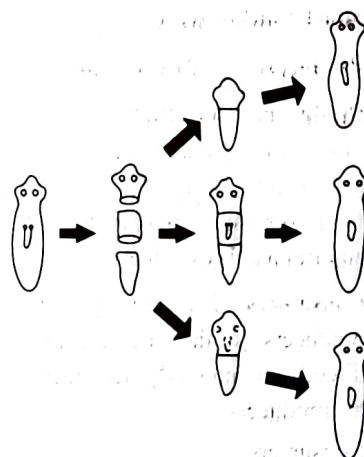
- (1) Due to sudden light on eyes, pupil contracts.
- (2) Sudden reaction to extreme cold or extreme hot water.
- (3) Movement of diaphragm
- (4) Sudden closing of the eye when something comes near the eye.
- (5) Coughing
- (6) Moving the hand as soon as nail is hurted etc.

(42) Explain : Process of Regeneration.

(Ch.7)

Ans. ➤ Many fully differentiated organisms have the ability to give rise to new individual organisms from their body parts. That is, if the individual is somehow cut or broken up into many pieces, many of these pieces grow into separate individuals.

- For example, simple animals like Hydra and Planaria can be cut into any number of pieces and each piece grows into a complete organism. This is known as Regeneration.



Regeneration in Planaria

➤ Regeneration is carried out by specialised cells. These cells proliferate and make large numbers of cells. From this mass 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.

(43) (a) What is unisexual and bisexual flower? Give its example

(b) What are the changes in flower after fertilisation

(Ch.7)

Ans. (a) ➤ The flower is said to be unisexual when it contains either stamen or pistil. For eg : Watermelon, papaya.

➤ The flower is said to be bisexual when it contains both stamen and pistil. For eg : Hibiscus, mustard, peas.

(b) ➤ After fertilisation sepal, petal, style, ovary shrivel and fall off.

➤ Ovules gets converted into seed.

➤ Ovary gets converted into fruit.

➤ In some fruit, sepals are connected with the fruit.

(44) Give Four points of difference between concave mirror and convex mirror.

(Ch.9)

Concave Mirror	Convex Mirror
○ Its principal focus is real.	○ Its principal focus is virtual.
○ Its focal length and radius of curvature are negative.	○ Its focal length and radius of curvature are positive.
○ Image formed by it is either real or virtual	○ Image formed by it is always virtual.
○ Image formed by it is either in front of it or on the back of it.	○ Image formed by it is always on the back of it.
○ Size of image formed by it is either equal to or greater than or smaller than size of object.	○ Size of image formed by it is always smaller than size of object.
○ It is used as a shaving mirror, make-up mirror, doctor's head mirror, search light mirror and as a head light mirror in the vehicles.	○ It is used as antitheft mirror in show rooms, as side view mirror and as rear view mirror in the vehicles.

(45) Define magnification produced by a spherical mirror. What does its value indicate? Also mention its formula. Discuss about its sign for real and virtual image.

(Ch.9)

Ans. ➤ Magnification produced by a given spherical mirror is defined as a ratio of height of image (h') to the height of object (h). It is shown by symbol m . Thus by definition.

$$m = \frac{h'}{h}$$

➤ Magnification produced by a spherical mirror gives how many times size of image is as compared to size of object.

➤ Generally, object is placed upright above the principal axis and so its height h is taken positive.

➤ Since real image is inverted, its height h' is taken negative and so for real image, value of m is obtained negative by definition.

➤ Conversely, since virtual image is erect, its height h' is taken positive and so for virtual image value of m is obtained positive by definition.

➤ Thus, when magnification is negative, image is real and when magnification is positive, image is virtual.

➤ For spherical mirrors, formula of magnification is as follows.

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

where v and u denote image distance and object distance respectively. (which are to be determined as per new cartesian sign convention system).

(46) Which law gives relation between potential difference across a metallic wire and current through it? Describe it in brief.

(Ch.11)

Ans. Ohm's law gives relation between potential difference across a metallic wire and current through it. This law was deduced experimentally by German physicist, George Simon Ohm. It can be stated as follows.

● **Statement :**

➤ "Potential difference (V) across a current carrying metallic wire is directly proportional to current (I) flowing through it, provided temperature of wire remains constant."

► Mathematically, $V \propto I$

$$\therefore \frac{V}{I} = \text{constant} \quad \dots (1)$$

► Here ratio $\frac{V}{I}$ remains constant for a given metallic wire at a given temperature. Such a constant ratio is called "resistance" of a given metallic wire, shown by symbol R . It is the property of a conductor to resist the flow of charges through it. Thus,

$$\frac{V}{I} = R \quad \dots (2)$$

► Electrical component having resistance is called "resistor"

► SI unit of resistance is ohm, shown by symbol Ω .

► Equation (2) gives mathematical form of Ohm's law. Writing SI units in equation (2),

$$\frac{\text{volt}}{\text{ampere}} = \text{Ohm}$$

► Using symbols, $\Omega = \frac{V}{A} = VA^{-1}$

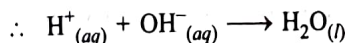
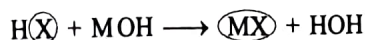
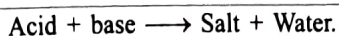
SECTION-D

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

(47) The dilution test of strong acid like H_2SO_4 and strong base like NaOH is exothermic? Explain it by an example. (Ch.2)

Ans. ► As we know, Acids generate $H^+_{(aq)}$ ion and Bases generate $OH^-_{(aq)}$ ion.

► We can write the neutralisation reaction as follows.



► What is involved when water is mixed with an acid or a base can be understood by given experiment.

Experiment :

► Take 10 ml of water in a beaker.

► Add few drops of concentrated H_2SO_4 to it and swirl the beaker slowly.

► By touching the base of beaker, observation is noted.

► On the basis of change in temperature of a beaker, it is noted whether the reaction is exothermic or endothermic

► Repeat this experiment with NaOH pellets and record your observation.

Observation :

► In both cases of H_2SO_4 and NaOH the rise in temperature of beaker is seen.

Conclusion :

► Reaction of dilution of concentrated sulphuric acid (H_2SO_4) and sodium Hydroxide (NaOH) are exothermic.

► In short the reaction of acid and base of dissolving in water is exothermic.

► Thus by mixing acid and base with water results in decrease in concentration of ions (H_3O^+ / OH^-) per unit volume.

► Such a process is called dilution and acid or base is said to be diluted.

(48) What is universal indicator? Give its uses.

Ans. ► Acid - base indicators can be used to distinguish between acid and base.

► Similarly universal indicator is used to determine the strength of acid or base and quantitative mass of ions in solution.

► Universal indicator is a mixture of several indicators. It is used to determine the strength of acid or base.

► Universal indicator shows different colours at different concentrations of hydrogen ions in a solution.

pH scale :

► A scale for measuring concentration of hydrogen ion in a solution is called pH scale.

► In pH, p = Potenz (in German) = Power.

► On the pH scale we can measure pH from 0 to 14. pH should be thought of simply as a number which indicates the acidic or basic nature of solution.

► Higher the hydronium ion concentration, lower is the pH value.

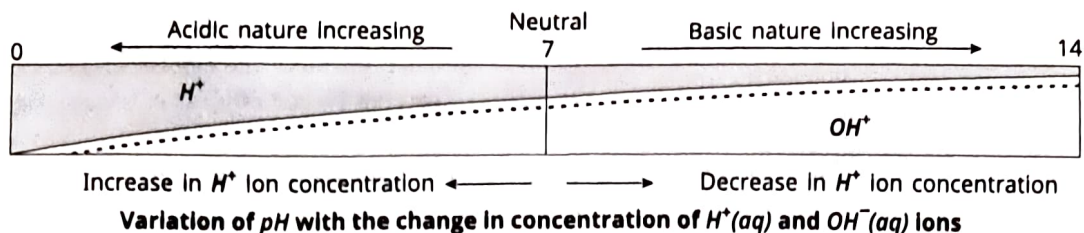
► If pH = 7, It shows neutral solution.

pH < 7, It shows acidic solution.

pH > 7, It shows basic solution.

► As the pH value increases from 7 to 14, it represents an increase in OH^- ion concentration in the solution. So, strength of alkali increases.

► Generally, paper impregnated with the universal indicator is used for measuring pH.



- The change occurring in concentration of $H^+_{(aq)}$ and $OH^-_{(aq)}$ show variation in pH.
- Thus strength of acid and base depend on number of H^+ and OH^- ions produced respectively.
- If we take 1 M HCl and 1M CH_3COOH , they produce different amount of hydrogen.
- "Acids that produce more H^+ ions are called **strong acids**."
- "Acids that produce less H^+ ions are called **weak acids**."

Relation between $[H_3O^+]$ and pH is as follows.

$$pH + pOH = 14$$

$$pH = -\log [H_3O^+] \quad pOH = -\log [OH^-]$$

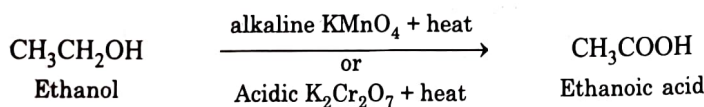
(49) (A) Why is the conversion of ethanol to ethanoic acid an oxidation reaction?

(B) A mixture of oxygen and ethyne is burnt for welding. Can you tell why a mixture of ethyne and air is not used?
(Ch.4)

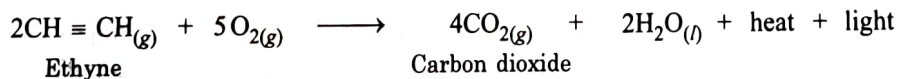
Ans. ➤ Oxidation reaction means addition of oxygen or removal of hydrogen in to the compound.

During conversion of ethanol to ethanoic acid hydrogen is removed from it and oxygen is added in to ethanol. Therefore it is called oxidation reaction.

Example.



- We need very high temperature for welding process, but when ethyne is burnt in air, incomplete combustion takes place, so large amount of smoke is produced and temperature is very low. As a result, it is necessary to occur complete combustion to obtain high temperature for welding process. As a result mixture of ethyne and oxygen is useful for welding.

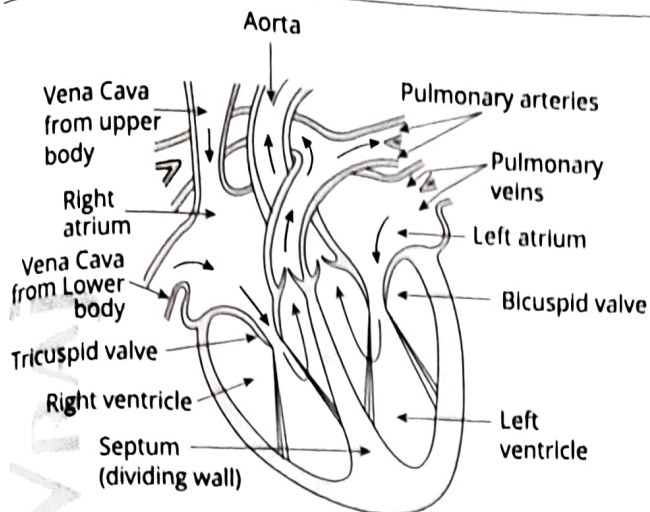


(50) Explain the circulation path of blood in human heart (Figure is necessary)

(Ch.5)

Ans. **Our Pump Heart :**

- The heart is a muscular organ which is as big as our fist. Because both oxygen and carbon dioxide have to be transported by the blood, the heart has different chambers to prevent the oxygen-rich blood from mixing with the blood containing carbon dioxide. The carbon dioxide-rich blood has to reach the lungs for the carbon dioxide to be removed and the oxygenated blood from the lungs has to be brought back to the heart. This oxygen-rich blood is then pumped to the rest of the body.
- We can follow this process step by step. Oxygen-rich blood from the lungs comes to the thin-walled upper chamber of the heart on the left, the left atrium. The left atrium relaxes when it is collecting this blood. It then contracts, while the next chamber the left ventricle relaxes so that the blood is transferred to it.



Schematic sectional view of the human heart

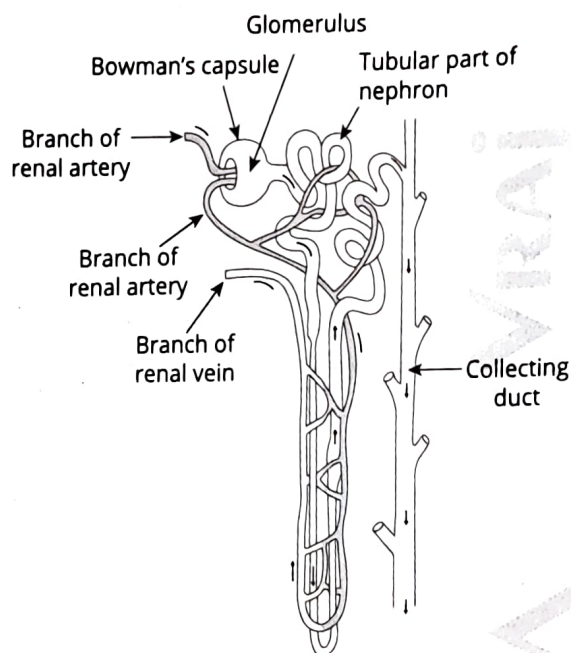
- ▶ When the muscular left ventricle contracts in its turn, the blood is pumped out to the body. De-oxygenated blood comes from the body to the upper chamber on the right, the right atrium, as it relaxes. As the right atrium contracts the corresponding lower chamber, the right ventricle dilates. This transfer blood to the right ventricle, which in turn pumps it to the lungs for oxygenation.
- ▶ Since ventricles have to pump blood into various organs, they have thicker muscular walls than the atria do. Valves ensure that blood does not flow backwards when the atria or ventricles contract.

(51) Write the structure of a nephron and its work.(Ch.5)

- Ans.** ▶ The excretory system of human beings includes a pair of kidneys, a pair of ureters, a urinary bladder and a urethra. Kidneys are located in the abdomen, one on either side of the backbone.
- ▶ Urine produced in the kidney passes through the ureters into the urinary bladder where it is stored until it is released through the urethra.
 - ▶ How is urine produce ? The purpose of making urine is to filter out waste products from the blood. Just as CO_2 is removed from the blood in the lungs, nitrogenous waste such as urea or uric acid are removed from blood in the kidneys.
 - ▶ It is then no surprise that the basic filtration unit in the kidneys, like in the lungs, is a cluster of very thin-walled blood capillaries. Each capillary cluster in the kidney is associated with the cup-shaped end a coiled tube called Bowman's capsule that collects the filtrate. Each kidney has large number of these filtration units called nephrons packed close together.
 - ▶ Some substances in the initial filtrate, such as glucose, amino acids, salts and a major amount of

water are selectively re-absorbed as the urine flows along the tube. The amount of water re-absorbed depends on how much excess water there is in the body and on how much of dissolved water there is to excreted.

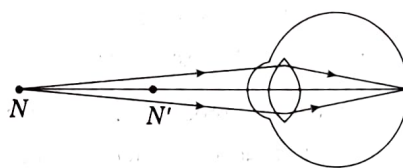
- ▶ The urine forming in each kidney eventually enters a long tube, the ureter, which connects the kidneys with the urinary bladder.
- ▶ Urine is stored in the urinary bladder until the pressure of the expanded bladder leads to the urge to pass it out through the urethra. The bladder is muscular.
- ▶ So, it is under nervous control, as we have discussed elsewhere. As a result, we can usually control the urge to urinate.



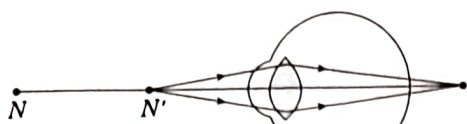
Structure of a nephron

- (52) Make a diagram to show how hypermetropia is corrected. The near point of a hypermetropic eye is 1 m. What is the power of the lens required to correct this defect? Assume that the near point of the normal eye is 25 cm. (Ch.10)

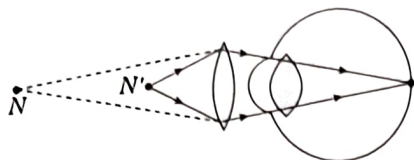
- Ans.** Near point of a normal eye is at 25 cm from eye. But for a hypermetropic eye, near point is farther away from it, say at point N , as shown in fig. (a), given below.



(a) Near point of a Hypermetropic eye



(b) Hypermetropic eye



(c) Correction for Hypermetropic eye

N = Near point of a hypermetropic eye.

N' = Near point of a normal eye.

► In a hypermetropic eye, image of nearby object is formed behind the retina, as shown in fig. (b) Since image is not formed on the retina, nearby object is not seen clearly by such eye.

► This defect can be corrected by using a convex lens of suitable power, as shown in figure (c), where the image is brought back on the retina, to see the nearby object clearly. Now, the new near point is at N' (at 25 cm) which is closer to eye.

► In the present case, near point a given eye is to be shifted from 1m to 25 cm (near point of a normal eye.)

► Hence, for given eye, $u = -25 \text{ cm} = -0.25 \text{ m}$
 $v = -100 \text{ cm} = -1 \text{ m}$

► According to lens formula,

$$P = \frac{1}{f} = \frac{1}{v} - \frac{1}{u} = \frac{1}{-1} - \frac{1}{-0.25}$$

$$= \frac{1}{0.25} - 1$$

$$= 4 - 1$$

$$= 3 \text{ m}^{-1}$$

$\therefore P = 3 \text{ D}$

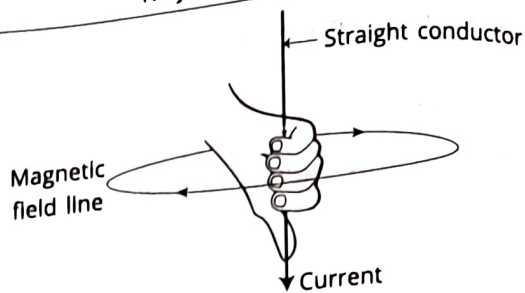
⇒ Convex lens of power 3 D should be used to correct given hypermetropic eye.

(53) (1) Mention in brief about "Right Hand Thumb Rule"

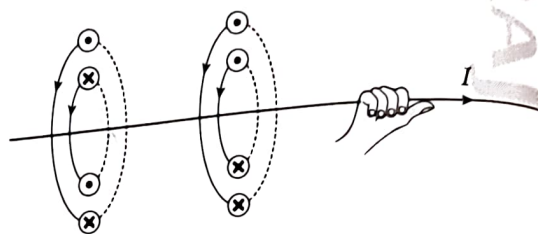
(2) Explain in brief about Fleming's left hand rule.

(Ch.12)

Ans. (1) "Right Hand Thumb Rule" is used to find how magnetic field lines encircle around current carrying straight conducting wire.



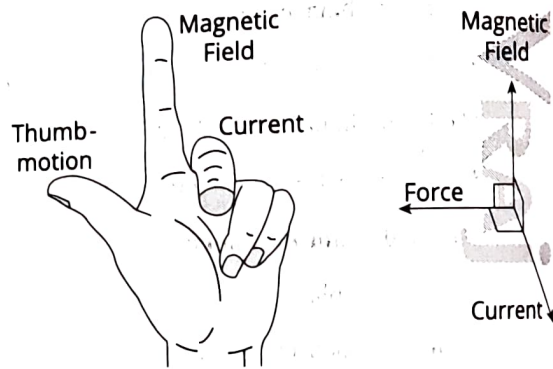
(Figure 1)



(Figure 2)

► **Right Hand Thumb Rule** : Just imagine that you are holding a current carrying straight conducting wire with the help of your right hand palm such that thumb points in the direction of current. The circular magnetic field lines take the turn around the wire in the same manner as the fingers take the turn around the wire.

(2) Fleming's left hand rule is used to find direction of magnetic force acting on a current carrying straight conductor, when placed perpendicular to external magnetic field.



Fleming's left-hand rule

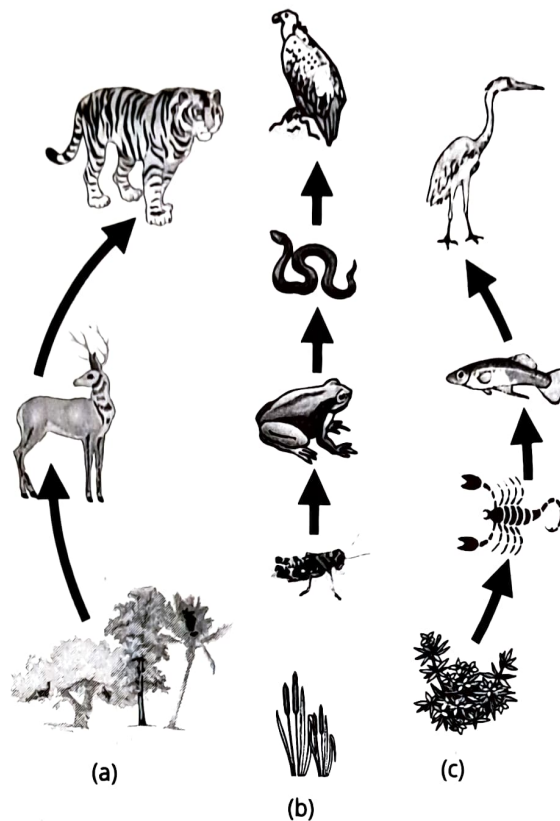
► As shown above, stretch left hand palm such that first finger (forefinger), second finger (middle finger) and thumb remain mutually perpendicular. At this time, if first finger points in the direction of magnetic field and second finger points in the direction of electric current then the thumb indicates direction of magnetic force acting on current carrying straight wire.

(54) Describe : Various food chains.

(Ch.13)

Ans. ➤ Various organisms feed on one another. This series of organisms taking part at various biotic levels form a food chain.

➤ Three different food chains are mentioned in the following diagram.



Food chain in nature (a) in forest, (b) in grassland and (c) in a pond

(Note : It is not necessary to draw diagram)

(1) Food chain in forest :

➤ Plants → herbivores → Carnivores → Top Carnivores

(2) Food chain in grassland :

➤ Grass → Insects → Frogs → reptiles → Birds

(3) Food chain in a pond :

➤ Aquatic plants → Scorpion → Fishes → Birds like herons

(Note : In food chain, scorpions are generally found on land (Ground-feeding animals). Example of crabs are more suitable than scorpions.)

➤ Each step of the food chain constitutes a nutrient level (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. The herbivores or the primary consumers come at the second trophic level small carnivores or the secondary consumers at the third and larger carnivores or the tertiary consumers form the fourth trophic level.

□□□